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MERCADOS LIBRES Y CAPITALISMO

Hacia una teoría general del capital

FREE MARKETS AND CAPITALISM

Towards a general theory of capital

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Introduction.

This is a heterodox work with orthodox foundations.

From the epistemological perspective it assumes seriously the contributions of Karl Popper and Imre Lakatos,[i] which in the current "orthodoxy" have become a glorified form of statistics—what Mark Blaug[ii] called an innocuous form of verificationism, something light years away from Popper's principles.[iii] In my interpretation of Lakatos, the Methodology of Scientific Research Programmes, can be used as a critical tool for theory building, not only as a tool for historical research. To do so a critico/rational reconstruction of the theories subject to inquiry is a necessary initial step. Certainly this starting point, if we are interested in the development of the theory, should not be an historical assignment, but should be a logico/systematic exercise. The goal should be to uncover the 'hard core' of the discipline, and if and when possible, to reconstruct such theoretical system. I have found that in economics such a systematic hard core is present in the works of classical economics and have found a remarkable continuity in its development. Solid foundations have been laid down.

Thus we argue for a research programme based on a rational reconstruction of the theoretical system of classical political economy. At the hard core of the classical grand vision we find the problems of the long term development of modern capitalist economies, closely related to the issues of the distribution of wealth and its impact on the dynamics of the system. From a contemporary perspective, we are talking about the analysis of the conditions for the long-term sustainability of alternative social modes of organization for the creation and the distribution of wealth. The understanding of these issues requires the solution of the problem of value—the formation of relative prices—the determination of income and its distribution. A theory of competitive markets where the relative prices of commodities—its value—are determined jointly with incomes, is at the hard core of the classical system. I will argue that classical

political economy constitutes a relatively well developed science with a common domain: the generation and the distribution of wealth; with a short and a long-run consideration; and with a relatively complete shared theoretical system founded on the determination of value in a competitive setting. The dynamics of the system are centred on the profitability of capital. The main divide I find in two alternative explanations regarding the system's dynamics that revolve around two different perspectives on profits. These, I identify as the Smithian, profits as a cost, and the Ricardian, profits as a residual, perspectives. Within both, capital is conceived as a physical entity comprising the commodities used to produce commodities. In the Smithian vision the cost of capital is a price; in the Ricardian, the rate of profit is a measure of profitability.

For the classics in one way or another capital, the profit rate, money and the interest rate, were fundamental variables that required theoretical elucidation. Today we are not closer to agreements in this area, than we were a hundred or more years ago; most likely the confusion has increased. Nevertheless, perhaps the time has come for integration.

Ultimately my interest in epistemology and economic theory is practical: the need to understand the world we live in so we can do something about it. The stability or instability of modern capitalist economies, financial crises, the problems of growth and poverty, the likelihood of major environmental catastrophes that will require radical changes in the way we allocate resources, the so-called new architecture of the world's financial system. Are in my view some of the central problems that need a radical re-thinking, to come up with new answers and policies. I believe that this process should start from the foundations of our knowledge. The XXth Century saw many theoretical and economic policy controversies: Keynes and Keynesians, neo classical, monetarists, Marxists, post-Keynesians, New Classical, etc., etc; many revolved around the theoretical questions concerning the interactions of real and financial markets, real world implications and economic policy alternatives. In particular, after intense debates

in the 1970s the issue of the integration of monetary theory to general equilibrium value theory was left dangling, and with it the scientific foundations of monetary and financial policies. I have concluded that the necessary integration of value and monetary theory passes through a theory of capital; as a category distinct from the commodities used in production. With regards to this last, the recent contributions of the so-called revolution in finance may prove fundamental: the value of capital does not come from the past but from the future. However, another antique and quite underground approach must also be rescued: capital is not a thing but a social relationship. Capital is an institution, it is an entitlement. This consideration implies that capital is not a scarce productive resource. This, as well, implies that the financial system cannot be seen as the locus where a scarce resource named capital is allocated to competing uses. Nevertheless, capital represents acquisition power, it is traded and its value may play a significant role in the dynamics of the system.

The purpose of this essay is to contribute to the development of a general theory of the economics of capitalism, by supplementing the classical theory of value in free markets with a theory of capital, which will permit us to study, in an integrated manner, the workings of real, financial and monetary markets, with a short and a long term perspective. It is considered that capitalism as a social reality is essentially different than the pure free market economies portrayed in the standard teachings of modern economies.

The theoretical proposal advanced in this essay integrates Say's Law and the workings of competitive markets in a wider framework that admits a continuum of temporary general equilibrium positions, where the Smithian ideal end point is just one of them. Such a general equilibrium approach would require initially the adoption of the two classical equilibrium conditions, in the short and in the long term: Say's/Walras' Law—the market clearing principle—and, in the long term only: prices equal costs. Equilibrium in capital markets is considered through the third classic general equilibrium short term condition: the returns on

capital are equalized. Certainly, these three classical equilibrium conditions are a rational reconstruction or reformulation of similar concepts present at the hard core of classical economics together with the workings of competitive markets.

In this work we will consider profits as a residual value determined in real terms and as a temporary general equilibrium phenomenon, in the long term when prices equal costs residual profits will disappear. We define capital as the property right over future residual profits, a property right that is valuable and that is traded in markets. To study the problem of the determination of the value of capital and its variations, we need to find a way to determine the economy's general rate of profit as the appropriate rate to determine the value of capital. To study the dynamics of the value of capital, we need to establish the way the profit rate interacts with the interest rate as determined by real and monetary forces. As well, we need to scrutinize the dominant capital pricing paradigms and to consider the issue of the structure of capital.

A true contemporary 'classical' approach would also integrate fully the monetary and financial forces at play, and develop a consistent theory of the interest rate as a completely different phenomenon from the profit rate. Such an integrated system—a classical hard core supplemented with an heterodox theory of capital and the nominal interest rate—should be able to summarize in terms of an aggregate demand and supply analysis, the short term determination of income and the interest rate, while considering the impact of capital effects. Ultimately, we may be able to advance the understanding of when and how the dynamics of capital may affect the short and long-term dynamics of the economic system, particularly cycles and financial crises, through variations in the value of capital and hence through changes in the value and distribution of wealth that may impact aggregate effective demand.

The alternative scientific research programme that may stem from this work would concentrate on the core problems of the classical theoretical system

that are still relevant for contemporary economics, and in the study of the complex dynamic processes, whereby real world economies, converge or not, either in a stable or in an unstable manner, towards a long term equilibrium, where the optimal results of free markets, as different from capitalism, can be realized. A ‘classical’ study of these processes would concentrate the analysis on the generation of profits, the profitability of capital and on its long-term trend. A true contemporary ‘classical’ approach to the study of modern capitalist economies would also integrate fully the monetary and financial forces at play, recognizing that financial forces can have real effects and that these can be negative, severe and long lasting. The problem is to understand the conditions where significant instabilities in modern capitalist economies can emerge endogenously so that they can be avoided. Also we want to understand the real workings of the monetary and financial systems so we can identify the conditions where they can contribute their best to the long term development of our economies and to the social and environmental sustainability of the global community.

Back to epistemology: If the hard core of a scientific discipline can be expressed in a succinct system, we may be able to use it as a tool for evaluating alternative theories and eventually for theory building. I find silly those pseudo-methodological postures that believe that in science everything goes, or that argue that a particular discipline should be completely cleansed from some particular perspective, say neoclassical economics, so the real truth can be somehow uncovered. Certainly, the plurality of approaches is the sine qua non condition for democratic life. In Lakatos vision, regressive scientific research programmes would eventually wither and die. Let them die in dignity, even if they proved to be wrong they cannot be seen as barren, the engine of knowledge thrives on the dialectics of opposing ideas and synthesis includes both sides. It does not matter if one side is in the negative. However, in science we should be able to identify in the growing tree of knowledge those dry, redundant branches that cannot bear fruit anymore. Many times an unwelcome task, given the

entrenched—emotionally and otherwise—vested interests that live off such branches. Epistemology or a solid methodology of science should assist scientists in carrying out this task.

As Lakatos expressed it, the first step in a serious critique of a scientific theory is to reconstruct and to improve its logical and deductive articulation; a rational critique does not assume the existence of a fully articulated deductive structure, a rational critique creates it. Lakatos saw clearly that it was impossible to understand the evolution of science or to have a totally descriptive historiography of science, without a philosophy of science. That is, a history of science free of methodological considerations. Lakatos as well understood that a pure philosophy of science, that is an a-historical, purely prescriptive methodology of science, was also impossible. This vicious circle can be expressed paraphrasing Popper: those who want to tell it like it is; will end telling it as it should be. Lakatos took as his maxim a paraphrase of one of Kant's dicta: "Philosophy of science without history of science is empty; history of science without philosophy of science is blind" and tried to develop Popper's contributions into a "critical tool of historical research."

Popper dealt fundamentally with the question of determining a criterion for what is and what is not science, he advanced the falsifiability principle as an answer.[iv] Lakatos explored a criterion for evaluating the growth of knowledge; he advanced the idea of the new facts, or of the unpredicted predictions that could widen the empirical content of a theory, increasing its predictive and explanatory powers. Unfortunately, Lakatos did not live long enough to fully develop his ideas, and what could have been a solid criterion for the growth of knowledge: the idea of the new facts became in the process of demotion of epistemology to statistics, a nickname for out of sample observations.

In some quarters it has become fashionable to argue that there cannot be an epistemology[v], among other things because closed systems are irremediably

flawed. An usual suspect pointed out in the field is general equilibrium economics as the paradigm of closed systems. A litany of well known complaints usually follows most around the unrealistic assumptions of the construct. What I find flawed is the idea of closed versus open systems. All systems are open, closure is always a methodological decision and as such, preliminary and to some extent arbitrary. The closure decision may be explicit or implicit, some may believe that closed systems do exist, but that is another story. Gödel[vi] showed that a single logical system was not enough to provide a foundation even for the arithmetic system, all consistent axiomatic formulations of number theory include undecidable propositions. Gödel demonstrated that every logical system is incomplete, and just as it is impossible to lift yourself up by your own bootstraps, it is impossible to justify your methods of reasoning on the basis of those same methods.

The previous ideas are relevant for the issue of the growth of knowledge: If we have say, ***s*** , number of alternative theoretical systems each one comprising at least a theory or a number of them, t_s , then we have, $t = t_s\, s$ theories, each one purportedly explaining a particular fact, f_i , where $i = 1$ to ∞ of course we may have many theories explaining the same fact or variation of it. From Gödel, then we have at least, ***s*** , undecidable propositions, ***d = s***. We can see these last as the measure of our ignorance. We can never know how much we know because what is there to know is infinite. Nevertheless we might be able to reduce our ignorance.

Let a hundred flowers bloom; let a hundred schools of thought contend. Then we will have ***s = 100 ; t = 100 ; f = 100 ; d = 100*** **.** Two hundred schools of thought each with a theory, ***s = t = 200*** **;** will increase our ignorance now ***d = 200*** , and quite possible will increase our confusion. Because if, ***f = 100*** now we have at least two theories per fact! Or double the facts, if scholars disagree on the *what* is to be explained. By contrast, if the different theories are integrated in systems: say now we have 25 theories per system, then we ***s = 4*** and thus

d = 4. In this simple case, note that systemic integration has made at least one theory per system redundant, so we are explaining the same facts with less knowledge (now ***t = 96*** *not* ***100****)* so to speak. Not to mention that through the integration of theories in systems we may find that previously separated facts are really parts of the same different fact, or that the randomness of some observations was apparent, and so on. All in all, our ignorance has been significantly reduced.

The parallel with Popper's principle should be evident: we cannot prove the validity of a theory, but we can certainly prove that a theory is not valid. Here we can say, we may not know if our knowledge has grown, but we can know if our ignorance, and/or confusion are less. The more systematized our knowledge is the more facts we will be able to explain without increasing our confusion. Knowledge grows not because we know more, we have no way of ascertaining this, but because we can explain more facts with less undecidables, or simply with less confusion. The growth of knowledge consists in the reduction of ignorance. And the only way we can achieve this is through the integration of particular theories into consistent logical systems. We need to be able to explain more with less. The empirical content of our theories, as Lakatos expressed, should expand. If an addition to a theoretical system permits us to explain previously unexplained facts or observations with the same—now expanded—logical apparatus, or if the amended system predicts 'new' facts or observations, we are advancing our knowledge.[vii]

More often than not, observations that cannot be explained by a particular theory or system are attributed to random causes that are external to the system. A particularly strong criterion to judge the power of an expanded theoretical system could be for example, if it is able to identify the particular mechanism(s) of intrinsic randomness generation, that can account for the system's apparent randomness.[viii] If such mechanism(s) can be clearly defined, we should expect repeatability and hence predictability, randomness of results becomes apparent.

Even though it should be recognized that the complete elimination of randomness that is introduced from the environment is impossible, the identification of the precise mechanisms at work that account for most or all of the apparent randomness in the system, will significantly reduce the presence of true randomness and hence increase the predictability of the system.

The Lakatosian inspired rational reconstruction presented in this work, has tried to re-create the deductive structure at the hard core of the scientific research programme, SRP, of classical political economy. I have used this rational reconstruction as a tool for the critical analysis of some of the most relevant contemporary currents of economic thought, and mainly to develop theoretical alternatives to help explain the aggregate dynamics of modern capitalist economies. In other words, I have used epistemology not only as a "critical tool of historical research" but also as a *"critical tool of scientific research."* I have proposed and tried to illustrate as well, a strict demarcation criterion for the growth of knowledge: only integrated theories that explain more with less and that provide us with the intrinsic mechanisms that reduce the apparent randomness of the system we are studying, will moderate our ignorance about it.

Gödel's contributions play a central role in this methodological approach: if all systems are by definition incomplete and only integrated theories advance knowledge—reduce ignorance—then the opening/closure methodological decision(s) pertaining a particular system become(s) fundamental. What are exactly the variables that correspond to another system? In other words: which are those variables that cannot be explained within the initial system but, nevertheless, play an essential role in its dynamics. And how can we integrate systems in an essential form? We should look for variables and linkages that expand the emprical content of our theories and reduce the apparent randonmess of our system(s). To express these ideas in another, colloquial way, the doors that close a system, may also be the doors that open another. If such a

connection is correct—if the linkage is essential in terms of the behavior of the system(s)—then both systems merge into one. Hopefully, a more powerful theoretical system in terms of its explanatory and predictive capacity.

It should be apparent that the structure and the purpose of this work require the revision of a wide variety of authors and schools of thought. Clearly I had to chose what to include and what not to include, which I did assuming all the responsibility. I tried to include only those authors and schools directly relevant to my study and to limit my analysis to the minimum necessary, without any presumption of dealing exhaustively with their contributions. A rational reconstruction is essentially deductive, inductive details were mostly sidestepped, I aimed for equilibrium and completeness given my purposes, personal inclinations and limitations.

I was immensely fortunate to have throughout this work the help and permanent support of Dr. Guadalupe Mantey my main tutor, and also of Dr. Martin Puchet Anyul, Dr. Etelberto Ortiz Cruz, Dr. Fernando A. Noriega Ureña, Dr. Carlos Rozo B., Dr. Alfredo Sánchez Daza. For all these very distinguished scholars my gratitude and personal consideration. In the end I am completely to blame for the errs and, if there are any hits, they should be seen as the result of an intense debate and collaboration among those involved in this effort particularly, Dr. Guadalupe Mantey.

The structure of this work follows the previous methodological and theoretical reasoning; all in all a theoretical integration of the workings of the real, capital and monetary markets is offered within an integrated general equilibrium framework of classical inspiration and some suggestions are offered to develop future research.

The first chapter presents an initial rational reconstruction à la Lakatos of the theoretical system of classical political economy, identifying what can be seen

as its hard core and its main shortcomings. The central problems are the determination of value and distribution, and the dynamics of the long term development of modern economies. The nature and determination of profits emerges as the fundamental question, inextricably linked to capital and to the profitability of capital.

In chapter two the problem of the nature and determination of profits is considered. The Smithian vision of profits as a cost is rejected. We seek to determine profits conceived, in a Ricardian spirit, as a residual of value but doing so under general equilibrium conditions. It is considered that the problem of profits should be solved at the most general level of abstraction without relying on special cases or particular hypotheses. Uncertainty, imperfect competition and information, rationality limits, among other equally important real world phenomena, are not considered at this initial state of the analysis.

I will argue that modern general equilibrium analysis in the way its has been developed by the seminal contributions of Arrow and Debreu, among others, inspired in the original Smithian vision of competitive markets and the contributions of Walras, admits the consideration of profits as a residual without changes in its fundamental logical structure. By solving in a definitive manner the classical theoretical problem of the determination of the value of commodities, Arrow and Debreu, have also provided us with a framework to solve the problem of profits as a residual of value. Once all the prices of commodities are determined, profits are determined. In the competitive equilibrium profits can be positive, or, equal to zero. I will make a case for the reinterpretation of positive profits as a residual of value, within the same logical structure of Arrow and Debreu. The introduction of real time in Arrow and Debreu, A&D, implies the restoration of the ancient classical distinction between the short and the long terms, as well as the second Walrasian, and other classics, long term equilibrium condition: prices equal costs/profits equal zero. Once real time, against the

compressed meta-time of A&D, is considered, positive profits are reinterpreted as a temporary residual of value that can emerge in general equilibrium conditions.

The consideration of profits as a residual raises the question of the nature of capital, which is the main issue we deal with in the following chapter.

In chapter three we define a modern capitalist economy as: an essentially monetary economy, where the maximization of the value of capital is a force as decisive as the maximization of utility and profits by consumers and firms, if not the dominant force of the economy. The explanation of the dynamics of such an economy requires that the problems of capital and the returns on capital, money and the interest rate are solved in a consistent way with value theory within a general equilibrium perspective. Capital is considered as a property right, as an entitlement, over residual profits, not in physical terms. Capital is not reducible to finance or to money, and the interest rate is seen as essentially different from the profit rate. In this work we argue that profits as a residual of value, capital and money are inextricably linked at the core of the workings of a capitalist economy. The main objective of chapter three is the analysis of capital and the profit rate.

Profits are determined in a general equilibrium where markets clear but prices differ from costs, profits emerge as a net addition to the acquisition power of the community, over and above the value of the commodities employed in production. The value of capital is determined by the value of future residual profits discounted at the appropriate rate. Capital is not money, but the possibility of turning capital into money and vice versa, can be considered as one of the main forces that ultimately cause the effects and disturbances, associated with the non-neutrality of finance and money. The consideration of both classical equilibrium conditions, markets clear and prices equal costs has the corollary that equilibrium with positive profits is by necessity a temporary equilibrium. We need to consider the continuous equilibrium of a modern economy where profits are continuously changing and so is the value of capital. Real time needs to be

considered. In this respect we follow the Walras/Marshall/Lindahl/Hicks intuition expressed in the idea of a general temporary equilibrium, nevertheless a reformulation is proposed. Modern general equilibrium analysis has developed its own perspective within the literature of sequence economies dealing with financial assets including money as one of them. A brief review and critique of this very important approach is presented.

We argue that the respective pricing mechanisms of commodities and of capital as a property right, as an entitlement, are essentially different. By considering profits as a temporary residual of value that is logically determined by the prices of all commodities, we have a base to determine the overall rate of profits of the economy and, hence, the value of capital as a trade able property right. This definition permits us to distinguish between two essentially different types of financial assets, first those whose value is directly associated to a particular commodity or a bundle of commodities, for example, a futures contract or an A&D state-contingent contract, and those whose value depends on residual profits. Only these last can be considered as capital, we distinguish two basic types of capital assets: equity and debt. We consider that the question of the existence or not of complete markets can be simplified this way: only those markets that deal with a particular asset, a service, linked directly to commodities need to be independent markets indistinguishable from goods markets; for capital we will need only one market. By doing so we can derive a rationale for a single capital market, where the returns on capital can be equalized, as the classics postulated.

To explain the equalization of the returns on capital, we adopt the principles of the no existence of arbitrage and the law of one price in financial assets markets, we argue as well for the irrelevance of the market clearing principle with regards to capital markets. To solve the problem of the value of capital as the present discounted value of future profits, it is necessary to determine the appropriate discount rate. We postulate that this rate is the overall

rate of return of the economy as determined by the prices of all commodities in general equilibrium. All in all a very significant simplification of the problem of the existence of complete markets is achieved. We conclude chapter three by introducing the problem of the structure of capital and by considering how the existence of capital and the interest rate as different from the profit rate, may cause a breakdown of Say's Law of Markets. Changes in the value of capital, capital effects, may affect the distribution of wealth and under some circumstances the overall level of wealth, with potential consequences in the demand for money and in the aggregate level of demand. That is, in the level of *effective* demand.

As long as shares of capital, that is equity, are the only form of property rights over residual profits that is considered, the existence of different rates of return at the firm level that causes the existence of capital gains (or loses) will only generate distributional effects among share holders that will cancel out at the aggregate level. Capital effects, changes in the value of shares that may enter in the budget constraints of consumers, for the economy as a whole will be zero. Under these circumstances Say's or Walras' Law is irrevocably valid. Nevertheless, once we introduce the interest rate, as a remuneration of debt, capital effects, changes in the overall value of capital either positive or negative, will emerge. Say's or Walras' Law, becomes a special case of macroeconomic equilibrium: the case where the economy's profit rate and the interest rate are equal. Other than in this particular case, Say's or Walras' Law is not irrevocably valid.

The task of chapter four is the study of the structure of capital or the financial structure of the economy to use a more common expression. Nowadays, the standard view within academic economists is that the capital or financial structure does not matter. A postulate enshrined in the so called, Modigliani—Miller—Barro—Ricardo theorem, which is an extension of Say's law of markets, or Walras' law, or the market clearing principle, to the world of

finance. We will argue that the financial structure matters, and that sometimes it does matter a lot. In contradistinction with previous chapters where the adopted perspective stems from the real side of the economy, in this chapter we will approach the problem from the perspective of modern financial economics. The proposed integration of both perspectives runs from the determination of profits and the rate of profit in the commodities markets, to the determination of the value of capital and the interest rate in capital and money markets.

In the previous chapter, we argued that capital, may emerge as a net financial asset of the community; as an asset with a value that may have a net effect on the level of aggregate effective demand. This capital effect, at the highest level of abstraction, depends on the existence of different forms of claims, of property rights, over residual profits. It depends on the existence of debt remunerated with interest, of shares remunerated with residual profits after debt service, and on the differences between the profit rate and the interest rate. Hence the consideration of the structure of capital, that is of the distribution of property rights over cash flows, in the most basic distinction between equity and debt as different forms of capital, is indispensable.

In a modern capitalist economy, capital is, of course, a very important component of wealth. Within this framework, contrary to the classical assumption that considers wealth and its distribution as a given, the generation and the distribution of wealth become variables at the core of movements between temporary general equilibrium positions. The distribution of wealth stops being an a priori given. Once we introduce different forms of claims on profits, the aggregate value of capital may change. The total level of wealth is not a constant anymore. The variations of the value of capital are considered as a case of *apparent randomness*, which our analytical framework explains. So at the core of the workings of a modern capitalist economy are the variations of wealth and its distribution.

From the financial economist's perspective we have seen in the last several decades a “revolution”; at its core there is a change in the theory of the valuation of capital, whereby the value of capital is determined by the net present value of future profits. Nevertheless, within the dominant financial perspective, quite frequently the two central variables of finance, the market rate of return—the general rate of profit—and the interest rate, are considered either as given independent variables determined outside of their system, or determined by special theories. In this chapter the main approaches to capital asset pricing are reviewed and criticized. A reformulation of the Miller and Modigliani framework is advanced, demonstrating that the capital structure of the economy matters. Also an alternative analysis to determine systemic risk is proposed. We end the chapter with a series of numerical examples to illustrate the emergence of capital effects and the determination of systemic risk, that is the variability of the returns on capital.

The emergence of capital effects and variations in systemic risk with potentially explosive destabilizing consequences, are directly related to the introduction of different forms of capital and the interest rate. This makes the analysis of money and the interest rate indispensable.

Chapter five stems from Schumpeter’s distinction between two major analytical traditions in economics: Real Analysis and Monetary Analysis. In this chapter, having developed an alternative theory of capital, a synthesis of both perspectives is attempted. Money as a simple unit of account, as a numèraire, a transactions device, does not matter, it is neutral. The main problem is to identify the conditions under which money is not neutral. The theoretical challenge is to find a rationale for the demand for money, under conditions of perfect information and zero transactions costs, and without relying on ad hoc hypotheses. By doing so, we may be able to develop an integrated theory of the nominal interest rate, where the central bank and monetary policy play a central function. We will

advance the inquiry about the potential role of monetary policies with regards of the stability of the system.

The emergence of capital as a net financial asset may impact directly on the level and the distribution of wealth, but also on the level of systemic risk. For the changes in the value and in the distribution of capital to have real effects they need to impinge on *effective demand*. They need to affect the spending decisions of consumers and firms. In other words, changes in the value of capital need to be translated into changes in the consumption and investment decisions of agents. If they don't, they will be neutral, and changes in the value of capital will only be virtual.

For capital to be spent it needs to become money. We will argue that this is the essential link between capital and money, which can provide us with a solid rationale for the demand for money. Money is demanded to make effective the acquisition power of capital, money is available acquisition power; following on Marshall we postulate that agents demand money in proportion of their capital.

The interest rate plays a key role in the emergence of capital effects, and the demand for money may impact the nominal interest rate, which may trigger real effects. We argue that the demand for money associated to capital is a fundamentally important part of monetary demand, a crucial part through which monetary disturbances operate, and, where monetary policy must have its effects.[ix]

Within the framework we have presented we will develop an alternative perspective on the determination of the interest rate as a variable essentially different from the profit rate, in a world where by necessity the central bank plays a crucial role and where the supply of money is mostly endogenous.

In chapter six I will assemble the theoretical alternatives developed in previous chapters, regarding profits, capital, the rate of profits, the capital or financial structure, money and interest, in an integrated fashion.

The purpose is to present the rudiments of a general theory of the economics of capitalism. A theory that can help us explain the dynamics of modern capitalist economies, through the understanding of the day to day, or short term, interaction of the different spheres of economic life: the *real* or commodities' markets, the capital and financial markets, and the monetary market; as well as the consequences of these interactions in the long term dynamics of the economy.

While the analysis in the previous chapters has been carried out in a vertical fashion, so to speak, here the analysis assumes a more horizontal approach stressing the integration of the results previously achieved. The main goal is to explore some uncharted territory and to identify a potentially fructiferous future research agenda. A quite crude and preliminary attempt at a macroeconomic synthesis is presented in terms of an aggregate supply and demand analysis that stems from the more detailed and nuanced work developed throughout this work.

The end of chapter six brings up one of the underlying issues—a more sociological and political one—throughout this work, Free Markets and Capitalism, the first more an ideal theoretical world the second more of a 'really existing' social reality.

All in all we hope to stimulate the debate by advancing some new alternative theoretical foundations to rethink and eventually to reform the existing monetary and financial systems, reducing and/or eliminating the sources of potential instabilities generated by capital while harnessing its positive powers to

promote growth and development, and to deal with the potentially catastrophic environmental challenges we are facing today. If capital is not a scarce resource, then we should concentrate in the betterment and conservation of human and natural capital, of labor and land, as the ancient economists would see it.

Finance should deal with the best ways to protect the property rights of those involved in economic activity without hindering it. If something can be done technically and there are human and natural resources available—think about stopping global warming—capital or the availability of financial resources, should not be the limiting factor.

We expect that the theoretical contributions and suggestions put forward here may help to better the world we live in, by reducing the ignorance and confusion that surround it.

Victor M. Castorena Davis

Loreto, Baja California Sur, 25 de agosto del 2007.

Notes to Introduction.

[i] Karl R. Popper, “The Logic of Scientific Discovery” 1965. Imre Lakatos, “The Methodology of Scientific Research Programmes.” 1983.

[ii] Mark Blaug, “Economic Theory in Retrospect.” 1978. Also, “The Methodology of Economics” Or how economists explain. 1997.

[iii] In “**Science, Pseudo-Science, and Falsifiability.”** 1962. Karl Popper wrote: “These considerations led me in the winter of 1919–20 to conclusions which I may now reformulate as follows.

1. It is easy to obtain confirmations, or verifications, for nearly every theory—if we look for confirmations.
2. Confirmations should count only if they are the result of *risky predictions*; that is to say, if, unenlightened by the theory in question, we should have expected an event which was incompatible with the theory—an event which would have refuted the theory.
3. Every "good" scientific theory is a prohibition: it forbids certain things to happen. The more a theory forbids, the better it is.
4. A theory which is not refutable by any conceivable event is non-scientific. Irrefutability is not a virtue of a theory (as people often think) but a vice.
5. Every genuine *test* of a theory is an attempt to falsify it, or to refute it. Testability is falsifiability; but there are degrees of testability; some theories are more testable, more exposed to refutation than others; they take, as it were, greater risks.
6. Confirming evidence should not count *except when it is the result of a genuine test of the theory*; and this means that it can be presented as a serious but unsuccessful attempt to falsify the theory. (I now speak in such cases of "corroborating evidence.")
7. Some genuinely testable theories, when found to be false, are still upheld by their admirers—for example by introducing *ad hoc* some auxiliary assumption, or by re-interpreting the theory *ad hoc* in such a way that it escapes refutation. Such a procedure is always possible, but it rescues the theory from refutation only at the price of destroying, or at least lowering, its scientific status. (I later described such a rescuing operation as a *"conventionalist twist"* or a *"conventionalist stratagem."*)”

[iv] “Thus the problem which I tried to solve by proposing the criterion of falsifiability was neither a problem of meaningfulness or significance, nor a problem of truth or acceptability. It was the problem of drawing a line (as well as this can be done) between the statements, or systems of statements, of the empirical sciences, and all other statements—whether they are of a religious or of a metaphysical character, or simply pseudo-scientific. Years later—it must have been in 1928 or 1929—I called this first problem of mine the "*problem of demarcation*." The criterion of falsifiability is a solution to this problem of demarcation, for it says that statements or systems of statements, in order to be ranked as scientific, must be capable of conflicting with possible, or conceivable, observations.” Karl, Popper, 1962.

[v] A fundamental criticism of Popper that underlines the Lakatosian proposal is the rejection of the positivist distinction between the “the context of discovery” and “the context of justification.” This criticism is shared by Kuhn’s sociopsychological theory in “The Structure of Scientific Revolutions” that introduced the hyper used and abused concept of scientific paradigms, as well as by the writers that advocate some kind of methodological pluralism if not open anarchism as the only valid method(s) to develop science, if anything at all. Among this, The most famous, but if not, by far the most interesting and entertaining is Paul Feyerabend “Against Method. Outline of an Anarchistic Theory of Knowledge.” London N.L.B. 1975. Also, Polanyi, Michael. “Personal Knowledge. Towards a Post-Critical Phylosophy.” 1958. London: Routlege & Kegan Paul. Speaking about the explosion of methodological pluralists, Paul Feyerabend in “How to Defend Society against Science” wrote *"Kuhn's ideas are interesting but, alas, they are much too vague to give rise to anything but lots of hot air. Never before has the literature on the philosophy of science been invaded by so many creeps and incompetents. Kuhn encourages people who have no idea why a stone falls to the ground to talk with assurance about the scientific method. Now, I have no objection to incompetence, but I do object when incompetence is accompanied by boredom and self-righteousness."* Unanimmity ends here: there cannot be a pure ahistorical philosophy of science, and science cannot be fully understood without its context. At the very least the recognition of the reality of science as a social collective enterprise, where it is agreed that “scientific theories must be assessable in terms of observations that are at least in principle available to all observers” (Blaug, M. 1997. p. 38.) necessarily introduces an evolutionary, historical, dimension in the philosophy of science.

[vi] For non mathematicians see for example: Nagel, Ernest and Newman, James R. “Gödel’s Proof” New York University Press 1958. And the well known classic Hofstadter, Douglas R. “Gödel, Escher, Bach: An eternal golden braid. Vintage Books Random House New York. 1979 and Sept. 1980.

[vii] Certainly, ad hoc hypotheses and other *"conventionalist stratagems"* cannot be considered as true expansions of a theoretical system. They are more like *patches*, to use a term from the software industry.

[viii] See section 4.3 for my proposal regarding apparent randomness in capital markets.

[ix] Among the early modern contributions that I find most interesting along this line of reasoning is James Tobin’s “Monetary Policy and The Economy: The Transmission Mechanism” Southern Economic Journal, Vol. 44, No. 3, January (1978).

FREE MARKETS AND CAPITALISM

Towards a general theory of capital

Victor M. Castorena Davis

ABSTRACT

The purpose of this essay is to advance the development of a theory of the economics of capitalism, by supplementing the classical theory of free markets with a theory of capital as the property right over residual profits, which will permit us to study in an integrated manner the workings of real, financial and monetary markets. At the core of the dynamics of modern

economies are the variations in the value of wealth and its distribution, capital is one of the most important components of wealth. Profits are considered as a residual value determined in real terms as a temporary general equilibrium phenomenon. To determine the value of capital and its variations, we determined the economy's general rate of profit, as the appropriate rate to value capital. To study the dynamics of the value of capital, we established the way the profit rate interacts with the interest rate. As well, we scrutinized the dominant capital pricing paradigms to consider the issue of the structure of capital. The variations in the value of capital have distributional and aggregate consequences and the financial structure matters. The variations in the value of capital are a case of apparent randomness, an explanatory intrinsic mechanism is offered. Potential sources of instability are identified, however if capital is an institution, it can be reformed and its powers harnessed to promote the common good. A true contemporary 'classical' approach needs to integrate fully the monetary and financial forces at play, an essential explanation for the demand for money linked to the value of capital is offered, and a consistent theory of the interest rate as a completely different phenomenon from the profit rate is presented. We advance the understanding of when and how the dynamics of capital may affect the short and long-term dynamics of the economic system, particularly cycles and financial crises, through variations in the value of capital and hence through changes in the value and distribution of wealth. The proposed research agenda includes micro and macro economic problems, for example: the structure of capital should be explained; we should be able to summarize in terms of an aggregate demand and supply analysis, the short term determination of income and the interest rate, considering the impact of capital effects; and we should analyze the complex dynamic processes, whereby real world economies, converge or not, either in a stable or in an unstable manner, towards a long term equilibrium, where the optimal results of free markets, as different from capitalism, can be realized. The role of monetary and financial policies is considered and an active policy is recommended. From the epistemological perspective the Popper/Lakatos framework is adopted, a demarcation criterion for the growth of knowledge is proposed and applied in the structure and content of this work: only integrated theories reduce our ignorance and powerful theories explain apparent randomness.

Chapter 1. A Classical Research Programme for Political Economy.

Introduction.-

In this chapter a rational reconstruction à la Lakatos of the theoretical system of classical political economy is attempted. At the core of the classical grand vision we find the problems of the long term development of modern capitalist economies, closely related the problems of the distribution of wealth and its impact on the dynamics of the system. From a contemporary perspective, we are talking about the analysis of the conditions for the long-term sustainability of alternative social modes of organization for the creation and the distribution of wealth. The understanding of these issues requires the solution of the problem of value and the determination of income. At the hard core of the classical system we find a theory of competitive markets where the relative prices of commodities —its value—is determined jointly with incomes. Here the seminal contribution is Adam Smith's Wealth of Nations. Smith's vision of competitive markets is supplemented with the systemic idea that supply creates its own demand, Say's law of markets, what I have considered the first classical equilibrium condition. I will argue that classical political economy constitutes a relatively well developed science with a common domain: the generation and the distribution of wealth, with a short and a long-run consideration; and with a relatively complete shared theoretical system, characterized by the determination of value within a competitive markets setting and two alternative explanations regarding the system's dynamics that revolve around two different perspectives on profits. These, I identify as the Smithian, profits as a cost, and the Ricardian, profits as a residual, perspectives. In my view contemporary economics is still fractured around this divide and some of the crucial unresolved theoretical debates of recent times are directly traceable to these central questions: What is the nature of profits and capital, of money and the interest rate? And how profits and capital, money and the interest rate, impinge on the dynamics of free markets and of capitalism as distinct social entities?

1.1 The Domain of Classical Political Economy: The Smithian and the Ricardian Perspectives.

The analysis of the conditions for the long-term sustainability of alternative social modes of organization for the creation and the distribution of wealth can be considered as the central theme of classical political economy.[1] Adam Smith's *Wealth of Nations* concentrated on the generation of goods and services, positing a free market, as the most conducive form of social organization to increase production. Smith saw in "the obvious and simple system of natural liberty" the solution to the moral problem of the compatibility between private gains and the common good, assuring the sustainability of the social order. David Ricardo defended free markets on the grounds that they would generate more and lower-priced products, while positive profits would sustain capital accumulation. For him, the understanding of the 'laws' that determined the distribution of wealth was central. In the short run Ricardo saw the essential problem in the determination of the rate of profits, which would determine the level of capital accumulation, output and wealth. In the long run, as long as markets where free, output would expand to its maximum possible as determined by the fecundity of earth, the costs and productivity of labor, profits would disappear and the product would be distributed in the form of rents and wages. Karl Marx saw in the reality of the XIX Century world a social mode of organization of production and distribution based on the existence of antagonistic social classes, and postulated that the capitalist mode of production[2] was not sustainable in the long run. The classical focus on the wealth of nations required an analysis of the long-term dynamics of economic development. The volume of production, or output, was dependent on the volume of accumulated physical capital. Capital accumulation was a function of profits and/or the rate of profits.[3] The core of classical analysis concerned itself with the production and distribution of wealth and focused on the relationships between profits, capital accumulation, production and population growth, to explain the dynamics of the system. All of the above within an institutional setting characteristic of a

competitive private enterprise economy. This is the domain of classical political economy.

The rates of rents, profits and wages played a key role in the secular process. Their determination went hand in hand with the determination of the rates of exchange between different goods and services,[4] thus a theory of value, that is a theory of relative prices, and a theory of distribution were essential. However, the different particular theories of value and of rent and population, were auxiliary tools for the study of the generation and distribution of wealth. They were not the main analytical object and clearly, value theory could not account for the whole of the domain of classical political economy. The long-term sustainability of modern economies was inextricably linked to the evolution of profits, and on the profitability of capital. Smith and Ricardo saw an eventual future of stagnation. For Smith, an excess of capital relative to profitable opportunities would drive down profits and hence stop capital accumulation. For Ricardo, the scarcity of natural resources would in time push up rents to a point where actual profits would not justify additional investments. In Marx, not only capital accumulation would eventually stagnate due to the law of the falling rate of profits, but the capitalist mode of production would also collapse and socialism would emerge.

1.2 The Theoretical System of Classical Economics: Profits and Capital.

The classical theoretical system confronted the problems of value, distribution and the long-term dynamics of modern capitalist economies. These problems required the elucidation of the nature of profits, capital, the rate of profits on capital and the determination of its long-run trend. The classics implicitly used the model of a pure free market, perfect competition in modern parlance,[5] to address the problem: How to explain the emergence of profits if trade was conducted strictly in terms of equivalent values? If prices were ‘natural prices’, and all commodities were traded according to their equilibrium values, how was it possible that a surplus value could appear? For Marx the dividing line

between classical economics and vulgar economics, was here: classical economists would solve the problem of the emergence of profits under conditions of exchange at market values, vulgar economists[6] would not. As Walras would realize in time, this condition implied a pure competition and general equilibrium approach, the acceptance of Say's[7] law of markets, and the consideration of money as a medium of exchange only. Hence, it would imply the validity of the classic quantitative theory of money to determine absolute prices. It is within this theoretical system that answers to the classical problem of the emergence of profits can be grouped around two perspectives on the issue: Profits as a real cost, the *price* of capital, in the Smithian tradition. Or profits as a residual after costs, in the Ricardian tradition. These two perspectives share a common analytical framework, however the different concepts of profits and capital that distinguish them, imply radically different conclusions in terms of the short and long term dynamics and sustainability of modern economies.

In the case of Smith the rate of profit is seen as a price, the price or the cost of capital, dependent on the supply and demand conditions for it. In the case of Ricardo and Marx, the profits accrued to capital[8] were considered as a surplus or as a residual left over from the total net output after paying rents and wages, that was appropriated by the entrepreneur or the capitalist that had control over the production process. Marx "solved" the problem of the emergence of profits in an equilibrium where every commodity is traded strictly according to its labor value, by introducing a special commodity: the labor force. The labor force is traded in strict accordance with its value in exchange, but the labor force is a commodity that has a unique value in use, it creates value. Laborers are forced to work for more time than the necessary time to pay for wage goods, hence they are exploited. The Ricardian analysis of profits presents two different scenarios, first the long-term equilibrium where output reaches its maximum as determined by the amount of accumulated capital, and where profits as a residual disappear due to competition. This is equivalent to the long term Smithian equilibrium, however in the Ricardian conception, the level of profits is zero, while in the

Smithian version profits correspond to the long term or “natural” price of capital. The second Ricardian scenario, which I have termed short-term, consists in considering the level and the composition of output, that is of aggregate demand, as given, then we can have positive profits as a residual, by considering as given the level of wages. If profits are not a residual but a cost, á la Smith, the total product then is equal to the sum of all individual prices and is equal to the sum of the total wages, rents and profits. This is the Smithian result that most puzzled David Ricardo, for him the total product should be determined independently of the prices of its components. Prices are a measuring device and should not affect the magnitude of what is being measured. Hence the need for a theory of value that is independent of distribution. Initially Ricardo avoided the problem of relative prices by assuming an economy with a single good, i.e. corn, as the only input and output of the system. To address the reality of an economy with multiple goods, he tried to develop a labor value theory where changes in the distribution of output did not affect the relative prices of commodities and hence the value of total output. He was never able to solve this problem himself.[9] Marx offered a solution in the so-called transformation of values to prices, as Ricardo’s, Marx’s formulation was also logically inconsistent.[10] Nevertheless, the consideration of the nature of profits as a residual not as a cost, is independent from the labor value theory in its different versions.

With respect to capital, the classical economists’ theoretical system shares at the most essential level the conceptualization of capital as a set of physical heterogeneous objects, the means of production, commodities that come from the past and that can be accumulated to produce more commodities. This posed a crucial problem: if capital is a set of commodities how can we solve the problem of the determination of the ‘natural price’ of capital as something distinct from the prices of the commodities that constitute capital? Ricardo tried to clarify this problem with his analysis of the single good economy—an analytical construct that with hindsight we might say has contributed more to confuse than to clarify the study of modern economies. With this approach we “solve” the

problem of the heterogeneity of capital and of the determination of its value by assuming it away. The logical puzzle of Ricardo has a solution and it is the Sraffian solution, which dispenses with the labor value theory(ies)[11], but it is forced to assume as given the level of aggregate output and demand, otherwise in the Ricardian logic, profits are zero. Marx also starts and mainly stays within the tradition of capital as a set of heterogeneous means of production with a value determined by aggregation.

In summary, the theoretical system of classical political economy dealt with the generation, the distribution and the growth of wealth. Ultimately, wealth was conceived as dependent on the accumulation of physical capital and capital accumulation depended on profits, hence the conceptualization of profits played a key role in the system. As analytical principles the classics postulated that the exchange of commodities should be carried on in terms of strict values, every commodity should be traded for other commodities of equal value, relative prices should be determined strictly in accordance to this rule. The previous postulate implied of course the existence of free market conditions, pure competition in modern terms, and the acceptance of Say's Law of markets, as an economy wide equilibrium condition. To analyze the exchange of commodities under free market conditions the classics developed various labor theories of value, which all proved to be inconsistent. Of course, a theory of value is required, however, the classical theoretical system as defined is not characterized by and it is not logically dependent on any particular theory of value whatsoever. In general, the classics adopted a view of prices where "market" or observable prices would move around or gravitate towards "natural" or equilibrium prices, that would reflect the "natural", "general" or "average," remunerations of land, labor and capital. With this the classics established what we can term as a second distinct global equilibrium condition, prices equal costs, the long run equilibrium condition par excellence. These views implied an approach that considered the economic system as a whole, in contemporary terms: a general equilibrium approach. For the classics real world economies were always in the short-term, that is, prices

were always different than costs, market prices differed from natural prices, and the long-term equilibrium adjustment process was characterized either by a trend towards stagnation or a stationary state, as in Smith and Ricardo, or by continuous fluctuations and instabilities, as in Marx. The key for the understanding of the dynamics of real world economies was in the generation of profits, the profitability of capital and in its long-term trend. The analysis of monetary phenomena by the classics can be summed up by the classical quantity theory of money, which relegated the influence of monetary factors to the realm of short-term temporary effects at most, without providing any essential link between the forces at the production level, real determinants, and monetary forces like the interest rate, the money supply, capital markets, etc., etc. The world of finance does not occupy an analytical space with the classics, there are, nevertheless, innumerable historical, anecdotic, practical and policy references. All the classics shared a conception of capital in physical terms, however, it is in the conceptualization of profits where the main cleavage of classical economics is to be found, profits are either a cost, as in the Smithian perspective, or profits are a residual, as in the Ricardian perspective. Given the privileged position of profits at the core of the theories of capital accumulation, value and distribution, as well as in modern financial economics, the analytical and practical consequences of the aforementioned divide reach to the whole of economics.[12]

Paraphrasing Prof. Blaug's question: Is there a 'core' of the classical theoretical system as defined? A core, in the sense of a set of problems that can be considered fundamental or essential within the classical theoretical system and that are relevant for contemporary economics. So that theoretical research in this respect can be considered as 'classical'. My answer would be yes, and it is the study of the complex dynamic processes, whereby real world economies, that are always in the short-term—a situation where market prices are different from natural prices and profits are different from zero—converge or not, in a stable or in an unstable manner, towards a long-term equilibrium—where prices equal costs. A 'classical' study of these processes would concentrate the analysis on

the generation of profits, the profitability of capital and on its long-term trend. A classical study should strive to provide an integrated analysis of the short and the long terms.

1.3 Neoclassical developments on Profits and Capital.

The adoption of a Smithian perspective on political economy is the trademark of neoclassical economics: the focus on the determination of prices and total wealth through the role of competitive markets. The continuity of the classical system in this respect is remarkable: at the hard core we have one main, relatively consistent, approach that results from the Smithian competitive pricing mechanism, the so-called “invisible hand,” coupled with Say’s Law of markets. The workings of such a mechanism, through price and quantity adjustments, in individual markets of commodities first, and then as a derivation in the markets for labor, land and capital, will result in the maximum output possible, at the minimum cost, given that wages, rents and profits—as the cost of capital—will be remunerated in the end at their natural rates. For Smith this was a long run hypothetical result from his “system of natural liberty”: it would be necessary to get rid of every form of mecantilism and to establish the appropriate social and political institutions, before truly free markets could be expected to produce such results. Nevertheless as it is known now, in the meantime we have no way of knowing if we are close or far from this ideal result.[13] In the short term market prices differ from natural prices; land, labor and capital are remunerated at rates different from their natural rates, Say’s Law, of course, holds at every point in time. But only when prices reach their natural level, that is when they are equal to the amounts of land, labor and capital, required for their production as technically determined, times the natural rates of wages, rents and profits, the economy reaches its full long term equilibrium. Other than at this ideal point the actual or market level of wealth is not determined. Needless to say, the classical Smithian proto-theory of wealth determination required a consistent theory of value to support the workings of the free market mechanism as postulated.

Within the theoretical system of classical economics, the central problem to be solved was the question of value, that is, of the relative prices of commodities, including those used for production. Walras understood this clearly and made this problem the starting point of his work. As Walras expressed it: "*Pure Economics,* is in essence, the theory of the determination of prices under a hypothetical régime of perfect competition." For Walras a consistent solution to the question of value was the necessary initial step in order to develop a *Theory of Social Wealth,* as the second part of the title of the *Elements* states.[14] The problem of economics then, was to establish the conditions under which given resources, land, labor, capital, raw materials, or in general, productive services, were allocated among competing uses, generating maximum consumers' satisfaction, the vector of prices that produced this result was the equilibrium solution. The central element of the neoclassical theory of value, as it came to be known, was the principle that economic behavior is maximizing behavior under constrained conditions. The allocation problem has a maximum solution, if and only if, the transferring process is subject to diminishing returns: the more a consumer enjoys a particular good the less utility it derives from it; the more labor we apply to a certain given task the less productive it becomes. Again, this is valid for households allocating income to different uses, thanks to the law of diminishing marginal utility that ensures that an optimum exists. And for firms searching for optimal factor purchases, the allocation problem has a solution thanks to the law of diminishing marginal productivity. This was an extension of the Ricardian[15] theory of rents, to capital and labor. In modern terms, these two laws are particular cases of the equimarginal principle that applies only to definite quantities of money, time or any other resources to be allocated or distributed among competing uses, by a maximizing agent.

Neoclassical economists treated distribution theory and factor pricing as part of a general value theory. The neoclassical theory of value aimed to provide the Smithian classical proto-theory of wealth determination with the logical foundation it did not have and presented a theoretical alternative to the Ricardian

theory of distribution from within the system.[16] Nevertheless, the theory of profits it offered, within the Smithian perspective of profits as a cost, relied on a notion of capital as a physical entity with a productivity of its own and depended on the assumption of the strict applicability of the equimarginal principle to the substitution of capital for labor in production, at least in the early phases of general equilibrium analysis and until these days within the neoclassical production function[17] tradition. These last two neoclassical developments:[18] the original Walrasian general equilibrium approach, and later the production function approach initiated by Knut Wicksell, with the refinement of Böhm-Bawerk's capital theory,[19] and followed by many others, are closely related, but they cannot be assimilated to each other. It might be argued that in their modern versions they are essentially different.

Let's briefly consider the production function approach that relies directly on the equimarginal principle. It is argued that in perfect competition, given the initial endowments, that is, the distribution of resources among households, the economic system as represented will generate inverse monotonic relationships between the physical quantities of the diverse factors and the corresponding rates of remuneration and hence the system will converge to the full employment of all factors, resulting in an efficient and stable equilibrium, where the value of total output will be exactly the same as the aggregate value of all remunerations, rents, wages and profits determined by the marginal productivity of land, labor and capital. Nevertheless, this result is obtained, if and only if, the production function is of a particular form that satisfies Euler's Theorem. Only in this particular case[20], that corresponds to a very particular conception of the cost of capital as the marginal productivity of capital, the two classical equilibrium conditions: Say's Law, valid in the short and in the long-term; and prices equal costs, valid in the long-term only, come together. With the implication that Smith and Ricardo's long-term, becomes a short-term result only: prices are always equal to costs, total wealth is always maximized, the economy is always employing fully all available resources. No wonder the classic's and also Walras'

long term condition, that prices equal costs has been practically abandoned in the modern literature as such. It has become an implicit assumption. It seems now that only the market clearing condition is enough, contrary to the founder's vision the economy is always in a long-term situation.

Joan Robinson, in her famous essay "The Production Function and the Theory of Capital" (1953-1954), re-opened the attack on the neoclassical conceptualization[21] attack that started the famous "capital theory controversies."[22] She concentrated the critique on the neoclassical concept of capital. In short, she argued that capital as employed in production functions could not be used to determine the interest rate or the profit rate and hence the distribution of output, because the aggregate value of capital depended on prices and hence on the distribution of income. Capital was a set of heterogeneous capital goods and could not be reduced to a single homogeneous entity with a dimension independent of prices. The publication of Piero Sraffa "Production of Commodities by Means of Commodities" in 1960 constitutes another landmark in the capital theories' debate, thanks to the discovery of the phenomenon of "re-switching of techniques"[23] or "reverse capital deepening." Sraffa argued that as variations take place in income distribution between profits and wages, the production techniques that are chosen as the most profitable ones; do not follow each other in an unambiguous and unchanging order. The production techniques that require a high proportion of capital to labor at a low rate of profits may well be discarded by other (more profitable) techniques when the rate of profits is higher. The former production techniques may become the most profitable techniques once again at even higher rates of profit. These results are valid, whatever convention may be adopted to "measure" capital. From the capital controversies the following two generally accepted[24] central propositions emerged: The conditions to be satisfied in order to aggregate heterogeneous capital goods are so extraordinarily restrictive as to rule out any reasonable possibility of constructing an aggregate physical measure of capital goods. And, there is no inverse monotonic relation between the quantity of capital and the

rate of profits. This is applicable both to the economic system as a whole and to the individual productive processes, and it is a proposition independent of the method chosen for measurement of capital, whether in physical or in value terms. Notwithstanding the problems of aggregation, the main definitive result is that the equimarginal principle applicable to production, in the form of the substitution of labor for capital, could not be sustained as a generally valid proposition.

The attempt of the neoclassical economists to provide the classical theoretical framework with a consistent theory of value, that incorporated the Smithian notion of profits as the natural cost of capital determined in real terms, that is, within the 'sphere of production', to use an ancient expression, failed in its production function version.[25] The equally ancient theory of capital as a wage fund survived, but only in its monetary version, the cost of money, the cost of 'funds', is the interest rate. In the Ricardian short term, profits as a residual would be determined in real terms and the interest rate would gravitate towards the profit rate not the other way around, as Smith implied. For Marx, interest payments would come from profits as determined by his theory of surplus value, the distribution of the surplus between financial and industrial capitalists was a question of power. The long-term implication of Ricardo's position would be a zero interest rate and zero profits. This coincides with Frank Hahn's discovery that the nil value of money is an equilibrium solution.[26] There is an equilibrium where the economy is effectively demonetized; it no longer appears to be a monetary economy. If we are not able to consistently demonstrate that there is something like a cost of capital, measured as the profit or interest rate, that is, different and independent from the prices of the physical commodities used as capital, then the Smithian and the Ricardian long term equilibria are one and the same.

The general equilibrium approach initially developed by Walras is a generalization of the Smithian idea that prices of commodities and production factors, are determined by the particular demand and supply conditions

prevailing in each market. What Walras demonstrates is that under certain conditions general equilibrium is possible, that is equilibrium prices for factors and products, defined as prices that satisfy two conditions: markets clear and unit costs and prices are equal, can be determined simultaneously. In Walras initial formulation the level of absolute prices, that is money prices, is undetermined. All prices are relative prices measured in terms of an arbitrary physical unit, the *numéraire*. The Walrasian 'solution' to this problem was to introduce the demand for money as circulating money in all utility functions, as it is known in modern general equilibrium analysis this is not a satisfactory solution. Nevertheless, the treatment of money and of securities in general, as if they were commodities, i.e. 'cash goods,' 'income goods,' etc., etc., by introducing their demand as part of the consumer's utility function, is practically the standard (but wrong) practice.

Walras originally assumed fixed technical coefficients of production, but in later versions he adopted the general marginal productivity theory of distribution, postulating the proportionality of the marginal productivity of different factor services to their prices. This step was carried on in way that added the same number of equations and unknowns to the system so general equilibrium was maintained. Nevertheless, by adopting the marginal productivity theory of factor pricing, Walras implicitly rejected his long term condition that prices equal costs of production, because according to the marginal productivity theory postulates, factors are always remunerated at their cost, so prices always equal costs. So in strict terms, either the original Walrasian prices equal costs condition, or the marginal productivity theory, is redundant. Modern general equilibrium analysis does not rely on marginal productivity analysis, but on activity analysis, so both Walrasian classical equilibrium conditions: markets clear and prices equal costs, can be reinstated. This is done, however, at the cost of introducing an ad-hoc theory of profits as we will see. Aggregate production function analysis adopts marginal productivity theory. The Walrasian long-term equilibrium where markets clear and prices equal costs corresponds to the Smithian/Ricardian long term: a pure free market world. Monetary phenomena are irrelevant in this world and the

Walrasian treatment of the demand for money is arbitrary. Aggregate production function analysis, characteristic of contemporary growth theory, is always in the Smithian/Ricardian long term, and is forced to deal with monetary and financial markets, as if they were essentially the same as commodities markets.

In addition to his theory of prices, Walras introduced a theory of capital that is essentially different from the classical perspective on the valuation of capital. Walras made the value of capital a function of the future profits of the firm, an analytical step of tremendous theoretical consequences for the classical political economy approach that conceived the value of capital on a cost or price basis and the profit rate as a simple result of dividing two independent value magnitudes: profits and capital. Walras tried to analyze together for the first time, the simultaneous determination of the prices of commodities and of the prices of capital. Considering the value of capital as depending on profits and as something different from commodities. Walras posited that the prices of capital goods are rigidly proportional to their net yield at given interest rates, that is, the price of a capital good is equal to the net present value of its future returns discounted at a given rate. Walras' theoretical problem was the determination of the prices of capital goods, considering as given the future profits derived from its use, which would be equal to the known net annual rentals and/or equal to their perpetual net yields. The question then was reduced to the determination of the appropriate discount rate. On this, Walras commented that he had looked in vain for the market where such rate was established. He settled for the interest rate. In the Walrasian long term equilibrium, residual profits would be zero, and prices will be equal to costs, á la Smith, and they would include the cost of the capital funds employed in production, that is the rate of interest. Of course, Walras was not aware of Hahn's argument that in the classical long-term equilibrium the economy was demonetized. In the Walrasian long term not only profits would be zero, capital would be valueless.

Walras treated all capital goods as if they were *'consols,'* that is fixed rate perpetuities, reducing the problem of the determination of the value of capital, to that of the valuation of a perpetual known given yield, that is in modern terms, of a future equal perpetual cash flow. Walras initiated the custom of treating the demand for securities, as the demand of any other consumption good, and he did the same thing with the demand for money to hold. Walras' theory is a theory of the relative prices of commodities, and unless we think that capital and money are essentially the same as any other commodity, that is simple goods: 'cash goods', 'equity goods', 'debt goods', etc. Money and capital have no place in the Walrasian proposal. The fundamental contribution of Walras in this respect is that he recognized, in contrast with the classical approach, that the value of capital was a function of future profits discounted at the proper rate, and that for the first time in economics, he tried to determine the value of capital as defined, the interest and/or the profit rate, simultaneously within a general equilibrium approach. Walras did not achieve an integrated analysis of the commodities and the financial markets. He simply treated financial assets, including money, in the same way as any other goods. Nevertheless, there is a fundamental expansion of the domain of the classical theoretical system by Walras. This is the introduction of the problem of the determination of the value of capital from outside the system, based on its future returns and dependent on a discount rate. The moment we admit that the valuation of property rights on capital as a security, can be different from the cost or the price of the commodities used in production, a completely new set of economic problems emerges. From a Lakatosian perspective this classifies as a substantial increase in the empirical content of economics compared to classical political economy. There is an instance of rupture, yes, barely developed, with the traditional view of capital as a thing.

Irving Fisher[27] developed the idea of capital as a fund of purchasing power whose value is determined by the present value of its discounted future returns. Á la Walras the value of capital depends only on its future returns, not considered

as a given, but determined by the physical marginal productivity of each capital good in particular. Fisher postulated that, in general, there are as many own-rates of interest in an economy as there are products produced with the aid of capital goods, and only in a stationary equilibrium a single interest rate would coincide with the many different own-rates of return. Fisher also postulated that only through a general equilibrium approach this theoretical problem could be solved. In a competitive equilibrium the marginal physical product of capital will be equal to the annual money rental of a representative capital good divided by its price, the so-called 'real own-rate of interest' of the product in a one sector economy. Under conditions of perfect arbitrage and with a constant price level, this own-rate, determined in real terms, will equal the money rate of interest. Á la Ricardo monetary forces will affect the rate of profits, only temporarily at most, and in equilibrium the real rate of return will determine the money rate of interest. Without fully developing a general equilibrium multi-good model, Fisher postulated that only in a stationary equilibrium a single interest rate would coincide with the many different own-rates of return.

Modern general equilibrium analysis is an extension of Walras' and Fisher's contributions. The contemporary analysis of the existence, optimality and stability of general equilibrium in a free market competitive economy, were already considered by Walras. General equilibrium theory is concerned with the interactions of many individual agents in an economy. A competitive equilibrium in modern analysis is defined, usually, as the state of affairs in which each consumer maximizes her satisfaction given her budget set defined by the prevailing price vector; each producer maximizes her absolute profits given the same price vector; and, the total supply of commodities is equal to the total demand for commodities, or Say's Law. This last equilibrium condition is known in the modern literature as Walras' Law:[28] "excess demands are zero; supplies equal demands: markets clear." The second classical and Walrasian long term equilibrium condition that prices equal costs, zero profits, is often subsumed a-critically to the first. The existence of 'equilibrium' depends on whether or not

there is a price vector that can sustain the above described state of affairs. The classical questions of general equilibrium analysis, or welfare economics, are whether every competitive equilibrium realizes a Pareto optimum—a situation where no agent can increase her satisfaction without decreasing someone else's —and whether a Pareto optimal state can be achieved and supported by a competitive equilibrium. Starting with Arrow and Debreu[29] seminal contributions, other modern authors have simplified and perfected these expositions demonstrating that under certain conditions a competitive equilibrium will realize a Pareto optimum and that a Pareto optimum can be achieved and is supported by a competitive equilibrium. General equilibrium analysis has shown that pure free markets can be an extremely efficient way of allocating resources and organizing economic activity. Within a set of perfectly defined conditions and within the appropriate institutional framework: the ideal Smithian end state is theoretically possible. Nevertheless, as Jaffé[30] correctly pointed out, the economies portrayed in general equilibrium analysis are not modern capitalist economies. General equilibrium models do not show *how* a capitalist system works, but how an imaginary free market system *might* work in conformity with certain principles.

A crucial point in modern general equilibrium models is that *current prices are present discounted values of dated goods.* In the spirit of the Fisherian analysis, each dated good's future price is discounted by its own-rate of interest, which in the model is directly derived from the prices of the same commodity between two dates, own-rates of return or interest for different commodities are not equal. Given that current and future prices are determined by spot and future markets, these last identical in A&D, the so-called own-rates of interest, which are nothing more than the per-cent relationship between these two prices of the same dated good, are of very little or nil theoretical interest,[31] i.e. agents do not react to them. The definition of *current prices as present discounted values of dated goods* is a truism. Of course, when someone says lightly that *the* profit rate

or *the* interest rate problem, is solved in general equilibrium through the use of dated commodities, it is evident that has problems understanding both.

The classical theoretical system, among other problems, lacked a consistent theory of value, the general equilibrium approach initiated by Walras and eventually perfected by the contributions of Arrow, Debreu and Hahn, among other modern theorists, filled this gap. Now the theoretical problem of the determination of the relative prices of commodities irrespective of their use, under conditions of pure free market equilibrium, can be considered as solved at least for the long-term scenario. The modern general equilibrium approach to value theory does not require a marginal productivity theory and does not depend on the use of micro or aggregated production functions. The latter two, a theory and an approach inextricably linked, whose validity was terminally questioned during the capital controversies. If we take seriously the generally accepted conclusions of this debate, where the best and brightest economists from the main currents of contemporary economic thought participated, profits cannot be considered as a cost or as a payment for the marginal productivity of a physical entity called capital. The rate of profits cannot be simply assimilated to the interest rate or vice versa. The frequent practice in general equilibrium analysis to consider profits as ‘frozen’ payments to firm ‘specific’ resources that are not traded as every other commodity is, constitutes an arbitrary assumption, an ad-hoc addition to the theory. Such a general equilibrium solution, that determines all prices of commodities, plus positive profits as ‘frozen’ payments to firm ‘specific’ resources, can be accepted at most as a temporary equilibrium[32] where markets clear, but prices differ from costs, so in strictly classical terms: profits can appear as a short term residual only. This argument will be developed in detail in the next chapter.

Regarding capital, its value cannot be determined simply by the aggregation of the prices of its constitutive parts; not as a production cost inclusive of interest á la Smith; it cannot be determined by its given yields,

discounted by the interest rate, á la Walras; and, it is not determined by the physical marginal productivity of capital goods. We will argue that the value of capital is determined by the future residual profits or returns, that a particular firm or entrepreneurial activity can yield. Capital is the tradable property right on these residual profits. It is not a thing, it is an entitlement. As we will see this view, at odds with standard economics based on production function analysis which conceives capital in physical terms, is shared by financial economists and practitioners alike but has not been integrated yet in a truly general equilibrium framework.

In this work we consider that the value of capital is distinct from the value of the commodities that are used in production with the expectation to generate profits. We will show that the mechanisms to determine the prices of commodities, general equilibrium conditions, and the prices of capital as an entitlement, the present value of future discounted profits cum arbitrage, are essentially different as well. Of course, from a scientific perspective they need to be integrated within the same theoretical system, and determined simultaneously. If capital depends on profits and profits are not a cost, but a residual that can only emerge in conditions different from the Smithian, Ricardian and Walrasian long-term full equilibrium, then the positivity of the value of capital is essentially a short-term phenomenon. So we need a theory to explain how levels of wealth or output, that are different from the long-term full equilibrium, can be achieved. If we can develop a theory that determines present and future residual profits, then to determine the present value of capital we need an appropriate discount rate. As we know the search for the market that determines such a rate was the object of the Walrasian vain efforts. Here, we either assume a zero present value of capital and determine an internal rate of return, or we can use the interest rate as determined in financial markets as the appropriate discount rate to determine the value of capital, and/or, using the prevalent Smithian securities pricing paradigm, we could take the interest rate as a base

and then add an arbitrary risk premium, so the value of capital can be determined.

All in all, given that capital is essentially a fiduciary phenomenon we need an integrated theory of commodities and financial markets. If our ultimate goal is to explain the dynamics of capitalist economies, a theory of capital is required. The problems of money, the interest rate, capital and financial markets in general, cannot be dealt with solely from inside value theory;[33] the consideration of exogenous structures is required. This conclusion is shared by general equilibrium theorists like Starr, among others, and by Sraffa and followers. From an epistemological standpoint it is a conclusion that should not surprise anybody: every logical system is incomplete, to consider otherwise is to pursue Hilbert's programme in economics. John Maynard Keynes was the first economist to visualize the need of a general theory to deal with some of these problems.[34] Problems that can be derived directly from the deductive structure of the classical theoretical system as reconstructed in my previous work.[35]

1.4 The Keynesian Challenge and the New Classical Economics.

The classical theoretical system lacks a theory for the determination of wealth at levels different from a Smithian ideal long-term equilibrium, or to use a modern expression different from 'full employment.' Walrasian general equilibrium and production function analyses share this characteristic. Here we either consider this a non-problem and assume that the economy is always more or less around this ideal level, save for random shocks, well intentioned government policies that cause more harm than good, workers that decide not to work more out of their own volition, or similar causes, that can push the economy away from its natural position and path of growth at full employment, which is the stance of the so called New Classical economists[36] or third generation monetarists.[37] Or, if we consider that the determination of the level of output at different levels than the Smithian ideal end-point is a real theoretical and practical

problem, then an alternative theory is required. Such a theory would require, either: The rejection of Say's Law,[38] and with it, implicitly or explicitly, the associated free market mechanism and to present an alternative theory of wealth determination and of competitive markets. Or as Clower expressed it would require an 'alternative theory of household behavior.' This line of thought is at the center of the Keynesian research programme: Say's Law is rejected and the principle of effective demand is the proposed alternative.

The other option, which is the path I will follow in this work, would be to develop a theory that integrates Say's Law and the workings of competitive markets in a wider framework that admits a continuum of general equilibrium positions, where the Smithian ideal end point is just one of them. Such a general equilibrium approach would require initially the adoption of the two classical equilibrium conditions, in the short and in the long term: Say's/Walras' Law, and, in the long term only: prices equal costs. To consider profits as a residual value determined in real terms, that and as a temporary general equilibrium phenomenon. Then, we need to determine the economy's general rate of profit, to study the problem of the determination of the value of capital. A third general equilibrium short term condition should then be considered: the returns on capital are equalized. A true contemporary 'classical' approach would also integrate fully the monetary and financial forces at play, and develop a consistent theory of the interest rate as a completely different phenomenon of the profit rate. These are some of the questions I will deal with in this essay. These are, at least from the short-term perspective, some of the questions that Keynes' analytical proposal is about. Before concluding this section a very brief reminder of some of Keynes' ideas is required.

Keynes'[39] work was a frontal attack on what he called "classical theory" and it was intended to be a 'struggle of escape from habitual modes of thought and expression'. For Keynes the classics included David Ricardo, James Mill, J. S. Mill, Marshall, Edgeworth and Prof. Pigou, among others.[40] It has become a

commonplace idea that Keynes' aggregation of such a wide number of scholars under a single heading was, at least, an oversimplification, that the 'classical economist' is a straw man,[41] no single pre-Keynesian writer or group of writers, personified classical theory. Nevertheless, it would be very difficult to deny that overall the contributions of the founders of political economy or economics as a scientific discipline, have a common domain, a deductive structure constitutive of a relatively well defined theoretical system, a set of common problems to be elucidated, among other elements that can be termed as 'classical.' I have argued in my essay about the theoretical system of classical economics, for such a type of rational reconstruction, with the ultimate purpose to help us to progress in our field. In other words, the rational reconstruction of the deductive structure of a scientific discipline should ultimately serve as a tool for the growth of knowledge. The rational reconstruction of the theoretical system of classical economics that I developed allowed me to conclude directly that a theory for the short-term determination of wealth or output was needed, that this theory required a consistent theory of profits and capital, and a different but consistent theory of money and the interest rate. So I would say that Keynes' straw man, more than a convenient rhetorical tool, is a 'rational reconstruction' of the thought of his favorite 'classical' writers. Long before Lakatos stated that the first step for the rational critique of a theory, is the reconstruction of its deductive structure, Keynes did precisely that.

What Keynes defined as classical economics included: David Ricardo's idea that there is no such thing as aggregate demand deficiencies, against Malthus' attempts to develop a rationale for them; classical price theory based on marginal utility and productivity analysis; and, Pigou's employment theory that advocates the ever present tendency towards full employment. From my perspective, I would say that Keynes criticized the views that believed the economy was always in or near the Smithian long term equilibrium; that prices were always equal to costs, thanks to the generalization of Ricardo's rent theory into the marginal productivity of factors theory; that the profit rate was equivalent

to the interest rate;[42] that monetary and financial forces did not matter; and that the aggregate impact of capital markets could be disregarded. What Keynes termed as classical theory was for him clearly inadequate to deal with the real short-term problems of modern capitalist economies.

Keynes' critique of 'classical economics' involved two main issues: First, the validity of the traditional analysis of the labor market where workers would react to and negotiate their wages in real terms only.[43] Keynes stressed that workers would negotiate money wages but that real wages and total employment would be determined by aggregate forces mainly.[44] Second, Keynes proposed to demonstrate that Say's Law of Markets, was a particular, not a general situation of aggregate equilibrium. Say's Law, could be integrated as a special case of the more general systemic principle of Effective Demand. Say's Law would determine total output and employment only at the full employment equilibrium point. The Effective Demand Principle would determine equilibrium in a continuum of points before equilibrium, the characteristic fluctuations of modern capitalist economies, could be traced back to fluctuations in effective demand. Monetary forces and financial markets would play a central role in the analysis. More than on an apparent "money illusion" on the part of workers, relevant for the consideration of the adjustment process of wages and prices, Keynes' analysis relied on the interaction of the interest rate and the profitability of capital, that he termed as the marginal efficiency of capital, interaction that would determine the level of investment, employment and aggregate demand. This interaction could, in Keynes' vision, generate significant positive wealth or windfall effects, which may impact the macro dynamics of the economy. The theoretical debate before Keynes, according to Wicksell, had three main issues pending: capital and interest, monetary dynamics and population.[45] In particular, the issues of capital and interest, were far from settled theoretical issues. Keynes did not try to solve these issues for their own sake, however, in his short-term aggregate analysis of the fluctuations of output and employment in a modern capitalist economy, the

fundamental variables are the relative prices of labor—wages—, capital assets—profits—, and money—interest—.

At the core Keynes questioned the validity of Say's Law, the systemic classical postulate. For Keynes, Say's Law coupled with the notion that prices would adjust immediately to costs as determined by classical price theory, meant that the existence of involuntary unemployment was impossible and therefore a strict adherence to Say's Law made it impossible to understand the causes and possible remedies to depressions and widespread unemployment. The world described by the classics constituted a special case of general equilibrium: full employment equilibrium. The Keynesian alternative was the principle of effective demand. The explanation of the behavior of modern capitalist economies required to supplement the classic theory of value —for Keynes the Smithian inspired Marshallian price theory— with the study of the dynamics of consumption, the profitability of capital, and of the determination of the interest rate in financial markets, as determinants of the level of investment and hence of aggregate effective demand. Even though Keynes was far from clear in this respect, it follows that financial markets are essentially different from commodities markets and their analysis cannot be simply carried on in terms of classical price theory. In other words, capital and money could not be treated as commodities.

A truly general theory of modern capitalist economies requires a different but integrated treatment of the markets for produced commodities and for financial assets. The pricing mechanisms in each case are essentially different but both markets are interrelated. Unfortunately, the fact that Keynes did not deal with the pending theoretical questions of profits, capital and interest in a systematic way, and tended to use the above mentioned variables with different definitions depending the problem he was dealing with, is, to an important extent, the origin of so much confusion[46] about Keynes' contributions to the theory and practice of economics. Particularly confusing are Keynes' analyses of capital.

What Axel Leijonhufvud calls, Keynes's habit of lumping together under the heading of non-money assets every possible form of value storage, is certainly one of, if not, the major weaknesses of Keynes' aggregative structure. Of course Keynes is not alone in this respect, up to this date capital theory is plagued by confusion. Quoting Keynes on capital theory: *"There is, as I have said above, a remarkable lack of any clear account of the matter."*[47]

A crucial point in the economics of Keynes is the existence of capital or wealth effects, that is changes in the aggregate demand caused by changes in the valuation of capital or wealth in general. For Keynes, in general, wealth effects are positive and significant.[48] In standard neoclassical theorizing, wealth or capital effects are non-existing. For Hicks they are most likely neutral and of little significance, for F.H. Knight they are: "…largely a fiction and a delusion." Nevertheless, if we consider Keynes' long term assets only as capital,[49] that is, as a property right on future residual profits, then we may be able determine consistently under general equilibrium conditions, the existence of significant wealth or capital effects at the macro level due to changes in the interest rate and/or the general profitability of investment and in the financial structure of the economy. That is, we may be able determine the existence of fluctuations in the value of capital, that can generate divergences between aggregate demand and supply, that is, effects that may cause the breakdown of Says' Law, something that Keynes indicated as a possibility but did not develop. Hayek's challenge to Keynes was precisely this: you have to show how under conditions of perfect competition capital effects can emerge. The great monetarist and former Keynesian, Karl Brunner, founded his rejection of Keynes' ideas in what he called the "London City Syndrome," that is, the idea that monetary influences on the economy are totally channeled via capital markets. An idea difficult to reconcile with the observation that monetary shocks and events also affect economies with no organized or with very under developed capital markets. The theoretical challenge stands, and in this essay I will show how under conditions of a

competitive general equilibrium, capital effects can emerge and how the financial structure of the economy plays a role in this.

All in all, Keynes and some of his followers' attack on Say's Law has proven unsuccessful, turning the 'market clearing' postulate into the central tenet of standard economics. What Keynes failed to do, was to recognize that Say's Law, as a short and as a long term equilibrium condition, only implies full employment when coupled with the second classical and Walrasian long term condition that prices equal costs. Also, what Keynes failed to fully recognize is that the classical price theory—Marshallian marginal productivity based—, that he somewhat reluctantly accepted, implied logically both long and short-term equilibrium conditions and hence full employment. What Keynes' critics from the neoclassical perspective did, was to reassert classical Marshallian price theory and deny that workers suffered from 'money illusion' when they negotiate their salaries. By doing so, the first element of the Keynesian critique was gone, except when nominal wages are considered rigid by assumption, an obvious special case of unemployment. Then they collapsed the interest rate and the profit rate, the marginal efficiency of capital, into the interest rate only, as the price that would guarantee the equality of savings and investment, and with it Say's Law. The rejection of any type of wealth or capital effects, not sufficiently established by Keynes, eliminated the speculative motive[50] in the demand for money and permitted to conclude that the vagaries of the financial markets and the financial structure of the economy could be safely put aside. Only in the extreme situation of the liquidity trap, another special case, the economy could be 'trapped' in unemployment. Keynes' general theory became the special case. From my perspective, the problem is not whether or not Say's Law is valid. It is valid. The problem lies in a particular conceptualization of price formation and output generation in competitive market conditions. What should be rejected is the Smithian inspired Marshallian classical price theory where profits are a cost and the short term is always equal to the long term, something Keynes never did.

Notwithstanding, the general direction of Keynes' theoretical research was, in my opinion, correct: the ideal long-term of the classics did not correspond to the realities[51] of our world; we need a theory to explain the actual short term aggregate movements of real life economies, that seldom, if ever, are in the ideal end-type situation portrayed by Smith or in the Walrasian world. To understand the dynamics of a modern capitalist economy we need a theory to explain profits as a residual and the value of capital as a function of profits, to elucidate the relationships between the rate of profits, the rate of interest and capital accumulation. In short, an integrated account of financial markets and commodities markets under general equilibrium conditions is essential. In the short-term markets clear, but this is a temporary equilibrium that does not correspond to full employment equilibrium and does not have optimal properties. Only when prices are equal to costs then the Smithian and Walrasian long-term results entail. The existence of temporary positive residual profits; the variability on the profitability of capital that can result from a succession of temporary equilibria; and the accumulation of capital as tradable property rights with a potentially high fluctuating value, dependent on future residual profits are phenomena that can affect the demand for money and that can generate effects that alter Says' Law in one way or another. Keynes derided Ricardo's domination of English economics for more than a century. Nevertheless, he developed solutions for some of the original problems that Ricardo assumed: the short-term determination of total demand and output; the determination of real wages. In the spirit of the classics, he did so from the perspective of the profitability of capital, as different from the interest rate, which is what that obscure member of the underworld,[52] Marx, did as well. From the perspective of the theoretical system of classical political economy, the Keynesian proposal seems more classical than the theory of the classics Keynes was struggling against.

Keynes' analysis and contemporaneous derivations, hinges around the question of the role of monetary and financial forces, vis á vis, real forces.[53] Within the classical theoretical system, the analysis was carried on strictly real terms. Nevertheless, for the classicals, the consideration of the profitability of

capital was essential. In Walrasian general equilibrium, money is simply a numéraire, monetary phenomena constitutes a veil over the real economic world were commodities are traded for commodities. A more contemporary 'real' view is that of Friedman's monetary analysis: "*money 'does not matter'*. "[54] Following on Friedman's steps, the New Classical Economists adopt a quite radical "money does not matter" view: the neutrality of money proposition(s).[55] What is common to contemporary 'real analysts' is the general presumption that money does not matter very much and the treatment of money and securities as if they were goods that are part of the agent's utility functions and are "consumed." [56] For the New Classical economists, the most important aspects of the economic world can be analyzed without references to monetary or financial forces, except as exogenous shocks. It is now a commonplace observation that what Keynes did, was to provide for the first time in the history of economics an integrated analysis of commodities and financial markets. Contemporaneous macroeconomics presents as an integrated analysis of real and financial markets the "Neoclassical Synthesis" or the IS-LM, Hicksian framework. IS stands for the equality between savings and investment, which implies Walras' Law. LM stands for the equality of the demand and supply of money as the equilibrium condition for the financial markets. L, stands for the liquidity preference or demand for money, and M, for the money supply. Variations in the interest rate and in aggregate output or income will assure the equality of demand and supply on both the commodities and the financial markets. If these two curves, IS-LM, are superimposed they will intersect at the point where there is a simultaneous equilibrium of the commodities and the financial market. There is only one possible combination of the interest rate and the level of income that will guarantee the simultaneous equilibrium in both markets. In this world Keynes' "unemployment equilibrium" is a logical impossibility, unemployment can only be a temporary disequilibrium phenomenon.

The neoclassical synthesis seems to fill some of the crucial gaps within the classical theoretical system: a short term theory of the determination of total

income and output; an explicit link with monetary forces, through the real balances theory the demand for money is ‘explained;’ and mechanisms that will propel the economy out of a situation different from full employment are proposed. Nevertheless the IS-LM approach eliminates the problem of profits and the profitability of capital and it equates the savings of households with the profits of firms. Which in my view is perfectly wrong: Households, can decide how much of their income they are going to consume and how much they are going to save. Firms, cannot decide how much money they are going make. In the original Keynesian thought, profitability of capital would determine investment, investment the level of income and given the propensity to consume, savings would be determined, being by definition equal to investment. The interest rate established a lower limit to investment, only projects with returns over and above ‘the’ interest rate, would be undertaken. The IS-LM perspective subsumes the rate of profits to the interest rate on funds, when it was Keynes’ intention to clearly separate the Marginal Efficiency of Capital from the Interest Rate.[57] Keynes believed that financial markets could generate significant systemic disturbances that could keep economies away from full employment for significant periods of time. Keynes thought that investment markets were not playing the fundamental role they should and that the existence of highly organized markets could even prove to be destabilizing.[58]

In standard macroeconomics teachings, financial markets are limited to the neoclassic LM, perspective of money and one financial asset, a fixed interest government bond, and one price, the interest rate. Other financial markets, i.e. private debt and equity, are treated as "extensions."[59] In this vision capital markets have an insignificant, if any, impact on the short and in the long term functioning of the economy, capital effects are an ‘insignificant illusion.’ The integration of the classical quantity theory of money through the real balances effect is far from satisfactory, in the last analysis the positivity of the price of money and hence the demand for money cannot be explained by the real balances theory. Within some perspectives it depends on exogenous structures:[60]

the state and the demand for money derived from taxes payable in money.[61] I will argue that the demand for money is inextricably linked to capital and hence to profits. The significance that Keynes ascribed to monetary and financial markets dynamics is severely diluted in the IS-LM framework.

Until the 1970s there was something of a centrist consensus regarding macroeconomics, built around the neoclassical synthesis. The synthesis and related themes were intensely debated from the post-Keynesian, Marxist and Monetarist camps. Nevertheless, the centrist moderate conclusions of the IS-LM 'Keynesians' held their ground as a practical guide for economic policy. The rational expectations hypothesis introduced by the New Classicals radically changed these conclusions, they contended that the predictions of the neoclassical synthesis, 'Keynesian economics,' were absolutely incorrect and that the doctrine that supported them failed. The behavior of people is strongly affected by their expectations about future events and they form these expectations in a rational way.[62] The Lucas critique showed that the existing econometric models at the time used to simulate changes in economic policy were flawed. The consideration of rational expectations would necessarily introduce changes in people's response to policies, so the old models were not appropriate. The introduction of rational expectations in Keynesian type models, resulted in fluctuations away from the 'natural' level of output that were significantly shorter and less pronounced. The aggregate supply function was revised through the introduction of the labor markets. Keynesian models relied on a slow adjustment of prices and wages, under rational expectations there was no reason why the adjustment of wages and prices should be slow, only unexpected variations in the price level would have real effects. Finally, these scholars argued that the proper instrument to deal with these problems was game theory, and that every economic model should be based on strictly rational individual behavior. In short, Keynesian synthesis models could not be used to formulate economic policy, they could not explain fluctuations in aggregate economic activity and monetary/financial forces would not matter. Policies intended to

stabilize could be de-stabilizing and that fixed rule policies were better than discretionary ones. They concluded that employment and production, usually hovered at its 'natural' level determined strictly in real terms as Keynes' classics. This is not a necessary conclusion of the classical theoretical system, where the issue of the short-term determination of output and employment and its fluctuations was an open question.

In the New Classical perspective, fluctuations in employment and output are variations of the natural level *not deviations* from it. So if there are fluctuations is because the economy is moving from one situation of competitive equilibrium to another, and these fluctuations can only be explained in terms of autonomous changes in general equilibrium conditions, preferences, technology, endowments, etc. Within this general perspective, for the Real Business Cycles (RBC) theorists the main force behind fluctuations is technology. Their analyses are based on highly simplified competitive models with a single good produced by labor and capital with a constant returns technology, and where the only shocks to the system are exogenous stochastic shifts in the production technology.[63] The logical consequence of this view is that the classical difference between the short term and the long term is eliminated. The moderate IS-LM type conclusions are completely rejected and the more radical original approach of the General theory as well as the fundamental conclusions from the capital controversies are not even considered.[64] For the New Classical economics is reduced to the endless development of the neoclassical aggregate production function approach to growth theory, but *with* micro foundations. Growth theory has traditionally been studied as part of macroeconomics, focusing on the undisturbed evolution of potential output, or of the level of production at normal capacity utilization. The fundamental **assumption** is that the goods and labor markets clear, that is, labor and capital are always fully or normally employed or that the employment level does not vary the prices equal costs condition is implicitly assumed as well. Growth theory uses mostly completely aggregated one-sector models, usually a single good is produced by capital and labor and all

consumers are assumed to be infinitely-lived and identical, which is exactly the same as positing a single agent. What Solow calls the 'ultra-strong neoclassical assumption' that the economy traces out the inter temporal utility maximizing program for a single immortal representative consumer or of a number of identical such consumers. This is the old idea of the economy as a giant farm, but now managed by a single immortal representative farmer. This individual is a utility maximizer, so the theory is supposed to be solidly grounded on individual maximizing behavior. The theory now is said to have micro foundations, and given that the economy is considered to be the sum of the individuals, it is the correct way, for some the only way, to study economic problems with the model of a single aggregated good with a single utility maximizing individual and with the use of dynamic games theory.

These models are often supposed to be general equilibrium[65] competitive models, however they are simple aggregate production function models, plus the representative consumer, where "general equilibrium" defined as market clearing with full employment of labor and capital, is an initial assumption and the short and long terms are one and the same. The explicit and the implicit equilibrium conceptualization of the New Classical' view, is clearly at odds with the Walrasian treatment of the conditions and consequences of economic progress. Walras visualizes equilibrium as the continuous process of chasing a moving target without ever reaching it. For Walras different adjustment processes operate at different speeds: market clearing can be determined in a matter of minutes. In contrast, the achievement of "full" equilibrium, where prices equal costs, is a considerably longer and slower adjustment process and in this process the evolution of profits and the role of the financial system and markets are central. Walras view of the reality of a modern capitalist economy is that of a continuous equilibrium, where the economy is always in a temporary equilibrium and this is different from day to day, moment to moment. In such a temporary equilibrium, markets can clear, but resources are not necessarily fully employed, output is not necessarily at its maximum level, money and financial markets

matter, and all the good things that correspond to the ideal Smithian end state do not entail.

The original developments of growth theory were concerned with the long term hypothetical sate of an economy growing while at full employment, a situation where Walras' Law and the prices equal costs conditions apply. This original moderate view of the founders has been challenged: the single good-single agent theoretical models can be used to account for short-term phenomena. It can explain not only the secular growth trends of advanced economies but also it could explain business cycles, depressions, for example *the Great Depression,* and basically every other economic problem. It became in the words full of hope of Robert Lucas: *"the only 'engine for the discovery of truth' that we have in economics."*[66] The founder of the RBC school, Prescott, argued recently that the great depression can be explained with growth theory supplemented with the labor/leisure decision, and concluded that for some reason*: "the unintended consequence of labor market institutions and industrial policies designed to improve the performance of the economy",* workers decided to increase their leisure during the Great Depression. After more than twenty years[67] of trying to find without success what technological shocks could have caused the Great Depression, using *"the only 'engine for the discovery of truth' that we have in economics"* only changes in the 'labor input' could 'explain' it. Prescott's argument is an implicit recognition of the incapacity of this approach to explain such an important phenomenon. Of course, if by definition, money does not matter and finance neither, and the only true way to represent the economy is in terms of an individual utility maximizing agent, or an infinite number of them which is the same, silly conclusions can follow. A truly general theoretical system is needed.

An alternative view from the New Classical economists, is found in the proponents of what is also called the New Keynesian economics.[68] In general these scholars accept the integration of rational expectations to

macroeconomics, the consequences of the Lucas critique on econometric models, and more or less the integration of the labor markets to the IS-LM framework and the aggregate supply and demand model of modern macroeconomics. However, they stress the existence of market imperfections and market failures, and the implications of these problems for the evolution of the economy. At the policy formulation level and obviously in political views, there are extreme discrepancies between these two major contemporary currents in economic thought. Among the issues debated are the length of the period of adjustment of prices and wages, which is the analysis of nominal rigidities, and the character of fluctuations. It is recognized by everybody that exogenous variations in the aggregate demand, like consumers' confidence, fiscal deficit, trade deficit or changes in the money supply, among other forces, affect in the short term the level of real output. Nevertheless, it is also recognized that in the medium term it will tend to its natural level. New Classical economists will say that the short term is very short, that the economy is always on or very close to a competitive equilibrium. The room for active economic policies is minimal and developmental advice is reduced to waiting.[69] The more radical New Keynesians will say that the short term can be very long, that the effects of aggregate demand variations can be very long and persistent and that very significant deviations in output from its natural level can be caused by market failures. The New Keynesian economics recognizes the endogenous explanation of those rigidities that may cause an inefficient allocation of resources as a cornerstone of their research program.[70] For these scholars, there is ample room for activist economic policies. What these contemporary views also share is a severely limited view of financial markets, in particular of capital markets. There are, of course, alternative views on capital markets (For example, Stiglitz and Grunwald) that have provided considerable insight on the dynamic interaction of real and financial forces, among other important but partial contributions. Nevertheless, the more radical original Keynes' analytical proposal regarding the need for a general theory to deal with the short term fluctuations of employment and output, incorporating in a consistent way the theory of value, has not been

accomplished. In Keynes' vision such a theory would rely on the interaction of real and financial forces in the amplest sense.

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The theoretical system of classical economics does not account for short term nor financial and monetary phenomena, it describes essentially the workings of a pure free market economy where money and finance are neutral. This result is directly derived from the Smithian vision of profits as a cost coupled with the classical idea of capital as a set of commodities: two archaic tenets that should be abandoned. To explain the real workings of our economies, the classical system needs to be completed with the integration, in an essential way, of the financial and the monetary dimensions characteristic of modern capitalist economies. The core of such expansion requires a theory of profits as a residual and of capital as the property right over these profits.

In summary, the purpose of this essay is to develop a theory of the economics of capitalism, by supplementing the classical theory of free markets with a theory of capital, which will permit us to study in an integrated manner the workings of real, financial and monetary markets, with a short and a long term perspective. This theoretical proposal integrates Say's Law and the workings of competitive markets in a wider framework that admits a continuum of temporary general equilibrium positions, where the Smithian ideal end point is just one of them. Such a general equilibrium approach would require initially the adoption of the two classical equilibrium conditions, in the short and in the long term: Say's/Walras' Law, and, in the long term only: prices equal costs. This will allow us to consider profits as a residual value determined in real terms and as a temporary general equilibrium phenomenon. Once profits as a residual are determined, we need to find a way to determine the economy's general rate of profit, to study then the problem of the determination of the value of capital and its variations. A third general equilibrium short term condition should then be

considered: the returns on capital are equalized. To study the dynamics of the value of capital, we need to establish the way the profit rate interacts with the interest rate as determined by real and monetary forces. As well, we need to scrutinize the dominant capital pricing paradigms and to consider the issue of the structure of capital. A true contemporary ‘classical’ approach would also integrate fully the monetary and financial forces at play, and develop a consistent theory of the interest rate as a completely different phenomenon from the profit rate. Such a framework should be able to summarize in terms of an aggregate demand and supply analysis, the short term determination of income and the interest rate, considering the impact of capital effects. Finally, we may be able to advance the understanding of when and how the dynamics of capital may affect the short and long-term dynamics of the economic system, particularly cycles and financial crises, through variations in the value of capital and hence through changes in the value and distribution of wealth. This alternative option would concentrate on the core problems of the classical theoretical system that are still relevant for contemporary economics, and in the study of the complex dynamic processes, whereby real world economies, converge or not, either in a stable or in an unstable manner, towards a long term equilibrium, where the optimal results of free markets, as different from capitalism, can be realized. A ‘classical’ study of these processes would concentrate the analysis on the generation of profits, the profitability of capital and on its long-term trend. A true contemporary ‘classical’ approach to the study of modern capitalist economies would also integrate fully the monetary and financial forces at play, recognizing that financial forces can have real effects and that these can be negative, severe and long lasting. The central problem is not, whether or not modern capitalist economies are inherently unstable, as Karl Marx and George Soros, believe, or inherently stable, as Prescott and Lucas have argued, the problem is to understand the conditions where significant instabilities can emerge endogenously so that they can be avoided.

Notes to Chapter 1

[1] The most representative works within the classical political economy are in my view: Adam Smith "Wealth of Nations." David Ricardo "Principles of Political Economy and Taxation" Karl Marx “Capital.”

[2] Marx never used the term capitalism.

[3] As we will argue throughout this work, from the classics until today the concepts of profits, capital and the rate of profits are far from clear and they need a major revision and reformulation. We will propose what we believe are sound theoretical alternatives in this respect. Certainly, profits and the rate of profits are concepts that cannot be assimilated to each other: profits refer to the absolute mass, while the rate of profits is a measure of the profitability of capital. As we will see the nature of capital, its value and the appropriate way to determine the profitability of capital, are issues that are very far from settled in the literature, up to this date capital theory is plagued by confusion. Quoting Keynes on capital theory: *“There is, as I have said above, a remarkable lack of any clear account of the matter.”* John Maynard Keynes. “The General Theory of Employment, Interest and Money.” pp. pp 139.

[4] Not everybody will agree strictly with this assertion, but it can be argued that they did with different degrees of emphasis as far as the interdependence of the theories of value and distribution. Modern Neo-Ricardians in the Sraffian vein, argue that Value and distribution can be dealt with, in a completely independent manner, considering this approach as the truly classic way. See more on this chapter, and section 3.1 of chapter 3.

[5] Marx also worked implicitly within a perfect competition and general equilibrium approach, clearly shown in his models of the ‘simple exchange of commodities,’ in the reproduction schemata and in the transformation problem. He would say without the assumption that the sum of prices equals the sum of values and that the sum of profits equals total surplus value, political economy is without a rational foundation.

[6] For Marx, Malthus was the paradigm of this species. Ricardo was no so sympathetic either. In a letter from Ricardo to James Mill 1st of January 1821, referring to Malthus, he writes: “Political Economy he [Malthus] says it is not a strict science like mathematics, and therefore he thinks he may use words in a vague way, sometimes attaching one meaning to them, sometimes another and quite different. No proposition can be surely more absurd.” Kurz and Salvadori, 2002, Footnote 2.

[7] After Jean Baptiste Say.

[8] As is well known Marx’s distinguishes between ‘constant’ and ‘variable’ capital, where variable capital includes only wage goods, and is the ‘only” portion of capital that creates new value because it is used to buy the only source of value, the labor force. However, this distinction, fundamental for the Marxist theory of surplus value is irrelevant for our purposes.

[9] Ricardo’s identification of the ‘invariable measure of value’ with the commodity produced with average composition of capital made Sraffa conclude that: “This preoccupation with the effect of a change in wages arose from his [Ricardo’s] approach to the problem of value which, as we have seen, was dominated by his theory of profits. The ‘principal problem in Political economy’ was in his view the division of the national product between classes and in the course of that investigation he was troubled by the fact that the size of this product appears to change when the division changes. Even though nothing has occurred to change the magnitude of the aggregate, there may be apparent changes due solely to changes in measurement, owing to the fact that measurement is in terms of value and relative values have been altered as a result of a change in the division between wages and profits.” Thus the problem of value which interested Ricardo was how to find a measure of value which would be invariant to changes in the division of the product; for, if a rise or fall of wages by itself brought about a change in the magnitude of the social product, it would be hard to determine accurately the effect on profits.” (Sraffa 1951, p. xlviii-xlix). Sraffa, Piero. (1951), “Introduction”, The Works and Correspondence of David Ricardo. Vol.I, ed. P. Sraffa. Cambridge: The University Press. The first logically consistent solution to this theoretical problem at the expense of the labor theory of value was offered by Piero Sraffa in his book “Production of Commodities by Mean of Commodities: Prelude to a Critique of Economic Theory” 1960. Cambridge: The University Press.

[10] The Sraffian and Post-Sraffian critique of the neoclassical theory of capital, demonstrated that there was not a simple direct relationship between the quantity of capital employed in production and the return on capital—rate of profits or “marginal product of capital”—changes of techniques from low to high and vice versa, intensity of capital, could result in movements in the rate of profit contrary to those predicted by the neoclassical theory of capital as an homogeneous aggregate. This is the phenomenon of re-switching and proved the inconsistency of the marginal productivity theory of distribution. The re-switching phenomenon applies, except in very restrictive conditions, also to labor as an homogeneous aggregate.

[11] The Sraffian solution determines the prices of all individual commodities and, either wages or the profit rate, one of these variables needs to be determined outside the production system. Sraffa opts for the determination of the rate of profit, through the interest rate as determined within the financial system, a process that is not analyzed. By doing this Sraffa eliminates capital from production, with the implication that the Sraffian system does not have room for any theory of capital at all! Classic Walrasian and contemporary general equilibrium analysis, share this fundamental problem.

[12] In standard neoclassical economic theory firms maximize the mass of profits and the concept of the rate of profits is assimilated to the interest rate, which in equilibrium is posited to be equal to the physical marginal productivity of capital. In the Ricardian and Marxian approach the rate of profits is the ratio of the value of profits and the value of the means of production, producers are supposed to respond not to the mass but to the rate of profits. In the Neo Ricardian tradition and similar perspectives that claim for themselves the true Classical approach, it is the rate of profits the important variable to consider regarding the behavior of firms. I consider both perspectives as flawed.

[13] In modern terms this is the Lipsey-Lancaster Theorem: When an economy is not in a first-best optimum there is no way of telling whether a given change takes us nearer or further away from the first-best optimum.

[14] Walras, Leon. *Elements of Pure Economics or the Theory of Social Wealth.* First published in installments between 1874 and 1877. All the references are from the English translation by W. Jaffé, London: George Allen & Unwin. 1954.

[15] According to Luigi Pasinetti the synthesis of the theory of differential rents, first developed in 1777 by James Anderson and the principle of diminishing returns, into what we know as the Ricardian theory of rents, is due to Malthus.

[16] Even though the neoclassical theory of value was an independent theoretical development that took place before the radical socialist critiques that emerged at the end of the 19th century, it definitively provided, and still does, significant rethorical ammunition against them.

[17] The theory of the firm states that it is always possible to specify a function which expresses the maximum volume of physical output obtainable from all technically feasible combinations of physical inputs, given the knowledge about input-output relationships and considering that technical knowledge is freely available. Inputs are usually classified into more or less homogenous classes and both outputs and inputs are measured in flows. It is assumed for convenience that the production function so defined is smoothly differentiable. In this view it is strictly necessary to assume that firms are profit maximizing. The input demand functions or the factors demand, are derived as an inverse form of the marginal product equations. In perfectly competitive factor and product markets firms will hire workers, machines, and space until wage rates, machine rentals, and land rentals are equal to their respective marginal value or marginal revenue products.

[18] For a recent survey and critique of these approaches from a NeoRicardian perspective see: Pasinetti, Luigi. “Critique of the neoclassical theory of growth and distribution” Entry prepared for the Storia del XX secolo, planned and so far unpublished, by the Instituto della Enciclopedia Italiana. Available for PDF download at Prof. Pasinetti’s website.

[19] In Bohm-Bawerk capital is associated with roundabout methods of production: In order to reap a harvest, you could send workers into the fields to pluck the ears of corn. A more efficient method is to spend capital on making scythes and then use this to cut the corn. An even more efficient method is to spend even more capital manufacturing reaping machinery and use this to harvest your corn. Progress is achieved through the use of labor in more roundabout methods of production; a widening of the gap between inputs and outputs. Capital supplies the necessary subsistence to labor during the ‘waiting time’ before new consumer goods are produced. This waiting time is extended to yield increased productivity until, in equilibrium, productivity is equated with the rate of interest. The nature of the rate of interest could be found in: a) people expect to be better off in the future; b) people put a lower valuation on future goods than on present goods; a) and b) result in a time preference, people are willing to borrow now against future income, to increase consumption today; c) a technical proposition is added, existing goods are technically superior to future goods, because in the interval existing goods are capable of producing more goods. “Capital and Interest” (1884) and “Positive Theory of Capital” (1889). Once you dissect Bohm-Bawerk’s theory of interest is a restatement of the ancient capital as the wage fund theory, only with a variable period of production.

[20] See Chapter 6, section 6.1 for a more detailed formal treatment.

[21] She posed the central questions that dominated the debate: What do we mean by capital in neoclassical economics? How do we measure it in technical units (or) in a way that it is independent of distribution and prices, so it can be used coherently in a production function and legitimately regarded as one of the determinants of distribution? What sense can be made of the notion of an economy getting into equilibrium? Either it is in equilibrium (plans and expectations are fulfilled) and always have been there or not. There is no guarantee or sense in the notion of convergence on, or fluctuations around an equilibrium position. What sort of society is being analyzed? What is the meaning of capital?

[22] The literature on this theme is voluminous and has been amply surveyed and reported, just to mention a recent recapitulation by one of the great survivors on the Cambridge, UK, side, see: Harcourt, G. C. (1994) “The Capital Theory Controversies” in “Capitalism, Socialism and Post-Keynesianism” Selected Essays of G. C. Harcourt. 1995. Aldershot, Edward Elgar. Harcourt concludes with a very sad note: “…the current position is an uneasy state of rest, under which a time bomb is ticking away, planted by a small, powerless group of economists who are either aging or dead.” P. 45.

[23] The phenomenon of "re-switching of techniques", went virtually unnoticed when Sraffa's book (1960) was published, until the mid 1960s through a series of essays forming a "Symposium" edited by Samuelson in 1966. The opening article of such Symposium, was written by Pasinetti (1966) as a criticism of a previous article by Levhari (1965). The Symposium was followed by a copious literature (For surveys see Harcourt, 1969, 1972). As Luigi Pasinetti recently wrote: “The main theoretical finding of these contributions is that in general there is no inverse monotonic relation between quantity of capital (whatever the method chosen for its measurement, whether in physical or in value terms) and rate of profits, a phenomenon also known as reverse capital-deepening.” In “Critique of the neoclassical theory of growth and distribution” Unpublished. Pp. 33-34.

[24] As the editor of the 1966 Symposium Paul Samuelson concluded:"[...] the phenomenon of switching [...] of techniques [...] shows that the simple tale told by Jevons, Böhm-Bawerk, Wicksell and other neoclassical writers alleging that as the rate of interest falls in consequence of abstention from present consumption, in favor of future, technology must become in some sense more roundabout, more 'mechanized', and 'more productive' cannot be universally valid [...]. There often turns out to be no unambiguous way of characterizing different processes as more 'capital intensive' [...].[...] If all this causes headaches for those nostalgic for the old time parables of neoclassical writing, we must remind ourselves that scholars are not born to live an easy existence. We must respect, and appraise, the fact of life." (Samuelson, 1966b, pp. 568, 582-3). Charles Ferguson (1969), in a book dealing specifically with the neoclassical theory of production and income distribution, reiterated Samuelson’s propositions: "... the Cambridge Criticism definitely shows that there may be structures of production in which the Clark parable may not hold [...]. The crux of the matter is that economists may be unable to make any statements concerning the relation of production to competitive input and output markets. I believe they can; but that is a statement of faith, [...]". (Ferguson, 1969, p. 269). See Pasinetti, Unpub. P. 34-35. Prof. Blaug in his Economic Theory in Retrospect (1978) wrote: “The fact remains, however, that the Switching Theorem suffices to show that the Austrian theory of capital—meaning the theory which reduces the differences between capital goods to ‘time’ and which then measures ‘capital’ as an ‘average period of production’, the rate of interest being determined by the interaction of the average period and the three reasons for positive time-preference on the part of individuals—is untenable.” P. 557.

[25] The general equilibrium approach in its modern Arrow-Debreu, A&D, derived formulations that do not rely on the traditional production function approach using activity analysis instead, are immune to the re-switching critique and have succeeded in providing a consistent theory of value for all commodities. They are capable of determining relative prices for all present and future commodities. However, their treatment of capital and of the profitability of capital is still very far from satisfactory. The revolutionary character of activity analysis lies, from the instrumental perspective in the set-

theoretic approach which is more fundamental and powerful than the smooth differentiable production function traditional approach. From the more ample theoretical perspective it provides the foundations to analyze production in a strictly technical resource allocating way. Without making confusing and arbitrary distinction between the commodities used in productions and without endowing arbitrarily defined aggregates like land, labor or capital, with physical productivities of its own that are independent of its use. Some early versions of activity analysis often made a distinction among primary, intermediate, and desired commodities. Primary commodities defined as the ones which flow into production from outside the production system; intermediate commodities which are the ones produced only for use as inputs for further production; and desired goods as those produced for consumption or other uses outside the production system. These are clearly arbitrary definitions that cannot illuminate the fundamental issues pertaining capital and distributional theories.

[26] In 1965, in a pioneering essay Prof. F. H. Hahn of Cambridge UK, put forth the suggestion that money may be worthless: Money is characterized by the quality that is desired for what it will buy. If, for some reason, it were worthless, it could not be valuable in this way. Hence there would be no excess demand for it. But this means that the nil value in exchange is an equilibrium "price" of money. There is an equilibrium where the economy is effectively demonetized; it no longer appears to be a monetary economy. Hanh, F. H. "On some problems of proving the existence of an equilibrium in a monetary economy" In *The Theory of Interest Rates* F. Hahn and F. Brechling, eds. 1966, Macmillan, London and Basingstoke. In my view the classical long term is such an equilibrium where the economy is demonetized: the excess demand for money is nil.

[27] Irving Fisher "Theory of Interest" (1930), "The rate of Interest" (1907 and 1930). He can be considered the grand father of modern financial economics thanks to his work on investment appraisal. For Fisher the interest rate is governed by the interaction of two forces: a) the willingness of individuals to give up income now in exchange for income tomorrow, that is "time preference" a term invented by him; and b) the "investment opportunity principle," the technological possibility to convert income now into income in the future. What he called the "rate of return over cost" which for Keynes corresponded to his "marginal efficiency of capital" and in modern financial economics has been developed into the concept of the "internal rate of return." Fisher defined his "rate of return over cost" as that discount rate which equalized the present value of the possible alternative investment choices open, showing that the ranking of alternatives depended on the interest rate. Changes in the interest rate may result in changes in the ranking of alternative investments. The modern concept of the internal rate of return is that discount rate that equalizes the net present value of a series of future cash flows to zero.

[28] The term was introduced by Oscar Lange, several commentators have questioned the validity of this name considering that it is formally equivalent to the ancient Say's Law of markets, however the term has taken hold in the literature and I'll use both indistinctly.

[29] The first successful formulation and proof of this problem is due to Arrow and Debreu. (Arrow K. J. And Debreu, G. "Existence of an equilibrium for a Competitive economy." Econometric, 34, January 1966.) "The essential idea is to consider the model of competitive markets as the model of an n-person non-cooperative game and to utilize a theory developed in game theory." This is the essence of the modern formulation of the existence question. In Koopman's words: "The problem is no longer conceived as that of proving that a certain set of equations has a solution. It has been reformulated as one of proving that a number of maximization of individual goals under independent restraints can be simultaneously carried out." The usual procedure is summarized as: "…we first specify the consumption set for each consumer, the production set for each producer, the behavioral rule for each economic agent, and a competitive equilibrium. Then, using the assumptions on the consumption set and the production set, and so forth, we want to prove the existence of an equilibrium. The problem is no longer one of finding a solution for the simultaneous equations or inequalities. The stress now lies in the compatibility of each economic agent's behavior." Takayama, Akira. Mathematical Economics. 2d. De. (P. 261).

[30] Cited by Currie and Steedman in "Wrestling with time" Problems in Economic Theory. P. 67. See also W. Jaffé, "Walras' Economics as Others see It" 1980. Journal of Economic Literature 18. pp. 528-58.

[31] Of course, own rates of return can be positive, negative or zero. The price of a personal computer, lets say 1, or 5 years from now most likely is going to be less than today, so the corresponding own-rate will be negative.

[32] The term was initially used by Hicks: a temporary equilibrium is a situation where markets clear, Say's Law or Walras' Law holds, but the economy is not in full employment. It is out of the full employment growth path. The concept of Temporary General Equilibrium is discussed in chapter 2, most relevant references are included.

[33] Monetarists like to think that price theory is the crucial or the only paradigm that economics has to understand aggregate economics, and that this theory can be used to explain the whole range of social phenomena. The New Classical economists have their own particular ideas about the only paradigm in this respect as we will see. I believe that there is confusion with the use of some the principles of price theory, for example: individual rational behavior, and price or value theory itself. Of course, the different theories that are needed to complete the theoretical system of the classics need to be consistent with each other, and share the same basic principles. Principles that constitute the non falsifiable or non refutable hard core of the discipline, as different from the authentic hard core that can be refuted.

[34] "Thus the analysis of the Propensity to Consume, and the definition of the Marginal Efficiency of Capital and the theory of the Rate of Interest are the three main gaps in our existing knowledge which it will be necessary to fill. When this has been accomplished, we shall find that the Theory of Prices falls into its proper place as a matter which is subsidiary to our general theory." Keynes, J. M., "The General Theory" Pp. 32.

[35] Castorena Davis, Victor M. "The Theoretical System of Classical Economics", 2004.

[36] The best known are Robert E. Lucas Jr., Thomas J. Sargent, Robert M. Towsend, Robert Barro and within the Real Business Cycle school Edward Prescott and Finn Kydland, among others.

[37] The original monetarists are Milton Friedman, Allan Meltzer and Karl Brunner, among others.

[38] "...if Keynes seriously meant to question the validity or relevance of Walras' law, he would have to reject the orthodox theory of household behavior and propose an acceptable alternative--and the alternative would have to include orthodox theory as a special case, valid under conditions of full employment. Walras' law is not, after all, an independent postulate

of orthodox analysis; it is theorem which is susceptible to direct proof on the basis of premises which are typically taken as given in contemporary as well as classical price theory." […] "*...either Walras' law is incompatible with Keynesian economics, or Keynes had nothing fundamentally new to add to orthodox theory*." p. 41. "...suppose that Walras' law is both unreservedly valid, relevant and compatible with keynesian economics...(then) Keynes may be subsumed as a special case of the Hicks-Lange-Patinkin theory of *tatonnement* economics...We would then have to conclude that Keynes added nothing fundamentally new to orthodox economic theory."[…] "If Keynes added nothing new to orthodox doctrine, why have twenty-five years of discussion failed to produce **an integrated account of price theory and income analysis? If Keynes did add something new, the integration problem becomes explicable; but then we have to give up Walras' law as a fundamental principle of economic analysis.** It is precisely at this point, I believe, that virtually all previous writers have decided to part company with Keynes. I propose to follow a different course. I shall argue that the established theory of household behavior is, indeed, incompatible with Keynesian economics, that Keynes himself made tacit use of a more general theory, that this more general theory leads to excess-demand functions which include quantities as well as prices as independent variables, and that, except in conditions of full employment, the excess-demand functions so defined do not satisfy Walras' law." p. 43. Clower, Robert. "The Dual-Decision Hypothesis".

[39] I will concentrate solely in John Maynard Keynes, "The General Theory of Employment, Interest, and Money" First Harvest/Harcourt Inc. 1964. All quotes are from this edition.

[40] See Keynes, J. M. "The General Theory of Employment, Interest, and Money", p. 3.

[41] "It appears that the body of ideas discussed under the name of 'classical' economics represented a convenient straw man of Keynes' invention to represent the thinking of his predecessors. For Keynes, a 'classical' economist was any writer who defended Say's Law. By Say's Law, Keynes meant the proposition that any increment in output will automatically generate an equivalent increase in spending and income such as to maintain the economy at full employment." Blaug, Mark. "Economic Theory in Retrospect" (1978) pp. 691.

[42] "I was brought up to believe that the attitude of the Medieval Church to the rate of interest was inherently absurd, and that the subtle discussions aimed at distinguishing the return on money-loans from the return to active investment were merely Jesuitical attempts to find a practical escape from a foolish theory. But I now read these discussions as an honest intellectual effort to keep separate what the classical theory has inextricably confused together, namely, the rate of interest and the marginal efficiency of capital. For it now seems clear that the disquisitions of the schoolmen were directed towards the elucidation of a formula which should allow the schedule of the marginal efficiency of capital to be high, whilst using rule and custom and the moral law to keep down the rate of interest." Keynes, J. M. "The General Theory…" p. 351-52.

[43] "In assuming that the wage bargain determines the real wage the classical school has split in an illicit assumption. For there may be *no* method available to labor as a whole whereby it can bring the wage-goods equivalent of the general level of money-wages into conformity with the marginal disutility of the current volume of employment. There may exist no expedient by which labor as a whole can reduce its *real* wage to a given figure by making revised *money* bargains with the entrepreneurs. This will be our contention. We shall endeavor to show that primarily it is certain other forces which determine the general level of real wages." Op. cit. p.13.

[44] "Let us assume, for the moment, that labor is prepared to work for a lower money-wage and that a reduction in the existing level of money-wages would lead, through strikes and otherwise, to a withdrawal from the labor market of labor which is now employed. Does it follow from this that the existing level of real wages accurately measures the marginal disutility of labor? Not necessarily. For, although a reduction in the existing money-wage in terms of wage-goods would lead to a withdrawal of labor, it does not follow that a fall in the value of the existing money-wage in terms of wage-goods would do so, if it were due to a rise in the price of the latter. In other words, it may be the case that within a certain range the demand of labor is for a minimum money-wage and not for a minimum real wage. The classical school has tacitly assumed that this would involve no significant change in their theory. But this is not so. For if the supply of labor is not a function of real wages as its sole variable, their argument breaks down entirely and leaves the question of what the actual employment will be quite indeterminate. They do not seem to have realized that, unless the supply of labor is a function of real wages alone, their supply curve for labor will shift bodily with every movement of prices…Now ordinary experience tells us, beyond doubt, that a situation where labor stipulates (within limits) for a money-wage rather than a real wage, so far from being a mere possibility, is the normal case. Whilst workers will usually resist a reduction of money-wages, it is not their practice to withdraw their labor whenever there is a rise in the price of wage-goods." Op. cit. pp. 8.

[45] See Leijonhufvud, Axel. "On Keynesian Economics and the Economics of Keynes" A Study in Monetary Theory. New York, OXFORD UNIVERSITY PRESS, London 1968. P. 212. "The issues were not resolved. Keynes' General theory had the effect of cutting the debate short. The capital-theoretic controversies were buried under the avalanche pro-anti, and (soon enough) post-Keynesian writings, and the issues were to remain in abeyance for some thirty years…(Keynes) His main point was that "Classical" interest theory generally dealt with a barter system and ignored the store of value role of money. This point was generally accepted. At the same time, however, Keynes did not achieve a satisfactory statement of his own theory of interest that could be substituted for the doctrines he had sought to demolish. (Critics made it clear that)…Keynes overstated the role of liquidity preference in interest determination. But this criticism did not put new life into the earlier debate on capital and interest. It failed to do so because the reformulation of the "Keynesian system" provided by Hansen and others was widely accepted as a successful "integration" of Keynesian and classical interest theory." In footnote 9 Axel writes: "The "IS-LM formulation" of the matter replaced the Classical economists' "Thrift" and "Productivity"-the exogenous data of the problem—with the endogenous flow rates of saving and investment, and made no reference to the stock concepts of "wealth" and "capital."

[46] The works of Dow, Chick, Gerrard, etc., already quoted in the first section are a good example.

[47] Op. Cit. p. 139.

[48] Keynes had a contradictory view in this matter he wrote "A country is no richer" when the general level of securities prices goes up without any change in objective transformation possibilities, "but the citizens, beyond doubt, *feel* richer." See Leijonhufvud, A. P. 266.

[49] “Once we relinquish the treatment of saving as simply the purchase of bundles of differently dated amounts of “the” consumer good and admit a demand for “wealth as such,” the door is open to Keynes’ “Precaution, Foresight, Calculation, Improvement, Independence, Enterprise, Pride, and Avarice” and sundry other “spirits” of a more or less animal” description…This “view of what the world is like” also implies that in the management of his portfolio, the representative transactor will be vitally concerned with the risk of capital loss and that, on balance, he will try to shed “capital uncertainty” rather than (net) “income uncertainty.”” Leijonhufvud, Axel. Pp. 258-259.

[50] “The three divisions of liquidity-preference which we have distinguished above may be defined as depending on (i) the transactions-motive, *i.e.* the need of cash for the current transaction of personal and business exchanges; (ii) the precautionary-motive, *i.e.* the desire for security as to the future cash equivalent of a certain proportion of total resources; and (iii) the speculative-motive, *i.e.* the object of securing profit from knowing better than the market what the future will bring forth.” Keynes, J. M. “The General Theory…” P. 170.

[51] “The celebrated *optimism* of traditional economic theory, which has led to economists being looked upon as Candides, who, having left this world for the cultivation of their gardens, teach that all is for the best in the best of all possible worlds provided we will let well alone…” Op. cit. P.33.

[52] The underworld of those who like Malthus, believed that there could be deficiencies or excesses in aggregate demand, Say’s Law did not hold, which clearly was not the case in the work of Karl Marx. See Keynes, J. M. “The General Theory…” P. 32.

[53] Schumpeter distinguishes between two major analytical traditions in economics: Real Analysis and Monetary Analysis. In his words: "Real Analysis proceeds from the principle that all the essential phenomena of economic life are capable of being described in terms of goods and services, of decisions about them, and of relations between them. Money enters the picture only in the modest role of a technical device that has been adopted in order to facilitate transactions...So long as it functions normally, it does not affect the economic process, which behaves in the same way as it would in a barter economy: this is essentially what the concept of Neutral Money implies." […] "Monetary Analysis introduces the element of money on the very ground floor of our analytic structure and abandons the idea that all essential features of our economic life can be represented by a barter-economy model." (Schumpeter, J. A. 1954. History of Economic Analysis. New York: Oxford University Press. Pp. 277-78).

[54] Friedman and Schwartz: income and prices will typically be found 'dancing to the tune called by independently originating monetary changes'. Conclusion of Friedman and Schwartz:, “Monetary History of the United States” P. 686. Neo-walrasians typically argue that in a closed economy, the absolute levels of money prices and aggregate money income depend *ultimately* on the quantity of legal tender means of payment as determined by the fiscal and monetary operations of government; but that the impact effects of autonomous changes in the stock of legal-tender money cannot be disentangled from other and equally important sources of economic disturbance--technological, phsychological, etc.--not, at least, by visual inspection of historical time-series data and casual study of related events. More pointedly, legal tender money--which does not include either demand or time deposits-- is merely one of many generally acceptable means of payment. The great bulk of objects which people regard as "money" at any given point in time consists of debt instruments, the amounts of which are determined in the short run not by government authorities but by the general public....it is absurd to assign a prominent role in cyclical movements to variations in the stock of legal-tender money, and it is even more absurd to treat the total "stock of money," however one might define it as an independent variable. See Robert Clower, Pp. 69-70. As the great neo-Walrasian Frank Hahn, more or less, said: If money does not matter neither does inflation, it is a truly astonishing feat to 'embrace a theory were inflation has negligible costs, and yet be the most vociferous advocates about curing inflation at any price.'

[55] “I should think we would view any monetary model that did *not* have this neutrality property with the deepest suspicions, the way we would view a physical model that predicted different times for the earth to complete its orbit depending on whether distance is measured in miles or kilometers.” Robert E. Lucas Jr. “Models of Business Cycles” P. 74.

[56] A crucial aspect of the common practice of conceiving money and securities as goods no different than ‘apples an oranges’ and dealing with them in terms of individual agents maximizing the utility they derive from the amounts of cash goods and credit goods they consume, is that it must be assumed that there is decreasing marginal utility of having more money, otherwise the required equimarginal conditions do not obtain in equilibrium. In a world of profit maximizing firms where money is power, this is clearly contradictory.

[57] Needles to say Keynes concept of the marginal efficiency of capital is very different from the typical notion of the profit rate, etc., etc., the point of this extremely summarized summary is to underline the Keynesian relationship between the profitability of capital and effective demand.

[58] “Speculators may do no harm as bubbles on a steady stream of enterprise. But the position is serious when enterprise becomes the bubble on a whirlpool of speculation. When the capital development of a country becomes a by-product of the activities of a casino, the job is likely to be ill-done.” Keynes, J. M. “The General Theory…” P. 159. Of course, Keynes was not *against* financial markets per se, he was *for* the proper organization of financial markets and he saw a public policy dilemma in this: “As when we were discussing the marginal efficiency of capital, the question of having a highly organized market for dealing with debts presents us with a dilemma. For, in the absence of an organized market, liquidity-preference due to the precautionary-motive would be greatly increased; whereas the existence of an organised market gives an opportunity for wide fluctuations in liquidity-preference due to the speculative-motive.” P. 171.

[59] See for example: Blanchard Olivier, "Macroeconomics" Second Edition Prentice Hall, 2000.

[60] See Starr (1989).

[61] This is the kind of statement that infuriates New Classical economists and monetarists, that believe that every aspect of economics should be explained in terms of value theory, or of a particular version of it.

[62] See among others: Lucas, Robert E. Jr., 1972a. “Econometric testing of the Natural Rate Hypothesis.” Pp. 50-59. *The econometrics of Price Determination,* ed. Otto Eckstein. Washington DC Board of Governors of the Federal Reserve System. 1972b. “Expectations and the Neutrality of Money.” *Journal of Economic Theory 4* (April). Pp. 103-124. 1975.

“An Equilibrium Model of the Business Cycle.” *JPE* 83 (December) 1113-44. 1976. “Economic Policy Evaluation: A Critique.” Pages 19-46 in “The Phillips Curve and Labour Markets.” Supplement to *JME* 1 (April) Ed. Karl Brunner and Allan Meltzer. With Thomas J. Sargent. 1978 “After Keynesian Macro Economics.” In *After the Phillips Curve: Persistence of High Inflation and High Unemployment*. Boston: Federal Reserve Bank of Boston. With Leonard A. Rapping, Lucas published the two original papers: 1969. “Real Wages, Employment and Inflation.” *JPE* 77 (September): 721-54. and 1970. “Price Expectations and the Phillips Curve.” *AER* 59 (June) 342-50.

[63] Prescott and Kydland use a highly simplified model with a single good produced by capital and labour, with a constant return technology, consumer are identical and live forever, the only shocks to the system are exogenous, stochastic shifts in the production technology. The question is: “Can specific parametric descriptions of technology and preferences be found such that the movements induced in output, consumption, employment and other series in such a model by these exogenous shocks resemble the times series behavior of the observed counterparts to these series in the postwar, US economy?” In Lucas, Robert E. “Models of Business Cycles.” Pp. 34.

[64] An impeccable critique is that of Pasinetti: “The growth models with endogenous technical progress that have emerged are extraordinarily refined in terms of the analytical tools used and at the same time naively simplistic in their vision of the world. Basically, using few but fascinating elegant analytical tools, they offer a re-edition and a restrictive re-adaptation of a mathematical model of inter-temporal maximization which Frank Ramsey, a young mathematician in Keynes's Cambridge group, had proposed in 1928. His model was in fact conceived as an exercise in bringing out the analytical properties of a hypothetical economic system where an omniscient central planner, endowed with eternal life, decides on the distribution of production and consumption over time for all his subjects, being himself acquainted with all their preferences and all the constraints imposed by the technical conditions. But the authors of the growth model with endogenous technical progress have had greater ambitions, aiming at providing a descriptive scheme of the real world, and it is here that they have shown surprising naivety. None have had any hesitation in using neoclassical aggregate, continuous and differentiable production functions of the very type for which abandonment had been advocated twenty years earlier. None felt the need to justify or explain the use of notions like aggregate physical capital, which, moreover, they would most of the time include in Cobb-Douglas type production functions, resting on decidedly shaky empirical support. These are applied as if they were part and parcel of everyday economic reality, not the slightest doubt being shown about them.” […] (the savings rate and the capital/net income rate) “…are "modeled" in such a way as to emerge from a process intended to represent maximizing behaviour. In accordance with an approach that has found recent favour and diffusion, they are presented as having "microfoundations". It is from this feature that the growth models with endogenous technical progress acquire their elegance and at the same time reveal their naivety. Basically, they reduce their aim at analyzing the behaviour of a single individual considered as "representative"; no longer a planner for all the other individuals but for herself. This extraordinary and queer individual lives forever, has perfect knowledge of the technical production functions, actually of the production function for one single good, and knows how to improve it (in other words how to produce technical know-how). She knows her utility function, from now to infinity; she adopts a (given) rate of inter-temporal preference and knows perfectly how to allocate efforts and consumption over time, in such a way as to achieve maximization of the present value of her satisfaction, again from now to infinity, given the characteristics of production, learning, and consumer preferences, from now to eternity. It is hard to think how such singular individual could possibly be attributed the characteristic of "representativeness". Whether she is "representative" or not is precisely the question that one would wish to see demonstrated.” Pasinetti, Luigi. “Critique of…” Pp. 46--48.

[65] As we saw in section 4, according to Koopmans, general equilibrium deals with the problem of the consistency of the actions of many independent agents. In Koopmans words: “The problem is no longer conceived as that of proving that a certain set of equations has a solution. It has been reformulated as one of proving that a number of maximization of individual goals under independent restraints can be simultaneously carried out.” The usual procedure is summarized as: “…we first specify the consumption set for each consumer, the production set for each producer, the behavioral rule for each economic agent, and a competitive equilibrium. Then, using the assumptions on the consumption set and the production set, and so forth, we want to prove the existence of an equilibrium. The problem is no longer one of finding a solution for the simultaneous equations or inequalities. The stress now lies in the compatibility of each economic agent’s behavior.“ One must ask if this is the central problem of general equilibrium analysis, how can we consider models with a single agent or identical multiple agents, which is the same, as general equilibrium models?

[66] In Lucas, Robert E. “Models of Business Cycles.” Pp. 108.

[67] Counted from the publication of Finn E. Kydland and Edward C. Prescott, “Time to build and aggregate fluctuations” Econometrica 50 (1982), pp. 1345-70.

[68] See for example Romer, David “The New Keynesian Synthesis” Journal of Economic Perspectives, Winter 1993, pp. 5-22.

[69] Also for the New Classical economists, the role of expectations is fundamental. They argue that under conditions of rational expectations a system of competitive markets can reverse potential rigidities and markets imperfections, as long as informational asymmetries and shocks are transitory.

[70] I want to thank Dr. Fernando Noriega for pointing this out.

Chapter 2. The Nature of Profits.

Introduction.-

In an economy where every commodity is traded strictly in terms of equal values, that is in terms of equilibrium relative prices, the problem of the existence and determination of profits emerges. Classical economists would approach this problem considering the exchange of all commodities as a whole that is from a general equilibrium perspective, and, as Marx used to say, vulgar economists would not. The classical perspective on value and profits implies necessarily a general equilibrium approach, ad hoc hypotheses and partial analyses are the trade mark of the alternative. In this chapter the problem of profits from the classical perspective is considered, its purpose is to determine profits conceived, in a Ricardian spirit, as a residual of value but doing so under general equilibrium conditions. It is considered that the problem of profits should be solved at the most general level of abstraction without relying on special cases or particular hypotheses. Uncertainty, imperfect competition and information, rationality limits, among other equally important real world phenomena, are not considered at this initial state of the analysis.

I will argue that modern general equilibrium analysis in the way its has been developed by the seminal contributions of Arrow and Debreu, among others, inspired in the original Smithian vision of competitive markets and the contributions of Walras, admits the consideration of profits as a residual without changes in its fundamental logical structure. By solving in a definitive[1] manner the classical theoretical problem of the determination of value, Arrow and Debreu, have also provided us with a framework to solve the problem of profits as a residual of value. Once all the prices of commodities are determined, profits are determined. In the competitive equilibrium of a privately owned economy, profits can be positive, or, equal to zero. In Arrow and Debreu, profits do not correspond to the cost of a factor named capital, positive profits are *interpreted*[2]

as a payment to factors of production specific or particular of a firm, that are not marketed, and, hence, do not have a market determined price as other commodities that are traded in markets. Positive profits, interpreted in this way, are consistent with a competitive general equilibrium of the Arrow and Debreu type.

I will make a case for the reinterpretation of positive profits as a residual of value, within the same logical structure of Arrow and Debreu. Those factors of production that are considered unique or specific of a firm, that are not traded and that, hence, remain forever *frozen* in a firm. Are reinterpreted at the most general level as a temporary competitive advantage, which sooner or later will disappear. Either when it is replicated by other firms, or when the previously frozen factors, whatever they are, enter the market, become commodities and acquire a market price just as every other commodity. In this case the previously unique factors become simply another cost. It is conceived then, that the *frozen* exclusive factors that generate positive profits for Arrow and Debreu, *thaw* over time.

The introduction of real time in Arrow and Debreu, A&D, implies the restoration of the ancient classical distinction between the short and the long terms, as well as the second Walrasian, and other classics, long term equilibrium condition: prices equal costs/profits equal zero. This last condition usually not not made explicit in A&D type models which rely on the market clearing, supplies equal demands condition, assimilating both classical equilibrium conditions in one and the same. Once real time, against the compressed meta-time of A&D, is considered, positive profits are reinterpreted as a temporary residual of value that can emerge in general equilibrium conditions. As competitive advantages vanish over time—as frozen factors thaw—residual profits tend to zero. Instant to instant, as Walras would teach the basic data of the problem change and new equilibria are generated, it is a continuous equilibrium. It is postulated that temporary general equilibria with positive profits are not necessarily Pareto

efficient. It is always so, the long term competitive equilibrium where not only markets clear but also prices are equal to costs.

The chapter starts with a revision of the classic Walrasian equilibrium concepts and conditions. The concept of a temporary general equilibrium as Hicks originally stated is discussed and a reformulation is advanced. It follows with a presentation of the essentials of modern general equilibrium analysis as an introduction to the exposition of the two basic competitive equilibrium models á la A&D, the pure competitive equilibrium with zero profits, the basic CE model, which can be said to represent a pure free market in a long term equilibrium, and then the so-called competitive equilibrium of a privately owned economy, the CEPOE model, which admits positive profits and is considered as a temporary equilibrium, and constitutes if not the representation of a modern capitalist economy a step in that direction. The standard way of dealing with profits, within general equilibrium analysis, is then criticized and two alternative views on profits are discussed: Knight's and Schumpeter. The final section of the chapter argues for the consideration of profits as a residual determined in a temporary general equilibrium, a short term equilibrium that does not exhibit the optimal characteristics of a pure long term equilibrium, which is distinct from Smith's ideal end state. The implication that positive residual profits emerge in a temporary equilibrium where markets clears, is that the market forces that could take the economy to full long term equilibrium, are severely curtailed. The so called frozen factors that permit the existence of residual profits, may take a very long time to thaw. This opens the question of how to deal with these problems from a public policy perspective.

The fact that the existence of positive residual profits in a general equilibrium setting is not necessarily Paretto optimal, among other issues, has been amply discussed in the modern imperfect competition literature.[3] In general it is considered that the existence of a mark up on prices, rooted on monopolistic competition or any other possible form of market power, results in a general

equilibrium where output and employment are determined at levels below of those corresponding to a pure free market equilibrium with zero profits, caeteris paribus.

These issues will not be analyzed in detail in this work.

The habitual approach has not dealt in a satisfactory way with the processes that may take the economy from one position to another. The alternative presented is based on a reformulation of the classical long term condition that prices equal costs and in a conjecture about the particular dynamic form under which these processes take place. At its most general level, a particular theoretical proposal about the character of the processes that may take an economy from a temporary short term equilibrium with positive residual profits to a full long term equilibrium where prices equal costs, is included in the last chapter of this book.

2.1. Equilibrium concepts and conditions.

The conception of the real economic world in Walras[4] is that of a process in which there are equilibrating forces at work but where equilibrium is never attained, because of endogenous changes and exogenous disturbances, clearly the analysis of such of process, requires a notion, or notions, of equilibrium. Walras by adopting a *point de vue statique,* creates the first of his imaginary targets, the most developed and best known: the general equilibrium implied by the current data where markets clear, where prices equal costs, full equilibrium, the stationary state. Then, the barely outlined and undeveloped second imaginary target: the continuous equilibrium, a succession of temporary equilibrium situations where moment to moment the “basic data” of the problem changes. As is known Walras analysis posits two different sets of equilibrium conditions: first, excess demands for every agent are zero, or "supplies equal demands" which can be summarized as Walras' Law[5]; and, second: prices equal

costs of production for every good and service. Subsumed to the second we find another, in my view essentially different condition: returns on capital are equalized. Which in the classical and neoclassical perspective is not a distinct rule, when prices are equalized to costs, the cost of capital as a factor of production is included. If capital is assumed to be homogeneous then its price in equilibrium will be the same and will be included in the prices of commodities proportionally to its use, hence: prices will equal costs including the normal (price) return on capital, so profits appear as a cost. However Walras failed to elucidate the nature of this cost and ended up considering money as capital and the interest rate on funds as the cost or the return on capital. The problem is that money as something different from a unit of account, a numérarire, has no place in general equilibrium, where only the prices of commodities are determined, hence the interest rate as the cost of capital cannot be logically considered as the cost of capital and profits cannot logically be considered a cost. In a Walrasian full equilibrium profits are zero just as in Ricardo's true long term. Modern versions of general equilibrium models, particularly the best known Arrow-Debreu type usually incorporate in an explicit essential way, only the first condition: excess demands are zero, markets clear. However, in the original Walrasian vision both sets of conditions play an important role in distinguishing the long from the short term and in the Walrasian idea of the continuous equilibrium.

The critics that caricaturize Walras as being obsessed with the timeless determination of prices and of resource allocation and those of his followers who think economics is only that, have both ignored the Walrasian treatment of the conditions and consequences of economic progress in Part VII of the Elements. This last rapidly dismissed as a coda by Jaffé,[6] editor of the complete Walras' works and author of *the* English translation of the Elements. In Part VII Walras tries to introduce dynamics to his static analysis and abandons the stationary state assumptions, focusing on the systematic implications of economic progress, capital formation, changes in relative prices, etc. Here, is where Walras

visualizes equilibrium as the continuous process of chasing a moving target without ever reaching it. Jaffé does not take seriously Walras' attempt at dynamics (attempt ignored by most), and then claims that Walras' aim is not to understand how a capitalist economy works but "to portray how an imaginary system *might* work in conformity with principles of [commutative] justice..."[7] The implicit corollary is that Walrasian general equilibrium analysis cannot help us understand the real workings of a modern capitalist economy. Jaffé's critique is valid with a qualification: Walrasian general equilibrium analysis is concerned with the workings of a pure free market economy not a modern capitalist economy, but certainly does not make justice to Walras' vision for whom the ultimate goal was to understand the dynamics of a capitalist economy. What general equilibrium analysis does is to solve the classical problem of value, the determination of the relative prices of commodities in a logically consistent way under conditions of a pure free market and to provide a solid base for welfare analysis. To understand a modern capitalist economy we need a lot more: profits, the rate of profits, capital, money and the interest rate, need to be explained. And all of these particular theories need to be consistently integrated in the same general deductive structure, which in my view corresponds to the theoretical system of classical economics where value theory as developed by general equilibrium theorists plays a central role. Nevertheless, Jaffé's critique is valid for most of the contemporaneous general equilibrium theorists who are explicitly or implicitly concerned with 'how an imaginary system *might* work,' under carefully determined conditions. And for whom a free market economy and capitalism are one and the same thing.

For Walras, the static analysis of a pure free market economy was just an initial phase in the understanding of the long term dynamics of a capitalist economy. In this respect, the equilibrium conception of Walras involves more than the 'supplies equal demands' condition. He shares Marshall's interest in the long-period equilibrium where prices are ultimately determined by costs of production including a 'normal equal return on capital.' These long-period prices

refer to relative prices that would obtain in 'normal conditions' in a free market economy. Neither Walras nor Marshall succeeded in tackling with the dynamic issues of long term development of capitalist economies. Walras as is known devoted most of his work to the development of the analysis' initial phase, merely outlining the vision of a dynamic analysis. The need for the latter is quite often overlooked in contemporary writings.

It was not overlooked by Walras in Lesson 35 of the *Elements:*

"Finally, in order to come still more closely to reality, we must drop the hypothesis of an annual, market period and adopt in its place the hypothesis of a continuous market. Thus, we pass from the static to the dynamic state. For this purpose, we shall now suppose that the annual production and consumption, which we had hitherto represented as a constant magnitude for every moment of the year under consideration, change from instant to instant along with the basic data of the problem."[8]

In Walras the market is forever chasing, but never reaching, a moving target:

"Such is the continuous market, which is perpetually tending towards equilibrium without ever actually attaining it, because the market has no other way of approaching equilibrium except by groping, and, before the goal is reached, it has to renew its efforts and start over again, all the basic data of the problem, e. g. the initial quantities possessed, the utilities of goods and services, the technical coefficients, the excess of income over consumption, the working capital requirements, etc., having changed in the meantime. Viewed in this way, the market is like a lake agitated by the wind, where the water is incessantly seeking its level without ever reaching it. But whereas there are days when the surface of a lake is almost smooth, there never is a day when the effective demand for products and services equals their effective supply and when the

selling price of products equals the costs of the productive services used in making them."[9]

For Walras different adjustment processes operate at different speeds: in a single market, or in Marshalian terms in partial equilibrium, current prices pertaining to the market day are, can be, market clearing and can be determined in a matter of minutes. In contrast, "full" equilibrium, where prices are equal to costs of production requires a considerably longer and slower adjustment process. In Walras' words:

"The diversion of productive services from enterprises that are losing money to profitable enterprises takes place in various ways, the most important being through credit operations, but at best these ways are slow. It can happen and frequently does happen in the real world, that under some circumstances a selling price will remain for long periods of time above cost of production and continue to rise in spite of increases in output, while under other circumstances, a fall in price, following upon this rise, will suddenly bring the selling below costs of production and force entrepreneurs to reverse their production policies. For, just as a lake is, at times, stirred to its very depths by a storm, so also the market is sometimes thrown into violent confusion by crises, which are sudden and general disturbances of equilibrium. The more we know of the ideal conditions of equilibrium, the better we shall be able to control or to prevent these crises."[10]

For Walras the stationary state corresponding to a situation of long-term full equilibrium where: *"the selling price of products equals the costs of the productive services used in making them"* is clearly an analytical point of departure, not an historical or empirical one. He uses the stationary state as a theoretical benchmark, to try to understand the deviations from it, the historical empirically observable situation where prices diverge from costs, where there are profits and loses, where credit markets operate, where resources are re-allocated continuously from industry to industry, where output and prices vary, and where

the process towards a theoretical stationary state of full general equilibrium takes extended periods of time: "*without ever actually attaining it."*

In summary, Walras uses an abstract theoretical end state of the economy, which corresponds to a stationary free market full equilibrium, as an analytical first step to try to understand the day to day real operation of a modern capitalist economy and the dynamic forces that propel its long-term development. Walras view of the reality of a modern capitalist economy is that of a continuous equilibrium, the economy is always in a temporary equilibrium and this is different from day to day, moment to moment. Walras ultimately wanted to understand the process by which this continuous movement tended towards an abstract final state of full equilibrium. Walras dynamic vision is different from the perspective of the contemporary neoclassical and the new classical views which consider that the economy is in reality most of the time close to, if not in, a full equilibrium, and that deviations from this full equilibrium growth path, as defined in neoclassical growth models, are the result from various exogenous disturbances and shocks. So the economy moves from a full or close to full equilibrium situation, to another similar situation. However, as long as there are profits and loses, capital and capital markets, credit operations, migration of investment within industries, etc., etc., for Walras the real economy is not in a full equilibrium. Unfortunately, Walras merely outlined his dynamic vision and it is his static formal analysis that has drawn most attention. Of course, the detailed knowledge of the ideal conditions of equilibrium, can provide some general foundations for the understanding of the forces that ultimately drive capitalist economies, profits and capital, but the analysis of pure free markets in equilibrium is clearly not enough. Paraphrasing Prof. Hicks when he was urging the profession to "look at the frictions in the face" in order to integrate value and monetary theory. The "inherently formidable difficulties" of the dynamics of a modern monetary capitalistic economy have to be confronted directly. The Walrasian vision of the continuous market can prove very valuable in this respect.

2.2 The concept of temporary general equilibrium.

In “Value and Capital”, John Hicks[11] proposed to turn Walras’ static formal analysis into a dynamic one. In this book Hicks introduced the concept of temporary general equilibrium.[12] In a more recent work[13] Hicks wrote that he was following some of the ideas of Marshall in this respect. Initially Hicks proposed a new equilibrium concept, intertemporal equilibrium, nevertheless this required agents to have perfect foresight. As this assumption was considered extremely unrealistic, it was then considered that agents could make forecasting errors and a central role was given to expectations. Then the Hicksian concept of temporary equilibrium based on imperfect foresight was postulated. Here the economy is perceived as composed of a succession of single periods. His idea was to ‘treat a process of change as consisting of a series of temporary equilibria[14] that are achieved over a sequence of equal periods of time. The equilibria achieved in these periods will not be necessarily and exactly alike but should have common features.[15]

Hicks selected as the analytical time unit the week and assumed that trade only took place on Mondays, prices held over the week and they will govern the disposition of resources during the week. Contracts can indeed be carried out during the week (goods can be delivered, and so on); but no new contracts can be made until Monday of the next week.[16] The equilibrium of spot markets on a given Monday was designated as a temporary equilibrium. Future markets played an important role since agents’ expectations impinge on their supply and demand behavior in the spot market, however it was recognized that they may fail to reach equilibrium. In a general temporary equilibrium, demand equals supply for each good that is currently being produced or demanded. Assets are introduced as a mean to hold acquisition power through different periods, the aggregate demand to hold assets for purposes of consumption in future periods must equal the existing supply of assets. The interest rate is conceived as the price that will equate the demand and supply of financial assets. The equilibrium

prices of commodities and the interest rate on assets will last only for the single period under consideration – hence the qualifier 'temporary'. It can be considered as a general equilibrium because both markets, commodities and assets, clear. Market rationing was discarded and for Hicks temporary equilibrium was identical to Walras' static equilibrium, except that expectations about the future were explicitly introduced and that they may not be realized generating then a new different equilibrium in subsequent periods. Hicks' framework allowed for disequilibrium, even though markets would clear or Say/Walras' Law would hold all the time. For Hicks, the condition for equilibrium over time is that "the prices realized on the second Monday are the same as those which were previously expected to rule at that date. …The degree of disequilibrium marks the extent to which expectations are cheated, and plans go astray. No economic system ever does exhibit perfect equilibrium over time; nevertheless the ideal is approached more nearly at some time than at others."[17]

The idea of temporary equilibrium in Hicks, was directly linked to the idea of a different condition of equilibrium, different from the market clearing condition, this distinct condition was considered more fundamental and referred to the chain of successive temporary equilibria over time. As we said, the condition that expected prices were equal to realized prices was the condition for this sort of fundamental equilibrium. As Leijonhufvud[18] expressed it: market-clearing was equilibrium in a "limited sense"; it was a *lower* equilibrium concept. While 'equilibrium over time' when prices corresponded to expectations was a *higher*, equilibrium concept. When Hicks emphasized that the economic system was 'usually out of equilibrium' or in disequilibrium, it was because the non-attainment of the higher equilibrium, even tough the lower equilibrium concept of market clearing was being realized.

The original idea of a temporary equilibrium can be traced to both Walras and Marshall. Marshall distinguished from a short term or temporary equilibrium and what he called a "true equilibrium" or long term equilibrium more akin to the

classical prices equal cost condition. In the short term the matching of supply and demand resulted from agents' haggling and bargaining, however despite possible mismatches and income effects, in the long term Marshall claimed that false trading will not prevent the achievement of "true equilibrium." Eventually, the adjustment process was a matter of time.[19] Following Marshall's footsteps in considering that prices were fixed through trial and error, Hicks admitted the possibility of false trading, but as Marshall did, he considered that false trading will have negligible effects.[20] Given that adjustment was a time-taking process, Hicks considered that the single period should be as short as possible in order to authorize static analysis—the parameters of the market, its data and especially the supply of goods, remain fixed—his choice of a week was longer than Marshall's ultra-short period (the day) yet shorter than his short period, usually associated with a month or some more.

The ideas of a temporary equilibrium gave birth over time to the idea of a sequential economy. In a sequence economy, instead of single general competitive equilibrium determined at an initial moment which then remains binding for all time, as in Walras' static analysis; a sequence of equilibria is considered, the "long run" general equilibrium is conceived as a succession of "short run" equilibria.

Hicks' original vision on temporary equilibrium was awarded little attention until the 1970s when it was analyzed rigorously by Jean-Michel Grandmont[21] and others. In temporary equilibrium, agents form *ex ante* expectations of prices in future spot markets and decide which current goods to consume and produce now and how many financial assets to buy/sell in order to bring purchasing power into/from the future in anticipation of buying a particular basket of commodities then. In temporary equilibrium, there is no requirement that these *ex ante* expectations be fulfilled: spot markets for both commodities and assets clear within the Hicksian week on the basis of current demands and expectations of future spot prices, but these expectations may very well be different from the

actual spot prices that emerge in the future. The result is a sequence of spot-market temporary equilibria with expectations being contradicted or fulfilled in every successive week. The idea of a sequence economy or of succession of temporary equilibria within the framework of modern general equilibrium theory was revisited due to the difficulties regarding the integration of monetary theory to Walrasian theory:[22] in a perfect Walrasian scenario, money had no essential purpose. The consideration of money and financial assets required the use of sequential economies. We will come back to these issues that are crucial for our theory of capital and money.

In this work, we will use the concept of a general temporary equilibrium as a situation where, what we have called the first classical general equilibrium condition, that is all markets clear, holds. We consider this as a short term equilibrium, à la Walras, Marshall and Hicks. We will consider a full, true or long equilibrium, as a situation where what we have called the second classical general equilibrium condition, that is prices equal costs, holds. The central element in our view is the existence of positive residual profits in the short term and their elimination due to free market competition in the long term. The similitude and the differences between the Hicksian concept and ours should be clear in this respect. A fundamental difference is the consideration of equilibrium in the financial assets market, which in Hicks vision is attained through the equalization of the supply and demand for assets through variations in the interest rate. Once we have developed our theory of capital in chapter three we will reconsider what we have called the third classical general equilibrium condition: the returns on capital are equalized, which we consider as a short term condition. We will propose an alternative vision of capital and monetary markets and the interest will be dealt with separately, as a variable fundamentally different from the returns on capital. Regarding the size of the period, how short is short and how long is long, we will argue that it is a function of the competitive structure of the market: the less competitive the economy, the longer the short term, and vice versa. In chapter six we will present a brief formal analysis of the

proposed adjustment process whereby residual profits are eventually eliminated and a true long term full equilibrium is achieved.

2.3 Modern General Equilibrium Analysis.

Modern general equilibrium[23] analysis is an extension of Walras' contributions, the contemporary analysis of the existence, optimality and stability of general equilibrium in a free market competitive economy, were already considered by Walras. Modern economics as a scientific discipline would not be the most advanced of the social sciences without the methodological and theoretical contributions of Walras. Of course, it is common knowledge that some of Walras' solutions for key problems of economic theory were simply wrong. For example: from a general methodological perspective the incorrect view that there exists a solution to equilibrium, simply because the number of equations and the number of variables is the same. From the perspective of particular theories, a non-satisfactory treatment of profits, capital, money, and interest. Also, even though Walras had a clear general vision of the long term equilibrium of a pure free market economy—which he tended to equate to a modern capitalist economy—, evident in his views on the continuous equilibrium, he never developed a satisfactory treatment of the adjustment processes that would take the economy to a 'full equilibrium.' Just to mention some of the most relevant themes for our study.

Modern general equilibrium theory is concerned with the interactions of many individual agents in an economy. A competitive equilibrium in modern analysis is defined usually as the state of affairs in which: each consumer maximizes her satisfaction given her budget set defined by the prevailing price[24] vector; each producer maximizes her profit given the same price vector; and, the total supply of commodities is equal to the total demand for commodities. This last equilibrium condition we will refer to as Walras' Law: "supplies equal demands: markets clear." As we know this is not the only equilibrium condition

considered by Walras, but the only one used by most modern analysts. The existence of 'equilibrium' depends on whether or not there is a price vector that can sustain the above described state of affairs. In other words, the consistency of the concept and the model of a competitive economy are concerned with the question: are the actions of numerous competitive producers and consumers consistent with each other? If they are, then equilibrium can be achieved in the form of a system of relative prices of commodities that sustains it. In equilibrium the prices of all commodities are determined; the classical problem of value is solved. In a situation of equilibrium, consumers and producers will not face an incentive to do something different from what they are doing and given the circumstances, they are doing the best they can.[25]

The classical questions of general equilibrium analysis, or welfare economics, are whether every competitive equilibrium realizes a Pareto[26] optimum, which is a situation where no agent can increase her satisfaction without decreasing someone else's, and whether a Pareto optimal state can be achieved and supported by a competitive equilibrium. Of course, if both questions can be answered positively as it is the case in the literature, then the definition of the precise conditions which support each proposition becomes crucial. As we know these questions are at the center of the emergence of economics as a scientific discipline since the times of Adam Smith. Smith had a brilliant economic intuition about the relationship between free competition and the optimization of social welfare, but without any conceptual precision. It was until Pareto at the insistence of his friends Barone and Pantaleone that the concept of *Pareto Optimum* was introduced. After initial reformulations and contributions by Lerner, Lange, Hicks, and Samuelson, the first rigorous formulations and proof of these propositions was completed by Arrow and Debreu,[27] A&D. After A&D seminal contributions, other modern authors have simplified and perfected these expositions. We refer the interested reader to the sources for the detailed mathematical proofs that under certain conditions a competitive equilibrium will realize a Pareto optimum and that a Pareto optimum

can be achieved and is supported by a competitive equilibrium. One could never use general equilibrium models, GEMs, confidently, as a fundamental tool of theory building, if it was not clear that they have a solution.[28] General equilibrium analysis has shown that pure free markets can be an extremely efficient way of allocating resources and of organizing economic activity, within a set of perfectly defined conditions and within a given institutional framework. Of course, the issue about the correspondence of real life economies with these models is another quite different question. As Jaffé correctly pointed out, the economies portrayed in general equilibrium analysis are not modern capitalist economies. I would add that the frequent assimilation of free markets and capitalism is more ideological than analytical.

2.4 The competitive equilibrium of the "Free Market" and the "Privately Owned Economy."

The literature after Arrow and Debreu, A&D, has developed a myriad of general equilibrium models, GEMs, for different purposes. In these section I will summarize the A&D modern competitive equilibrium model[29] in its two basic formulations, the competitive equilibrium model, CE, which can be interpreted as a "pure" free market model, with zero profits in equilibrium; and the so-called competitive equilibrium of the privately owned economy, CEPOE, which considers the existence of 'shares' representing private ownership of firms and positive profits in equilibrium but still does not correspond to a capitalist economy. Capital is conceived in physical terms and as a part of the total resources available in the economy, as always is within the classical tradition. Nevertheless, the introduction of shares—not traded and valueless in A&D—can provide us with a solid stepping stone to conceptualize capital purely as a tradeable property right over residual profits in a consistent way with value theory. Both models are based on individual rational behavior, consumers maximize their utility in consumption and firms are profit maximizing, in a full

information environment. Both models use as the only equilibrium condition[30] Walras' Law, that is, markets clear. None deals with money as distinct from a simple unit of account, capital or financial markets. The main difference between these two models is that only the first model can be considered a true full long term equilibrium where in Walrasian terms, prices equal costs. First, I will describe these two basic models, for which Jaffé's critique of Walras is perfectly valid. That is: these models do not show *how* a capitalist economy works, but how an imaginary free market system *might* work in conformity with certain principles. Then, following the logical implications of these GEMs and with these developments in mind initiate the analysis of profits as residual of value, as a base for a model of a capitalist economy that can deal with capital as a property right, capital markets and money. That is to move towards a general theory of capitalism—akin to Walras' theory of 'social wealth'—for which Jaffé's critique does not apply.

The economy portrayed in these models, CE and CEPOE, has two types of economic agents "producers" and "consumers," a particular individual can be a producer and a consumer simultaneously. Markets are competitive and free in the sense that each economic agent is small relative to the size of the economy, there are no barriers to entry and the impact of the individual agent's actions, as a producer or consumer, on market prices are negligible. There is a large number of individual agents, every tradeable good or service, is a "commodity" defined by its physical characteristics, its availability location and its availability date. The behavioral rule for consumers is that each consumer maximizes her satisfaction over the set of commodity bundles that she can afford to buy with her income. Each producer maximizes her profit using the process or processes available in her production set. The approach followed is that of activity analysis. Should be well known, that the modern general equilibrium, GE, analysis of consumption and production does not use, require or invoke, vulgar marginal value and/or distribution theories, and/or micro or macro production functions. General equilibrium models, of the A&D type, are characterized by the existence of a full

set of futures markets that perform the role of intertemporal allocation. Every commodity is dated, that is, defined by its description and by its delivery date. The problem of uncertainty was treated by Debreu in the final chapter of his 1959 book, by generalizing the notion of commodity still further: a contract for the transfer of a commodity will include the specification of 'an event on the occurrence of which the transfer is conditional'. Debreu wrote: “This new definition of a commodity allows one to obtain a theory of uncertainty free from any probability concept and formally identical with the theory of certainty developed in the preceding chapters” (Debreu, 1959 p. 98). This approach is based on Ken Arrow's concept of 'choices of Nature’. Clearly, uncertainty is of utmost importance in real world economies, however to deal with it theoretically, a base notion of certainty is indispensable.[31] The typical household endowment consists of commodities—including heterogeneous labor or human capital services—dated for availability in the present (spot) and in the future, it consists of both current and future goods. Following the Walrasian tradition: there is a single date of active trade; trade takes place in dated commodities: current goods spot and futures contracts (goods contracted for delivery in the future). This is the way the intertemporal allocation process works. Each household would receive abstract purchasing power to be credited toward its purchases on the market, in exchange for sales of its endowment. It would then purchase spot goods for current consumption and contracts for delivery of future consumption.

In summary, the economy in Arrow and Debreu is an intertemporal, perfect foresight world with a complete set of future state-contingent markets available at the initial time period. Thus, the only thing an agent has to do is to purchase a set of future state-contingent commodities in the *initial* time period and then just watch the future unfold. A state-contingent commodity is a contract that promises to deliver to the holder of that contract a particular commodity when a particular state of nature occurs at a particular time (and delivers nothing at any other state and/or time). Thus, a *"commodity"* in the Arrow-Debreu world is a good which is described by its physical properties, its location in time, and the

state of the world in which it is delivered, e.g. *"raincoats delivered on August 25, 2010 if it rains"*. The notion of complete markets means that there are sufficient markets open at the initial period to trade on all types of physically-differentiated goods, say (n) goods, every possible state of nature every period, say (S) , and (T) time periods, which implies we need nST markets open to begin with, which is a very stringent assumption. As we will see in the next chapter the modern general equilibrium approach to money and finance is mostly based in the consideration of sequence economies, the introduction of special securities to overcome the need to have such a large set of future and state-contingent markets be open at once, the consideration of incomplete markets, among others. In this chapter we will concentrate in the most basic aspects of these models that are necessary for the purpose of this chapter: the analysis of profits. In the next chapter where we analyze the question of capital, we'll take up the subject again.

As Prof. Starr expressed it*: "The household goes to the market with a portfolio of securities representing its endowment and when all trades have been completed it leaves the market with a portfolio of securities representing its lifetime consumption plan."*[32] Markets will open only once, in the Arrow&Debreu world agents make a perfect-foresight decision on their consumption patterns from the outset and then purchase and sell intertemporal and state-contingent contracts at the *initial* time period. As these contracts are presumed to remain binding, then markets do not need to remain open once all contracts are made in the initial time period. Even if spot markets would reopen, there would be no trading as equilibrium in future state-contingent markets implies Pareto-optimality and no mutually beneficial trades would appear. Hence, the household budget constraint is a lifetime budget constraint expressed in terms of present discounted values of sales and purchases, where the value of all its purchases must equal the value of its sales. A crucial point in these models is that *current prices are present discounted values of dated goods.* Where each dated good's future price is discounted by its own-rate of interest, which in the model is directly

derived from the prices of the same commodity between two dates, own-rates of interest for different commodities are not equal. Given that current and future prices are determined by spot and future markets, the so-called own-rates of interest, which are nothing more than the per-cent relationship between these two prices of the same dated good, are of very little or nil theoretical interest,[33] i.e. agents do not react to them. It should be evident that, if what these models determine is the prices of commodities at different times and locations, the own-rates of interest or of return, are a simple numerical relationship without any economic significance.

The logic of this complete pure free market economy does not require debt instruments or capital markets characteristic of a modern capitalist economy. This is because futures markets allow the timing of household consumption to be allocated independently of the timing of sales by the household endowment. In this economy future markets perform two quite distinct functions: Price determination, all agents know the trade-off between present and future consumption and between goods at a variety of dates. And, a capital market function, allowing every household to arrange its desired consumption plan from the present to the future, subject to its lifetime budget constraint. The result is Pareto efficient in terms of household lifetime utility functions, and as firms maximize their profits they minimize costs so it is an efficient allocation too. Once all trade is realized at the initial date, economic activity is simply the fulfillment of the contracted plans. Under these theoretical conditions markets do not need to open at subsequent dates, because there are no desired net trades. The trading mechanism in an A&D type GEM is simplified in a way that implies that there is no role for a medium of exchange, money, in the trading process.[34] Money is only accounting money, a simple *numéraire,* and the interest rate as we usually know it—what Greenspan used to move—has no role or place in these models, nor does the profit rate on capital or capital as something different from commodities.

Before continuing an important point needs to be stressed, according to Debreu: *"By focusing attention on changes of dates one obtains, as a particular case of the general theory of commodities ... a theory of saving, investment, capital, and interest. Similarly by focusing attention on changes of locations one obtains, as another particular case of the same general theory, a theory of location, transportation, international trade and exchange."*[35] That is *'capital, and interest'*, or better said, profits and capital, *and* money and interest, are visualized by Debreu—and practically by all of his followers—as particular cases of the *'general theory of commodities.'* That is, at the same logical level of apples and oranges. In the present essay it is recognized that modern value theory á la A&D, has solved correctly the problem of the prices of commodities, however it is argued that capital and money cannot be considered simple commodities and, hence, their value cannot be determined by the '*general theory of commodities.'*

A formal presentation of the basic models will help to develop our argument more precisely. The following set theoretical definitions and notation[36] will be used:

There are *k* producers and *m* consumers in the economy. Agents are concerned with "commodities," every tradeable good and service, is a "commodity." A commodity bundle is considered to be an element of R^n, that is an *n*-dimensional vector whose components are real numbers. A commodity is defined by its physical characteristics, its availability location and its availability date. There is a "price," relative price, for each commodity and the price vector is an element in R^n .

The production process, y_j for the *j*th producer is an n-vector whose negative elements denote "inputs" and whose positive elements denote "outputs." The set of all possible input-output combinations for the *j*th producer is the production set of *j* denoted by Y_j. Obviously, $y_j E Y_j$ where Y_j is a subset of R^n.

If there are no economies or diseconomies of scale, the aggregate production set of the economy can be defined by

$$Y \equiv \sum_{j=1}^{k} Y_j$$

In modern general equilibrium analysis, the production process is considered from the point of view of activity analysis. The revolutionary character of activity analysis lies, from the instrumental perspective in the set-theoretic approach which is more fundamental and powerful than the smooth differentiable production function. With the consequence that the traditional approach then becomes redundant. And together with it, in my view, single good economy wide models with whatever version of marginal productivity analysis they come associated with, as well as the automatic assumption that market clearing implies the equality of prices to costs. From the more ample theoretical perspective, activity analysis provides the foundations to analyze production in a strictly technical resource allocating way. Without making confusing and arbitrary distinctions between the commodities used in production and without endowing arbitrarily defined aggregates like land, labor or capital, with physical productivities of its own that are independent of their use. Some early versions of activity analysis often made a distinction among primary, intermediate, and desired commodities. Primary commodities defined as the ones which flow into production from outside the production system; intermediate commodities which are the ones produced only for use as inputs for further production; and desired goods as those produced for consumption or other uses outside the production system. These are clearly arbitrary definitions that may obscure more than illuminate the fundamental issues regarding the nature of profits, capital and its dynamics. At this level of analysis they are clearly redundant. So *Y* should not be confused with output or income in the usual national accounting sense, which is equal to the flow of final demand goods, usually represented by Y. *Y*, the

aggregate production set of the economy, reflects the production possibilities available for a certain economy.[37]

The consumption set for the i^{th} individual is denoted by X_i and consists in the set of possible consumption bundles, x_i, where, $x_j E X_j$ where X_j is a subset of R^n. The aggregate consumption set of the economy can be defined by

$$X \equiv \sum_{i=1}^{m} X_i$$

Given a price vector p and consumers' income M_i, the consumers budget set is $\{x_i : x_i \text{ E } X_i \text{ and } p*x_i \leq M_i\}$. Consumers can only consume a value equal or less than their lifetime income.

Each individual receives her income by selling or offering her resources in the market, receiving gifts from someone else or receiving a share in the profits of firms. Income in this model means the total value of all the flows and stocks of the commodities than can be sold to the spot and futures markets. As we said, although the word income is more frequently used, the above definition corresponds more closely to wealth; however income will be used to keep in line with the current usage. This formulation implies that labor or better said, human capital, is heterogeneous, there is no logical reason to invoke any aggregation of these services, and each human capital service is unique. Brain surgery, software developing, street sweeping and brick-laying are distinct, unique human activities, not reducible to a single abstract category, and not priced by a single abstract mechanism, i. e. marginal productivity of labor. Each type of human capital services is a unique commodity and its price, that is the remuneration that the individual receives for her services, is determined by the general equilibrium conditions just as any other commodity.[38]

Human capital is unique also in the sense that it cannot be bought and sold, humans are free and slavery is long dead, only the services of human

capital are traded. Individuals can, of course, 'bank' on their human capital. As long as all the commodities are dated, income is also dated, so the possibility of lending and borrowing by individuals will affect the consumer's budget set. Within Arrow-Debreu style GEMs, the existence of dated commodities implies perfect foresight, and full future markets imply that the intertemporal allocation function of capital markets is performed by these markets: consumers enter the market with a set of securities representing their life endowment, and leave the market with a set of securities representing their life long consumption plan. There is no need or room for capital markets in the usual real-life sense of the phrase.

If the consumption vector of individual i, is x_i taken all its components as nonnegative, denoting her resources as $\underline{x}_i$ and assuming that she gets all her income by selling $\underline{x}_i$, then when price vector p prevails in the market, her income will be $p^* \underline{x}_i$ and her budget constraint $p^* x_i \leq p^* \underline{x}_i$

So if we denote the initial resources held by consumer i^{th} by $\underline{x}_i$ then the initial bundle of commodities held by consumers in the aggregate is

$$\underline{x} \equiv \sum_{i=1}^{m} \underline{x}_i$$

If, $z_i \equiv x_i - \underline{x}_i$ then the budget constraint can be rewritten as $p^* z_i \leq 0$ in this convention z_i includes negative elements that are quantities supplied and positive elements representing quantities received. In this case the set X_i represents the set of all possible consumptions and trades for the ith consumer.

The usual definitions of feasibility, Pareto optimum, and competitive equilibrium are as follows:

Definition (feasibility): An array of consumption vectors $\{ x_i \}$ is said to be feasible if there exists an array of production vectors $\{ y_j \}$ such that
$x = y + \underline{x}$

Definition (Pareto optimality): A feasible $\{ x_i \hat{} \}$ is said to be **Pareto optimal (P. O.)** if there does not exist a feasible $\{ x_i ' \}$ such that $x_i ' \geq x_i \hat{}$ for all i=1,2,..., m with $>i$ for at least one i.

Definition (competitive equilibrium): An array of vectors $[p\hat{}, \{ x_i \hat{} \}, \{ y_j \hat{} \}]$ is called a **competitive equilibrium (C. E .),** if $x_i \hat{} \; E \; X_i$, $i = 1,2,...m$, $y_j \hat{} \; E \; Y_j \quad j = 1,2,...k$,

and,

(i) $x_i \hat{} \geq x_i$ for all $x_i \; E \; X_i$, $i = 1,2,...m$, (consumer equilibrium)

(ii) $p\hat{} * y_j \hat{} \geq p\hat{} * y_j$ for all $y_j \; E \; Y_j \quad j = 1,2,...k$, (profit maximization)

(iii) $x\hat{} = y\hat{} + \underline{x}$ (feasibility) [39]

Based on this type of logical structures, general equilibrium theorists proceed then to demonstrate the existence of a competitive equilibrium in the form of a vector of prices, that is technically feasible and Pareto optimal.[40] This model of a competitive equilibrium can be interpreted as a pure free market economy, that achieves what Walras saw as a full long term equilibrium, where costs equal prices and the profit maximization behavior of producers results in the elimination of profits. That is, without the introduction of ad hoc hypotheses, profits are equal to zero in equilibrium.[41] Let us recall that all of the commodities employed in production are remunerated at equilibrium levels and unless we arbitrarily define profits as a payment for the use of a particular undefined resource, the previous result maintains. The level of consumption in real terms is the maximum achievable given the existing resources and technology, and the optimality and stability of the system is guaranteed. Such an ideal state could be seen as the classical stationary state; as long as the ‘basic data’ of the system

remains unchanged the system will generate just enough output to sustain the maximum desired level of consumption that is technically feasible. Over time net and gross investment will vary at the levels required so that the productive capacity can sustain the desired life-cycle consumption. Only human capital will be remunerated at the highest possible rates, including, of course, managerial wages, and only non-reproducible assets and non renewable natural resources will be in a position to generate a rent for their owners, as a residual value given its best use. This hypothetical state corresponds to what I have termed Ricardo's true long term equilibrium, all income or wealth is distributed between rents and wages, profits are zero.[42] This is the logical long-term outcome of the workings of a pure free market economy and entails the positive social welfare results posited by Smith's invisible hand theorem. This model can be interpreted as a hyper developed pure barter economy, where the trading process is centralized —the Walrasian auctioneer being a parable of a set of institutions that would perform such a role—, where the existence of a full set of futures markets will deal with the intertemporal allocation processes which will be determined by technology and preferences without a role for the so called own-rates of return. In this world only accounting money is needed, the interest rate as we know it has no place, profits and capital as a claim over them have neither, or they will have ceased to exist.[43]

The basic free market competitive equilibrium model we have briefly presented, does not specify who owns the profits to be maximized and how each consumer obtains the income to purchase her consumption vector. An expanded basic model, the CEPOE, considers the private ownership economy case: it is assumed in the literature that all the resources are initially held by the consumers only and some are sold (rented) to the producers that are conceived as firms. Firms are owned by consumers only and ownership is represented by stock, shares, issued by the producers. Producers or firms may get positive, zero or negative profits, consumers receive their share of profits or losses. It should be noted that 'firms' are introduced at this level without an explicit logical foundation

or a clear rationale for their existence. If all the resources available for production are initially in the hands of consumers and we can obtain a competitive full equilibrium in a pure barter firm-less world, then what is exactly a firm? What does a firm own that is different from the productive resources already owned by consumers? And what is exactly what the property right embedded in shares represents? In the next chapters some of these issues will be analyzed.

Let us present the well known model of the competitive equilibrium of a privately owned economy, CEPOE, which includes profits and shares. Consumers receive income from selling the commodities they own, that is the sale of services from their human capital and whatever else they can trade, plus a share in the profits generated by firms they own.

Let $y_j \; E \; R^n$ be the production point (input-output combination) chosen by producer *j*th when price p prevails, as we know the negative elements of y_j are inputs and the positive outputs. Then p * y_j represents the profits of producer *j*th.

If we represent with θ_{ji} the fraction of the stock of the *j*th producer owned by the *i*th consumer then

$$\sum_{i=1}^{m} \theta_{ji} = 1 \text{ for all } j \text{ and } \theta_{ji} \geq 0 \text{ for all } j \text{ and } i.$$

So total income (or wealth) of consumer i, prior to any consumption, can be represented as[44]

$$p^* \underline{x}_i + \sum_{i=1}^{m} \theta_{ji} (p^* y_i)$$

So in the case of a privately owned economy the following definitions apply:

Definition (competitive equilibrium of the private ownership economy): An array of vectors $[\, p\hat{}, \{ x_i\hat{} \}, \{ y_j\hat{} \}, \{ \theta_{ji} \}]$ is called a **competitive equilibrium of the private ownership economy (C. E. P.O.E.),** if $x_i\hat{} \; E \; X_i$, $i = 1,2,...m$, $y_j\hat{} \; E \; Y_j \quad j = 1,2,...k$,

and,

(i) $x_i\hat{} \geq_i x_i$ for all $x_i \; E \; X_i$, such that $p\hat{} * x_i \leq M_i$,
where $M_i = p\hat{} * \underline{x_i} + \sum_{i=1}^{m} \theta_{ji} (p\hat{} * y\hat{}_i)$
$i = 1,2,...m$, consumer maximization.

(ii) $p\hat{} * y_j\hat{} \geq p\hat{} * y_j$ for all $y_j \; E \; Y_j \quad j = 1,2,...k$, profit maximization

(iii) $x\hat{} = y\hat{} + \underline{x}$ feasibility.

It is usually posited in the literature that the expanded basic model including profits and shares in the ownership of firms in the specified manner, exhibits the same positive social welfare characteristics as the pure free market competitive model. As has been demonstrated under precise conditions, equilibrium solutions exist for general equilibrium models of this type. They are considered unique, stable, efficient and optimal and it is posited that if the above specified array of vectors including profits and shares is a competitive equilibrium of the private ownership economy CEPOE, then it is also a competitive equilibrium too. Following Takayama: "It is easy to check that every CE can be derived from some CEPOE. This can be done by giving the *i*th consumer the resources $\underline{x_i} \equiv x_i\hat{} - (1/m)\, y\hat{}$ and the shares $\theta_{ji} \equiv 1/m$ (observe that $\sum_{i=1}^{m} \theta_{ji} = 1$, $x\hat{} = y\hat{} + \underline{x}$, and so on), where $[\, p\hat{}, \{ x_i\hat{} \}, \{ y_j\hat{} \}]$ is a C.E. "[45] Of course, it should be evident that this condition is an arbitrary redistribution of resources with no meaningful direct economic interpretation. It also should be evident that the equilibrium condition, demand equals supply, was preserved by introducing profits simultaneously as costs and as revenues, without an explicit

logical foundation, that is both classical equilibrium conditions, markets clear and prices equal costs, are compressed into one and the same. In other words, profits are assumed to be a cost, and the second classical equilibrium condition that prices equal costs is simply introduced by assumption so the optimal results of a competitive equilibrium are maintained in a situation where profits are positive. We have seen that profits cannot be considered legitimately as a cost, they appear as a residual as in the Ricardian tradition, if this is the case, how can we ascribe the same logical properties to both different types of competitive equilibrium? As we showed before[46] when Walras introduced an initial version of the marginal productivity theory to his system, he implicitly turned the classical long term equilibrium condition that prices are equal to costs into a short and long term condition making it a redundant part of his system. However, if the marginal productivity theory of distribution cannot be sustained, as has been over and over demonstrated, then the classical long term condition that prices equal costs would remain as an indispensable part of the original Walrasian vision.

Walras himself was not able to provide a complete satisfactory mathematical proof on the existence and stability of a competitive equilibrium.[47] Contemporaneous general equilibrium theorists have proved in different ways the existence and stability of a competitive equilibrium under the conditions sketched above. Starting with the so-called Walras-Cassel[48] system and after that the definitive works of Arrow and Debreu, McKenzie, among others.[49] We could not use these models confidently as theory building tools, if this was not the case. This is not the place, or the writer, to repeat the fundamental contributions of these authors which are well known. Suffice it to say that the theoretical proof of the existence and stability of a competitive equilibrium confronts very important and difficult problems and related assumptions, first recognized and systematized by Arrow and Debreu. The most important, among others, are the survival and satiation problems; the character of the utility functions and the production set; and the number of producers, usually considered as determined exogenously. This last problem is inextricably linked with the question of profits

and hence with the question of capital. Profits and capital need to be explicitly and essentially incorporated in general equilibrium analysis to construct a better understanding of the workings of modern capitalist economies in the real world. The traditional Smithian approach of profits as cost has to be abandoned; we need to develop the Ricardian vision of profits as a residual.

The classic problem concerning profits confronted by Smith, Ricardo, and Marx, was how to explain the emergence of profits if trade was conducted strictly in terms of equivalent values. If all commodities were traded according to their value, how was it possible that a surplus value would appear? It should be apparent that this logical problem should be solved without leaving the assumptions of pure competition that necessarily imply a general equilibrium approach. For Marx the dividing line between classical economics and vulgar economics was right here. The classics would solve this problem under conditions of pure competition, vulgar economists would not. The introduction of ad-hoc hypotheses was the trade-mark of the 'vulgar' economists. In contemporary terms we need to explain profits, within a general equilibrium framework.

2.5 Profits in General Equilibrium Analysis

Earlier versions of general equilibrium analysis relied on marginal productivity analysis and tried to generalize a Smithian approach through ad-hoc capital and interest theories. Modern general equilibrium models, have shown that the old marginalistic approach is redundant, activity analysis is a more powerful theoretical alternative and does not require the simplistic and often purely ideological tenets of marginalism. Nevertheless, the treatment of profits and the conceptualization of its nature is either ambiguous, or it is simply assumed away by making profits the cost of some special resources, private factors, that are not marketed.[50] Again, either we introduce ad hoc hypotheses

that *define* profits as a cost, or we have to recognize that under perfect competition residual profits are zero.

The question of profits is one of the most important and difficult problems concerning the existence of a competitive equilibrium within a general equilibrium framework, it is usually considered in the context of the number of firms in an industry and the nature of returns and scale: constant, diminishing or increasing returns.[51] The usual treatment of profits in general equilibrium models is summarized in the next quote: *"In Arrow and Debreu and subsequent works such as Debreu, it is assumed that the total number of firms (producers) is fixed... It is well known and can easily be checked that diminishing returns to scale for an individual producer implies a positive profit, which in turn should imply that firms enter the market. Constant returns to scale for the aggregate production set can be justified on the basis of an adjustment in the number of firms, which are small compared to the industry. Diminishing returns to scale for an individual firm typically occur when there are certain limitational fixed factors, such as managerial ability or entrepreneurship, which are not explicitly introduced in the model (and are not marketed). Therefore, diminishing returns to scale (for each firm) plus a finite fixed set of firms imply the scarcity of certain commodities (factors) and freezing the assignment to various production processes of these commodities... Under diminishing returns to scale, firms may make profits, which are attributable to payments for the use of such resources as entrepreneurial skills or special talents of some kind. In McKenzie's model, such resources are explicitly included in the list of commodities (and marketed) and the number of firms need not be fixed, so we can safely assume constant returns to scale for the aggregate production set."* [52] If profits are payments for the services of some particular commodities that can be traded and as long as new firms can enter the market, a competitive equilibrium with positive profits will be at most short lived and profits will tend to zero. The consideration of some services provided by human capital, *such as managerial ability or entrepreneurship,* as factors that are not marketed and that are 'fixed' in a

particular firm, is obviously an arbitrary assumption. In reality the markets for executive talent and top management are as active as any other market, and there is no logical or empirical reason to treat some human services as fixed and not marketed, while the rest is variable and marketed. Mostly in small and medium or family owned concerns, managerial wages and profits are mixed, and even so competition will set them at a market level consistent with equivalent remunerations for these types of human capital. In corporations where management and ownership is separated, managerial wages and profits are completely different things.[53] In my perspective, McKenzie's approach is correct: all resources are treated as commodities, all of them are traded and their prices are determined by general equilibrium conditions. This approach, the rejection of vulgar marginal productivity of factors theories by the consideration of activity analysis requires the introduction of the second classical long term equilibrium condition, prices equal costs, profits are zero, and so it is the value of capital. When profits on shares are made explicit in the competitive equilibrium model of the privately owned economy, CEPOE, they are not explained (to assume that they correspond to payments to unique firm specific factors of production that remain in the dark, is, for sure, not an explanation) and the role profits play in the dynamics of the system, very important in the real world, becomes diluted in an ambiguous and partial way. Nevertheless, we have a competitive equilibrium with positive profits that are determined endogenously in a way consistent with Walras' Law which corresponds to the market clearing postulate.

The introduction of profits and shares in the competitive equilibrium of a privately owned economy model is an initial step towards a more realistic model of a modern capitalist economy. But the assumption that profits are a cost can be seen as an ad-hoc step to avoid the uncomfortable implication that in a full equilibrium profits are zero, but we have a system that depends on the profit maximization behavior of producers. The logical implication of the standard approach, is that there are input-output vectors that are only available for a particular firm so: $p^ * y_j^ > 0$, which introduces an artificial restriction on

society's production set: There are input-output vectors that in equilibrium yield positive profits, $p^ * y_{jp}^ > 0$, but they are only accessible in a permanent way to a limited set of producers. This is an obvious ad-hoc hypothesis which contradicts the hard core of the theory. This formulation presents a problem: if in equilibrium profits as a residual disappear, we are then in the pure free market competitive equilibrium, the simple CE model. If profits are a cost, then they should enter the input-output vectors available for all the firms, and again $p^ * y_j^ = 0$, we are in the competitive equilibrium world, in a pure free market. Clearly to consider profits as the "cost" of a factor that does not enter the complete set of input output vectors so profits are distinct from zero in equilibrium, is not a satisfactory solution, if we are trying to understand a modern capitalist economy.

What is of interest for our purposes is that we can determine in a logically consistent way the prices of all the commodities that constitute wealth in the amplest sense, in a general equilibrium that comprises current or spot prices and future prices. Equilibrium prices for all commodities are determined both in situations with zero and with positive profits. Standard analysis considers profits as a cost in the Smithian tradition, they are forced to introduce ad hoc hypotheses, as the existence of special factors that are not marketed and that are 'frozen' within a firm, to support they contention. Within the same analytical framework we can correctly conceptualize profits as a residual, in the Ricardian tradition. Once all prices are determined profits are determined. What we need to do is to distinguish between the short term—where markets clear but prices diverge from costs—and the long term—markets clear *and* prices equal costs. Also we need to reintroduce real time in the analysis, only current or spot prices are real, future prices are virtual, positive profits are a temporary phenomenon, and if the value of capital depends on current and future profits, it is essentially a virtual value. Only the full long term equilibrium, where both classical equilibrium conditions hold,[54] exhibits the positive optimal characteristics of a Smithian-Walrasian, pure free market.

There are, of course, alternatives theories of profits. Let's consider the two most relevant for our theme.

2.6 Alternative views of profits: Schumpeter and Knight

Schumpeter[55] argues that if entrepreneurs are making positive profits, it is because the economy is never perfectly competitive, or in equilibrium. Pure profits are due to the existence of monopoly positions or temporary deviations of market from equilibrium prices due to imperfections of competition. Entrepreneurs innovate looking for unexplored profit opportunities. Discovering these opportunities and organizing production accordingly, entrepreneurs assure themselves of a temporary monopolistic position and of the ability to obtain a disequilibrium profit as long as competition from other entrepreneurs does not materialize in that market. How important and how temporary these profits are depends on the particulars of the productive or commercial innovation and on the degree of institutional rigidity of the economy. It should be clear that stating that profits are positive because we are not in equilibrium, does not solve the classical problem of the existence of profits in equilibrium.

Another contemporary alternative to deal with the problem of the existence of profits in equilibrium is the introduction of uncertainty a la Knight.[56] Knight stated that the presence of uncertainty about the future could make it possible for entrepreneurs to earn positive profits despite product exhaustion and competitive equilibrium. For Knight, the entrepreneur is forced to speculate on the price of his final product, because production takes place before consumption. The demand for factors, labor, land, capital, etc., is derived from the expected consumer's demand for output. Unless the demand price for output is known the product price is not determined. The entrepreneur guesses the price at which the output product will sell, and translates the marginal physical products of hired factors into anticipated marginal value products. Hired factors are awarded their remuneration on a contractual basis, the entrepreneur as a residual claimant,

may make a profit if realized total receipts prove to be greater than forecasted total receipts.[57]

The approach to profits in this work is different from Schumpeter's in that he considers profits as a disequilibrium phenomenon and he accepts the Smithian idea of the existence of a cost of capital, while we consider that the existence of profits is consistent with a full information competitive equilibrium—temporary, short term, but a market clearing equilibrium—and, we reject the Smithian view on profits. We have argued that at the most basic level, residual profits exist because it takes time to replicate a competitive advantage and to achieve a long term full equilibrium. To consider profits as a disequilibrium phenomenon, á la Schumpeter, has a very important corollary: the economy is always more or less in a full equilibrium, entrepreneurial profits can only be short lived and profits will be equalized to the cost of capital rapidly by competition reestablishing equilibrium. In disequilibrium situation market forces operate at their full strength. By contrast, if profits as a residual are an equilibrium[58] phenomenon, that is a phenomenon consistent with Walras' Law, then we can have positive profits for very long periods of time. Hence, the economy is seldom, if ever, in a full equilibrium situation and can stay quite far away from such a state for extended periods of time. The main difference between our approach and Knight's, is that Knight's is an effort to explain profits in a consistent way with the marginal productivity theory of factor pricing, hence the emphasis on product exhaustion in equilibrium. Modern general equilibrium by using activity analysis does not require production functions and/or a marginal productivity theory. General equilibrium assumes certainty, market prices are known, and profits caused by uncertainty, Knightian profits, have no place in general equilibrium. However, positive profits as a residual of value are completely determined in a short term general equilibrium where markets clear. An important point needs to be stressed here, if markets are clearing, then the strength of the market forces that may eventually eliminate residual profits is severely curtailed. Those

mysterious private factors ‘frozen’ within privileged firms, may well never ‘thaw,’ if left to the market alone.

2.7 Residual Profits as a Temporary Equilibrium.

In the standard teachings of neoclassical economics, the need for a theory of profits has been eliminated and profits have remained unexplained. In the words of Prof. Blaug:

"The classical conception of profit as an income accruing to a socioeconomic class enjoying the status of employer, combining the functions of both capitalist and manager, has given way in modern economics to the conception of profit as a noncontractual windfall gain accruing to a disembodied entrepreneur. There is no problem about where this profits come from: they constitute, as it where, a tax on the productivity of hired agents.... So long as we retain the assumption of perfect competition and constant returns to scale leading to product exhaustion - the sum of the anticipated distributive shares equals the anticipated value of total output - profits are due solely to noninsurable ‘uncertainty.’ But if we drop these assumptions, a number of new kinds of profits make their appearance. There is ‘monopoly profit’, owing to restricted entry into the industry. Then there is ‘monopsony profit’ , owing to a divergence between average and marginal factor costs. Finally, there are ‘Ricardian rents’, resulting from inelasticities in the supply of factors; unlike the other gains, these are not the object of entrepreneurial expectations and do not violate the assumptions of constant costs and perfect competition. Nevertheless, all these do come within the purview of the uncertainty theory of profit. Any monopoly or monopsony profits that are predictable will be capitalized, and the same thing is of course true of correctly foreseen rents. As a result the market value of the firm’s assets will exceed their current cost of production, and the imputed interest on these assets, including monopoly returns or rents, is not ‘profit’ proper. Thus, if all market results were predictable, contractual plus

imputed costs would always tend to exhaust the receipts of firms. Profits cannot be positive unless there is noninsurable uncertainty. The theory of profit, therefore, has no place in neoclassical analysis because the fundamental theorems of neoclassical economics rest upon the assumption of perfect certainty."[59]

If we consider pure profits as a residual left over after all contractual costs have been met, including the transfer costs of management, insurable risks and depreciation of physical capital, and not as an opportunity cost nor a real cost. There are no reasons why these profits should be positive or negative for any firm, for any period of time, under competitive conditions. In the long run for the economy as a whole pure profit will be zero. If there are pure profits in an economy, then it is not in a situation of full equilibrium in the Walrasian sense, and we cannot expect that the optimality properties of a pure free market economy to be present. It has been argued that within a general equilibrium framework, only non- marketable, firm specific and subject to diminishing returns, factors, can yield profits. But then, it would be a matter of defining precisely what factors are we talking about, and if they are real costs, that is if they reflect the use of real scarce resources, we need to consider them as such and then we have zero profits in equilibrium again. And even if we can identify such very special and rare firm-specific factors, we have no reasons to expect that the pure profits generated thanks to them will be appropriated by the shareholders, instead of management, lawyers, unions, or whoever has the property rights on these 'factors' or the power to benefit from them. In strict GE conditions uncertainty is assumed away. But, if not, profits, positive or negative, due to non-insurable uncertainty (Knightian profits) if considered to be normally distributed, will have an overall expected value of zero too. Again in full long term equilibrium: *costs would always tend to exhaust the receipts of firms,* or prices will equal costs, with zero profits.

Once we leave the competitive equilibrium conditions, '*a number of new kinds of profits make their appearance',* but these cannot be legitimately being considered as costs and then imputed in prices. GEMs have no rationale for such imputed costs, because they do not reflect the use of real resources. Then profits have to be considered a residual, to be found only in situations of temporary equilibrium, that is, in long term disequilibrium. Any firm or industry generating pure profits, whether management imputes them as costs or not –as the required cost of capital, for example—which in the end is irrelevant, will attract new entries, that is other firms that will try to replicate the profit generating activity until competition drives profits to zero. The number of firms cannot be considered as given as in some versions of standard theory where the optimal size of the firm and the industry is an unsolved problem. In short profits are always a residual, present only in situations of temporary equilibrium, where the welfare implications of general equilibrium analysis do not necessarily apply. From the public policy perspective the problem is that if positive profits are consistent with a market clearing equilibrium, these temporary equilibria can last very long and can generate very significant distributional and aggregate capital effects,[60] which can keep the economy away from an optimal path of growth forever. If markets are clearing, then the market forces that can ultimately push the economy towards a full long term equilibrium and optimal growth path are severely curtailed.

A competitive equilibrium with profits is necessarily a temporary equilibrium, simply because the existence of positive or negative profits will incentivate the entry of new competitors to that particular industry and/or the exit of the losers, and because the changes in profits and prices, will make consumers better or worse off, so both the production set and the utility functions of consumers will be affected. Also, as we will see, the existence of positive profits implies a positive value of capital and the potential existence of capital effects. Obviously as long as profits are positive, capital shares are going to be valuable, if different shares generate different amounts of profits, the returns on

capital, which are not defined yet, will need to be equalized. Then shares will be traded, capital gains or losses in share trading are going to affect the original household's endowments, the overall value and the distribution of wealth maybe affected by variations in the value of capital, and the basic data of the problem will be changed as well. Over time, maybe, the economy will tend from a temporary equilibrium with profits different from zero to a full equilibrium, but this may take a very long time and we do not know if we are close or far from such situation. Most likely the economy will be moving continuously from a temporary equilibrium position to another, in a succession of temporary equilibria, in a Walrasian continuous equilibrium. As of now there is not much more we can say about this process, which clearly seems to be a closer, but still very distant, approximation to the way a real modern economy behaves. We need more building blocks to get there.

Let us note, however, that this vision of the economy evolving in a dynamic equilibrium, most likely always away from a full employment situation, is at odds with the current orthodoxy of the new growth theory that posits an economy developing over a full employment path. The current approach in vogue that considers that the economy can be adequately represented by a single consumer—or whatever trick we use to soften this extreme idea and consider an infinite number of agents—that maximizes her utility and that the economy traces out the behavior of this utility maximizing individual(s). Eliminates by assumption some of the most important aspects of the economic life of our times, like firms, profits, capital, money, interest and finance. [61]

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In a Schumpeterian spirit but within the Ricardian tradition, we can consider profits as a residual, a temporary, a short term, but an equilibrium result. Once all prices are determined, profits are determined. Such a temporary equilibrium, where markets clear but prices are different from costs, can be quite

permanent, as was argued before and as Walras indicated in his vision of the 'continuous' equilibrium. This type of equilibrium would be a Nash equilibrium, people are doing the best that they can under the circumstances, but it is not a Pareto optimal situation and there is no way of telling if we are near or far from such an ideal long term result. In such circumstances positive residual profits can emerge, let's say, from the competitive advantage of some firms that have privileged access to some input output vectors that allow them to generate profits at prevailing equilibrium prices. All we need as an initial assumption is to consider that it takes time for these production vectors to become accessible to all the firms, for prices to reach new, long term equilibrium and drive profits down to zero. It takes time to replicate a competitive advantage. In the meantime, firms with a competitive advantage will have positive residual profits, or net free cash flows, to express it in modern financial terms. Clearly a competitive advantage or some sort of monopoly rights, do not need to be based only on a technical advantage, these are most of the time ephemeral. The creation, preservation and the strengthening of barriers to entry is what counts. Creating and maintaining a competitive advantage or some sort of monopolistic rights is costly, firms will negotiate with shareholders and will offer future larger profits in exchange for the right to use current free cash flows to maintain existing competitive advantages and/or to create new ones. The fact that creating and/or maintaining a competitive advantage is costly does not mean that these are necessary costs of production for the commodities involved. It can be argued that the use of real resources to achieve these goals is detrimental of social welfare.[62] The demarcation criterion, to borrow a phrase from epistemology, should be: only those resources required to produce a commodity in a full long term equilibrium qualify as a real cost, in the classical sense. In a government-less, pure free market world, politically sustained competitive advantages do not play a role. However, the role of **power**[63] to create, sustain or impose a competitive advantage or a monopoly right is fundamental in real world capitalist economies. Power defined as the capacity of some agents to impose behavior on other agents that is of compelling actions that will not be performed in the absence of

such capacity. The imposition of taxes by a state is a clear example, but also powerful private agents, corporations, unions, etc., etc., can impose costs on society at large, that are just like taxes. Nevertheless, without the expected quid pro quo of taxes paid to a legally constituted authority.

Residual profits generated by firms that are creating new value, that is firms that are making available for consumers commodities at lower prices than before, or better commodities at the same price, thanks to competitive advantages grounded on better skills in production, comercialization, etc., that can constitute temporary barriers to entry for a particular market, are not the same, from society's perspective, as profits that constitute an expropriation of value from consumers by firms fixing prices above long term equilibrium costs or by limiting free competition and access, thanks to the protection of the state or any other equivalent power based legal and or institutional barriers. Evidently profits from value creation are positive from the perspective of social welfare and growth, they are, or can be, an important source of growth, and free markets will result in that they are temporary and that the new value created will be sooner or later, transferred to consumers. Value creating profits are similar to the Schumpeterian entrepreneurial profits. Profits from value expropriation, reduce social welfare and growth, they are just like taxes but without the quid pro quo that is expected, but not always provided, from the state’s services. Profits from firms that exploit non-competitive circumstances that are sustained by power, are not the only and not necessarily the most important barrier to growth and development. All the costs that are, or can be, imposed on society as a whole without a counterpart in the provision of real goods and services that increase the utility of consumers, are expropriating value from them. They are just like taxes without a quid pro quo. Just to mention an example, an increase in the benefits of public servants without an increase in the quality and/or quantity of the services they provide, constitutes an expropriation of value from the rest of society.

To harness the best of free markets a democratic society should eliminate the capacity of private groups—corporations, unions and the like—or politicians to impose costs and/or taxes without a *real* quid pro quo. The consideration of residual profits and equivalent 'costs' as an equilibrium market phenomenon raises the question of how to deal with these problems from the perspective of public policy. For example, financial policy in general and development finance in particular. A difference that should be stressed between residual profits and any other tax-like cost that could be imposed on consumers as a whole is that profits correspond to a legally recognized property right of those who financed a firm, which is to capital as defined, and that capital can be traded in markets with different levels of institutionalization.

The fact that capital can be traded implies that its future value can be obtained today and that distributive and aggregate capital effects can be generated. These may change the original distribution of wealth in directions not necessarily compatible with a sustained optimal path of growth or with the goals of a modern democratic society. As every other property right, or any other right, capital, and all the institutions around it—say, the financial system—are an historical product of the development of society and there is nothing 'natural' about them. The financial system, then, can and should be redesigned in ways that limit the potentially pernicious effects on growth and the distribution of wealth that can be generated by capitalism, so that the preeminence of free markets can be established.

The theoretical issues pertaining firms, profits and capital, as well as money, interest and finance are far from being resolved within a general equilibrium framework. To consider firms as consumers, profits as the cost of commodities, shares of capital just as apples and oranges, and capitalism as if it was a pure free market, is to forsake the understanding of the real world where we live. The next chapters will deal with capital and the profit rate, money and interest, among other issues, from the perspective of a capitalist economy.

Notes to Chapter 2.

[1] Definitive in the sense things can be so in science. Following Lakatos we can consider value theory á la Arrow and Debreu, as one of the pillars of the hard core of a contemporary classical research programme in political economy. As it is known the hard core of a science can only be considered *definitive* by the methodological decision of its practitioners.

[2] As Debreu used to say the logical structure of a theory is independent from its interpretation.

[3] For a recent book that presents a comprehensive view on these issues see: "The Monopolistic Competition Revolution in Retrospect" Edited by Steven Brakman, Rijksuniversiteit Groningen, The Netherlands, and Ben J. Heijdra Rijksuniversiteit Groningen, The Netherlands**.** Printed version published November 2003. In this collection of original essays experts in the fields of macroeconomics, international trade theory, economic geography, and international growth theory address the question of why the second revolution was so successful. They also highlight what is missing, and look forward to the next step in the modelling of imperfectly competitive markets. The text includes a comprehensive survey of both monopolistic competition revolutions, and previously unpublished working papers by Dixit and Stiglitz that led to their famous 1977 paper that revolutionized the modelling of imperfectly competitive markets. It launched what might be called the second monopolistic competition revolution which has been far more successful than the first one, initiated by Edward Chamberlin and Joan Robinson in the 1930s. Includes original contributions from Dixit, Ethier, Neary and Stiglitz amongst others.

[4] Walras, Leon. *Elements of Pure Economics or the Theory of Social Wealth.* First published in installments between 1874 and 1877. All the references are from the English translation by W. Jaffé, London: George Allen & Unwin. 1954. For an excellent presentation of Walras' system see Blaug, Mark. "Economic Theory in Retrospect" Third Ed. 1978. For a brief analysis centered on Walras theory of capital see Castorena Davis, Victor M., 2004. "The Theoretical System of Classical Economics: Continuity and Rupture" Master in Economics Thesis FE UNAM México Oct. 2004. Ch. 4.

[5] The term was introduced by Oscar Lange, several commentators have questioned the validity of this name considering that it is formally equivalent to the ancient Say's Law of markets, however the term has taken hold in the literature and I'll use it. In strict terms Walras' Law states that if *m-1* markets are in equilibrium, then the m^{th} market will be in equilibrium too. See Harris, Lawrence. 1981, "Monetary Theory" Mc.Graw Hill Co. New York. Ch. VI.

[6] W. Jaffé, "Walras' Economics as Others see It" 1980. Journal of Economic Literature 18. pp. 528-58.

[7] Cited by Currie and Steedman in "Wrestling with time" Problems in Economic Theory. P. 67.

[8] Walras, p. 380. For Walras the basic data are: resources, techniques and tastes, considered invariant over a certain period of time.

[9] Walras, p. 380.

[10] Walras, p. 380-1.

[11] See Hicks, John R. "Value and Capital: An inquiry into some fundamental principles of economic theory", 1939. Hicks followed a line of research that stressed the need for general equilibrium theory to be 'in time' and to integrate agents' attitudes to the future. This was initiated by Lindahl (Lindahl's seminal paper was published in Swedish in 1929. It was translated into English under the title 'The Place of Capital in the Theory of Price' and published as part three of Lindahl's book Studies in the Theory of Money and Capital.) (1939) and Hayek. (See 'Intertemporal Price Equilibrium and Movements in the Value of Money', published in German in 1928 and reprinted in Hayek (1984).

[12] For a more contemporaneous perspective on the subject see: Grandmont, Jean Michel. "Temporary General Equilibrium Theory." In ***Econometrica*****, Vol. 45, No. 3 (Apr., 1977), pp. 5**35-572. This paper surveys some recent studies of economies where trading takes place sequentially over time, and where each agent makes decisions at every date in the light of his expectations about his future environment, which are functions of his information on the present and past states of the economy. The paper reviews particularly the issues raised by arbitrage in capital markets, by the consideration of money and banking activities, and by the introduction of production in temporary competitive equilibrium models. An investigation of the logic of temporary equilibrium models with quantity rationing is also offered, as well as a quick review of the study of stochastic processes of temporary equilibria. A recent paper providing an historical perspective is: De Vroey, Michel. **"**The temporary equilibrium method: Hicks against Hicks." April 2004. IRES, Université Catholique de Louvain, 3 Place Montesquieu, 1348 Louvain-la-Neuve, Belgium. Work supported by the Belgian French-speaking Community (Grant ARC 03/08-302) and the Belgian Federal Government (Grant PAI P5/10). In chapter three section 3.2 a brief presentation of the current literature is presented, see footnote 26 for complete references.

[13] Hicks, J. R. ([1976] 1982), 'Time In Economics' in *Money, Interest and Wages: Collected Essays on Economic Theory*, vol. II, Oxford: Basil Blackwell, pp. 282-300.

[14] Hicks, J. R. (1946), Value and Capital (second edition), Oxford: Clarendon Press. Pp. 127.

[15] Later in his work Hicks stated: "In the discontinuous treatment we begin with the working of the model in a unit period (week, month or year); then we proceed to a sequence of such periods. … In dynamics, the single periods as we shall call them will not be alike, or not exactly alike; but they will still have some common features, so that much of the analysis can be made repetitive. Much of the work can be done on a representative single period; this single period is always a first step. But it is never the only step in a dynamic theory; some means of linkage between successive single periods must also be provided.… thus what in the last chapter we called "equilibrium at one point in time" becomes the equilibrium of the single period; what we called "equilibrium over time" becomes equilibrium over a sequence of single periods" (Hicks, John R. "Capital and Growth" 1965, pp. 30-1). Quoted by De Vroey, Michel. 2004.

[16] Hicks, J. R. (1946). Pp. 122-3.

[17] Hicks, J. R. (1946). Pp. 132-3.

[18] Leijonhufvud, A. (1984), 'Hicks on Time and Money', Oxford Economic Papers, Supplement, pp. 26-46. Pp. 31. Also quoted by De Vroey, Michel. 2004.

[19] Marshall emphasized that adjustment was a time-taking process. He used a conception of time based on a tripartite division: Temporary Equilibrium on the first "Day", Short Period, and Long Period. This taxonomy followed from Marshall's ceteris paribus method. In the ultra-short period, the quantity produced is a part of the data 'having been determined by decisions that, when the market opens, are already in the past' (1965: 53). In the short period, the equipment, etc. is still a fixed quantity yet variable capital is no longer so. As a result, changes in the quantities supplied

can enter the picture. Finally, in the long period, fixed capital is also taken out of ceteris paribus pond.

[20] "In Marshall's reasoning, false trading did not impede the realization of true equilibrium because he discarded income effects on the grounds that expenditures in every market represented only a small proportion of total expenditure. Whatever the validity of this argument in a partial equilibrium context, its extension to a general equilibrium perspective was dubious, as Hicks himself had admitted in his 1934 article on Walras…Yet, oddly enough, in Value and Capital he discarded such qualms, justifying false trading on the grounds that income effects were negligible.[13] Footnote 13: In Hicks' terms, 'I think we may reasonably suppose that the transactions which take place at 'very false' prices are limited in volume. If any intelligence is shown in price-fixing, they will be (1946: 129). This stance prompted Clower's scathing commentary, that 'It is heartening to know that income effects can be ignored if they are sufficiently unimportant to be neglected' ([1965] 1984: 44)." De Vroey, Michel. 2004.

[21] See footnote 12 above.

[22] Frank H. Hahn developed this seminal critique, as we will see in chapter 5. If a full set of future state-contingent contracts are available, then why should agents demand money? The first step in the process of integrating money into general equilibrium theory was to assume, therefore, that a full set of contracts was *not* available. In this case, as outlined above, a role for financial assets (such as money) emerges - but, as we saw, that necessitates a sequential structure.

[23] Some fundamental publications regarding Modern General Equilibrium Theory. Books: Leon Walras (1874) *Éléments d'économie politique pure, ou théorie de la richesse sociale* (*Elements of Pure Economics, or the theory of social wealth*). (1899, 4th ed.; 1926, rev ed., 1954, Engl. transl.). F. Y. Edgeworth, (1881) *Mathematical Psychics: An essay on the application of mathematics to the moral sciences*. Gerard Debreu (1959) *Theory of Value: An Axiomatic Analysis of Economic Equilibrium* (Reprinted by Yale University Press, 1972). Werner Hildenbrand (1974) *Core and Equilibria of a Large Economy* (Princeton studies in mathematical economics) Princeton: Princeton University Press. **Articles:** John von Neumann (1937) "A Model of General Economic Equilibrium, in K. Menger, editor,*Ergebnisse eines mathematischen Kolloquiums, 1935-36*. (Translated and reprinted in *Review of Economic Studies*, 1945). Kenneth J. Arrow (1951) "An Extension of the Basic Theorems of Classical Welfare Economics," in Neyman, editor, *Proceedings of Second Berkeley Symposium.* Gerard Debreu (1951) "The Coefficient of Resource Utilization," *Econometrica* **19**, 273-292. Kenneth J. Arrow and Gerard Debreu (1954) "Existence of an Equilibrium for a Competitive Economy," *Econometrica* **22**, 265-290. Kenneth J. Arrow (1953) "The Role of Securities in the Optimal Allocation of Risk-Bearing," *Econometrie* (Reprinted in *Review of Economic Studies*, **31**(1964) 91-96). Martin Shubik (1959) "Edgeworth Market Games," in *Contributions to the Theory of Games* (A. W. Tucker and R. D. Luce, eds.), Princeton, Vol. IV, 267-278. Gerard Debreu (1963) "On a Theorem by Scarf," *Review of Economic Studies* **30,** 177-180. Robert J. Aumann (1966) "Existence of Competitive Equilibria in Markets with a Continuum of Traders," *Econometrica* **34**, 1-17. Robert J. Aumann (1964) "Markets with a Continuum of Traders," *Econometrica* **32**, 39-50. Gerard Debreu (1970) "Economies with a Finite Set of Equilibria," *Econometrica* **38**, 387-392. Roy Rader (1972) "Existence of Equilibrium of Plans, Prices and Price Expectations in a Sequence of Markets," *Econometrica* **40**, 289-303. John Geanakoplos and Herakles Polemarchakis (1986). "Existence, Regularity, and Constrained Suboptimality of Competitive Allocations When the Asset Market Is Incomplete," in Walter, Heller, Ross Starr, and David Starrett eds. *Essays in honor of Kenneth J. Arrow: Volume 3, Uncertainty, Information, and Communication*. Cambridge, New York and Sydney: Cambridge University Press, 65-95. Roy Radner (1979) "Rational Expectations Equilibrium: Generic Existence and the Information Revealed by Prices," *Econometrica* **47**, 655-678.

[24] Prices are relative prices, that is rates of exchange between commodities, expressed in the appropriate unit of account, or numéraire.

[25] The concept of a competitive general equilibrium is different than the frequently used concept of a Nash equilibrium. Often, unfortunately, in common usage both concepts tend to be confused and the properties of the first are sometimes assigned to the second. Lucas makes this difference very clear: "I have described the actions a_i simultaneously chosen by agents as a (Nash) *equilibrium*, but the term equilibrium in this (now entirely standard) context obviously does not refer to a system 'at rest', nor does it necessarily mean 'competitive' equilibrium in the sense of price taking agents, nor does it have in general any connection with social optimality properties of any kind. All it *does* mean is that, in the model, the objectives of each agent and the situation he faces are made explicit, that each agent is doing the best he can in light of the actions taken by others, and that these actions taken together are technologically feasible." Lucas, Jr. Robert E. "Models of Business Cycles" Basil Blackwell, 1987. Rep. 1990. pp.15-16.

[26] See Blaug, M. (1978) pp. 618-622. Pareto, V. (1906) "Manual of Political Economy"

[27] For Koopmans, this is the essence of the modern formulation of the existence question. In his words: "The problem is no longer conceived as that of proving that a certain set of equations has a solution. It has been reformulated as one of proving that a number of maximization of individual goals under independent restraints can be simultaneously carried out." The usual procedure is summarized as: "…we first specify the consumption set for each consumer, the production set for each producer, the behavioral rule for each economic agent, and a competitive equilibrium. Then, using the assumptions on the consumption set and the production set, and so forth, we want to prove the existence of an equilibrium. The problem is no longer one of finding a solution for the simultaneous equations or inequalities. The stress now lies in the compatibility of each economic agent's behavior." In Takayama, Akira. Mathematical Economics. 2d. De. (P. 261). The first successful formulation and proof of this problem is due to Arrow and Debreu. (Arrow K. J. And Debreu, G. "Existence of an equilibrium for a Competitive economy." Econometric, 34, January 1966.) "The essential idea is to consider the model of competitive markets as the model of an n-person non-cooperative game and to utilize a theory developed in game theory."

[28] It is known that the Walrasian system possesses a economically meaningful, unique solution, provided that: a.- returns to scale are constant or diminishing; b.- there are no externalities in production or consumption; and, c.- all goods are 'gross substitutes' for each other, that is the rise in the price of one good will produce positive excess demand for the other. The modern GE literature has extended the analysis to imperfect competition, increasing returns to scale, uncertainty, among many other previously 'unresolved' issues.

[29] The so-called Arrow-Debreu competitve equilibrium, CE, model, was developed by Kenneth Arrow and Gerard Debreu in the 1950s as published in several papers (See first footnote Section 2.2). The classic book of modern value theory is Gerard Debreu's *Theory of Value*, published in 1959. Debreu's tasks in this book are : "(1) the explanation of the prices of commodities resulting from the interaction of the agents in a private ownership economy through markets, (2) the explanation of the role of prices in an optimal state of the economy" (Debreu, 1959, p. ix). An 'economy' is defined in terms of three sets of data: (i) a given number of consumers, characterized by their consumption sets and their preferences; (ii) a given number of producers, characterized by their production sets; and (iii) total resources (cf. ibid., p. 74). As regards the latter, Debreu specified: 'They include the capital of the economy at the present instant, i.e., all the land, buildings, mineral deposits, equipment, inventories of goods, ... now existing and available to the agents of the economy. All these are a legacy of the past; they are *a priori* given' (ibid., p. 75). All resources are owned by consumers, so the property rights as to these resources are considered as given. The substance of the presentation that follows is from Debreu.

[30] See 2.1. Walras established two general equilibrium conditions, these are: Market-clearing for *n* factor markets and Equality of unit costs and prices for *m final goods.*

[31] The idea, now in vogue in some quarters, of 'fundamental uncertainty,' something like 'all we know is that we cannot know,' is simply a call for intellectual surrender. In what follows we'll stay within the limits of 'the theory of certainty.'

[32] See "General Equilibrium Models of Monetary Economies" Studies in the static Foundations of Monetary Theory" Ed by Ross M. Starr. Academic Press, Inc. Harcourt Brace Jovanovich, Publishers. 1989. P. 5.

[33] Of course, own rates of return can be positive, negative or zero. The price of a personal computer, lets say 1, or 5 years from now most likely is going to be less than today, so the corresponding own-rate will be negative.

[34] All trade takes place between the individual and an abstract market. There is an abstract price formation mechanism, sometimes personified as the Walrasian auctioneer. Once general equilibrium prices have been announced, agents deliver their excess supplies to the market and withdraw their excess demands, consistent with budget constraint. Inasmuch as prices are market clearing, there is no unsatisfied excess demand. The agent's trade is a single transaction, the delivery of goods and withdrawal of demands. (Record keeping is required, so budget constraints are fulfilled, but there is no explicit account in the model of it). Since each agent and firm's transaction takes place in a single exchange, there is no role for a token or carrier of value to be held between transactions, hence no role for a medium of exchange. In Starr's words: "The perfection and simplicity of trade in the model preclude a role for money as a facilitator of transactions. You can't improve on perfection." (Starr, p. 5)

[35] Debreu, 1959. p. 32.

[36] To facilitate the exposition I will use the notation and definitions presented in Takayama, Akira. "Mathematical Economies" Second Edition. Ch. 2. The Theory of Competitive Markets. 1990.

[37] Clearly within A&D at every point in time, real time, the economy's aggregate gross production value and the level of employment are determined. Introducing the suitable definitions and assumptions, consumption, savings, net and gross investment, among other national accounting variables, can be explicited. Nevertheless, at this point of the analysis this is not considered necessary.

[38] In the ancient, capital controversy between the Cambridge(*s),* UK and USA. The Cambridge, UK, side, argued strongly and rightly that the myriad of heterogeneous goods used in production, could not be aggregated in any meaningful way in a single abstract concept defined as capital and then use its marginal productivity as a determinant of the remuneration for its services. However they did not have any quarrel with the aggregation of labor, which is as heterogeneous as "capital" understood as physical things, and for which an aggregate wage rate could be defined.

[39] This definition of feasibility is often replaced by $x^ <= y^ + \underline{x}$, allowing an excess supply of commodities, which implicitly or explicitly assumes "free disposability" of commodities, then it is necessary that the price vector $p^$ in the definition of competitive equilibrium be nonnegative. Free disposability is not assumed so undesired commodities have negative prices. See Takayama, p. 190.

[40] See, Kenneth J. Arrow and Gerard Debreu "EXISTENCE OF AN EQUILIBRIUM FOR A COMPETITIVE ECONOMY" Cowles Foundation Paper 87. Reprinted from ECONOMETRICA, Journal of the Econometric Society. Vol. 22, No. 3, July 1954. The University of Chicago. "It is well known that, under suitable assumptions on the preferences of consumers and the production possibilities of producers, the allocation of resources in a competitive equilibrium is optimal in the sense of Pareto (no redistribution of goods or productive resources can improve the position of one individual without making at least one other individual worse off), and conversely every Pareto-optimal allocation of resources can be realized by a competitive equilibrium…From the point of view of normative economics the problem of existence of an equilibrium for a competitive system is therefore also basic." Pp. 265-66

[41] In modern activity analysis the profit maximization point in these conditions is the origin, that is zero. Mathematicians like to say that this is a convention and that the origin can arbitrarily be fixed at any point. However, the only point where profit maximization in general equilibrium in a perfectly competitve world that makes economic sense is zero.

[42] The distinguished Ricardian scholar Luigi Pasinetti has argued that in this hypothetical state, wages would be barely at at a minimum subsistence level and that most of the wealth would be concentrated in the hands of rentiers. It is my view that his analysis is wrong in this respect, only by introducing very restrictive and unrealistic assumptions, almost Malthusian, about population growth and the wage setting mechanism such a result entails. See Pasinetti, Luigi. "Critique of the neoclassical theory of growth and distribution" Entry prepared for the Storia del XX secolo, planned and so far unpublished, by the Instituto della Enciclopedia Italiana. Available for PDF download at Prof. Pasinetti's website.

[43] Once in a while one still reads or hears, that something close to the Walrasian pure barter world existed at some point in the distant past. Certainly, such a world is unknown to historians and anthropologists. The vision of a pure free market economy organized along the lines of a Walrasian, Arrow-Debreu, world; if it comes from somewhere, it is from the future. Only a highly developed society that consciously engaged in the design and the implementation of the institutions required to make the best of a pure free market economy could achieve something close to such a world. Clearly we are not there yet and clearly too, our present day institutions are far from allowing the best of a pure free market economy to

emerge. Maybe a Walrasian-Arrow-Debreu world, belongs in the same utopian category of advanced communism and other fantasy worlds. However, being rooted in true human behavior, consumer's utility maximization and producer's profit maximization, we cannot help, in a deep libertarian sense, to wonder that, perhaps, it is in this vision of the future where a true liberal political action programme should be based. Not in the blind defense of the status quo as if it was today, something close to the final state of a free-market full equilibrium originally envisioned by Adam Smith.

[44] "..the definition of a competitive equilibrium can, in fact, be independent of the question of who owns the resources, because one can describe a consumer's behavior not by specifying how much of his total income is, but by specifying the point chosen by him." See Takayama, p. 173.

[45] Takayama, p. 194.

[46] See Castorena Davis, Victor M. 2004. pp. 83.

[47] "The Walrasian general equilibrium theory was published in the 1870's, while Brouwer's work on fixed points appeared three decades later. It is therefore no wonder that Walras could not achieve a mathematical consolidation of the conjecture in the days before the advancement of topology; he should certainly not be criticized for his failure to achieve a mathematical solution, but should be admired for his mathematical imagination which let him formulate this well-posed conjecture." Nikaido, H. "Convex Structures and Economic Theory" New York, Academic Press 1968. p. 270. Cited in Takayama A. p. 277.

[48] Cassel, G. "Theory of Social Economy." 1923.

[49] Debreu, G. "A Social Equilibrium Existence Theorem," Proceedings of the National Academy of Sciences of the U.S.A., 42. Nov. 1952. "Market Equilibrium," Proceedings of the National Academy of Sciences of the U.S.A., 42. Nov. 1956. "Theory of Value," New York, Wiley, 1959. Arrow, K. J., and Debreu, G. "Existence of an Equilibrium for a Competitive Economy," Econometrica, 34, July, 1954. Arrow, K. J. "An Extension of the Basic Theorems of Classical Welfare Economics" Proceedings of the Second Berkeley Symposium on Mathematical Statistics and Probability. University of California Press, 1951. McKenzie, L. W., "On the Existence of General equilibrium for a Competitive Market," Econometrica, 27, January 1959.

[50] For A&D maximum profits can be either zero or positive (See Arrow and Debreu, 1954, section 3.1.2. pp. 275) The existence of positive profits is justified by the introduction of a particular hypothesis: factors that are private to the firm and are non marketed. "If, however, we assume that among the factors used by a firm are some which are not transferable in the market and so do not appear in the list of commodities, the production possibility vectors, if we consider only the components which correspond to marketable commodities, will not satisfy the additivity axiom. (Footnote, 2.)" "(2.) The existence of factors private to the firm is the standard justification in economic theory for diminishing returns to scale. See, e.g., the discussion of "free rationed goods" by Professor Hart [9], pp. 4, 38; also Hicks [10], pp. 82-83; Samuelson [18], pp. 84." A&D pp. 267.

[51] Piero Sraffa produced a seminal piece dealing with the problem of returns and presenting a seminal, in my view, critique of the simplistic neoclassical approach.

[52] Takayama, Op. Cit. pp. 264-265.

[53] In this respect the following news item is illuminating and self-explanatory:
"Gates gets pay hike" World's richest man gets 4% raise, with bigger payout coming from dividend jump.
September 21, 2004: 11:26 AM EDT CNN/Money. NEW YORK (CNN/Money) - Microsoft Chairman Bill Gates, the world's richest man, got a modest pay raise over the last year, according to a company filing. Microsoft Chairman Bill Gates saw only a modest rise in pay but a big jump in dividend payments during the company's last fiscal year. Gates, who is also the company's chief software architect, received $901,667 in salary and bonus from the company for the fiscal year ended June 30, the company revealed in its proxy filing with the Securities and Exchange Commission. That's up 4.4 percent from the year earlier total in salary and bonus. But Gates' increase was lower than the nearly 15 percent rise in pay and bonus he received the previous fiscal year. The filing shows Microsoft CEO Steve Ballmer received the identical pay and bonus as Gates, as he has each of the previous two years. Neither executive received stock options Gates was listed as the world's richest man by Forbes in March, with an estimated net worth of $46.6 billion. Gates' personal income saw a bigger jump when Microsoft doubled its annual dividend to 16 cents from 8 cents during the 2003 fiscal year. The company's first dividend payment was made in fiscal 2003. With 1.1 billion shares of Microsoft stock, or about 10 percent of its shares outstanding, Gates' dividends during the year came to about $175.6 million. This November, the company plans to pay a special dividend of $3 per share, subject to shareholder approval. The company announced in July that Gates will donate his $3.3 billion proceeds of the special dividend to the Bill and Melinda Gates Foundation, the charitable organization named for him and his wife. The company has also announced it will now pay a quarterly dividend of 8 cents a share, again doubling the 16-cent annual dividend it paid last year. That should raise Gates' regular dividend payments to about $351 million. Ballmer holds about 411 million shares of Microsoft stock, meaning his dividend payments during the last fiscal year came to about $65.8 million. His dividend payments this fiscal year, including the $3 special dividend, are due to come to $1.4 billion." Can someone seriously argue that the profits of Microsoft, TELMEX, and similars are the cost of managerial ability and entrepreneurship?

[54] It has become sort of a tradition, that the analysis of the adjustment processes that may take the economy towards a position of competitive equilibrium, rely mainly on the market clearing condition, I suggest that the emphasis should be shifted towards the second classical equilibrium condition: prices equal costs.

[55] Schumpeter, Joseph. A. "The Theory of Economic Development." Cambridge, Mass. Harvard University Press, 1934. Particularly Ch. 4.

[56] F. H. Knight, "Risk, Uncertainty and Profits." 1921.

[57] Knight's theory is not a simple a theory where profit is a reward for bearing the **real** cost of uncertainty or an inducement to bear uncertainty. This would imply that there is a relationship between the level of profit and the irksomeness of bearing uncertainty. If bearing uncertainty was a factor of production or a productive service, marginal productivity theory would explain it and we would not need a special theory for profits. In Knight profit is the difference between ex-ante and ex-post returns, it is not a distributive share, that is, it is not a remuneration of land, capital, or

labor, etc., it can be found in payments to all types of productive agents. When most entrepreneurs take a bearish view of the future, the contractually hired agents will receive less than the realized value of their marginal product, entrepreneurs will make profits. If most are bullish losses will occur. In balance Knight concluded in line with Smith, that entrepreneurs will be optimistic: a large number of them will be attracted by the uncertainty of the prize draw and on average their receipts will be probably negative.

[58] Recall that in an equilibrium situation agents do face incentives to change their behavior!

[59] Blaug, M. op.cit pp. 486-487.

[60] See Chapter 3.

[61] Prof. Blaug concludes a chapter on the capital controversy with a quote and a comment: "'Economists do not understand the phenomena of capital and interest. They do not understand why the rate of interest is generally positive (and thus how is it that capitalism can work).' If so, it is a damning indictment of one of the most acrimonious controversies of modern economics. But in point of fact, it is not so. Rather, the reason the rate of interest is positive has little if anything to do with static equilibrium theory, which is the domain of the great reswitching debate; it rests on the presence of uncertainty in a dynamic model of price determination á la Knight and Schumpeter." Blaug, M. "The Methodology of Economics." 1992, Rep. 1997. pp. 184. Half-disagreeing with Blaug, I would say it rests on an alternative theory of capital.

[62] Just think about the legal fees involved in antitrust lawsuits, or in resources employed by big unions defending their privileges, among other possibilities.

[63] Prof. Chalmers Johnson in his extraordinary seminars at IR/PS, UCSD, where I had the honor to be his student, would say that the central problem of neoclassical economics was its absolute disregard for the question of power.

Chapter 3. Capital and the Profit Rate.

Introduction.-

The theoretical elucidation of a modern capitalist economy, defined as: an essentially monetary economy, where the maximization of the value of capital is a force as decisive as the maximization of utility and profits by consumers and firms, if not the dominant force of the economy; requires that the problems of capital and the returns on capital, money and the interest rate, are solved in a consistent way with value theory within a general equilibrium perspective.[1] Certainly we are talking about capital as a property right, an entitlement over residual profits, not as physical merchandise. Also we see capital as not reducible to money, and the interest rate as essentially different from the profit rate. It is argued that profits as a residual of value, capital and money are inextricably linked. We believe that this essential connection is at the core of the workings of a capitalist economy. The main objective of the present chapter is the analysis of capital and the profit rate, fundamental elements of this link.

In the previous chapter we analyzed some representative general equilibrium models. With Jaffé, we concluded that they do not represent the way actual modern capitalist economies work, but how an ideal free market world would under carefully specified conditions. Nevertheless, by solving the classical problem of the determination of the relative prices of commodities in a logically consistent way, general equilibrium analysis constitutes a solid base to develop a theoretical system along classical lines that can represent the actual workings of capitalism, as distinct from a pure free market economy. Arrow and Debreu, demonstrated the existence of a general competitive equilibrium in the commodities market sustained by a vector of prices that admits zero or positive profits, we rejected the hypothesis that positive profits correspond to the cost of some unspecified factors of production unique to a firm and that are not marketed. We postulated instead that positive profits are a residual of value without a quid pro quo in real resources, and

argued that *both* classical equilibrium conditions: markets clear or Say/Walras' Law, and prices equal costs, need to be reestablished. Profits, as a residual of value, are determined in a general equilibrium where markets clear but prices differ from costs, profits emerge as a net addition to the acquisition power of the community. Hence, if profits are a residual of pure value[2] they can exist only as abstract acquisition power, a pure form of value completely alienated from the world of commodities. The vision of profits as something associated in one way or another to a physical surplus of some kind should be abandoned. Capital, as a property right on future profit streams that is valuable and that can be traded, should be analyzed. The value of capital is determined by the value of future residual profits discounted at the appropriate rate. Current profits are existent, future profits and, hence, the value of capital, are virtual. Capital is not money, but the possibility of turning capital into money and vice versa, can be considered as one of the main forces that ultimately cause the effects and disturbances, associated with the non-neutrality of finance and money. As we will argue in the next chapters.

The consideration of both classical equilibrium conditions, markets clear and prices equal costs has the corollary that equilibrium with positive profits is by necessity a temporary equilibrium, a short term equilibrium. Which in turn implies that the flat, compressed, or meta-static[3] time of typical general equilibrium analysis, should be separated in what is real time and virtual time. In other words, we need to consider the continuous equilibrium of a modern economy where profits are continuously changing and so is the value of capital. In this world only the ever-changing present is real, and the future is always virtual. Real time needs to be considered. In this respect we follow the Walras/Marshall/Lindahl/Hicks intuition expressed in the idea of a general temporary equilibrium, nevertheless a reformulation is proposed. Modern general equilibrium analysis has developed its own perspective within the literature of sequence economies dealing with financial assets including money as one of them. We will present a brief review and critique of this approach.

The Walrasian market clearing condition, “supply equals demand” is the central feature of most general equilibrium models. The competitive equilibrium models presented in the last chapter, share Walras' Law as *the* general equilibrium condition: excess demands are zero, markets clear. The central assumption of the so called New Classical Macroeconomics is also that markets clear.[4] Besides the equalization of prices to costs, Walras and other classic writers also dealt with the equalization of returns on capital. However, Walras and most writers practically assimilated into one and the same thing these last two conditions. We consider this assimilation as incorrect; the equalization of returns on capital, as an entitlement, is a short term temporary equilibrium condition; the equalization of prices to costs is a long term full equilibrium condition of commodities’ markets. And, as we know, Walras’ Law is both a short term and a long term equilibrium condition. The equalization of the returns on capital is properly a capital market[5] equilibrium condition, while Walras’ Law and the prices equal costs conditions correspond solely to commodities markets. We have argued that the respective pricing mechanisms of commodities and of capital as a property right, as an entitlement, are essentially different. By considering profits as a temporary residual of value that is logically determined by the prices of all commodities, as given by general equilibrium conditions, we have a base to determine the overall rate of profits of the economy and, hence, the value of capital as a trade able property right. This definition permits us to distinguish between two essentially different types of financial assets, first those whose value is directly associated to a particular commodity or a bundle of commodities, for example, a futures contract or an A&D state-contingent contract, and those whose value depends on residual profits. Only these last can be considered as capital, we distinguish two basic types of assets equity and debt. We consider that the question of the existence or not of complete markets can be simplified this way: only those markets that deal with a particular asset, a service, linked directly to commodities need to be independent markets indistinguishable from goods markets; for capital we will need only one market. By doing so we can derive a rationale for a capital market, where the returns on

capital can be equalized, as the classics postulated. To explain the equalization of the returns on capital, we adopt the principles of the no existence of arbitrage and the law of one price in financial assets markets, we argue as well for the irrelevance of the market clearing principle with regards to capital markets.

To solve the problem of the value of capital as the present discounted value of future profits, it is necessary to determine the appropriate discount rate. We will find that this rate is the overall rate of return of the economy as determined by the prices of all commodities in general equilibrium. The general rate of return on capital is not determined by the workings of a particular market, where the specific demand and supply conditions, say of capital, determine the price of capital, as, say, the cost of capital. Walras' complaint that he had looked for this market in vain, has a reason: such a market does not exist. Instead the general rate of return of the economy is determined by the current and future prices of all commodities, it is a result of a temporary general equilibrium with positive residual profits. In addition to the consideration of real time and the reinterpretation of profits as a residual of value, other substantial modifications to the basic A&D type model of the competitive equilibrium of the privately owned economy will be introduced to model an economy closer to the real world, these are the redefinition of capital and the profit rate or the returns on capital. Through the reordering of the equilibrium prices of the dated commodities that enter the profit vectors of firms in real time, we will obtain the series of future profits, that is cash flows, that aggregated for the economy as a whole would yield a determinate rate of return for the economy, as the rate that would make the present discounted value of future profits, that is of capital, equal to zero. I postulate that this general rate is the appropriate rate to determine the value of capital at the firm level. Certainly, we will observe firms with a positive, negative or zero, value of capital. Due to arbitrage, the value of shares of capital of individual firms would change until every share would yield the same returns as the whole economy. The returns on capital would equalize around the economy's general rate of return, arbitrage and the Law of one price will rule. The classical theory of value paradigm[6] will prove to be redundant when dealing with

capital markets. The proposed approach to incorporate time and financial assets and to value capital within a general equilibrium framework is radically simpler and I believe more powerful, than the prevalent modern perspective of sequential economies that is still following the old Hicksian advice[7] of treating money and by extension other financial assets with the traditional tools of value theory.

As long as shares of capital, that is equity, are the only form of property rights over residual profits considered, the existence of different rates of return at the firm level that causes the existence of capital gains (or loses) will only generate distributional effects among share holders that will cancel out at the aggregate level. Capital effects, which are changes in the value of shares that may enter in the budget constraints of consumers, for the economy as a whole will be zero. Under these circumstances Say's or Walras' Law is irrevocably valid. Nevertheless, once we introduce the interest rate, as a remuneration of debt, a distinct property right over residual profits characterized by the obligation of the debtor to pay back a contractually determined fixed amount in a certain time, over and above the original value of the debt, which is interest. Then, the divergences between the economy's rate of return and the interest rate can cause capital effects that are different than zero at the aggregate level. Walras' Law becomes a special case.

Therefore, the financial or capital structure of the economy, which is the distribution of property rights over cash flows, between equity and debt holders, matters. Such analysis is the purpose of the following chapter.

The four sections of this chapter concentrate on capital and the profit rate, analyzing first two alternative radically different views on the matter. The first section briefly studies the problem of the equalization of returns on capital as distinct from the classical problem of the equalization of the profit rate. Then we present the sequential economies in general equilibrium where financial assets and the fundamental theorem of capital asset pricing play a central role.

The last two sections concentrate on my views on these issues; in the third we study the question of capital as a property right over residual profits, as an entitlement, under general equilibrium conditions; and in the fourth we present a theory for the determination of the general rate of profits. All in all, the alternative theories of capital and the profit rate here developed signify a major simplification of the dominant approach. They will permit us to move closer to the understanding of the real dynamics of modern capitalist economies, those where we live. A task that sometimes seems to be lost in the seemingly never ending quest for abstract formalization.

3.1 The 'classical' rate of profits and the equalization of returns on capital.

Classical economists, Smith, Ricardo, Marx, among others, conceived of capital as a physical entity and tried to determine a long-run uniform rate of profit on capital, as an equilibrium condition in the trade of commodities. Walras dealt with this question as well. The problem with Walras conception of the uniformity of the returns on capital is that sometimes he viewed profits as the returns on durable capital goods, then as the internal rate of return on investment projects, and also as the interest paid on funds, that is on money.[8] Without distinguishing between capital as a thing with an assumed physical productivity of its own, money, and capital as an entitlement, a property right. In fairness, these problems are present not only Walras, but in most of the literature as we saw, and "solved" only at the crudest level in the neoclassical parables of the single good economy, as Ferguson and Samuelson expressed it, where capital in its different personalities is reduced to one and the same thing, just as in the Ricardian corn economy. Obviously the lack of clarity in the definition of the nature of capital does not help to elucidate the nature of the profit rate. If we distinguish clearly between capital as a trade able property right and the commodities used in production, then it should be evident

that Walras' equalization of returns condition, refers to two totally different situations: one that establishes the equalization of prices to costs of production with residual profits equal to zero, and another that establishes the equalization of returns on shares, on property rights over future profits. The equalization of returns on shares—on capital as ownership—implies the existence of positive residual profits and of a market for these titles; in other words, the existence of a capital market where property rights over profits are traded. If there is such a market, which is not the case in Walras and which is not explicitly analyzed in most A&D type models, the process of equalization of returns on capital as shares, will be essentially short-term, the equilibrium in capital markets temporary and with effects that can impinge on the consumers' budgets. The proponents of the efficient capital markets hypothesis[9] would say that the process of equalization of returns on shares is immediate. The process of equalization of returns on capital is driven by investors trying to maximize the value of their capital. By contrast, the equalization of prices to costs, which implies that profits are zero, is essentially a long term process, it requires the elimination of barriers to entry and competitive advantages at the firm level and this can take very long periods of time. This process is driven by firms seeking to maximize profits, theoretically in response to the demands of utility maximizing consumers. Consumers who are also investors. In Walras the profits that are zero in long-run equilibrium are the residual profits that individual firms could obtain above their costs of production inclusive of the cost of capital funds (the natural price of capital or normal profits in Marshall's terms), which for Walras is simply the cost of funds, that is the rate of interest. In the A&D type GEMs discussed above there is no such thing as, capital, funds or money, the profit rate, or the interest rate in equilibrium.

Overall we have found that in a long term, or full, equilibrium there is no such thing as the cost of capital, all the commodities employed in production are remunerated at equilibrium prices equal to costs and profits equal to zero. If in the long term profits are zero, the so called average profit rate as defined in the Ricardian/Marxian tradition which is at the core of the system of prices of

production, becomes highly debatable.[10] Not everybody will agree with this general conclusion, let's take a look at a heterodox perspective.

Recently some scholars of the postSraffian tradition[11] have extensively argued in favor of the revival of what they consider the characteristic approach of classical economics, what they define as the long period position method. This is defined as the Ricardian/Sraffian and also Marxian, question of defining a system of relative prices, given total demand, its composition—which implies that total output and its composition are also given—as well as, available resources and technology. As Sraffa[12] demonstrated there is such a system of prices, i.e. production prices, where each price incorporates an equal rate of profits on capital, defined as: the value of profits measured as total output minus total wages and rents, divided by the total value of the goods employed in production, which is physical capital. The answer to this question exists logically, but requires that either/or wages and profits, are determined from outside the system of production. The Ricardian assumption is that wages are the historical given and profits appear as a residual, the Sraffian version is that the rate of profits can be determined by the financial system, it becomes the interest rate (in the Smithian tradition), a cost that is part of long term equilibrium prices and, hence, wages appear as the residual. Among other reasons, scholars within this perspective find this approach interesting and justified by stating that they can determine prices in a way that is independent of demand conditions, so they argue that the neoclassical approach where demand do plays a role, is, to say the least, *not* classical, or that it should be rejected outright. It is puzzling to think, how this approach can be interesting or even useful from a policy perspective. If by definition we define demands conditions as a given, obviously they cannot play a role when the system is in a 'long term position.' If we study a sailing vessel at anchor, can we conclude that the wind does not play a role in sailing? Can we reduce classical economics to the study of long term positions? I do not think so. As Blaug[13] has written, the variations of output and demand are at the heart of classical analysis. I believe that Frank Hahn[14] was right when he wrote that the Sraffian system should be

considered a particular case of general equilibrium analysis. In my view, where the Sraffian seminal contribution lies is in the definitive demonstration that the equimarginal principle does not apply to capital and the return of capital, the so-called reswitching[15] problem: the profitability of capital cannot be associated in any meaningful way to an index of scarcity, with the implication that it should not be considered as a cost related to a physical resource of some kind or other. The Sraffians have not been able to provide an alternative answer to the crucial question of the profitability of capital, except in the most restricted case: the so called ‘long period position’ where profits are reduced to the interest rate as determined in financial markets, just as Smith posited a long time ago.

If we think of a market for capital as a property right on the profits of firms allowing for shares to be traded, the returns on securities should be equalized through changes in the relative prices of shares in a temporary equilibrium. However, without a determinate mechanism to price shares, as Walras' expressed it, transfers of ownership would be 'theoretically without rational motive.' Walras was well aware about the problem of pricing “capital assets,” if you have an income generating asset[16] how do you to determine its current price? You take the future cash flows that the asset will yield and discount them by the ‘appropriate rate.’ I have looked in vain for the market that determines such a rate, was Walras complaint, as he lapsed into an implicit homogeneous capital definition, which in the end made it equal to money and the ‘appropriate’ discount rate equal to the interest rate on loanable funds.[17] Nevertheless, as we saw Walras was the first economist that tried, without succeeding, to determine the prices of capital assets as a function of future returns and in a general equilibrium setting. In his analysis, Walras considered the future returns of capital assets as given, and then obviously a discount rate was required to determine its current price. Walras dealt with every capital good as it was a *consol* that is a perpetuity yielding a known return, in equilibrium equal to the monetary interest rate. Of course, this is not a satisfactory solution; we still need to determine a general rate of return.

Allowing for some reiteration, let's recall the well known offspring from Walras' capital theory: the one presented by Irving Fisher in his classic book, "The Rate of Interest."[18] Fisher approached the theory of capital and interest from what he considered as a consistent general equilibrium approach and he insisted that capital was a fund of purchasing power consisting in the present value of discounted future returns[19] of all income yielding assets. This fund of acquisition power has no one to one relationship with the stock or with the structure of physical capital goods. For Fisher there are as many own-rates of interest in an economy as there are products produced with the use of physical means of production, that is capital goods, and only in a stationary equilibrium will all rates be reducible to a single interest rate. Fisher's own-rates of interest represent the percent relationships of the present and future prices of the same good, modern general equilibrium analysis does the same. In a 'first approximation', unfortunately not followed by a second, Fisher's general equilibrium analysis consisted of a one-commodity world. That is an economy producing a consumption good produced with itself, just as the giant farm corn-economy of David Ricardo, where capital is corn and profits are corn too; the single good economy assumption that has become the standard practice in many quarters. Alas, not an innocent simplifying assumption, what it means is that general equilibrium is partial; that the marginal productivity of factors theory is smuggled back in; and that there is only one own-rate of return, which corresponds to the marginal physical productivity of the single good that happens to be capital too.

Fisher's conception of capital as a fund of purchasing power, whose value is determined by the net present value of future returns, is in general terms, the perspective adopted in this study. However, the problem with Fisher is that he defines as capital, any stock that yields a flow of services over time, and this includes buildings, machines, land, raw materials, natural resources, and by necessity, human capital. Fisher defines as 'income' the surplus of services on top of the requirements to maintain and to replace the stock of wealth. That is, profits are conceived as a physical surplus, which in a general equilibrium where Walras'

Law holds is an illogicality, as I will show. But in a single-good economy, the first approximation of Fisher, and of many, many, others that stay there, is the only way to go. Then, if capital is the only factor of production, all income is interest/profits. So wages are merely interest payments to the owners of human capital, rent is interest on land capital, etc., etc. This would be possible if there was something like a perpetual fund of productive power, an homogeneous substance within which human and physical capital of different 'types' would be indistinguishable from each other. If this was the case, value theory, that is general equilibrium theory, would be redundant, relative prices in a single good economy do not make any sense. In Fisher's economy spot price(s) would simply be the net present discounted values of the future 'income', defined as a physical surplus, generated by that stock of capital that comprises every factor of production. Of course, the appropriate discount rate is the own rate of return of the single good that is used as capital and also is consumed, a rate that is the only (interest) rate in this world. In a multi good economy the idea that spot prices are net present discounted values of future prices, makes no sense at all. If spot and future prices of commodities are determined by general equilibrium conditions, then the so called own rates of return are simply a percent relationship between equilibrium prices, they do not determine prices, neither spot nor future. The idea of spot prices as discounted future prices, if followed to its ultimate logical consequences, results in an infinite logical progression. Every spot price in every moment in time is always a discounted future price, which is also a discounted future price, and so on. In my view, just as it is incorrect to treat capital as a commodity, as a good, it is incorrect to treat commodities as if they were capital.

As it was pointed earlier the Arrow and Debreu, A&D, conception of equilibrium is one of simultaneous clearing of all commodities markets. Only Walras' Law condition is required. The distinction between temporary and a full equilibrium loses significance because profits are considered as costs, spot and futures trades take place today, and markets do not open again. In the *Theory of Value,* Debreu does not try to identify relationships between equilibrium prices, he

posits, however, that the 'problem of the returns on capital' can be 'solved' as a particular case of the general theory of commodities, through the so-called own rates of return, that is the relationship between the current and future prices of the same commodity in the same location. What is of interest is whether the classical condition of a uniform rate of return on capital goods can be determined, or has any meaning or role in an Arrow-Debreu type economy. As we said, Debreu's *Theory of Value* does not define a system of own rates of interest, however many reformulations do. A well known result is that own rates of interest, or return, between two dates for any two different goods or services need not to be equal in equilibrium. It follows that rates of return on different durable goods, and land for example, would be uniform only for particular time profiles for rental payments. The Sraffian proposal obtains an equal rate of profits on capital goods in equilibrium, at the expense of generality and under extremely restrictive assumptions as we saw. Nevertheless, it makes no sense to think of a process of equalization of returns on durable assets in a world, the Arrow-Debreu Walrasian world, where the role of capital markets is non-existent, given that its functions are performed by a full set of futures markets and all transactions take place at the present instant. [20]

Firms may own, all, part or non, of the durable goods employed in production, they may have small or large levels of indebtness, so we do not have a way to define a priori, what is the value of the ‘capital’ owned by the firm which we can use to measure its profitability. In general, it does not make any sense to think about rates of return on durable assets that are simply commodities produced and priced as every other commodity. The uniform rate of profits of the classics, at the core of the Sraffian program, is of little theoretical or practical interest. It can only be determined under very particular conditions,[21] and agents do not react to it, unless we assimilate it to the interest rate as determined in financial markets. We will take up this question again in chapter six.

The problem of capital has a solution: the prices of commodities: including machines, buildings, land and its services, as well as the prices of human services

are determined by general equilibrium conditions, that is by classical[22] value theory, where demand plays a role and total output and its composition is determined simultaneously. In full long-term equilibrium output reaches its feasible maximum, prices equal costs, own-rates of return are analytically redundant—they can be negative, zero or positive and agents do not react to them—, only non-reproducible commodities pay rent, determined as a residual given its best use.[23] The owners of commodities used in production, including all forms of human capital, receive the equilibrium prices for the goods and services they sell to firms. Capital is *only* the property right over the residual profits generated by firms. How and why this property right developed historically is another question to be answered in another place.[24] Nevertheless, capital is a fund of abstract acquisition power, not a fund of perpetual productive power. Its value is equal to the present discounted value of future residual profits and it is a virtual value. In short, we have to distinguish clearly between two different pricing mechanisms: one, for the prices of commodities, where value theory/general equilibrium analysis applies; and, another for the price of capital—the prices of shares as claims on residual profits—where the Fisherian net present value of future returns applies.[25] Naturally, we still have to determine the appropriate rate to use in order to determine the present value of future residual profits.

3.2 Capital, assets and returns in sequential economies.

In Debreu, as with the classics and in general in A&D type models, capital is conceived in physical terms and as part of the total resources of the economy including land and natural resources.[26] Total resources also include human capital. It is assumed that all resources are owned by consumers, so the structure of the property rights as to these resources is given. All of these resources, and/or their services, are marketed and in equilibrium their prices are determined as the price of every other commodity is. Debreu posits a known structure of participation on the profits generated by firms; it is assumed that firms are owned by consumers

and that they have a given participation, a *'share'*, on the profits generated by firms. Certainly firms are not part of the *'total resources'* of the economy, firms as agents are indistinguishable from consumers. Contrary to what happens in the real world, firms as such, are valueless and hence they are not traded. Given that all resources are owned by consumers and sold or rented to firms for production and further sale of commodities, firms do not own long term assets, so the value of the firm is not determined. Nevertheless, when current and future profits are positive, the property rights on the profits generated by firms are valuable and, hence, could be traded in markets. That is 'shares' which correspond to capital in our definition, could be traded in capital markets and then, have a determinate price in equilibrium. As we mentioned briefly in chapter two, in a perfect Arrow and Debreu economy with complete markets finance and money are irrelevant. Certainly, they are quite important in the real world where we live. Indeed, the issues pertaining money and finance have been dealt with extensively before; there is a very important body of literature[27] dealing with financial assets, markets and different types of securities from the general equilibrium perspective, where seminal contributions to the science have been developed. Nevertheless, most if not all of it, is characterized by the conceptualization of securities, 'assets,' as if they were commodities sold by firms, as if securities where just like apples and oranges. The payoffs and returns on financial assets are considered as a given, as in Walras' consols. As payoffs and hence returns remain unexplained, often in a more or less explicit/implicit way most consider the returns on 'assets' á la Smith that is as a cost reflecting the price of a scarce resource. For example, 'assets' that yield interest à la Hicks. And when capital is mentioned the returns on capital are seen as a reward for the sacrifices involved in its creation. Alternatively in this essay, capital is considered *only* as the property right over residual profits, as a valuable right that can be traded in markets. There is no such a thing as the 'cost' of capital, something associated to a notion of scarcity, as we will see: the value of capital depends first and foremost on the profitability of firms and of the economy as a whole, it is influenced by the financial structure of both and by the interest rate. All in all as we will see in the remaining chapters of this book, the value of capital will

determine the net value of the complete set of financial assets of the community. This restricted but precise re-definition of capital will allow us to overcome the old problem of defining capital theory in such a way *'as to embrace something less than the whole of economics.'*[28] Before developing these ideas a brief presentation of sequential economies and the fundamental theorem of asset pricing, from the more orthodox general equilibrium perspective is required.

As we saw in chapter two, the economy in Arrow and Debreu is an intertemporal, perfect foresight world with a complete set of future state-contingent markets available at the initial time period. As we know, a state-contingent commodity[29] is a contract that promises to deliver to the holder of that contract a particular commodity when a particular state of nature occurs at a particular time and delivers nothing at any other state and/or time. Thus, the only thing an agent has to do is to purchase a set of future state-contingent commodities in the *initial* time period and then just wait for contracts to be fulfilled. Of course such a world requires complete markets, which means that there are sufficient markets open at the initial period to trade on all types of physically-differentiated goods, say (n) goods, every possible state of nature every period, say (S) , and (T) time periods, so we need nST markets open to begin with. Arrow and Debreu classical vision leaves out of the picture the world of money and finance as we know it. The transfer of acquisition power through time is achieved through these very particular specialized markets.

In the Hicksian temporary equilibria sequential scenario, consumption pattern decisions are made, but either binding intertemporal or state-contingent contracts are not fully available and/or foresight is not perfect. Thus, agents make a consumption plan based on *expectations* of future prices of commodities, and then purchase two types of objects: goods for consumption and assets to carry purchasing power over to future periods when they can be traded for consumption goods. Spot markets open at the beginning of times, but they also open at

subsequent moments as traders buy and sell assets and commodities time and time again. In Hicks temporary equilibrium assets are indistinguishable from money: people save and invest in 'assets' and equilibrium in asset markets—the equalization of the demand and supply of assets—is achieved through variations in the interest rate, the same logic we find in the IS-LM framework. Also, within this Hicksian framework money and by extension assets are incorporated in the utility and demand schedules of individuals as if they were goods, a procedure that Hicks himself recanted later in his life, as we will see. There are two important points here that need to be underlined: the first is that the successive "Hicksian weeks" (spot product markets) are interlinked with each other through markets for financial assets. And second, financial assets are treated with the tools of classical theory of value as developed for commodities, i.e. they are incorporated in the utility schedules of individuals, independent demand schedules are derived for each asset, etc., etc. In other words, they are treated as special cases of the general theory of commodities as Debreu would have expressed it.

The idea of temporary equilibria has developed into the vision of sequential or sequence economies, time is introduced and markets open period by period. The modern general equilibrium approach to money and finance is mostly based in the consideration of sequence economies; the introduction of special securities or financial assets to overcome the need to have such a large set of future and state-contingent markets be open at once as in A&D; the consideration of incomplete markets, among others closely related issues.[30] As we briefly mentioned in chapter two, the difficulties of integrating the theory of money to the Walrasian theory, provided the main impetus to the introduction of sequential economies into *modern* general equilibrium theory. The seminal critique of Frank Hahn clearly identified the central difficulty: in a perfect foresight, finite-dimensional Walrasian scenario, money had no *essential* purpose; there is not a valid rationale for the demand for money.[31] The central question within modern general equilibrium analysis was: Why should agents demand money or financial assets in general, if a full set of future state-contingent contracts are available? The obvious first step was to

assume that a full set of A&D type contracts was not available. In this case, a role for financial assets, money among them, emerges - but, as Hicks and others had indicated a sequential structure for the economy was needed.

Certainly the Arrow and Debreu classical vision that required a huge set of future and state-contingent markets be open at once to never open again, was extremely unrealistic and for many a very difficult assumption to consider. Nevertheless Arrow[32] himself concluded that we do not really need a full set of commodity-specific state-contingent contracts to obtain the Arrow-Debreu equilibrium, financial securities could perform this function as well. What Arrow argued is that if we wish to consume eggs and bacon on a certain day, we do not need to purchase a contract which delivers eggs at that state and time and a contract which delivers bacon at that state and time. Instead, we only need to purchase a contract which yields money (or some unit of account) on that day which we can then use to purchase eggs and bacon on the spot market. As a `possible solution, he proposed what has since become known as an "Arrow security." A security which promises to pay a unit of a numèraire good if a particular state in a particular time period occurs and nothing otherwise. To transfer purchasing power across all states, we only need a single "Arrow security" for each state of nature. If we have S possible states in any time period and n physically-differentiated commodities, we merely necessitate S securities for each time period rather than nS. Thus, in the initial time period, we only need (n+S)T markets to exist - as opposed to nST state-contingent markets - in order for agents to carry out their intertemporal consumption plans. However, this suggestion required that we must allow spot markets to be open in the future. When the full set of future state-contingent markets are replaced by a far fewer set of markets for financial securities, markets *cannot* close after the initial trading day. Spot markets should be open in the future when agents' securities are liquidated into purchasing power that will be used to purchase goods on the spot markets at that time period. Commodity and financial assets markets must be open in *every* time period. The intertemporal Arrow-Debreu economy is replaced with a "*sequential*" economy.

A sequential economy is usually conceived as an economy that moves through a succession of time periods each with its own set of states of nature. The initial state is certain; trading takes place in spot commodity markets and asset markets. The endowments of households in the initial time period are given. Households will purchase consumer goods for consumption now and a portfolio of assets to transfer purchasing power to the next period. As is customary: subject to the household's budget constraint. Market clearing is achieved so the set of commodity prices and the set of asset prices in the initial time period are determined. In the next period there may be *several* states of the world which emerge, nature plays its role and chooses a particular state of the several predefined possibilities, and only one state will be true. As endowments are random, the households receive different endowments in different states, assets purchased in the previous period yield different returns in dissimilar states, so the returns of particular asset portfolios would be different depending on the choices nature made. The income for the household in the second period will depend on the set of prices of endowments and assets resulting from the particular states of nature and new initial conditions. They use this income, of course, to purchase commodities again at the new prevailing spot prices in whatever state of nature emerged and another set of assets at the new prices to transfer purchasing power to the next period; obviously spending is subject to the resulting budget constraint. Over time we move to a new time period, then we have a new set of states of nature that are possible where, once again, nature makes the choice and the whole process is restarted. This continues for future time periods and states until the end of times.

It is important to take some time and discuss the definition of assets within this currently standard conceptualization. An asset is defined as a financial instrument which carries a current purchase price and a future payoff or, an entire series of future payoffs depending on the states of nature that emerge in the future. Customarily, the simplest kind of asset that is considered is a bond, which pays a sure monetary payoff in the future regardless of the state that actually occurs in the

future (net of default risk). With stocks, of course, the payoff is not certain and depends on corporate profits which will in turn depend on the state of nature that emerges in the future. Other assets, of course, have different payoff structures. Customarily payoffs are considered as data of the problem, they are given. What adjusts is the price of the assets; they are the variable of the problem.

Nonetheless, despite these differences in detail, in general, financial assets are considered as the means to transfer purchasing power across time periods and states of nature. Buying an asset implies we are transferring purchasing power from the present to some future state; selling or short-selling an asset implies we are transferring acquisition power from some future state to the present. Regardless of the type of financial asset—stocks, bonds, options, etc.—all of them involve at least these time-and-state spanning properties. Evidently, an asset market is the "place" where assets are traded and, consequently, buy/sell prices are determined.[33] The following table[34] presents an idea of the different assets and their payoffs in different states, as conceived in the literature.

States	Type of Asset							
(t=1)	Commodity Payoffs			Numeraire Payoffs				
	Real Asset	Commodity Future	Arrow-Debreu	Numeraire Asset	Riskless Bond	Arrow Security	Equity Share	Call Option
1	x_1	unit of i	0	r_1	r	0	$q\ p_1y_1$	$\max[0,r_1-c]$
2	x_2	unit of i	0	r_2	r	0	$q\ p_2y_2$	$\max[0,r_2-c]$
....	...	...	...	...	...	...	...	...
s	x_s	unit of i	unit of i	r_s	r	1	$q\ p_sy_s$	$\max[0,r_s-c]$
...	...	...	...	....	....	...	...	...
S	x_S	unit of i	0	r_S	r	0	$q\ p_Sy_S$	$\max[0,r_S-c]$

From the perspective of this work, a more precise consideration of the payoff or the returns on financial assets—within the standard approach—is relevant. As was said financial assets are used by agents to transfer purchasing or acquisition power across time and states. In the literature assets are described in terms of "payoffs" and not "returns" and this is a crucial distinction because the return to an asset is the monetary value of the payoff in a particular state.[35] Also, it is very important to note that the term return refers to monetary payoff and not in the sense which the term is used in finance. This is defined as monetary payoff minus purchase cost over cost, what is usually called financial return; a formulation more akin to the classical rate of profit, but nonetheless quite different. So the returns on financial assets as customarily defined in this theoretical context, are totally different from the classical (Ricardian/Marxian) conceptualization of capital and the profit rate, but also from the concept of financial returns which are the centerpiece of the financial practice and theoretical inquiries. The returns on securities in this context are either expressed in physical units (a vector of commodities) times spot prices; or in arbitrarily defined units of a numèraire good. Capital as something different from physical goods and the profit rate have no place in this context. In what follows, we will come back to these issues as we develop an alternative theory of capital and the “profit rate” or the appropriate rate to use to determine the value of capital. A brief presentation of equilibria in sequence economies follows.

In the literature three types of equilibrium in sequential economies are usually presented. All three of them use basically the same structure of product markets/asset markets that we have outlined, in all of them the market clearing condition applied to asset markets is the main equilibrium condition, but not the only one as we will see. These types of sequential equilibria are: "*temporary*" equilibrium, "*Radner*" equilibrium and "*rational expectations*" equilibrium. The form of expectations that are assumed is what makes them different. In summary, temporary equilibrium does not require perfect foresight or information-consistency

across agents; Radner equilibrium requires perfect foresight but not consistency; rational expectations equilibrium requires information-consistent expectations.

In temporary equilibrium, agents form *ex ante* expectations of prices in future spot markets and make the type of sequential product market-asset market decision above described: they decide which current goods to consume and produce now and how many financial assets to buy/sell in order to bring purchasing power into/from the future with the expectation of buying a particular bundle of commodities then. Certainly there is no requirement that these *ex ante* expectations will be fulfilled, within the "Hicksian week" spot markets for both commodities and assets clear on the basis of current demands and expectations of future spot prices. However, these expectations may very well be different from the actual spot prices that emerge in the future. The result is a sequence of spot-market "temporary" equilibria with expectations being contradicted or fulfilled in every successive week. In essence the same process that Lindahl and then Hicks described many years ago.[36]

What is usually called the Radner equilibrium was proposed by Rod Radner in 1972,[37] he developed an equilibrium of "plans, prices and price expectations". Also he used a sequential structure of goods/assets markets; however he required perfect foresight as well. Spot markets are required to clear in every period as before, but it is also required that the spot prices that emerge in the future be consistent with current expectations. In Radner's model, then, markets remain open over time, but the trading that occurs in them does not yield unexpected prices. A crucial aspect of Radner equilibrium is that it can replicate the results of an Arrow and Debreu[38] economy, without requiring a full set of contingent markets at the initial time period but rather only a set of asset markets (a lot less markets than in A&D classical vision) and a sequence of open goods markets.[39] Here, agents form expectations of spot prices in future states, purchase present goods and securities on the basis of those expectations. Current and future spot prices of goods and assets adjust so that all "markets" clear and these price expectations

must be fulfilled.[40] In Radner's model agents have perfect foresight in the sense that agents "know" which spot prices will emerge if a particular future state of nature occurs. Agents do not know which state is going to actually occur in the future. The contrary assumption would mean that there is no uncertainty; hence all of these sophisticated models would be irrelevant. Certainly probability will play a role some agents may think some states are likelier to occur than others, so in general agents will form expectations about the probability over future states. In Radner equilibrium these probability assignments are entirely subjective and need not be the same across agents. The assumption of perfect foresight does not rule out differences in belief about the probability of future states.[41]

The last type of sequential equilibrium considered is the rational expectations equilibrium.[42] It can be seen as a special case of the Radner equilibrium: The case when the probabilities assigned by all agents about future states are the same across agents, agents are assumed to form "information-consistent" probability assignments. If agents have the same information about the future economy their probability assignments will be the same. The "common information" assumption of rational expectations equilibrium is more restrictive than in Radner equilibrium, however given that it takes explicit account of the informational role of prices, it opens the consideration of how rational expectations are formed through the sharing and diffusion of information.[43]

The common assumption in the three types of equilibrium in a sequential economy we have described is that markets are complete. As stated, it is the form of expectations what makes them different. What if markets are not complete? This is the core question of the rapidly expanding literature on incomplete markets.[44] A situation of "*incomplete asset markets*" arises when the number of linearly independent securities is less than the number of states. Or in simpler words, there are not sufficient markets and securities to deal with every possible future state of the economy. The "basic property of incomplete markets"[45] implies, then, that we will not have Pareto-optimality of the resulting allocation. Certainly, we will *still*

have a resulting allocation, which is not compromised by the absence of complete markets: agents still have budget constraints and they can still maximize utility accordingly and derive commodity demands and asset demands, etc., etc. However, the result will be a Radner type equilibrium that is not isomorphic to the Arrow and Debreu scenario. The implications of this seem clear enough: agents cannot generally fulfill their optimal intertemporal consumption plan but must make do with a less desirable plan.

This is not the place and certainly I'm not the writer to present a relatively decent survey of the very ample literature dealing with incomplete markets. Nevertheless a very important issue present in the field needs to be mentioned and this is the question of why markets may be missing. There are three important aspects to this question: a) If markets are incomplete what has eliminated future state-contingent commodity markets? b) How do asset markets emerge to replace absent state-contingent markets? c) And, if markets are incomplete why the resulting asset markets might still fail to span the state-returns space? Answers to these questions have included some form of transactions costs, bounded rationality, asymmetric information or some combination of these factors.[46]

To finish this exposition of sequential economies, we will briefly take a look at the so called "Hart Existence Problem" and to the "Fundamental Theorem of Asset Pricing," that is the existence of "no arbitrage" asset prices. This is a quite interesting but difficult to grasp body of literature, however it is necessary in order to put in context and to strengthen the arguments put forward in this work.

As we saw above, the return of a certain asset, in certain state, is equal to the payoff of the asset in the state that occurred evaluated at the spot prices in this state. Oliver D. Hart[47] discovered that the fact that returns in different states depend on different state prices can lead to some unexpected consequences relating to the existence of equilibrium Radner style. Recall that for Radner equilibrium *complete* asset markets are assumed. This does not mean that we

have a full set of "state-contingent" markets as in Arrow and Debreu, it means only that the set of assets can span the entire state returns space, or that there are a number of linearly independent securities equal to the number of states. In short, there are sufficient markets and securities to deal with every possible future state of the economy. The Hart Problem is not directly associated to incomplete markets; it is associated to the question of returns and as developed further by different scholars, to the introduction of money in a pure commodities economy.

In Radner equilibrium, the set of returns to assets are linearly independent vectors in the state net transfer space, any net income transfers over time, can be made across states by constructing portfolios of assets which are linear combinations of assets. By suitable constructions of portfolios of assets, agents can undertake any set of transfers of purchasing power between states and times. What Hart demonstrated is, given that return vectors are functions of the spot prices in the different states there may be vectors of prices that make the vectors of returns in both states collinear. If the return vectors are linearly related, or when return vectors become collinear, then they can no longer span the entire space. Specifically, when state prices are such, we can make construct all sorts of portfolios with the available assets, but the possible returns are now restricted to a particular set; outside of this set other returns are not obtainable by any portfolio. The dimensionality of the space of possible returns is severely reduced.[48] As Hart demonstrated, such a situation could lead to non-existence of Radner equilibrium.

Commentators have confronted Hart's problem by developing, generally speaking, three different lines of analysis: the first arguing that Hart counterexamples are rare.[49] Thus Radner equilibria exist generically, with Hart type counterexamples being rather exceptional. I will not comment on this line of ideas. From our perspective the other two lines of argumentation are the most interesting given that they rely on one way or another on the introduction of money. The first of these last two is to express all payoffs in terms of a numèraire good,[50] "gold"; and the second, is to construct a nominal unit of account,[51] "cash" which is independent

of prices and have asset payoffs expressed in cash. These two lines of argumentation do not use real assets that pay bundles of commodities; instead they posit financial assets that only pay either gold or cash.

The alternative based on a numèraire good, let's call it "gold" in short, eliminates the Hart problem. It is assumed that *all* asset payoffs are in units of "gold," the return to a particular asset, say f, in a certain state, say s, is merely $r_{fs} = p_{1s}r_{fs}$ where r_{fs} is the number of units of gold asset f pays out in state s while p_{1s} is the price of gold in state s. If, we normalize the price of gold to 1 in each state, returns are reduced to $r_{fs} = r_{fs}$ which is merely a number. The result is that prices between different real goods in a given state can change all they wish - they will not affect the relative returns of assets in that state. The dimensionality problems are eliminated; the Hart problem will not arise. In the light of the argumentation that we are developing in this work, the previous ideas serve to highlight one of the crucial assumptions of standard economics when dealing with financial assets, not only the returns on assets are assumed as given, but also the relative returns of assets and by using gold, also the acquisition power of financial assets in terms of commodities is given.[52] Variability can only result from the state of nature and this is random.

The second alternative, the economy with a ″unit of account″ or ″cash″ structure is more interesting. In short, the resulting equilibrium is not strictly a Radner equilibrium and the Arrow-Debreu equivalence does not hold. Most significantly, there is a severe indeterminacy problem.[53] To begin let's recall that here the returns on assets are given in cash, and that the value of cash is not directly connected to commodities, hence, the real return of asset f in state s is $r_{fs} = g_s/P_s$ where P_s represents the "price level" in state s (some index of the spot prices, p_s). Now returns are dependent on the price-level. Contrary to the case of the gold economy or its equivalent a real asset economy, where if prices rise in a particular state of nature, returns will rise as well, in a cash economy the value of the returns will fall as prices rise. Inflation and disinflation of asset values emerge as problems.

Nevertheless, the question of why should we consider the returns on all financial assets as given in nominal terms, is not addressed. This approach reminds us of the Walrasian treatment of all financial assets as if they were consols with given returns.

We cannot reproduce here the analysis and conclusions of the main proponents of this line of thought; we refer the reader to the sources. However, the main trust of the argument is that in a cash economy, the relative prices of assets in terms of commodities and, I would add, in terms of different assets, can play a role through their impact in demand. In other words changes in the real value of assets affect the budget constraint of agents, and this would force agents to modify their transfers of acquisition power between states.[54] All in all, except in two exceptional cases there will be *indeterminacy* of Radner equilibrium in a cash economy.

And here we are back again to the ancient issue raised again by Hahn in the 1970s, how we can reintegrate monetary theory into general equilibrium theory.[55] An important point should be made: this integration problem is inextricably linked to the question of financial assets and the returns on financial assets. Or using the terminology proposed in this work, to the issues of capital and the rate of profits or returns on capital, parallel concepts but dissimilar in form and content.

Financial markets can be considered as the central feature of sequence economies and the concept of no-arbitrage asset prices developed initially in financial theory is *the* crucial element in the determination of asset pricing and market equilibrium. An arbitrageur purchases a set of financial assets at a low price and sells them at a high price *simultaneously*, obviously making a profit for herself without having invested and/or risked resources of her own. Arbitrageurs require *no* outlay of personal endowment but only need to set up a set of simultaneous contracts such that the revenue generated from the selling contract pays off the costs of the buying contract, i.e. construct a portfolio consisting of purchased

assets and short-sold assets which yields positive returns with no commitment. The simultaneity ensures that the arbitrageur carries *no* risk as none of his own personal resources are ever on the line. Simultaneous and risk less pure arbitrage can be considered as the quintessential "free lunch".

The justification for the "no-arbitrage" assumption in financial market equilibrium is: if there *were* arbitrage opportunities, arbitrageurs would seize them and these would be eliminated immediately. This is why pure arbitrage is not normally present in the real world. As the main proponents of the concept in modern financial theory expressed it:

"Assuming no arbitrage is compelling because the presence of arbitrage is inconsistent with equilibrium when preferences increase with quantity. More fundamentally, the presence of arbitrage is inconsistent with the existence of an optimal portfolio strategy for any competitive agent who prefers more to less, because there is no limit to the scale at which an individual would want to hold the arbitrage position. Therefore, in principle, absence of arbitrage follows from individual rationality of a single agent. One appeal of results based on the absence of arbitrage is the intuition that few rational agents are needed to bid away arbitrage opportunities, even in the presence of a sea of agents driven by `animal spirits'." [56]

If asset prices allow for arbitrage opportunities, agents would immediately hone in on a portfolio position that yielded arbitrage profits. Also agents would be able to replicate this arbitrage portfolio infinitely with no personal resource constraint, given the "no-commitment" nature of arbitrage opportunities. Under these circumstances, the price differences which enabled the arbitrageur to hold such a position would close almost instantly. To exemplify, let us represent a situation *with* an arbitrage opportunity so we can obtain an intuitive understanding of the meaning of arbitrage-free prices and asset market equilibrium as used in the relevant literature: Suppose that we have two issuers of bonds, say A and B so that

returns on each of the bonds they issue are the *same* ($r_A = r_B = r$) but their respective purchase prices is *different,* thus $q_A \neq q_B$ and $q_A > q_B$. We have an arbitrage opportunity available to an arbitrageur: suppose an agent short-sells the high-priced bonds, bond A, by the amount a_A (< 0) so that he gains $-q_A a_A$. He can use part of the proceeds of this short-sale to purchase amount a_B of the low-priced bond B, thus outlaying $-q_B a_B$. The "net gains" of the arbitrageur are $d_0 = (-q_A a_A) - (-q_B a_B) > 0$ and $d_1 = r(a_B + a_A) > 0$ and thus a positive net gain vector $d = d_0 + d_1$. The agent need not limit himself to merely selling a_A and purchasing a_B but, as long as the prices q_A and q_B are fixed and bonds of each type are supplied without end by the market under perfect competition conditions, then the arbitrageur can replicate such operations and increase his arbitrage gains to infinity. Without expanding on the more technical part of the argumentation what could enable something like this to happen is that there is a "non-convexity" which is occasioned by *different* prices for what is effectively the same asset.

In general, an arbitrage opportunity can be thought of as a series of trades where an agent commits none of his own endowment and yet makes positive gains along the line. In its most simple context, two types of arbitrage opportunities are defined: the first kind guarantees positive returns with non-positive commitments, for example, borrowing and lending at different rates; and the second kind that guarantees non-negative returns with negative commitments, the quintessential "free lunch". In an arbitrage opportunity of the first kind, the agent is not buying any asset at the initial time, she makes "no commitment", or outlays none of her endowment to purchase assets (although he can sell assets). However, the agent is nonetheless making a *positive* return in the future. In an arbitrage opportunity of the second kind, the agent is short-selling the asset and thus has "negative commitments", i.e. she is increasing her "endowment" or purchasing power in the initial period. Nevertheless, she makes no future payments and possibly even makes positive gains.

The *absence* of arbitrage opportunities is based on two conditions: the first states that you cannot purchase and short-sell a single asset and make a gain in the process; and the second is that there is a "law of one price" for assets with the same return. The first condition, while technically necessary is a financial truism: we cannot buy and sell a single asset (say asset A) and make arbitrage gains. The second condition is a lot more interesting, the law of one price forces all assets with the same risk less return to have the same price, i.e. that if $r_A = r_B$, then it must be that $q_A = q_B$. The so called law of one price is a fundamental principle of financial economics and it is through these conditions that its link with the formal definition of absence of arbitrage is established.

For those not familiar with the literature and at the risk of being repetitive for some and obvious for others, let's not forget that the type of equilibrium analysis we have been briefly presenting, deals with financial assets using the tools of classical value theory—just as Hicks suggested to do in the case of money in the 1930s and recanted many years later. That is treating assets as if they were goods and investors as if they were consumers maximizing utility from the possession of wealth. As current dicta mandates the problems are posed in terms of maximization by individual rational agents. This is evident in the standard definition of equilibrium in financial markets; asset market "equilibrium" is defined if total demand for the asset by purchasers must equal total supply of it by short-sellers. In other words, the classical market clearing condition applied to finance. Thus, if equilibrium exists, then net trade must "net out". In a two agents' world, one agent's demand for assets to buy must equal to another agent's short-selling of them. If this is the case it should follow that the price of an asset is exclusively determined by demand and supply conditions. Then what is the role of the Fundamental Theorem of Asset Pricing? Here is where the tools of classical value theory come in handy: the marginal utility in the acquisition—or may we say consumption—of assets, is to be equalized with the price of assets.

For example, the bond which costs q pays r units of income in the future, so q/r is the price of a unit of income in the future, it also represents the discounted future value—the present value—of a unit of future income. Considering that the future marginal utility of the asset is proportional to the asset price, q, agents will buy a quantity of the asset that will equalize the marginal utility of their future income—of course weighted by their personal proportionality factor—to its present value, which is the inverse of the marginal utility of current income. And under the conditions usually posited in the prevailing literature, particularly the typical perfect competition assumption, but also the consideration of given and unexplained payoffs of financial assets, if this is valid for one agent then it is valid for all, so we have equilibrium à la Radner.[57] However this is strictly true only in the case where all payoffs are expressed in a numèraire good, in gold so to speak. Then we have equilibrium in asset markets—financial markets—in a non-cash economy, not a very elegant way to integrate monetary theory to general equilibrium theory. If we introduce money as cash, Hart problems appear and we are back in the area of severe indeterminacy of equilibrium, as we saw above.

Nevertheless, let us stress that ultimately the validity of the Law of One price in financial markets and of arbitrage as the essential mechanism of capital asset pricing is not dependent on the use of classical value theory and the market clearing principle of equilibrium. We will argue that the Law of One Price and Arbitrage are the fundamental principles of capital markets where equilibrium is achieved through the equalization of the returns on capital, returns that are not assumed as given but determined by general equilibrium conditions in the commodities markets.

3.3 Capital and the market for capital in general equilibrium.

In Arrow and Debreu: "*An agent does not take decisions about the 'forms' in which to hold his wealth."*[58] So as several commentators following up on Walras have observed: there cannot logically be a justification for a market in share-

holdings. There would be no rationale for markets for transfers of ownership of land, or any other form of 'capital'.[59] In the more advanced versions of general equilibrium of sequential economies assets are simply considered as a vehicle to transfer acquisition power across time, from the present to the future and from the future to the present. Many assets provide a service and as such they should be priced as any other service, in the theoretical world we have presented in the previous section assets are not—they cannot be—a net asset of the community, what is an asset for an individual agent is a liability for another, this is why asset markets clear and in the aggregate transactions in the asset markets ‘net out.’ The previous perspective can only be valid for all of those assets that have a value directly associated to the value of commodities, clearly if someone loses money in a futures contract is because somebody else is profiting in the exact same amount. The fees paid in the process remunerated the particular services provided for those that arranged and enforced the futures contract. We believe that is important to distinguish between financial assets that provide a specific service and have a value directly determined by the price of a commodity or a bundle of them, from those assets that have a value directly associated to the future residual profits generated by firms. These last correspond to our definition of capital, profits and capital are (or may be) part of the value of aggregate wealth. Those financial assets that simply represent a service do not constitute an addition to aggregate wealth.

In my perspective the essential point of the so called Arrow and Debreu/Radner equilibria equivalence is that money and finance are neutral, they do not matter, and financial assets are simply a mean to transfer acquisition power through time and states of nature. If assets simply provide a service and in the aggregate what is an asset for Jane is a liability for Pedro, why would they matter? However, as we saw in our very brief review of the literature the introduction of money may cause severe indeterminacy of Radner equilibrium, also as is known in the field the problem of the asset structure of the economy is far from trivial, and the A&D/Radner equivalence is such only under quite restrictive conditions. And

these conditions still are very, very, far away from the real dynamics of modern capitalist economies, which is what we are trying ultimately to understand.

It is argued throughout this work that the variations in the value of capital are at the core of the dynamics of modern capitalist economies. If the returns on capital are dependent on the generation of residual profits, they stop being a given and become a variable, the value of capital can then be explained and its variations and potential distributional and aggregate consequences can then be studied. By radically separating capital from other financial assets that have specific commodities and services as the underlying real asset, we may be able to sidestep many of the unresolved problems confronted in the theory related to the definition of the nature of payoffs and returns, as well as the integration of monetary theory and general equilibrium theory which in my opinion requires a theory of capital first. Also this approach will allow us to deal with the problem of the returns on capital and the structure of capital from a different perspective, more closely related to the way things are in the real world.

The logic of the temporary equilibrium existence of residual profits implies a sequence of spot markets for commodities and the emergence of a market for capital as a property right over those future profit streams. If we consider that the magnitudes and time patterns of future profits streams are by necessity different, we can legitimately expect that the "returns" on the securities representing these rights will be different. Agents will be confronted with the possibility to trade shares with low returns for shares with higher returns, investors can profit from trading shares and agents can *chose capital as a form in which to hold their wealth*. Hence, once we define capital strictly as a property right that can be traded we have a direct general equilibrium foundation for a market in share holdings where the returns on shares would be equalized in equilibrium. In other words, a capital market is needed. This requires the consideration of another dimension for the individual agent which in A&D is a consumer and a producer, we need to consider each individual as an investor too. A holder of abstract acquisition power in the

form of capital of securities that represent a property right over residual profits. Certainly, an investor will seek to maximize the returns on her shares, that is, to maximize the value of her capital. The analysis of the determination of the value of capital becomes essential.

In the next section, I will present a solution for the determination of the economy's rate of return, which in my view is the appropriate rate to determine the prices of shares of capital, as the present discounted value of future residual profits. The prices of capital will adjust to this general rate until all shares yield the same overall returns. This will allow us to rigorously define and determine one of the essential general equilibrium conditions of a capitalist economy, equal returns on capital. It is necessary to stress that the proposed solution to the determination of the economy's rate of return presented here is radically different from the generally accepted Smithian inspired securities' pricing paradigm, developed by financial economists and that is taught in finance courses and used in the practice of investments. Just as in Smith's price theory where natural prices are the sum of the labour, land and capital costs involved in production remunerated at their natural prices, in modern financial economics the equilibrium (expected) rate of return on any security is defined as the sum of the equilibrium real rate of interest, plus the expected rate of inflation, plus a security-specific risk premium.[60] The overall rate of return is simply an average of the returns of specific securities. In a A&D type world, there is no inflation, there is no uncertainty and hence no risk, so all that is left is the equilibrium real rate of interest and we are back to Walras incorrect solution, if not all the way back to Smith's, but now using a Fisherian/Wall Street jargon. So all this fancy definition has to say is that in equilibrium all securities yield a rate equal to the interest rate, and when asked to define where this interest rate comes from, they go all the way back to the pre-classical loanable funds theory of interest, but expressed in the lingo of the times.[61] In short, the theory behind the ruling security pricing paradigm is no new theory at all. Where we find a significant jump forward is in the idea of arbitrage and the so called Law of One Price for securities. As we saw, arbitrage[62] is one of the most fundamental

concepts in financial economics, is usually defined as *"the act of buying an asset at one price and simultaneously selling it or its equivalent at a higher price."*[63] Thanks to the activities of arbitrageurs, that continuously try to profit from price differentials buying and selling securities, the prices of securities adjust until every security ends up yielding the same return. Hence, we have the Law of One Price: two securities or groups of securities with the same payoff, or returns, structure must sell for the same price: *"If two identical securities (or packages of securities) are selling in two markets at different prices, it should be profitable to buy the security in the low-priced market and sell it in the high-proceed market simultaneously. In the process, arbitrageurs, who engage in this activity for a profit, drive up the price in the low-price market and drive down the price in the high-priced market, eliminating the price differential."*[64] There are many differences between professionals of finance within the ruling Smithian camp regarding the right way to define equilibrium yields and price relationships among securities, but almost everyone agrees that the Law of One Price rules almost all of the time in securities markets: securities or bundles of securities with equivalent returns will be priced so that risk-free arbitrage is not possible.[65] In short, the prices of securities, in our case of shares, will change relative to each other so that in equilibrium they will yield the same return. My proposed solution for the determination of the rate of return on capital rejects the ruling Smithian paradigm where the total return on capital is a sum of costs: the real cost of money, the cost of inflation and the cost of risk.[66] The dominant financial approach relies on a partial equilibrium perspective, the excess return of a security is considered independently of the returns of other securities and the so-called market rate of return is simply the nominal interest rate plus an average of risk premiums. Also the nature of the security specific risks is not explained, but it is considered as different from the business risk that the firm issuing securities faces in its operations. Within the Smithian perspective, the returns on securities, are assimilated to the interest rate, which is not determined or it is zero in the long run, resulting in that the value of capital is indeterminate, so there is not a rationale for a capital market.

In contrast, the proposed solution follows the Ricardian tradition of profits as a residual, which are completely determined by general equilibrium conditions as we saw. Capital is conceived in the same way as financial economists conceive of securities, as a property right, a legal claim on the cash flows, residual profits, of the firm that issues the security. My perspective determines first the economy's rate of return and then uses this general rate as the benchmark around which the prices of shares will adjust until every share yields the same returns, due to the activities of investors and/or arbitrageurs, buying and selling shares trying to maximize the value of their capital. Instead of obtaining a total return by adding up costs, we determine first the general rate of return of the economy based on the generation of residual profits by firms and then we proceed to inquire how this rate is distributed among different components: the interest rate on debts being the most important of these. It should be clear, as a matter of elemental logic, that the quasi-universally accepted Law of One Price requires a determinate, or a known, rate of return, and/or payoff structures, based on which the relative prices of securities will adjust.

The competitive equilibrium of the private ownership economy, as considered in the last chapter, does not satisfy the condition that prices equal costs of production and does not have a place for a capital market where the condition of equality of returns on capital could be satisfied. Then, it is a poor representation of a real capitalist economy, and logically it is not a full equilibrium. It is a temporary equilibrium: demands will equal supplies, markets will clear, but as long as profits evolve the basic data of the problem will change. In such equilibrium there are positive residual profits, and firms obtain different rates of return, there is an incentive for producers either to increase or decrease their production, enter new ventures or leave non-profitable activities, causing changes in the relative prices of commodities. Once we consider capital as defined, we have a theoretical motive for transfers of ownership, for a market in shares, for a capital market. Agents, now as investors, will have to chose how to allocate their capital, not as things but as abstract acquisition power, in the form of shares. From the perspective of the

owners of shares representing property rights of future profits streams, there is an incentive to get rid of shares with below average returns and trade them for shares with higher returns that is to behave like investors, maximizing the value of their capital. Capital market operations will result in changes in the relative prices of shares and consumers as investors will have an incentive to buy or sell shares in their portfolio to accommodate their consumption plans. Equilibrium in the capital market will be attained when the relative prices of shares adjust until all shares yield the same return, equal to the economy's rate of return. The Law of One Price will hold. We consider that this result can be achieved through the activities of a few arbitrageurs, maybe even one powerful arbitrageur will suffice, so the consideration of a huge number of independent markets for financial assets, the consideration of market clearing à la Walras in all of them, a multitude of agents, etc., etc., becomes redundant, and also the application of traditional theory of value analysis to securities markets.

Once the economy's rate of return is determined, the relative prices of shares will adjust so the returns on capital are equalized, we need only one market for capital and some arbitrageurs, for consumers individually the prices of shares or the price of capital will appear as a given. This process is essentially short term and in the conditions of perfect information and zero transaction costs, assumed in general equilibrium the adjustments in the prices of shares should be immediate, just as it is posited by the efficient market hypothesis. All in all, under the conditions of a temporary general equilibrium we will have one capital market and one price for capital (the price today for a unit of future residual profits) and this will be equal to the economy's profit rate. The equilibrium in the capital market as envisioned is necessarily a temporary equilibrium: as long as there are residual profits capital has a value, over time profits change continuously, and so does the value of capital, and every change will be immediately reflected in share prices, both in terms of commodities and in terms of each other.

A capitalist economy is characterized by continuous adjustments in the value of capital that are endogenously generated, not the result of exogenous shocks and stochastic disturbances. They come from the permanent process of competition that causes profits eventually to disappear. It should be clear that movements in the capital market so defined have nothing to do with the stock and/or the structure of the commodities, durable or not, used in production, as happens to be in the real world.[67]

We have argued that the consideration of the capital market should be limited to those assets whose value is directly dependent on residual profits, we can consider basically two types of assets: equity and debt. It will be argued that in a pure equity[68] economy, variations in the value of capital would depend strictly on the overall profitability of the economy, i. e. the general rate of return, and in the relative profitability of firms. Real world capitalist economies are not pure equity economies; besides equity, a variety of securities representing claims on the profits of firms coexist, of which debt[69] that commands interest is the most important. In such an economy the value of capital also depends on the structure of the claims, that is on the financial or the capital, structure of the economy, and on the interest rate on debts.[70]

A capitalist economy is always in a short term temporary equilibrium, markets clear in commodities markets and the returns on capital are equalized through changes in the relative prices of shares in the capital market. The forces of competition push the economy towards the theoretical target of prices equal to costs, nevertheless, if the economy ever gets there, ceases to be a capitalist economy, the value of capital is zero then. It becomes the ideal pure free market state originally envisioned by Smith and represented by the classical general equilibrium models á la Walras and A&D.

The temporary equilibrium of a capitalist economy is not optimal either and there is no presumption that it corresponds to a particular level of employment or

productive capacity utilization. Only the long term full equilibrium corresponds to a full employment Pareto optimal situation. The existence of profits as residuals generated by the existence of competitive advantages[71] caused simply by the time it takes to equalize prices to costs, suffices to establish the inexistence of a Pareto optimal situation. Certainly, it well can be that a growing well developed economy is moving towards such a state, if profits are value creating and not value expropriating[72], or that is consistently close to it, but we cannot assume that this is always the case. Such cases are most likely the exception than the rule of the life of modern capitalist economies. The traditional general equilibrium alternative of considering profits as payments for non-specified resources that are not marketed and stay frozen within some firms, is not a satisfactory explanation nor an innocent assumption indeed. All it does is to assume that profits are costs and that prices are equal to costs, hence the economy is always in full equilibrium by statement[73].

We are beginning to transcend Jaffé's critique of the Walrasian general equilibrium tradition. From the theoretical perspective what this tradition does correctly is to solve the classical problem of the determination of the relative prices of commodities in an ideal free market world. Nevertheless, it does not provide an adequate description and hence an explanation, that can help us predict the actual workings of 'really existing' modern capitalist economies.

By explicitly considering profits as a residual determined by general equilibrium conditions, depending only on the consideration of real time and capital as the property right over them, we can provide a logical base for the existence of a capital market and its equilibrium condition, providing an initial explanation for the dynamics of capital. In the spirit of the classics the driving force of capitalism resides in the profitability of capital, however, contrary to the classical tradition of considering capital in physical terms and its profits as a cost, as Smith did, we are dealing with profits as a residual and capital as a tradeable property right, with a value that impinges in the overall dynamics of the economy. In such an economy the maximization of the value of capital becomes a driving force as important or

more than the maximization of utility and profits. It is a general equilibrium theory, still rough and unfinished, of a capitalist economy. To determine the value of capital, an appropriate rate of discount is required. The general rate of profit comes next.

3.4 The general rate of profit.

The use of dated commodities is the trademark of Walrasian, Arrow and Debreu type, general equilibrium models. The problems of space and time are dealt with by assigning to each commodity to be traded spatiotemporal coordinates. The same commodity is different depending on when and where it is available. Abstracting from the spatial dimension, the price of a commodity can remain constant or vary over time. At each point in time it will be an equilibrium price determined by general equilibrium conditions, all present and future prices are known. In Arrow and Debreu this equilibrium is always a full long term equilibrium, once it is achieved, trade is over, markets will not re-open because there are no more net trades available. The temporal dimension in A&D general equilibrium is compressed in an instant, the moment when the auctioneer announces the final market clearing prices. Nevertheless, once we consider the existence of residual profits, prices reflect a temporary equilibrium, the basic data of the problem may change, markets may have a reason to reopen and economies will move over time through a succession of temporary equilibria.

In a capitalist economy where the maximization of the value of capital by investors is one of the driving forces, together with the maximization of utility by consumers and profits by firms, the determination of the rate of profits, that is the appropriate discount rate, is fundamental. The value of capital today is a function of its current and future cash flows. In Arrow and Debreu the value of capital is reduced to current profits, spot and future profits are compressed in one, capital as such does not have a place in this a world, as we saw. To understand and to determine the economy's rate of profit we need to decompress A&D time and

adopt financial time, that is real time or calendar time. We need to visualize the trading process as a succession of market days, weeks, minutes, etc., where we look at transactions not as a flat image of all transactions taking place at once, but at transactions as they happen through real time. This is the perspective of the financial economist dealing with the 'time value of money', that is with capital. The value of capital today is important, because capital as a claim on future residual profits, can have a positive value today, and this value should be incorporated in today's budget constraint of the consumer. If we can incorporate logically and consistently the value of capital as a separate component of the consumer's budget constraint[74], then we need to revise Walras' Law. And, hence the demand for money, among other determinants of the short and long term dynamics of a modern capitalist economy, like the investment function of the firm. By doing this we can start to develop an integrated analysis of both long and short term phenomena. If by explicitly considering the value of capital and its changes in the consumer's budget constraint, we can show that under some conditions the individual and the aggregated budget constraints are affected by this, say, *capital effect*[75], then we have a reason for markets to reopen. This, because once a temporary equilibrium has been achieved the initial conditions, or the basic data of the problem as Walras used to say, might have changed as a result of the equilibrium itself, sparking a new round of adjustments in prices, profits, the value of capital, the demand for money and so on.

The profits generated by a producer in the basic GEMs we presented before, are equivalent to net cash flows, the earnings before interest and taxes, EBIT, of finance people. Lets recall that profits are a vector of value, they cannot be reduced to a physical dimension and they appear ultimately because consumers as a whole, society, assign more value to the finished product than to the commodities used in its production. Using the same notations presented in chapter two, the profits for producer *j*th are a vector of dated commodities (inputs-outputs) multiplied by a vector of prices, this product represents the dated profits of the *j*th producer. Obviously, net cash flows, can be positive, negative or zero at any

given moment in time. Dated profit streams in a competitive equilibrium of the private ownership economy are logically equivalent to the firm's net cash flows. So if the *j*th producer's net cash flows are determined over the considered time period, which they are because all prices are determined, there is an internal rate of return, IRR[76], associated to each one of them. In other words, there is, a discount rate, r_j , that would equalize the net present value NPV, of the *j*th producer's profit streams to zero.

The vector of the profits (cash flows) for producer *j*th is:

$$p * y_j = cf_j \quad where \quad cf_j \; E \; R^n \quad and \quad \sum_{j=1}^{k} (p * y_i) = cf$$
$$cf_j / cf = O_j \quad and \quad \sum_{j=1}^{k} O_j = 1$$

The profit streams or the cash flow of producer *j*th are represented by cf_j, this is a vector of values, of positive and negative prices times quantities, associated to dates, *cf* is the sum of the individual producers' cash flows, it represents the cash flows of the economy as a whole. O_j represents the participation of the *j*th producer in the total profits of the economy, the sum of these participations is one. It is clear that under the general equilibrium conditions of the CEPOE[77], model both cash flows, the firm's and the economy's, are perfectly determined. Just as current cash flows are determined at any given moment in the real world. Simply because all prices are determined.

If we order the elements of these vectors, which as we know are dated, from the present time *t (period 0),* to time *t+1, t+2,..., t+n,* where $cf_{j\,t}$, represents the initial cash flow, or the net value of the commodities employed in the initial period of production, and using the familiar net present value formula, NPV, we have for the *j*th producer:

$$NPV_j = cf_{j\,t} + cf_{j\,t+1} \left(1/1 + r \right)^{t+1} + cf_{j\,t+2} \left(1/1 + r \right)^{t+2} + ... + cf_{j\,t+n} \left(1/1 + r \right)^{t+n}$$

Where, *r*, is the discount rate which is unknown under the conditions of the basic model. Using the value additivity principle[78] we can aggregate the cash flows of every producer and we will obtain the cash flows for the economy as a whole:

$$NPV = cf_t + cf_{t+1}\,(1/1+r)^{t+1} + cf_{t+2}\,(1/1+r)^{t+2} + \ldots + cf_{t+n}\,(1/1+r)^{t+n}$$

The implicit internal rate of return IRR for the economy as a whole, that will make, $NPV = 0$, will be denoted by *r.* In a competitive equilibrium with positive profits, this rate is determined. The only essential modification of the typical A&D model consist in the introduction of real time. This rate, *r,* is what I call the economy's rate of profits or rate of return, I consider it as the appropriate rate to discount future cash flows and hence to determine the value of the capital of individual firms[79]. Walras loooked in vain for the market that determines such a rate, well there is not such market. The economy's profit rate is not determined by the supply and demand for a particular commodity, call it capital, money, or what you will, it is determined by the supply and demand conditions of all commodities' markets simultaneously. It is a result of the equilibrium in commodities markets: in a short term temporary equilibrium with residual profits, this rate is positive; in a full long-term equilibrium with zero profits, this rate obviously disappears.

Once we introduce real time in the analysis, the irrelevance of the so called own-rates of return becomes obvious, at each point in time *t,t+1, t+2,…, t+n*, we simply register the spot prices at that moment, we have as inputs and outputs *bundles* of commodities at current prices, that together determine a particular cash flow. There is no logical way that we can establish any meaningful relationship between the so-called own rates of return of individual commodities and the internal rates of return as defined above[80]. The relationship between the price of a particular commodity today and its price sometime in the future is not relevant for the profitability of a firm or the economy[81]. What is of importance is, if this particular commodity can be produced and sold at a profit, and this depends on the relative prices of all inputs and the final price of the commodity, not on the relative price of

the commodity with itself at some other time. Once we substitute real time for virtual time the problem of the valuation of capital becomes apparent, it can not be solved based on own-rates of return associated to particular commodities, we need a measure of profitability in terms of pure value. Such a magnitude can only make sense in a real time environment, not in the virtual time of the A&D world. The concept of the rate of profit or return derived from the previous analysis is a measure of the profitability of particular producers and of the economy as a whole. These rates of return, individual and aggregated, are radically different from the concept of own-rates of return or technical rates of return, which, as we know, are derived from the relationships between the prices of the same commodity in different moments of time as established in futures markets. Some reiteration might be useful, own-rates of return are equilibrium price relationships of the same commodity at different moments in time. To use the own-rates derived from futures markets for particular commodities to discount profit streams, does not make any economic sense. It is known that own rates of return are different. Hence, given that in production we have bundles of commodities as inputs and outputs, which commodity's own rate would be the appropriate discount rate? And, to discount each future input or output using the corresponding own-rate would be equivalent to use spot prices to begin with, future profits will always be equal to present profits, which eliminates the problem by definition and certainly would not provide us with a bench mark to estimate the relative profitability of different firms and to eventually value the shares owned by consumers. That is to determine the value of capital in the form of shares that represent a claim on residual profits, which is what we are ultimately interested in doing.

Internal Rates of Return or implicit profit rates associated to profits vectors of inputs-outputs ordered in real time (bundles of dated commodities of positive and negative sign), are a relationship among flows of pure value over time.

It is clear that there is nothing in the above described model of the competitive equilibrium of a private ownership economy that indicates that profit

rates of producers, measured as the IRRs of individual producers should be equal. On the contrary, in the spirit of a succession of temporary equilibria and market competition, it should be expected that profit rates of individual producers are always different, always changing, always gravitating towards the economy's rate and ultimately in the long, long term, towards zero.

To transcend the pure normative character of GE analysis, to go beyond Jaffe's critique, the introduction of real time is of essence. As we can see, directly from a simple general equilibrium model[82], by ordering transactions in real time, we can derive as completely determined variables, the cash flows and associated internal rates of return for every producer and for the economy as a whole. This last one is the aggregate rate of profitability determined by general equilibrium conditions and it corresponds to the general rate of return of the economy. At each point in time these rates are univocally determined. If we use the general rate of return as the "appropriate discount rate" for every individual producers' profit streams we can directly obtain the net present discounted value of the individual firm, the value of its shares of capital. For the *j*th producer, we have:

$$NPV_j = cf_{j\,t} + cf_{j\,t+1}\ (1/1+r)^{t+1} + cf_{j\,t+2}\ (1/1+r)^{t+2} + \ldots + cf_{j\,t+n}\ (1/1+r)^{t+n}$$

If we make the NPV_j equal to zero, we obtain the internal rate of return IRR for producer *j*th, that will make $NPV_j = 0$, as r_j .

$$0 = cf_{j\,t} + cf_{j\,t+1}\ (1/1+r_j)^{t+1} + cf_{j\,t+2}\ (1/1+r_j)^{t+2} + \ldots + cf_{j\,t+n}\ (1/1+r_j)^{t+n}$$

As we saw, for the economy as a whole:

$$NPV = 0 = cf_t + cf_{t+1}\ (1/1+r)^{t+1} + cf_{t+2}\ (1/1+r)^{t+2} + \ldots + cf_{t+n}\ (1/1+r)^{t+n}$$

Where the rate of return for the economy as a whole, that will make,

$NPV = 0$, is r.

In summary, using the general rate of profit, r, as the appropriate discount rate to obtain the value of the capital of the individual firm, we will have:

$$If \quad r = r_j \ then \ NPV_j = 0$$
$$If \quad r < r_j \ then \ NPV_j > 0$$
$$If \quad r > r_j \ then \ NPV_j < 0$$

Those firms with a net present value of their future profits or cash flow streams equal to zero, would be returning the same yield as the economy as a whole. Those firms with negative values would be below normal profitability. And, those with positive NPVs would be above average profitability. Profit maximizing producers will react to these profit rates estimates, and consumers that own shares that represent ownership rights on future profit streams will too react to these rates too. It should be clear by now, that the process of equalizing returns at the firm level is a long term process, it corresponds to Walras' full equilibrium and to Marshall's long term equilibrium. It is the process whereby prices are equalized to costs. While the process of equalizing returns on shares is almost immediate. In the full information world of general equilibrium the markets for shares will be efficient[83]. The workings of the capital market will assure that every consumer viewed as an investor[84], would trade her shares, until due to efficient markets and to the Law of One Price and arbitrage[85], the prices of shares will adjust until every share will yield the same return and this return will be exactly the same as the average return for the economy as a whole. It does not matter how much someone wants to get, how much return someone requires, capital yields what the economy yields. As popular wisdom expresses you cannot beat the markets. For the simple reason that total profits are given and they are completely independent of their distribution.

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In summary, if the property rights over future residual profits are valuable, then a capital market emerges and in the market for shares—or other forms of capital—relative prices of shares will adjust until the returns on capital are equalized, satisfying this, reformulated, classical equilibrium condition. As we said this result does not depend on the classical assumptions of market clearing and a multitude of agents, and /or markets. We need a market for capital, a market for the rights over future profits, and few arbitrageurs.

Capital emerges as the ultimate vehicle for transferring acquisition power over time and states of nature. The value of profits in terms of commodities, the economy's and the firms' rate of profits is determined, so the value of shares of capital is also determined. There is no need to consider the payoffs of assets in terms of goods, or in terms of arbitrary unexplained units, which as we saw present very serious theoretical problems. In this context capital is not an artificial security, like for example the Arrow security, invented to overcome the classical problem of integrating money to general equilibrium. The concept of capital as we have been using it corresponds to an existing institution; in the real world capital is essentially a fiduciary phenomenon, it is valuable and it is traded. In the financial world capital is the most important way to store and to transfer value over time. And in the real world finance and money do matter.

The perspective adopted here can simplify significantly the problem of the existence of complete markets. As we saw the classical Arrow and Debreu vision requires the existence of a full set of state contingent markets, Radner proposed that only a subset of markets were needed and that equilibrium in a sequential economy under certain conditions was isomorphic with Arrow and Debreu equilibrium, which meant that all the optimality properties of this last could be ascribed to the first. Nevertheless, the required number of assets markets in Radner equilibrium was still huge; the conditions and assumptions for equivalence extremely strict; and as Hart and others postulated the problem of returns and the

introduction of money could open the door to severe indeterminacy of equilibrium. In this work we have argued for the separation of assets in those whose value depends on commodities and those whose value depends on future residual profits, capital. We believe that the first kind of assets can be safely treated as if they were commodities; these markets belong with commodities markets. But for capital we have suggested an alternative treatment that simplifies things tremendously: one single capital market to transfer acquisition power over time. Given that we do not need to assume the existence of payoffs or returns arbitrarily defined because we have provided an explanation for profits, the rate of profits and capital, then we can treat capital as if it was a single asset with the same return. Thus we need only one market. Now a crucial problem needs to be addressed, if markets emerge for all those assets that are essentially commodities transactions, and a market for capital exists that can take care of the intertemporal allocation of acquisition power not covered by commodities markets. Then we have full markets and the basic property of incomplete markets does not apply. In other words, are we in the Arrow & Debreu/Radner equilibria equivalence world? My answer is no, because in my approach the existence of a full equilibrium with all the nice full employment and optimality properties of the classical vision, is not related first to the completeness or nor of markets, but to existence of residual profits. A general equilibrium in a capitalist economy is achieved when all markets for goods clear and when the returns on capital are equalized.[86] A general equilibrium a la Arrow & Debreu is achieved when all markets for goods clear and when prices equal costs, that is when residual profits are zero, in this world the intertemporal allocation of acquisition powers is taken care through commodities markets, money and finance do not have a role.

To finish this chapter let us comment on the introduction of a diversified structure of capital, a crucial issue with potential macroeconomic consequences. In the capital market as we envision it, the prices of shares of firms with above average profitability will increase relative to the prices of shares of firms with profitability below average. Some shares will show capital gains and some will

show capital loses, resulting in a distributional effect, some consumers will win and others will lose, in terms of the abstract acquisition power represented by the value of their shares. In the world of a competitive equilibrium with a market for shares, that is in a pure equity economy, where the appropriate rate to value capital is the economy's rate of return and returns on shares are equalized, capital effects, that is capital gains and loses at the individual share level, will have only distributional consequences and will cancel out in the aggregate. Capital effects, that are changes in the aggregate supply and demand conditions due to changes in the value of capital, will be neutral[87] in a pure equity economy. Walras' Law would still be irrevocably valid. If and only if the general rate of return as defined, is used as the "appropriate" discount rate to value future profits, the rate around which returns on capital are equalized.

Certainly, for an individual or for a set of individuals, the option to trade capital for commodities of equivalent value is open, as long as there is another individual or set of individuals, willing to receive those shares and to keep them in their portfolio. In a monetary economy, individuals have also the option to trade capital for money, they can opt for liquidity[88], and they can demand money. The existence of capital with a potential positive, or in some circumstances negative, present value opens an additional potential source for the aggregate demand for money. In a pure equity economy this source will not operate, individual demands and supplies will cancel out.

In any given point in time then, the budget of the consumers will include all the real resources, commodities, owned by them; the current profits paid out by firms; and, a portfolio of shares representing the net present value of the firm's future profits, that is the value of capital. It should be stressed that in an economy where capital is held only in the form of shares, a pure equity economy, where in equilibrium the prices of shares are equalized so every share yields the same return and this return is equal to the economy's general rate of return, the net present value of the economy's portfolio of shares is zero. It is when the interest

rate is introduced and when the property rights over the residual profits of firms, when capital, adopt different forms, particularly debt that yields an interest rate that is different from the economy's general rate, that the value of capital can be different from zero, and hence a new element is introduced in the workings of Walras' Law.

As an alternative to the pure equity economy, we can consider a pure debt economy where instead of shares, property adopts the form of fixed interest rate securities, and this interest rate is used as the appropriate discount rate to value capital. If the interest rate, i , is equal to the economy's aggregate rate of return, r, then capital effects are neutral, the economy's $NPV = 0$.

However, if the interest rate is under the economy's rate of return, the excess cash flows over and above the interest rate have a positive value, the aggregate net present value of capital is positive. If the case is reversed, that is the interest rate is above the general rate of return, then the aggregate value of capital is negative. We have said this before, but it is important to stress it: logically the existence of capital precedes the interest rate. Payments to debt holders come from profits as defined, that is from free cash flows. In summary, denoting the interest rate as, i, and aggregate capital effects, NPV, as κ :

$$\text{If} \quad i = r \ \text{then} \ \kappa = 0$$
$$\text{If} \quad i < r \ \text{then} \ \kappa > 0$$
$$\text{If} \quad i > r \ \text{then} \ \kappa < 0$$

Denoting as $\kappa_j = NPV_j$

We had defined the total income of consumer i, as M_i . Now the budget constraint is:

$$M_i = p * \underline{x}_i + \sum_{i=1}^{m} \theta_{ji} (p * y_i) + \kappa_j$$

Or, $M_i = W_i + R_i + P_i + \kappa_j$

For the economy as a whole:

$$M = W + R + P + \kappa, \quad \text{Or,} \quad Y = W + R + P + \kappa$$

In the aggregate we will have,

$$Y = W + R + P$$

Only when:

$$\sum_{j=1}^{k} \kappa_j = \kappa = 0;$$

Which is the case, if and only if shares are the only form of claims against residual profits and the returns on capital are equalized at, *r*, the general rate of profits. Or when there are different forms of claims against residual profits, say equity and debt, if $i = r$.

The previous analysis demonstrates that under conditions of general equilibrium with perfect information and zero transaction costs, capital effects may affect at the aggregate level the workings of Say's Law, or Walras' Law in its equivalent modern usage. These effects are caused by divergences between the economy's profit rate as determined in commodities markets and the interest rate, at this point of the analysis simply introduced from outside the system. Walras' law is unreservedly valid only when the interest rate equals the economy's profit rate, it becomes a special case[89]. Let's recall that, essentially, the ancient Say's Law of markets and Walras' Law, states that commodities can only be acquired with commodities. Capital is not a commodity, however appears as an additional asset, a financial asset, a *net* financial asset, in the consumer's budget. However, for the

virtual value of capital to become demand it has to become money first. The introduction of the interest rate implies the consideration of the financial structure of the economy; this is the task of the next chapter. Should be obvious that the interest rate implies the existence of money as well, an issue that will be analyzed in chapter five.

Notes to Chapter 3.

[1] "When economists reach agreement on the theory of capital they will shortly reach agreement on everything else. Happily, for those who enjoy a diversity of views and beliefs, there is very little danger of this outcome. Indeed, there is at present not even agreement as to what the subject is about." Christopher J. Bliss, *Capital Theory and the Distribution of Income*, 1975: p.vii. "The explanation and determination of the interest rate still gives rise to more disagreement among economists than any other branch of general economic theory." Gottfried von Haberler, *Prosperity and Depression*, 1937: p.195.

[2] If markets clear, then the excess demands for every commodity are zero, there are no physical surpluses or deficits of any merchandise.

[3] This is Axel Leijonhufvud expression.

[4] As we saw before, Chapter 1, coupling the market clearing principle with the marginal productivity theory of distribution, implies assuming that prices are always equal to costs, so the economy is always in a long term equilibrium, i.e. full employment, where whatever the unemployment rate is, it corresponds to its 'natural' level, save for external shocks and stochastic disturbances. This is exactly what New Classical economists, Lucas, et. al. and Real Business Cycle theorists, like Prescott and Kydland, do. For them the long and the short term are indistinguishable and the precepts of growth theory can explain the short term fluctuations of modern capitalist economies, without any reference to financial and monetary phenomena.

[5] That is the market where property rights on future profits are traded. Certainly, capital markets have nothing to do with the markets of the things used in production.

[6] The utility based supply and demand model coupled with the market clearing postulate.

[7] Advice repudiated by Hicks himself later in his life.

[8] "In general, these triple equalities—the rate of return or rate of profit on capital=the internal rate of return on capital projects=the rate of interest in the loan market—have to be satisfied simultaneously but as soon as we consider, uncertainty, depreciation, and obsolescence as a result of technical progress, it is easy to see that there may well be no determinate and stable equilibrium that can be attained by any adjustments of the initial data. Walras certainly failed to solve this problem satisfactorily and he tends continuously to lapse into the assumption of identical capital goods, that is, either a homogeneous capital stock or an infinitely malleable one, in order to simplify the argument. As a matter of fact, if we studiously avoid any assumption of the homogeneity of capital, it cannot be said that we have even now solved Walras' problem of proving that equilibrium in the presence of capital accumulation with n capital goods is necessarily determinate." Blaug, M. "Economic Theory in Retrospect." Pp. 614.

[9] The efficient market hypothesis states that the prices of securities fully reflect available information. Investors buying stocks and bonds in an efficient market should expect to obtain an equilibrium rate of return. Firms should expect to receive the "fair" value (present value) for the securities they sell. See for example Ross, Westerfield and Jaffe, "Corporate Finance" 2d. Ed. IRWIN, Homewood, Ill. Boston, MA. 1990. G7. Also, Bodie, Kane and Marcus. "Essentials of Investments" IRWIN, Homewood, Ill. Boston, MA. 1992. Pp. 269, 276-278.

[10] The long-run equilibrium based on a uniform rate of profit with associated prices of production is a key concept in the classical economic theory. This equilibrium is the outcome of an adjustment process: differential profit rates induce capital mobility between markets, which continues until profit rates equalize. The issue comes from Ricardo's conclusion that production conditions in basics determine the profit rate. Nevertheless, the Ricardian basics theory of the profit rate is either a physical-standard theory of the profit rate or a capital-productivity theory. The Marxian perspective stems from the so called transformation problem (The locus classic is: Marx, Karl. 1976. Capital, Volume III. International Publishers, New York.). In the more recent literature, it is usually assumed that there is imperfect labor mobility or similar rigidities. Nikaido's (Marx on Competition, **Nikaido, Hukukane,** *Zeitschrift fur Nationalokonomie, 43(4), 1983, pages 337-362*) critique initiated a debate about this concept. We cannot present a survey or anything close to it in this present work; however several scholars have argued that there are several major conditions that impede a tendency for profit rates to equalize. Some neo Marxists have argued that capitalism cannot be shown to reach a Neo-Ricardian equilibrium, (See for example: **Naples Michele I. "**A Radical Economic Revision of the Transformation Problem" Review of Radical Political Economics, Vol. 21, No. 1-2, 137-158 (1989).). These conclusions coincide with my argument that the classical definition of the profit rate is not a very useful category and should be reconsidered. Some other works that may be of interest in this regard, with conclusions in several different directions are: Dynamics of Growth and Capital Mobility in Marx's Scheme of Reproduction, **Nikaido, Hukukane,** *Zeitschrift fur Nationalokonomie, Journal of Economics, 45(3), 1985, pages 197-218.* Steedman, Ian. 1981. Marx After Sraffa, Verso, London. Naples, Michele I. 1988. Is a Uniform Profit Rate Possible? A Logical-Historical Analysis, Science & Society, 52(1) (Spring), 83-93. Dumenil, G. and Levy, D. 1987. The Dynamics of Competition: a Restoration of the Classical Analysis. Cambridge Journal of Economics, 11(2) (June): 133-164.

[11] Among others the most conspicuous are Kurz and Salvadori. See: **Kurz, H. D.** (1987). "Capital Theory: Debates", in "The New Palgrave", edited by J. Eatwell, M. Milgate and P. Newman, vol. 1, London: Macmillan, pp. 357-63. **Kurz, H. D.** (ed.) (2000). "Critical Essays on Piero Sraffa's Legacy in Economics", Cambridge, Melbourne, New York: Cambridge University Press. **Kurz, H. D. and Salvadori, N.** (1995). "Theory of Production. A Long-period Analysis." Cambridge, Melbourne and New York: Cambridge University Press. **Kurz, H. D. and Salvadori, N.** (1997). "Understanding 'Classical' Economics. Studies in Long-Period Theory", London: Routledge. **Kurz, Heinz D. and Neri, Salvadori.** "Blaug on the Sraffian Interpretation" 2002. HOPE 34:1 (2002). **Salvadori, N.** (1998). "A Linear Multisector Model of 'Endogenous' Growth and the Problem of Capital", Metroeconomica, **IL**, pp. 319-335. **Salvadori, N.** (1999). "Transferable machines with uniform efficiency paths", in Mongiovi, G. and F. Petri (eds.), Value, Distribution and Capital. Essays in honour of Pierangelo Garegnani, London: Routledge, pp. 297-313.

[12] **Sraffa, Piero.** (1960), "Production of Commodities by Means of Commodities. Prelude to a Critique of Economic Theory." Cambridge: The University Press.

[13] **Blaug, Mark.** "Misunderstanding classical economics: The Sraffian interpretation of the Surplus Approach" 1999. History of Political Economy, HOPE 31.2:229. Also **Blaug, M.** "Classical Economics", in Eatwell, J. Millgate, M. and

Newman, P. The New Palgrave Dictionary of Economics, London: Macmillan, Vol.1 434-45.

[14] **Hahn, F. H.** (1982). "The Neo-Ricardians", Cambridge Journal of Economics, **6**, pp. 353-74.

[15] For a recapitulation by one of the main actors see: **Harcourt, G. C.** (1994) "The Capital Theory Controversies" in "Capitalism, Socialism and Post-Keynesianism" Selected Essays of G. C. Harcourt. 1995. Aldershot, Edward Elgar.

[16] For Walras a physical asset, a durable capital good.

[17] In Walras' influential but incorrect capital theory he is forced to introduce artificial constructs like the units or 'slabs of perpetual income' per unit of time, the famous E. And the definition of the interest rate as the reciprocal, 1/E, of the price of E, considering at the same time, E and the interest rate, as two *different independent* variables to be determined by his general equilibrium system, which is obviously wrong. Also, how is different a slab of perpetual income, from money or from capital?

[18] As was presented in VMCD, "The Theoretical…." Fisher's work was described by Schumpeter as *"the peak achievement…of the literature of interest."* Also Fisher's work was Keynes' inspiration for his theory of the marginal efficiency of capital, and Fisher is Arrow-Debreu's theoretical antecedent of the theory of the interest rate as a special case of the general equilibrium theory of dated commodities. Modern financial economics and capital budgeting techniques are based on Fisher's contributions to net present value and internal rate of return analysis. Fisher's propositions regarding the real and money rate of interest are universally accepted. In short modern theories dealing with interest and capital, including mine, incorporate in one way or another Fisher's contributions.

[19] Net Present Value is defined as: $NPV = C_o + \sum_{t=1}^{T} C_t/(1+r)^t$ where C_t are the firm's cash flows or residual profits in future periods, *t*, and, *r ,* the rate of return on capital. Clearly if residual profits are determined by general equilibrium conditions, shares of capital will have a determinate value only if the rate of return on capital is known.

[20] The usual problem here is the identification of capital with the property of durable or production goods. Durable goods are produced, their price is set as any other nondurable good, in the market for durable goods, and their transfers, are just the same as nondurable goods, and the division between durable and non is simply arbitrary. In the framework of an Arrow&Debreu finite time horizon model, a result that is disturbing for those that identify owning capital with owning things, is that in equilibrium the current price of durable goods is equal to the accumulated price of its services, which means that at the point when "all economic activity either ceases or is outside of the scope of the analysis" (Debreu, in Currie p. 146) the prices of durable goods are zero when they can be depreciated in economic terms, or indeterminate when not, as in the case of land.

[21] Particularly the assumptions regarding total output/demand and its composition as given and invariant to changes in the distribution of income.

[22] In its modern, general equilibrium/activity theory, version.

[23] It can be argued that human capital comprises both reproducible and non-reproducible services. The services of a network administrator can be reproduced, they are remunerated by wages set at market levels, in a full equilibrium equal to the costs involved in (re)producing such a service. The services of Leonardo da Vinci, or for that matter of Britney Spears, are not, they generate rents, which are residual incomes not determined by their costs. Of course, in a free market individuals are equal before the law and in politics, but unequal in the value of the services they can provide to the marketplace.

[24] This is a crucial problem, as of now suffices to say that the way firms are organized and property rights over them are established in the real world is an historical, institutional, process and it is not a given natural form of the way things are. In the Harvard Business Review of December 2002, (Spanish Edition) Charles Handy in the article "Para qué son los negocios?" (HBR, Dec. 2002. pp. 41-45) writes "La idea de que quienes financian una empresa no sólo son sus financistas, sino sus legítimos propietarios, se remonta a la época de las primeras empresas, cuando el propietario era quien efectivamente, financiaba, y era, normalmente además el CEO. Una segunda idea también anticuada, y relacionada con la anterior, es que la empresa es una propiedad, sujeta a las leyes de propiedad. Esto tuvo su razón de ser hace dos siglos, cuando surgió el derecho corporativo y una empresa se constituía a partir de un conjunto de activos físicos. Ahora que el valor de una empresa radica fundamentalmente en su propiedad intelectual, en sus marcas y patentes, y en la habilidad y experiencia de su personal, parece inverosímil tratarla como sí fuera propiedad de financistas que pueden disponer de ella a su gusto. Es posible que así lo diga la ley, pero no parece justo. No será que quienes tienen esa propiedad intelectual, quienes aportan su tiempo y su talento en lugar de su dinero, deberían tener algunos derechos, algo que decir sobre lo que para ellos es "su" empresa?

[25] In the real world firms can own directly all, some or none, of the physical assets employed in production. The value of the physical assets as such, is irrelevant for the value of a firm as such, that is, as an ongoing business concern. A piece of iron, a machine, etc., has a market price that is independent of the value of the firm that owns it. What counts in capital markets is not how much iron, plastic, wood or silicon, in whatever form or shape is owned by a firm, but the capacity of the firm to generate residual profits.

[26] "…and (iii) total resources" (Debreu, 1959, p. 74). Regarding these he specified: "They include the capital of the economy at the present instant, i.e., all the land, buildings, mineral deposits, equipment, inventories of goods, ... now existing and available to the agents of the economy. All these are a legacy of the past; they are *a priori* given" (Debreu, 1959, p. 75). The standard definition of capital in economics is also in physical terms, it is conceived as a scarce resource: **"Capital.** The stock of goods which are used in production and which have themselves been produced. A distinction is normally made between *fixed capital*, consisting of durable goods such as buildings, plant and machinery; and *circulating capital*, consisting of stocks of raw materials and semi-finished goods, components, etc., which are used up very rapidly (>>CIRCULATING CAPITAL). The word capital in economics generally means *real capital*—that is, physical goods. In everyday language, however, *capital* may be used to mean money capital, i.e. STOCKS OF MONEY which are the result of past saving. Two important features of capital are (a) that is creation entails a sacrifice, since resources are devoted to making non-consumable capital goods instead of goods for immediate consumption; and (b) that it enhances the PRODUCTIVITY of the other FACTORS OF PRODUCTION, LAND and LABOR, and it is this enhanced productivity which represents the reward for the sacrifice involved in creating capital. Hence, we can surmise

that new capital is only created as long as its productivity is at least sufficient to compensate those who make the sacrifice involved in its creation." The Penguin Dictionary of Economics, Graham Bannock, R. E. Baxter & Ray Rees, 2d. Ed. 1979. Pp. 63.

[27] **Allen, B.** (1986) "General Equilibrium with Rational Expectations", in W. Hildenbrand and A. Mas-Colell, editors, Contributions to Mathematical Economics in honor of Gerard Debreu. Amsterdam: North-Holland. **Allen, F. and Gale, D.** (1994) Financial Innovation and Risk Sharing. Cambridge, Mass: M.I.T. Press. **Arrow, K.J.** (1953) "The Role of Securities in the Optimal Allocation of Risk-Bearing", Econometrie; as translated and reprinted in 1964, Review of Economic Studies, Vol. 31, p.91-6. **Balasko, Y. and Cass, D.** (1989) "The Structure of Financial Equilibrium with Exogenous Yields: The case of incomplete markets", Econometrica, Vol. 57 (1), p.135-62. **Black, F. and Scholes, M.J.** (1973) "The Pricing of Options and Corporate Liabilities", Journal of Poliical Economy, Vol. 81 (3), p.637-54. **Bray, M.** (1989) "Rational Expectations, Information and Asset Markets", in F.H. Hahn, editor, The Economics of Missing Markets, Information and Games. 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Vol. 36, p.110-19.

[28] In The Penguin Dictionary of Economics, we find the following entry: **"Capital theory.** That area of economic theory concerned with analysis of the consequences of the fact that production generally involves INPUTS which have themselves been produced. The existence of these 'produced means of production', or CAPITAL, has profound implications for the nature of the economic system. A central element is the role of time, and intertemporal planning. The production of capital requires the sacrifice of current consumption in exchange of future, possibly uncertain, consumption, and the mechanisms by which this process is organized influence the growth and stability of the economy in important ways. The existence of capital is also central to the analysis of the INCOME DISTRIBUTION. A major and controversial question has been: What determines the income derived by the owners of capital relative to that of suppliers of labour power, and can their share be justified in terms of their contribution to the production of output? An understanding of the nature and implications of capital is fundamental to an understanding of our economic system, and indeed, as one leading contributor to the subject has recently remarked, the problem in attempting to define capital theory is to do it in such a way 'as to embrace something less than the whole of economics' (C. J. Bliss in *Capital Theory and the Distribution of Income.)*. Pp. 69. The problematic nature of defining capital can be illustrated by noting that in the Dictionary of Finance and Investment Terms, John Downes, Jordan Elliot Goodman. BARRON'S Financial Guides. 1985. We find 27 entries on CAPITAL but no definition of CAPITAL alone! Finance persons do not see capital as a physical entity, or as a problematic concept all. Someone's capital is simply her net worth.

[29] As stated before, a "commodity" in the Arrow-Debreu world is a good which is described by its physical properties, its location in time, and the state of the world in which it is delivered, e.g. "raincoats delivered on August 25, 2010 if it rains".

[30] "If we take the Keynesian construction seriously, that is, as of a world with a past as well as a future and in which contracts are made in terms of money, no equilibrium may exist..... From all this, as well as from our existence discussions, we conclude that the Keynesian revolution cannot be understood if proper account is not taken of the powerful influence exerted by the future and the past on the present and by the large modifications that must be introduced into both value theory and stability analysis, if the requisite future markets are missing." Kenneth J. Arrow and Frank H. Hahn. *General Competitive Analysis*, 1971 (p. 361, 369).

[31] In chapter five we will deal with the problem of money, an issue that I believe can be fully resolved—as full things can be in this context—once we have developed a theory of capital, such a theory will provide us with an essential rationale for the demand for money derived from capital. In my perspective to understand money within a capitalist economy, we need to elucidate capital first. For references on Hahn see chapter five.

[32] Kenneth J. Arrow (1953). See full reference in footnote 26 above.

[33] As we will see in the next chapter, the determination of asset prices is one of the main concerns of financial theory and there are a handful of competing theories. However, one of the central features of asset pricing theory, or, as some claim, "the one concept that unifies all of finance" (Ross, S.A. and Dybvig, P.H. 1987) is the stipulation that, in equilibrium, asset prices are such that "arbitrage" is not possible.

[34] This table is reproduced from: http://cepa.newschool.edu/het/essays/sequence/spanning.htm. This sample of assets is divided into assets which have payoffs of specific "real" commodities and assets whose payoffs are in terms of a numèraire good or unit of account. Real assets offer specific commodities as payoffs. The first in the table is a *real asset* which pays out different *bundles* of commodities in different states, an agent who bought a "real asset" will receive delivery of a bundle of goods. The next two categories are merely special cases of real assets. The simplest is a *commodity future* which pays a unit of the ith good in *every* state. Thus, an agent who wished to have a sure delivery of x_i units of good i could purchase x_i units of this commodity future. An *Arrow-Debreu state-contingent claim* is a special kind of commodity future: it pays a unit of a particular good i if state s emerges and nothing otherwise. Notice that this is *precisely* what was being implicitly purchased by agents in the A&D with full state-contingent markets: an agent who sought to receive amount x_{is} of good i in state s would, in effect, purchase x_{is} units of this asset. Thus, in general, in an Arrow-Debreu economy, we would we would need n(S+1) types of assets like these. Considering those assets with payoffs in the numèraire good or unit of account, the first is the most general: a *numèraire asset* which pays r_s units of the numèraire good if state s emerges; note that it pays different amounts of the numèraire good in different states. Many types of securities fulfill this criterion. A special case of this is the *riskless bond* which pays a coupon, or *sure* amount, r of the numèraire good in *every* state. As an even more special case, we have the famous *Arrow securities* - so named because they were introduced by Kenneth J. Arrow (1953) as a substitute for state-contingent commodity claims. Arrow securities are assets which pay a single unit of the numèraire good if state s emerges and nothing otherwise. *Equity shares* are slightly more complicated: let q denote the percentage of a firm that a single share represents and let $p_s y_s$ denote the profits in state s of the firm in which this share is held (expressed in terms of the numèraire good). Then, q $p_s y_s$ is the share's payoff when state s occurs. Finally, the (European) *call option* is a derivative asset on another security. Defining a particular "strike-price" as c, then a call option gives the agent the option to buy, in state, S, a unit of the primary asset at price c. The payoff on the primary asset in state s will be denoted r_s. A call option will be exercised if $r_s > c$ - thus, the return on the option in state s is max[0, r_s - c]. The asset structure of an economy consists of the set of assets available which can be bought or sold at the initial time.

[35] The following example will illustrate what is meant by purchasing power in this context. A commodity future may have a payoff of x_i units of commodity i in every state, but the *value* of that payoff in state s, the actual transfer of purchasing power, depends on p_{is}, the spot price of commodity i state s. Thus, the *return* of that security in state s is $p_{is}x_i$ and a different state which has a different spot price for good i will therefore have a different return. Denoting by r_{fs} the *return* to asset f in state s, and using r_{fs} as a generic term for the "payoff" to security f in state s (whether a commodity vector or a vector with only the numèraire good), and p_s the vector of spot prices in state s, then the return to security f in state s is $r_{fs} = p_{sr\,fs}$ and this is, properly speaking, the actual "income" or "purchasing power" that asset f delivers in state s.

[36] See section 2.2 chapter two. Also references in footnote 26 above. For temporary equilibrium in particular see: Bent Stigum (1969) and Jean-Michel Grandmont (1974, 1977).

[37] Radner, R. (1972) "Existence of Equilibrium of Plans, Prices and Price Expectations in a Sequence of Markets", Econometrica, Vol. 40 (2), p. 289-303. More references in footnote 26 above.

[38] Arrow (1953) claimed and Radner (1972) proved, that *even if* not all state-contingent commodities are available for trading at t = 0, a Pareto-optimal equilibrium may nonetheless be reached when markets re-opened at time t = 1 after the state is realized and trading occurs *if* the resulting spot prices in the future states are correctly anticipated by agents at t = 0 and we can transfer purchasing power across states. Among other considerations Radner equilibrium relies on three basic conditions: (i) every agent is optimizing; (ii) asset markets clear; and, (iii) product markets clear in every state.
[39] Consumption plans are made as if we are in an Arrow-Debreu economy: the trading that occurs in the future in the Radner economy can be thought of as sequential analogue of the carrying out of contracts settled upon in the initial period in the Arrow-Debreu economy.
[40] The Radner equilibrium, also sometimes referred to as "spot-financial market" equilibrium or ”perfect foresight" equilibrium, differs in form from the Arrow and Debreu full contingent markets scenario, however yields the same outcome.
[41] The only thing perfect foresight assumes is that all agents know which spot prices will occur if a particular state of nature happens and which spot prices will occur if a different state happens. Certainly, a particular agent may think a particular state is more likely to occur, than a different future state and dissimilar agents may have dissimilar estimates about the probability of future events.
[42] The "rational expectations" equilibrium concept was introduced by Roy Radner (1967) and made famous by Robert E. Lucas (1972) and Jerry R. Green (1973). Theoretical antecedents can be found in Lindahl (1939). Full references in footnote 26 above, for Lindahl section 2.2.
[43] For example, if agents begin with different information, a less-informed agent may nonetheless acquire the information the others have by carefully observing the price movements and making inferences from that.
[44] Among the seminal papers are: Oliver D. Hart (1975) "On the Optimality of Equilibrium when the Market Structure is Incomplete," 1975, JET and also "Some Negative Results on the Existence of Comparative Statics Properties in Portfolio Theory," 1975, RES.
[45] This "basic property of incomplete markets" was stated by Magill and Quinzi, 1996: p.97. See reference in footnote 26 above. We do not have Pareto-optimality as the marginal rates of substitution are no longer equated to each other across agents, i.e. we will not have an "optimal risk-bearing allocation.”
[46] As several authors have noted, these assumptions can eliminate a handful of markets and thus force one away from full set of Arrow-Debreu contingent markets, nevertheless, they are external and mostly ad-hoc.
[47] “On the Optimality of Equilibrium when the Market Structure is Incomplete," 1975, JET. "Some Negative Results on the Existence of Comparative Statics Properties in Portfolio Theory," 1975, RES. Full references in footnote 26 above. For a very useful summary with the proper formalizations see:
http://cepa.newschool.edu/het/essays/sequence/hartproblem.htm
[48] Reductions in dimensionality may cause discontinuities in demand functions, and these “holes" in the demand function may be precisely where the supply function passes through. A Radner equilibrium may not exist.
[49] See, for the incomplete markets case: Duffie and Shafer (1985, 1986) and Hirsch, Magill and Mas-Colell (1987), for the complete markets case: Repullo (1986) and Magill and Shafer (1990). Full references in footnote 26 above.
[50] Proposed initially by Kenneth J. Arrow (1953) and developed by John Geanakoplos and Herakles Polemarchakis (1986). Full references footnote 26 above.
[51] See the works by David Cass (1984), Jan Werner (1985) and Darrell Duffie (1987). Full references in footnote 26.
[52] Could this be the hidden rationale of all of those that long for a 19th Century type of Gold Standard as the cure for all evils in the modern financial World?
[53] In cash economies, Radner equilibria will be severely indeterminate. Cass (1985), Geanakoplos and Mas-Colell (1989) and Balasko and Cass (1989).
[54] Suppose spot prices doubled in a particular state s but not in any other state; *relative* spot prices *within* state s have not changed; *but* the purchasing power of the payoff to an asset which delivers cash in state s has declined. Consequently, one would expect the agent to make changes in his net transfers across states to compensate for the rise in spot prices in state s. A rise in the prices of commodities is not neutral if payoffs are in cash. The "grand" budget constraint is affected.
[55] Magill and Quinzii, (1990, 1996) among other scholars have considered the indeterminacy of Radner equilibrium in a cash or monetary economy as a new starting point—so to speak—to achieve this old due integration.
[56] P.H. Dybvig and S.A. Ross, (1987) See footnote 26 for full references.
[57] Scholars within this tradition have established the condition for equivalence of Radner equilibrium and Arrow-Debreu equilibrium. In a simple illustrative manner the steps to this end can be summarized: First they establish, through the "fundamental theorem of asset-pricing" that to every Radner equilibrium, there corresponds a vector of no-arbitrage asset prices, q. Then they show that the existence of these no-arbitrage asset prices implies the existence of a vector of semi-positive multipliers $m = (1, m_1, .., m_S)$, where m_s represents the marginal value of state s. Finally, they demonstrate that multiplying the spot price vectors $p_1, ..., p_S$ of the Radner equilibrium by their corresponding multipliers, the result obtained is the set of state-contingent price vectors for an Arrow-Debreu equilibrium. The reverse proof is also valid: if there exist a set of state-contingent price vectors which form an Arrow-Debreu equilibrium, a no-arbitrage asset price vector and portfolio choices which imply a Radner equilibrium can be deduced.
[58] Currie and Steedman p. 147.
[59] "... Markets for the services of land would be sufficient, since the initial owner could obtain at the present instant the rents for the services of the land for the entire time horizon. Transfers of ownership would, to use Walras' phrase, be 'theoretically without rational motive'. To the extent that transfers of ownership can and do take place, the resulting pattern of ownership of land would be indeterminate. Transfers in the ownership of machines, trucks, houses and cars would likewise be 'theoretically without rational motive'." Currie and Steedman p. 147.

[60] Practically every modern book on investments and finance presents this or a similar definition. Risk is defined as uncertainty regarding future rates of return. Uncertainty is quantified using probability distributions of rates of return that are characterized in terms of their expected or mean return and their standard deviation. The theory goes that investors will hold a security only if; they are compensated for bearing a higher risk with a higher return. This remuneration is the risk premium defined as an expected return in excess of that on risk-free securities (the real cost of money in equilibrium). It is posited that a risk-averse investor will consider risky portfolios of securities only if they offer a risk premium.

[61] For example, "The economy's equilibrium level of real interest rates depends on the willingness of households to save, as reflected in the supply curve of funds, and on the expected profitability of business investment in plant, equipment, and inventories, as reflected in the demand curve for funds. It depends also on government fiscal and monetary policy." Bodie, Zvi, Kane, Alex, Marcus, Alan J. "Essentials of Investments" Richard D. Irwin. Inc. 1992. p. 174. It is usually argued that the impact of fiscal and monetary policy is limited and short lived.

[62] See articles by Ross, S. A. in footnotes 19 and 26, above. Ross developed the fundamentals of the arbitrage capital pricing model in his 1976 articles.

[63] Bodie, Zvi, Kane, Alex, Marcus, Alan J. "Essentials of Investments" Richard D. Irwin. Inc. 1992. p. 174.

[64] Op.cit. p. 175.

[65] It should be noted that the arbitrage based Law of One Price is independent of any consideration about the 'supply and demand' of a security. The activities of one powerful arbitrageur suffice to ensure its validity.

[66] Of course, non-insurable risk, if the security specific risk premium was insurable then it would be possible to insure against it, in insurance markets! And if it is a Knightian risk then in a pure free market it would not exist! Simply because Knightian profits depend on uncertainty and in a pure free market perfect certainty is assumed.

[67] The stock and structure of the durable and non-durable goods used in production changes very slowly, while capital markets are highly volatile.

[68] Equity is defined as an ownership interest in a corporation. An equity owner holds shares or stock of a firm, representing a claim on profits.

[69] Debt is defined as a loan agreement that is a liability of the firm, it constitutes an obligation to repay a specified amount, including principal plus interest, at a particular time.

[70] We will come back to these issues in the next chapters.

[71] In the most general sense they will include also all sorts of monopolistic rights. The modern literature on imperfect competition from a general equilibrium perspective has amply demonstrated this assertion.

[72] As defined in chapter two.

[73] The New Classical macroeconomists' tenet of the so-called 'natural rate of unemployment' replicates this idea, with the addendum that whatever the level of unemployment is, it corresponds to a full equilibrium.

[74] Consumers may spend more (or less) if they are (or fell) more (or less) richer. Firms may expand (or curtail) operations if the market value of their shares, their capital, increases (or decreases).

[75] Clearly the fact that the existence of a wealth or income effect, can affect the validity of Walras' Law, has been debated by economists before. For Hicks they are most likely neutral and of little significance, for F.H. Knight they are: "…largely a fiction and a delusion." For Keynes, wealth effects are positive and significant. I will deal with this particularly defined capital effect in detail, once we finish assembling the basic blocks of our theory. I will argue that this capital effect may be neutral, positive or negative, depending on the relative positions of the general rate of return, the interest rate and the financial structure of the economy.

[76] Finding the IRR is the same as finding the roots of a polinomial equation, in this case the NPV equation. From the theory of polynomials, we know that any *nth* order polynomial has *n* roots. Each such root that is positive and less than one can have a sensible IRR associated with it. Using the rule of signs of Descartes we conclude that a stream of n cash flows can have up to M positive IRRs, where m is the number of changes of sign for the cash flows. However, if the process of obtaining a mathematical solution for an IRR can be extremely complex and still yield no solution, the calculation of the NPV with given rates always yields a solution, then the IRR can be estimated by an iterative process where the NPV is calculated using guesses for the IRR until a close enough to zero NPV is obtained. Usually these numerically estimated IRRs are sufficiently good in any applied or empirical problem, advanced financial calculators use this iterative method. There are cases when there are multiple or no mathematical solutions for the IRR. However, even in extremely complex cash flows, with multiple changes of sign, most of the time a very good approximation to the IRR can be obtained using an iterative process. Also, it is the case that firms do not confront a single cash flow but several cash flows, corresponding to different projects, products, periods, etc., etc. So its possible to conceive a situation where even the most complex cash flows can be aggregated with others in a way that they will yield a determinate IRR. Certainly in the real world investment projects that generate cash flows that are so complex that their profitability, IRR, cannot be determined would be rejected by managers, so there is a selection process at work whereby only investment projects with determinate IRRs would be considered by managers and investors. Of course, in some cases for complex capital budgeting problems the use of IRRs can be misleading for management decisions, then the NPV is the only sure proof method of adequately evaluating alternative cash flows and/or investment opportunities, but then an arbitrarily chosen discount rate has to be used.

[77] The model of the competitive equilibrium of the privately owned economy, the CEPOE, see chapter two.

[78] In an efficient market the value of the sum of two cash flows is equal to the sum of the values of the individual cash flows, the value addivity, VA, principle.

[79] It is important to note that, *r,* is ***not*** the average of the individual producers' profitability rates. It is the aggregate rate and cannot be derived as an average of rates.

[80] This problem has been confronted before. Hicks, of course, in chapter XII of "Value and Capital", established a distinction between "the true rate of interest, which…is a money rate" and the own rate on the "auxiliary standard commodity," a numeraire which can be chosen at random among the "real" commodities of the system. With respect to

these two rates, he then pointed out that "…there is no reason why this 'natural rate' should be the same as the true *money* rate of interest." Clearly the attempt to derive a meaningful relationship between an own rate of return, or any combination of them—standard, auxiliary or whatever—with a profitability measure for the economy is a theoretical dead-end. This logical dead-end is shared by Sraffa and the Neo-Ricardians, it is absurd to reduce the existence of a profit rate to the technical conditions of an economy or to the existence of a physical surplus, which is the same. There is no such thing, profits are always a surplus value. For Hicks see "Value and Capital", Chapter XII.

[81] It is very important for the consumer, the inter-temporal allocation problem depends on these prices and it is solved without the 'interest rate'.

[82] The CEPOE.

[83] As is known, according to the efficient market hypothesis (EMH) The prices of securities fully reflect available information. Investors buying stocks and bonds in an efficient market should expect to obtain an equilibrium rate of return. Firms should expect to receive the "fair" value (present value) for the securities they sell. The problem is that modern financial economics does not provide a satisfactory answer to the equilibrium rate of return. We have offered a solution to this problem here: the equilibrium rate of return is the economy's or the general rate of return or profit.

[84] To conceive consumers as investors too, we have accepted the Separation Theorem. The Separation Theorem states that the value of an investment to an individual is not dependent on consumption preferences. All investors will want to accept or reject the same investment projects by using the Net Present Value rule, regardless of personal preference. We can separate the decisions regarding the maximization of utility taken by consumers based on personal preferences and prices, from the decisions taken by consumers as investors based only on the relative profitability of shares. In the world we have been building there is no such thing, yet, as risk-free investments so the personal risk-aversion of the investor does not play a role.

[85] Arbitrage is usually defined as the act of buying an asset in one market at a lower price and simultaneously selling an identical asset in another market al a higher price. This is done with no cost or risk. Arbitrage opportunities are inexistent in perfectly competitive financial markets, or better said, are immediately eliminated. That is markets in which no trader has power to change the price of securities or commodities. They are characterized by the following conditions: (1) trading is costless, and access to financial markets is free. (2) Information about borrowing and lending opportunities is freely available. (3) There are many traders, and no single trader can have a significant impact on market prices.

[86] If we assume like A&D that positive profits represent a payment for the services of those firm specific resources that are not traded, that remain frozen in the firm, etc., etc. Then we can conceive an equivalence of our general equilibrium in a capitalist economy with the traditional A&D. Certainly a sequential economy is still needed and variability can be introduced by considering some randomness in the pricing process and hence in the profitability of firms. Also expectations can be explicitly considered, etc., etc. The important point here is that this equivalence can be derived with minimal modifications to the classical model. Nevertheless, the goal of this work is to come closer to reality not to dwell upon abstract considerations, so we'll leave these issues for future research.

[87] Assuming that the preferences of those consumers that win and those that lose are not significantly different.

[88] Liquidity is always an option for an individual, but it is not an option for society as a whole. In other words it is impossible to convert the virtual value of society's capital into money, that is abstract acquisition power, without affecting the value of capital. If everybody would try to get liquid at once, the virtual value of capital would vanish. Chapter FIVE will analyze these issues.

[89] In the article, "The Dual-Decision hypothesis" the great NeoWalrasian and Keynesian Robert Clower, wrote: "...if Keynes seriously meant to question the validity or relevance of Walras' law, he would have to reject the orthodox theory of household behavior and propose an acceptable alternative--and the alternative would have to include orthodox theory as a special case, valid under conditions of full employment. Walras' law is not, after all, an independent postulate of orthodox analysis; it is theorem which is susceptible to direct proof on the basis of premises which are typically taken as given in contemporary as well as classical price theory." […] "...*either Walras' law is incompatible with Keynesian economics, or Keynes had nothing fundamentally new to add to orthodox theory*.' p. 41. "...suppose that Walras' law is both unreservedly valid, relevant and compatible with keynesian economics...(then) Keynes may be subsumed as a special case of the Hicks-Lange-Patinkin theory of *tatonnement* economics...We would then have to conclude that Keynes added nothing fundamentally new to orthodox economic theory." […] "If Keynes added nothing new to orthodox doctrine, why have twenty-five years of discussion failed to produce **an integrated account of price theory and income analysis? If Keynes did add something new, the integration problem becomes explicable; but then we have to give up Walras' law as a fundamental principle of economic analysis."** p. 43.

Chapter Four. The Structure of Capital.

Introduction.

In the last chapter we argued that capital, conceived as a property right on future profit streams that is valuable and that can be traded, can emerge as a net financial asset of the community. An asset with a value that may have a net effect on the level of aggregate effective demand. This capital effect, at the highest level of abstraction, depends on the existence of different forms of claims, of property rights, over residual profits. It depends on the existence of debt remunerated with interest, of shares remunerated with residual profits after debt service, and on the differences between the profit rate and the interest rate. Hence the consideration of the structure of capital, that is of the distribution of property rights over cash flows, in the most basic distinction between equity and debt, is indispensable. The study of the financial structure of the economy, to use a more common expression, is the task of the present chapter. Nowadays, the standard view within academic economists is that the capital or financial structure does not matter. We will argue that it does, and that sometimes it does matter a lot. Which is the more down to earth perspective of business people that deal with it on a daily basis.

We have determined the value of capital as the present discounted value of future profits. We postulated that the appropriate discount rate is the overall rate of return of the economy as determined by the current and future prices of all commodities, not in a particular market. We demonstrated how due to arbitrage, the value of capital shares of individual firms would change until every share would yield the same returns or rate of profit as that of the whole economy, and how the returns on capital would equalize around this general rate. The value of capital is virtual, nevertheless, the possibility of turning capital into money and vice versa, that is the potential of capital to be monetized, can be considered as one of the main forces that ultimately causes the effects and disturbances, associated with

the non-neutrality of money[1]. We concluded that changes in the value of capital, capital effects, may affect the distribution of wealth and under some circumstances the overall level of wealth, with potential consequences in the demand for money and in the aggregate level of demand. That is, in the level of *effective* demand.

As long as shares of capital, that is equity, are the only form of property rights over residual profits that is considered, the existence of different rates of return at the firm level that causes the existence of capital gains (or loses) will only generate distributional effects among share holders that will cancel out at the aggregate level. Capital effects, that is changes in the value of shares that may enter in the budget constraints of consumers, for the economy as a whole will be zero. Under these circumstances Say's or Walras' Law is irrevocably valid. Nevertheless, once we introduce the interest rate, as a remuneration of debt, capital effects, that is changes in the overall value of capital, either positive or negative, will emerge. A separate component appears in the consumer's budget constraint, the value of capital, with the potential to change the initial conditions of the problem and impinging on Say's or Walras' Law, which then becomes a special case of macroeconomic equilibrium: the case where the economy's profit rate and the interest rate are equal. Other than in this particular case, Say's or Walras' Law is not irrevocably valid.

In a modern capitalist economy, capital is, of course, a very important component of wealth. Within this framework, contrary to the classical assumption that considers wealth and its distribution as a given, the generation and the distribution of wealth become variables at the core of movements between temporary general equilibrium positions. As we saw, residual profits emerge as a net asset of the consumers and they change with the passage of time due to competition; as they do, the overall profitability of the economy and the relative profitability of firms varies as well, impinging on the relative values of shares of capital, that may cause distributional effects on wealth. Let's recall that rents, that is the income derived from the ownership of land, in its most general concept, is

determined by its residual value under general equilibrium conditions, so as the value of capital changes so will be the value of land. The distribution of wealth stops being an a priori given. Once we introduce different forms of claims on profits, the aggregate value of capital may change. The total level of wealth is not a constant anymore. So at the core of the workings of a modern capitalist economy are the variations of wealth and its distribution. Clearly as they change they may affect the behavior of consumers and firms, and initiate rounds of relative prices changes, new temporary equilibriums, etc., etc.

In contradistinction with previous chapters where the adopted perspective stems from the real side of the economy, in this chapter we will approach the problem from the perspective of modern financial economics. The proposed integration of both perspectives runs from the determination of profits and the rate of profit in the commodities markets, to the determination of the value of capital and the interest rate in capital and money markets. From the financial economist's perspective we have seen in the last several decades a “revolution,” through the rigorous application of economic logic, in the way financial phenomena and practice are now understood.[2] At the core of this revolution in finance, there is a change in the theory of the valuation of capital,[3] whereby the value of capital is determined by the net present value of future profits.

Modern financial economists[4] have developed fundamental contributions to the analysis of the cost of capital and capital markets, portfolio theory, options and futures pricing, among many other central microeconomic financial issues. Also economists like the Nobel prize winner Joseph Stiglitz and B. Greenwald among others[5] have developed a novel approach to deal with the study of the microeconomic aspects of credit and equity markets in conditions of imperfect information, with the associated problems of moral hazard, adverse selection, and agency costs. They have studied the implications of such microeconomic phenomena on the macroeconomic dynamics of the economy. In particular, regarding the role of government and financial markets in economic development,

as well as the relationships between financial markets imperfections, business cycles and productivity growth. Scholars like Stiglitz and Greenwald have focused on the analysis of economies with imperfect information and incomplete markets. In general, they have concluded that there can be significant Pareto inefficiencies in free market (I would say capitalist) economies, due to capital and financial markets imperfections, among other problems. This so called "new view" of capital markets correctly points out that capital markets are essentially different than commodities markets, that financial markets cannot be understood in terms of the simple supply and demand paradigm and that market failures that characterize these markets justify some form of governmental intervention.[6] To explain why the dynamics of competitive markets may not generate, left to itself, Pareto efficient results, the "new view" of capital markets relies on market imperfections, incomplete information and market failures. More recently, some of the central arguments from these scholars have been extended and applied to monetary economics.[7] A central aspect of these ‘alternative’ views coincides with the standard approach: the financial structure of the economy does not matter, *except* when capital markets are not perfect.[8]

In this work we have been trying to demonstrate how capital effects can generate distributional and aggregate wealth effects and aggregate demand fluctuations—under conditions of perfect competition and complete information—that may generate sub optimal results and macroeconomic instabilities that can be exacerbated by the financial structure of the economy. In other words, the approach developed in this work, does not rely on market imperfections, incomplete information, market failures, uncertainty or randomness, or other ad hoc hypotheses, to explain the characteristic sub optimal results and macroeconomic instabilities of modern capitalist economies.

Both from the micro and the macroeconomic perspective economists have been dealing quite successfully with particular financial phenomena and some of its implications. Nevertheless, within the dominant financial perspective, quite

frequently the two central variables of finance, the market rate of return—the general rate of profit—and the interest rate, are considered either as given independent variables determined outside of their system. Or, in the case of the market rate of return, as an average of the individual securities or firm's returns conceived as the cost of capital or its required return. Or, in the case of the market interest rate, as determined by some form or another of the ancient loan-able funds theory. Also, central to the analysis of modern financial economics is the postulate that the financial structure of the economy, and hence financial policy, is irrelevant. A postulate enshrined in the so called, Modigliani—Miller—Barro—Ricardo theorem, which is an extension of Say's law of markets, or Walras' law, or the market clearing principle, to the world of finance.[9]

In general, but with significant caveats, with modern financial theory and practice we share the conception of the value of capital as the present discounted value of future profits. Modern financial economics uses an essentially fiduciary concept of capital. With the "new view" of capital markets we share the idea that capital markets are essentially different than commodities markets, but we disagree with their ad hoc approach and with most of what follows. Nevertheless, it is argued that modern financial economics does not fully acknowledge the implications of considering the value of capital as a function of the residual profits of the firm and of the economy, and of capital as a property right that cannot be treated as a produced commodity. These implications follow:

First: it would have to be accepted that capital is NOT essentially linked to the property rights over physical assets of any kind. As we have repeatedly stated, the value of such assets is determined by general equilibrium conditions in the commodities' markets. Asset-less firms can be valuable and the value of the commodities employed in its operations has nothing to do with the value of the firm as such. We cannot say, for example, that 'the prices of the assets of a firm change when the value of the firm does.' Capital is the property right over residual profits, *only*.

Second, the value of capital cannot be associated in a meaningful way to any notion of scarcity and it cannot be considered the direct result of a sacrifice in consumption or the result of thrift.

Third, the value of capital is a virtual value dependent on the *future* profitability of the firm and of the economy, on the interest rate and on the financial structure of both the firm and the economy. These are continuously changing, and so is the value of capital, the standard assumption that the value of capital is a given should be abandoned.

Fourth, capital is valuable in a short term temporary equilibrium, in a long term full equilibrium capital is valueless. Changes in the value of capital change the Walrasian basic data of the problem. At the core of the dynamics of a modern capitalist economy we have the variations of wealth and its distribution.

Fifth, even under conditions of perfect competition and information, the financial structure of both the firm and the economy is relevant, the structure of capital matters. The dynamics of the value of capital, associated to variations in the returns on capital, leverage and the interest rate, have both distributional and aggregate consequences.

And sixth, the central problem of the financial system is *NOT* the efficient allocation among competing uses of a scarce resource called capital, (money or credit for that matter). The central problem of the financial system, at the highest level of abstraction, is to guarantee the property rights of those involved in production and trade. As is implicit in its name, it is a matter of trust.[10]

With modern financial economics we have two fundamental disagreements:

First, with the selection of the appropriate rate of discount to value capital. That is, with conceptualization of the returns or the cost of capital, of pure Smithian[11] pedigree, shared by most of the literature concerned with the valuation of capital: the cost/price of capital as the sum of the real interest rate, plus the inflation rate, plus a firm or security specific risk premium. Idea enshrined in the well known Capital Asset Pricing, CAPM, and Arbitrage Pricing Theory, APT, models. Closely associated with these notions, is the Efficient Markets Hypothesis and the Random Walks notion, which we will criticize as well.

Second, with the idea that the financial or capital structure of the firm, and hence of the economy, does not matter, idea expressed in the well known Miller and Modigliani's, M&M, propositions, and expanded to a general equilibrium perspective by Stiglitz. A postulate that is equivalent to an extension of Say's law to the financial world.

Regarding the first, we have already developed a consistent alternative to the determination of the returns of capital from a general equilibrium perspective, that rejects the Smithian paradigm of profits as the cost of capital. And, with regards to the second, we have shown, how the interaction of the interest rate and the profit rate may cause aggregate capital effects, with potentially significant macroeconomic consequences dependent on the financial structure of the economy.

In this chapter we will elaborate our critique of the Smithian paradigm of the returns on capital, extending it to the ruling approaches to capital assets pricing models and, we will develop an alternative to the basic M&M propositions that demonstrates that the capital structure of firms, and hence of the economy, does matter, and that sometimes it matters a lot.

There is certainly an evident parallel with our previous discussions, if you follow the Smithian paradigm of the returns on capital, you are assuming that

prices equal costs, and hence that residual profits are zero. If you are adopting the Modigliani—Miller—Barro—Ricardo theorem, you are assuming that markets always clear. The logical conclusion of both underlying thesis is, of course, that finance and by extension money, do not matter.

In the first section of this chapter we will see how our previous results stand from the financial perspective. To do so, we analyze the financial flows of a simplified modern capitalist economy, the emphasis is in the simultaneous consideration of both the income, or profits and loses, as well as the balance, facets of financial flows.

The last is a crucial point. The standard, Smithian plus M&M, approach ONLY considers the balance side of the problem and ignores the bottom line: the generation of profits. Certainly the balance is always balanced.

The second section will present an initial link between capital and the demand for money based on a reformulation of the classical quantitative theory of money, these issues will be developed further in chapter three.

The third section will present a critique of the Smithian paradigm of the cost of or the returns on capital, the so called required return on capital approach.

In the fourth section we analyze the generally accepted models of capital asset pricing that basically constitute extensions of the Smithian paradigm of the cost of or the returns on capital. We present a critique of the Capital Asset Pricing Model, CAPM, the Arbitrage Pricing Theory, APT, and conclude the section with a presentation and critique of Random Walks and the Efficient Market Hypothesis, EMH.

To finalize the chapter, we will develop an analysis and a critique of Miller and Modigliani's, M&M, propositions regarding the financial structure of the

economy and will present an alternative formulation that demonstrates that the financial structure of the economy does matter and that sometimes it matters a lot. A formulation that does not stand on ad hoc hypotheses about the financial system and its institutions. A series of numerical examples supplement the theoretical argument.

4.1 Financial Structure and Financial Flows.

Until now we have been looking at the economy predominantly in real terms, to use a finance person expression: from the left side of the balance sheet.[12] That is, from the perspective of the real resources employed in production. In a modern capitalist economy, the perspective from the right side of the balance sheet, is of the utmost importance. This is the perspective of the different property rights over the firm's assets and profits, this is the 'side' where the liabilities and shareholders equity are recorded. This 'side' is crucial for the financial practitioner, nevertheless, the right side of the balance sheet is more often than not, overlooked by economists, given the consideration that monetary and, by extension, financial phenomena are ultimately neutral and all or most of the relevant issues of the economy can be dealt with, in strictly real terms. Which is, as we said a logical implication of the underlying ideas that markets clear and that prices always equal costs.

Traditionally the analysis of financial flows in an economy starts and stays within the balance sheet perspective, nevertheless, we need to consider as well the profits and loses perspective. Considering an economy in a competitive equilibrium as defined in previous chapters, lets take a look at both perspectives together. So we can explore the fundamental connections between the real, financial and monetary aspects of the economy.

In modern capitalist economies the generation of profits is what counts. Therefore, the *bottom line* is our starting point. For the profit maximizing firm the

profits and loses or the income generated are crucial. At the simplest level income is defined as the difference between revenue and expenses,

Revenue – Expenses ≡ *Income*

This definition corresponds, in general, to our previous definition of profits,[13] as cash flows. The vector of profits includes the prices and quantities of all inputs (-) and all outputs (+), obviously the sum of all outputs equals revenue, the sum of all inputs equals expenses, and the residual equals profits. The accounting income statement as it is usually presented does not correspond directly with the firm's cash flows. The income statement is composed of several sections: First an operations section that reports the firm's revenues and expenses from principal operations; the result of this section is the total earnings before interest and taxes, EBIT. Then, the non-operating section that includes, among other things, all financing costs such as interest charges. Usually in a separate section, taxes levied on income[14] are reported and finally the *bottom line* that presents the net income, or net profits of the firm. Often net income is presented in terms of earnings per share and its distribution between retained earnings and dividends paid out to share holders.[15] Net income is different from the cash flows used to determine the net present value of a firm, however they are closely interrelated. Among the most important differences is that under generally accepted accounting principles revenues are recognized when the earning process is virtually completed even tough no cash flow has necessarily occurred, for example, in a sale for credit. Also several non cash items are reported as expenses against costs, the most important of them is depreciation,[16] deferred taxes are also an important non cash expense usually reported.

In the world we have been constructing profits correspond directly to earnings before interest and taxes, firms have no assets of their own, hence depreciation is not an issue, firms do not retain earnings and pay out all profits to shareholders. So profits correspond directly to the firm's cash flow.

Some elaboration is needed. In the real world, the financial cash flow of the firm is the most important item concerning the financial standing of a firm, it does not correspond to the accountant's report known as the 'statement of cash flows', or to the profits and loses, P&L, statement, however it can be derived directly from the financial reports of the firm. As we know, the fundamental accounting identity that defines the balance sheet is,

Assets ≡ *Liabilities* + *Stockholder's Equity.*

Just as the value of the firm's assets is always equal to the value of the liabilities plus the value of the equity of the firm, the cash flows from the operations of the firm must equal the cash flows to the firms creditors (debt-holders), and equity investors, (share-holders). That is:

Value of the Firm, CF(A) ≡ *Value of Debt CF (B)* + *Value of Equity CF(S)*

This corresponds to the capitalization value of the firm or to the value of capital as we have been using the expression.

The value of capital as a property right over future residual profits, cash flows, of a firm, is always equal to the value of the particular claims against it.[17]

The first step to determine the cash flows of the firm, is the cash flow from operations, or operating cash flow, this is equal to earnings before interest and taxes, EBIT, plus depreciation minus taxes. Operating cash flow can be used to acquire fixed assets, or it is augmented through the sale of fixed assets, the result is denominated capital spending. Also cash flows from operations can be used to increase net working capital.[18]

All in all the firm's cash flows from operations are the sum of:

Operating cash flow + Capital Spending + Additions to net working capital = Total cash flows

Total cash flows are distributed among cash flows to creditors and cash flows to shareholders. Cash flows to creditors are usually called debt service they comprise interest payments and the retirement of debt. Obviously the repayment of debt has as a counterpart the effect of new borrowing, that is proceeds of the 'sale' of new debt.[19] In summary, the cash flow paid to creditors is equal to,

Value of Debt CF (B) = Debt Service + Net Debt

The cash flow paid to equity holders comprises the dividends and the repurchase of stock, which together are denominated as 'cash to stockholders', minus the proceeds from the new issuing of shares. In summary, the cash flow paid to stockholders is equal to,

Value of Equity CF(S) = Cash to Stockholders + New Stock

If we would consider that some firms do issue debt to fund their operations then for the debt issuing firm:

Total Cash Flow = Profits = Value of Equity CF(S) + Value of Debt CF (B) = Total Firm Value

In the hyper-simplified economy we have been considering, all the commodities employed in production as well as firms are owned by consumers, firms do not own any assets, they do not issue debt, they buy or rent the services required from consumers and other firms, so depreciation and capital spending are not an issue for firms, also firms do not retain any earnings.

In a competitive general equilibrium profits are positive or zero.[20]

Then assuming that net working capital is zero, in this hyper-simplified government less world, the firm's total cash flows are:

Total Cash Flow = Profits = Value of Equity CF(S) = Total Firm Value

Clearly if this is valid for a firm, then it is valid for the economy as a whole, by simple aggregation.

If we consider that in the aggregate the debts of a firm are assets of another firm, so that they cancel each other, then for the economy as a whole this equality is also valid in the presence of debt.

In short, at the core of this analysis we have:

Profits = Capital

In a competitive equilibrium with positive profits, the value of profits equal the value of capital. In a full long term equilibrium total firm value or the value of capital, as defined, is zero, because prices equal costs and residual profits are zero. As we have said repeatedly the firm's value, or the value of capital, is dependent mainly on its capacity to generate residual profits. When the firm's value changes, the value of its assets, if it owns any, does not change. The price of whatever assets the firm may or not own are determined by general equilibrium conditions in commodities markets. Only the value of the claims against residual profits, the value of capital, may change due to changes in the profitability of the firm and of the economy, and due to changes in the structure of capital as we will see.

Capital and profits appear as a pure value without physical assets as a quid pro quo. Nevertheless, they are a real value a trade-able value, they are abstract acquisition power. The crucial point here is that at the most fundamental level the value of profits and the value of capital are one and the same thing. In a very old

fashioned way we could say: capital is profits and profits are capital. Capital is a pure financial asset.

As we saw in the last chapter, the cash flows and associated internal rates of return for every producer and for the economy as a whole are determined. By using the general rate of return determined by general equilibrium conditions, as the "appropriate discount rate" for every individual producers' profit streams we obtained the net present discounted value of the individual firm, the value of its shares of capital. Those firms with a net present value of their future profits or cash flow streams equal to zero, would be returning the same yield as the economy as a whole. Those firms with negative values would be below normal profitability. And, those with positive NPVs would be above average profitability. The value of capital in a particular firm will depend on its own profitability, but also on the economy's profitability. As prices of capital vary, some consumers will gain and some will lose, In a pure equity economy, capital effects, that is capital gains and loses at the individual share level, will have only distributional consequences and will cancel out in the aggregate. Capital effects, that is changes in the aggregate supply and demand conditions due to changes in the value of capital, will be neutral, if we abstract from distributional effects.

In any given point in time then, the budget of the consumers[21] will include all the real resources, commodities, owned by them; the current profits paid out by firms; and, a portfolio of shares representing the net present value of the firms' future profits, that is the value of capital. In the individual's budget (See previous footnote) profits and capital gains appear as separate components, but this difference is eliminated in the aggregate, profits equal capital. The repetition may not be otiose, we are considering a competitive equilibrium with positive profits, where capital is the property right over residual profits only, and the economy's rate of profit is the appropriate rate of discount to value capital.

In a pure equity economy or, if debt is introduced, in a situation where the economy's rate of return is equal to the interest rate, the aggregate value of capital is equal to zero.

Lets take a look at the firm's cash flow, equal to the income (P&L) statement, and the balance sheet simultaneously.

As we have posited firms do not own directly any of the assets employed in production, these are owned by consumers, individual firms may, of course, buy and/or sell commodities from/to other firms. To carry on production the firm receives the necessary commodities from consumers and/or firms, in exchange it issues promises to pay, accounts payable, these *papers* are liabilities of the firm. At some point before closing a cycle, a firm delivers its output and receives promises to pay against particular commodities, accounts receivable, these *papers* become assets of the firm. Upon closing, accounts receivables are collected and paid, they constitute the firm's revenue. Accounts payable are settled and these correspond to the firm's expenses.

Profits are the residual left after expenses are covered.

If profits and capital have a positive value, given that:

Assets ≡ *Liabilities* + *Capital.*

Then, as conventional economists and financiers say, the value of the assets of the firm has to increase in the same amount of the increase in the value of capital. However, the firm does not own any physical assets, all that was produced was sold and there are no inventories, then profits equal to capital appear on the right side of the balance sheet as retained earnings or as a capitalization value.

On the left side of the balance sheet, given that the firm has no assets, profits can only appear as a pure financial asset, as abstract acquisition power. Or as money, in its more general concept.

We will come back to money in the next chapter, however some considerations in this and the following sections are needed. Customarily, money is defined as anything that serves as a generally accepted medium of exchange, as a standard or measure of value and a means to save or store purchasing power. When the State declares the national money to be the statutory means of payment (currency): everyone is obliged to accept it as payment for services, then it functions as legal tender, that is as an instrument of release of debts and obligations.

In this study and at a very high level of abstraction money is defined as abstract acquisition power, that is acquisition power not linked to a concrete or a specific commodity or group of commodities.[22]

So the moment before final settlement we have:

FINANCIAL FLOWS OF THE FIRM, I :

Cash Flow/P&L	ASSETS	LIABILITIES & CAPITAL
Revenue	Accounts	Accounts
(-) Expenses	Receivable	Payable
Profits (CF)	(= Revenue)	(= Expenses)
		+Profits (CF)
	Total Assets	Total L&C

Once receivable and payable accounts are settled, profits appear in the right side of the balance as stockholders equity. Profits equal capital.

We have seen that profits do not have a physical counterpart, on the left side of the balance, the firm has as its only assets, financial assets, with a value equal to the profits generated, which in these simplified conditions is equal to the firm's value or capital as defined. The value of the financial assets that represent the firm's profits, just as every other value, needs to be expressed in monetary units, in a numeraire.

We can postulate that firms do not retain any earnings, all profits are distributed. However, let's assume that firms need to pay profits to share holders in a generally accepted means of payment, expressed in a generally accepted monetary unit, that is money.

At this point money is simply introduced from outside the system and only as defined.

If profits are paid in money, then we have:

FINANCIAL FLOWS OF THE FIRM, II:

P&L	ASSETS	LIABILITIES & CAPITAL
Revenue	Money	
(-) Expenses		Profits (CF)
Profits (CF)		To be distributed
	Total Assets	Total L&C

Once profits are paid out to the owners of the firm, the firm is in 'zeroes:' Zero assets, zero liabilities, and zero capital. Certainly, the debt(s) or the obligation(s) of the issuer represented by receivables, have to be released or settled somehow, nevertheless, unless every paper is a generally accepted means of payment, then they have to be settled with money.

From the perspective of the consumer profits paid out by firms constitute a net increase in their wealth, when profits are paid what the consumers receive are financial assets—and these can assume a wide variety of forms—that enter the consumer's budget. In this simple analysis, we have arbitrarily considered that profits are paid in money, simply defined as a form of generally accepted means of payment. We could, also arbitrarily, consider receivables, *paper*, issued by firms in the course of their operations as money. Then, financial assets issued by firms would be money.

All in all, irrespective of the particular form of the financial assets that are used to pay or to settle profits, the fundamental point is that their value is determined by the value of capital. If the value of capital in the aggregate is positive, that is if capital emerges as a net financial asset of the community, all the papers that may be used to represent these rights will have a positive value that is exactly the same as the value of profits, obviously present and future properly discounted. Only if capital has a positive value will financial assets in the aggregate have a net positive value. If not, we will not have net financial assets and the value of existing assets will cancel out in the aggregate. To express the same idea in terms of a better known debate and maybe abusing the terminology: when the aggregate value of capital is zero, all money is internal; when it is positive, we have external money.

So assuming that consumers demand that they receive their profits in money, as generally accepted means of payment, expressed in a generally accepted monetary unit that represents abstract acquisition power. And also assuming that consumers do not hoard.

We will have under these circumstances:

Profits = Capital = Money

That is, in a competitive equilibrium with positive profits a la A&D, profits, capital and money are undistinguishable. It should be clear by now that if residual profits do not exist, then capital is valueless in the aggregate, and so is money irrespective of its form. We would be in the classical ancient world where money is only a veil, only a unit of account, all money is internal and all financial phenomena would be neutral.

A brief consideration of banks and debt is required. Instead of firms and consumers directly performing a financial function using 'receivables' as means of payment, we can think of banks, or financial intermediaries, as firms specialized in protecting the property rights of traders in the market place. To initiate production, firms obtain credit from banks to acquire in *cash* from consumers the necessary inputs for production, once production is completed and sold to consumers, credits are paid back to banks. Banks record credits and debits, issue 'money' as a means of payment, help in the enforcement of contracts by stipulating collateral requirements as a protection against default, etc., etc. Obviously banks are firms that charge for their services, interest and fees, so they can buy the commodities they need to provide them. Once the production and sale cycle is completed, credits are paid back and cancelled, the money that was created is destroyed. The services provided by banks are commodities, their price will ultimately equal costs, in the meantime if banks can generate residual profits, they will have a positive capital value, just as any other firm. Once banks cover their costs, if there is a residual, profits will appear as net financial assets of banks, as the banks' capital.[23] If banks distribute all their profits, as in the previous case, they will end up in 'zeroes' as well.

In the presence of banks and debt the previous considerations are equally valid. Debt and leverage by themselves, are not essential. They are important because they can have a very significant effect on the value of capital and on the

variability of the returns on capital, as we will see. Also, debt is important because it yields interest and here is where the linkage with the monetary markets arises.

All things considered in a competitive equilibrium a la A&D with positive profits, where capital is the property rights over these profits, and the value of capital is determined as was established in the last chapter. We have from the financial perspective that in the aggregate: total assets equal total liabilities; total cash flows equal the firm's value; the value of profits equals the value of capital and equal the value of all financial assets in circulation. This last what we called simplistically: *money*, as generally accepted means of payment, expressed in accepted monetary units, times velocity of circulation. Capital equal to profits, may appear as a net financial asset that becomes part of the consumer's wealth. And Walras' Law holds irrevocably. To advance the understanding of modern capitalist economies we need to distinguish clearly capital from money, particularly if the interest rate on money plays such a crucial role in the emergence of capital effects as we will see.

Clearly, when prices equal costs, when residual profits are zero, we are in the world of the New Classical economists or the ideal Smithian end state. When residual profits are positive, capital is valuable. However, as long as the aggregate value of capital is zero, money and finance can be safely considered as fundamentally "neutral."

Nevertheless as we will see ahead, capital is not neutral, even in the absence of aggregate effects there are distributional effects that may be significant. Once the aggregate value of capital differs from zero, it is not neutral anymore and its effects on the real economy, carried on through the monetary and financial markets, may be quite important. We argue that in an economy where capital is held only in the form of shares, a pure equity economy, the net present value of the economy's portfolio of shares is zero. When the property rights over the residual profits of firms adopt different forms, particularly as debt that yields an interest rate

that is different from the economy's general rate, then the aggregate value of capital can be different from zero, and hence a new element is introduced in the workings of Walras' Law.

Aggregate capital effects are neutral,[24] only if the interest rate, is equal to the economy's aggregate rate of return. However, if the interest rate is under the economy's rate of return, the excess cash flows over and above the interest rate have a positive value, the aggregate net present value of capital is positive. If the case is reversed, that is if the interest rate is above the general rate of return, then the aggregate value of capital is negative. We demonstrated that under conditions of general equilibrium with perfect information and zero transaction costs, capital effects may affect at the aggregate level the workings of Say's Law, or Walras' Law in its equivalent modern usage. These effects are caused by divergences between the economy's profit rate as determined in commodities markets and the interest rate, as determined in monetary markets where central banks, and also banks (as Stiglitz insists), play a central role.

Standard analysis does not recognize these effects, they argue that monetary and financial phenomena do not matter. This type of analysis depends entirely on the Smithian conception of the cost of capital, which is nothing more than the old idea that prices are always equal to costs, and hence the economy is in a long term equilibrium. And, also on the a-critical adoption of Say's law to finance, expressed in the consideration of the balance side of finance only, leaving the bottom line—profits and loses—out of the picture.

The modern formulation of the financial irrelevance perspective was founded with the classic Miller and Modigliani's propositions: as the financial structure of the economy changes, say as leverage increases, the value of capital stays constant because the required return of capital increases, that is the portion of the cost of capital that reflects risk, in the exact amount to leave the value of capital invariant.

These old ideas in modern dress: the Smithian paradigm of the cost of capital, and the neutrality of financial phenomena, need to be scrutinized.

4.2 The risk and return on capital Smithian paradigm.

In chapter three we started the development of an alternative to the standard paradigm regarding the value of capital. It was argued that to determine the value of capital as the present discounted value of future profits, it was necessary to determine the appropriate discount rate. We postulated that this rate is the overall rate of return of the economy as determined by the current and future prices of all commodities in general equilibrium. We demonstrated how due to arbitrage, the value of capital shares of individual firms would change until every share would yield the same returns or rate of profit as that of the whole economy, the returns on capital would be equalized around this general rate. The value of a firm would depend not only on the profitability of that particular firm, but on the overall profitability of the economy and as we will see in this chapter on the interest rate and the financial structure of the firm and the economy.

The standard paradigm recognizes that the value of capital depends on future profits, nevertheless, for them the appropriate discount rate is the so-called required return on capital, defined as we saw, as the as the sum of the real interest rate, plus the inflation rate plus a security or firm specific risk premium. A conceptualization that in a competitive full information environment, is the same as saying that the cost of capital is simply the interest rate. The ruling paradigm views the overall returns on capital as the simple average of firms' returns, we have argued that the overall rate of return is not an average rate. It is impossible, without resorting to arbitrary weighting methods, to obtain the overall rate of return of the economy as defined, as an average of rates.

In this section we will elaborate our critique to the ruling risk and return Smithian paradigm on the value of capital.

Financial economists and practitioners customarily see the economic world from the perspective of the investor. They see a process where firms invest money, cash, in commodities to produce other commodities to sell and, hopefully over real time, to generate more cash, more money, than they invested originally. They see this process as a process that will create added value for the owners of the firm, excess value, profits, that will be distributed eventually to share holders as money. Managers are supposed to increase the value of the firm by buying assets that generate more cash than they cost, or better said, bundles of commodities that will be used to produce other commodities of greater value. To raise the funds firms need to finance investment, they sell securities in capital markets, at the most general level securities representing equity and debt, or stock and bonds. Usually the markets for stock and bonds are seen as equal to, or at least as not significantly different from, commodities markets where the classical supply and demand paradigm rules. Finance persons are primarily interested in the net cash flows before the payment of interest on borrowed funds and before the payment of taxes, in what is defined by practitioners as earnings before interest and taxes, (EBIT), or gross profit. Financial economists are not very interested with profits in the accounting or bookkeeping sense, that is the net income or net profits after interest charges and taxes, (plus other sundry charges). After all, interest charges depend on the level of debt that the firm *decided* to issue and taxes are an exogenous given from the perspective of the individual firm.[25] Ultimately, all claims on the firm have to be satisfied with the firm's cash flows.

From the perspective of the financial economist what is of the foremost interest is the determination of the value of the firm, prior to its distribution. The firm's total value, or the value of the securities that represent property rights over the firm, its capital, is determined in equilibrium by the net cash flows, or EBIT, generated over time by the firm and in its most basic expression it is equal to the

net present discounted value, or simply the net present value, NPV,[26] of its future cash flows,[27] or residual profits. From these: taxes, interest payments for debt holders, and dividends for share holders, will be paid. In the financial world time is real, it is calendar time, and money in the bank is real, while future cash flows are virtual, to value them they have to be discounted using the 'appropriate' discount rate. So the value of a firm, or an 'investment' or, in general, of capital, can be obtained, the determination of the appropriate rate of return on capital is needed. For the financial economist this rate corresponds to the so-called **required return on capital,** which as we know, is defined as the sum of the equilibrium real rate of interest, the expected rate of inflation, and a firm or security specific risk premium.[28] Even tough there is not a universally agreed-upon definition of risk, habitually risk is defined as the variability of returns or as the measurable possibility of losing or not gaining value.[29] Risk is measured in terms of the variance or standard deviation of a frequency distribution, the spread or dispersion of returns in an observed distribution is a measure of how much a particular return can deviate from the mean or average return. The usual practice is to start from a risk-free return, usually a base interest rate like that of the U.S. Treasury bills, and then consider an excess return of the risky asset[30] which is added to the basic rate as a risk premium, to compensate investors for bearing risks.

From the firm's perspective, to analyze profits within a short and long term equilibrium, financial economists often use a Marshallian type firm and industry partial equilibrium analysis. This type of analysis posits a perfectly competitive industry characterized by costless entry and exit, undifferentiated products, and increasing marginal costs of production. Each firm produces at the point at which marginal costs are equaled to market prices.[31] Long-run equilibrium exists when prices also equal average costs. When long-run equilibrium is achieved total revenue equals total costs for the firm and for the industry as a whole. In the standard or traditional Smithian-based approach costs include **the required return on the capital** used by each firm, then in a competitive industry, the actual return on capital must equal the required return. So excess returns, economic rents or

'pure profits,' are zero. The value of the firm will be exactly the same as its cost and no new value will be created. Within this framework, no projects or investment opportunities with a positive Net Present Value, NPV, will exist in equilibrium in a competitive market. Every project, investment opportunity, or in general, every form of capital will have an NPV equal to zero. Of course, there can and will be different required returns on capital all over the spectrum of firms, industries, securities, etc., etc., however, according to the standard view they will reflect different risk premiums.[32] In this world, in a competitive equilibrium the required or expected return on capital will be the same as the realized or actual return on capital, only errors in expectations may cause both to differ. In equilibrium the returns on capital will equal the cost of capital. The second classical equilibrium condition that prices equal costs will hold, by definition, always.

If, in an industry there are excess returns or profit making opportunities, new entrants will quickly invest in that market, their additional capacity and attempts to gain market share will increase the supply, drive prices down and consequently lower the returns for all the firms in the industry. Projects with a positive NPV will disappear, and with them investment opportunities. In equilibrium, every project will yield the same required return and NPVs will be zero. For financial economists, this process is analogous to the process of identifying under-valued securities in the capital market based on fundamental analysis. It can be done successfully, only if, there are financial market imperfections that do not permit “financial assets” to reflect their equilibrium value. In the same form the existence of profits or economic rents or investments with excess returns, that lead to positive NPVs, could only be explained by real commodity's market imperfections, in the form of some sort of barriers to entry or monopolistic controls over products or factors. Or as ‘disequilibrium’ situations. What could be considered an impeccable definition of a modern capitalist economy is the one advanced by Alan C. Shapiro in a classic paper on finance: *“This is the essence of corporate strategy: creating and then taking advantage of imperfections in products and factor markets. Thus, an understanding of the strategies followed by successful firms in exploiting and*

defending those barriers to entry created by product and factor market imperfections is crucial to any systematic evaluation of investment opportunities. Successful investments (those with positive NPVs) share a common characteristic: they are investments that involve creating, preserving, and even enhancing competitive advantages that serve as barriers to entry."[33] Shapiro's analysis highlights precisely the nature of profits as a residual in a Ricardian fashion, explained in his perspective by barriers to entry. This poses a theoretical problem: higher returns on capital do NOT reflect only higher risk premiums, but also, or better said mainly, the higher market power of the firm (s) involved, that allows them to generate residual profits.

The question here is then: Where does the required return on capital end and where do residual profits begin? Standard financial analysis does not provide a satisfactory answer[34], it is assumed that the **required return on capital** is a cost to be imputed on the value of the assets of a firm, it is usually considered as a given based on the 'requirements' of investors, or as a simple market empirical average. Within this type of analysis, the second classical equilibrium condition that prices equal costs, will hold, with the caveat that prices include the cost of capital, conceptualized as the required return on capital. Clearly profits rates will be different, but these differences will be explained because of the different risk premiums. Given that we have no theoretical explanation about the nature, sizes and about the structure of these risk premiums, they are what they are, and *always* prices will equal costs.

Nevertheless, in general equilibrium competitive conditions such a cost as the required cost of capital, is non-existent. Commodities used in production are rented, bought and sold at market prices. These prices are determined in exactly the same way of the prices of the commodities that are consumed and which often are the same. The prices of the commodities used in production, enter directly the cost of the commodities produced with them. Of course, insurable costs, risks, can be insured and they will be priced as every other commodity is priced. In a

competitive long term or 'full' equilibrium, as everybody seems to agree, prices will equal costs. And in an A&D type CE, these costs will reflect only the commodities, the real resources, used in production. Not even an interest rate, as the price of funds or the price of money. The conclusion should be straightforward, there is not a valid microeconomic foundation to the consideration of the so-called **required return on capital** as a cost, that reflects a firm or security specific risk premium, assimilated somehow to a scarce resource to be allocated. The returns on capital are only associated to residual profits. When pressed on the issue most will fall back on the vulgar conception of the single good economy where marginal productivity theory rules, and where the return of capital *is* the interest rate, as determined by the marginal productivity of capital, and some version of the loanable funds theory.

The standard Smithian definition of the equilibrium expected, or required, rate of return is usually accepted without any critical analysis by most financial economists and corporate finance practitioners. Within this perspective the real rate of interest is usually considered as given and determined independently by the willingness of households to save, positing a positive relationship between the supply of funds by families and the real interest rate. In other words, consumers confronted with an increase of the interest rate will reduce consumption and augment their financial savings to benefit from higher yields now, to fund more consumption in the future. The demand for funds from borrowers, that is, firms investing in plant and equipment, etc., is assumed to have a negative relationship with the real interest rate. If this rate rises, then firms confronted with a portfolio of investment choices, ordered by their relative profitability, will reduce their investment, because some projects will not be profitable enough to compensate the new higher interest payments. It is pointed out correctly that the government fiscal and monetary theory, affects interest rates. This view of interest rates corresponds to the venerable, because of its age not because of its analytical powers, loan-able funds theory of the interest rate. The classic "modern" version of this theory can be found in Irving Fisher's writings of the 1930s.[35] The expected

inflation rate depends on the expected level of prices as determined by the behavior of the government's fiscal and monetary policies. Leaving the government out of the picture for now, the standard practice determines the returns of a security as the sum of two prices: the nominal interest rate and a risk specific premium, in a purely Smithian fashion. Ricardo would be as intrigued as he was when he could not swallow the idea that the total real product of an economy depended on the prices of its components. If we follow the above cited standard definition, an increase in the real interest rate will increase the profitability of every investment, the equilibrium expected rate of return. If this is so, why should then investment or consumption be affected? One of two "theories" should be dropped: either the loan-able funds theory of the interest rate, or the Smithian theory of profitability as a sum of prices. In my perspective both theories should be abandoned. As we know by now, we can determine directly from general equilibrium conditions the total rate of return of the economy, without relying on the interest rate. Nevertheless, the need remains for an alternative theory of the interest rate that dispenses with the ancient loan-able funds theory in its multiple disguises.

The way financial practitioners look at the risk and return paradigm, is from the perspective of the individual as an investor, she will hold securities only if she gets a sufficient return that will compensate her for holding risky securities, that is entitlements with uncertain financial returns. Which is a sensible proposition in the everyday world of finance, but not an explanation or a theoretical justification for considering whatever return somebody decides to require as a compensation for ‘risk’, as a real economic cost. If the so-called required returns were a real cost involving the use of scarce resources,[36] the competitive market mechanism would generate a relatively stable structure of returns associated with particular activities or industries, firms or securities, that will gravitate, as all prices do, around an equilibrium level associated to a cost. Consequently, a theory that argues against the existence of the so-called required return on capital as a real cost would be falsified,[37] if in reality we would observe a stable structure of required costs of

capital across firms, industries, countries and over time, reflecting, for example, some empirically observable risk factors that would be incorporated in the security specific risk premiums. Then we would observe a stable structure of risk and returns associated with particular securities, firms or industries. Of course this is not the case, risk/returns show a great variability and are associated with the existence of competitive advantages mainly. For the simple reason that in a competitive market many firms will be going after the same profitable opportunity, and sooner or later competition in a free market will wipe out residual profits. Hence returns across firms, industries, countries and over time, will be continuously changing as profit making opportunities disappear, and these returns will move around the economy's rate of return, as determined by general equilibrium conditions. If, in reality this was the case, and I think it is, the cost of capital as the sum of nominal interest plus a security specific risk premium hypothesis would be falsified.

4.3 The Capital Assets Pricing and Arbitrage Pricing Theory Models. Efficient Markets and Randomness.

The Capital Assets Pricing Model, CAPM,[38] is a generalization of the basic cost of capital Smithian hypothesis. It argues that the risk of a security cannot be properly evaluated in isolation, what matters is the contribution of a security to the risk of a large portfolio, this is the sum of the covariances of the security's returns with the returns on the other securities in the portfolio. The contribution of a security to the risk of the market portfolio is the covariance of the security's return with the market's return. This standardized contribution is called the *beta (β)*. The CAPM states that, the expected or required return of a security is positively (and linearly) related to the security's beta. In formal terms:

$$\underline{R} = R_f + \beta(\underline{R}_m - R_f)$$

Where: $\underline{R}$ = *Expected or required return;* R_f = *Risk free rate;* $\underline{R}_m$ = *Market return.*

The Smithian approach predicts stable betas, and as has been shown repeatedly, they are not. Analysts 'explain' this unpredicted behavior in terms of a 'statistical property' called 'reversion towards the mean'[39] that betas happen to exhibit. Clearly an ad-hoc explanation. The real problem is what determines the mean towards which particular observations reverse to.

An alternative to the CAPM, within standard financial economics, is the Arbitrage Pricing Theory, APT, developed initially by Stephen A. Ross[40] in the 1970s. While the CAPM, uses the sensitivity of a security's return to one factor, the market return, as the single determining force, the APT posits that several factors should be used instead of a single market index. Ross started his analysis by considering that several fundamental economic factors should be considered, like production, inflation, the term structure of debt and the interest rate, among other forces. In the sense that the APT uses several factors as explanatory variables instead of one, it is considered by some as a generalization of the CAPM. Formally a multi factor version of the APT can be represented as:

$$\underline{R} = R_f + \beta_1(\underline{R}_1 - R_f) + \beta_2(\underline{R}_2 - R_f) + \beta_3(\underline{R}_3 - R_f) + \ldots + \beta_k(\underline{R}_k - R_f)$$

Where: $\underline{R}$ = *Expected or required return;* R_f = *Risk free rate;* β_1 = *Beta with respect to factor 1, 2 and so on to k;* $\underline{R}_{1\ldots k}$ = *Factors 1 to k.*

The term $\underline{R}_1$, represents the expected return on a portfolio (or security) whose beta with respect to the first factor is 1 and whose beta with respect all other factors is zero.

It is important to note that in the APT perspective, what counts are the variations of expected returns due to *unanticipated* changes in the factors considered as determinant. A model with only three factors, say, F_I, *inflation,* F_{GDP}, *output,* F_{irate} , interest rate, can be writen as:

$$R = \underline{R} + \beta_I F_I + \beta_{GDP} F_{GDP} + \beta_{irate} F_{irate} + \varepsilon$$

In this formulation the actual return of a security, *R*, will be equal to the expected return, $\underline{R}$, plus the impact of unexpected changes in economic factors, i.e., inflation, output and the interest rate, what is called systematic risk because it affects a wide range of securities; plus, a term reflecting the unique risks of a particular security, ε , which is considered as unsystematic risk.

For the CAPM equilibrium values of capital are those that are obtained by discounting future earnings at the required rate of return. Capital values can change if, earnings or the components of the required return on capital change. Within the APT model, values of capital are determined in a similar form, but the actual return of a security, will be equal to the expected or required return, plus the impact of unexpected changes in economic factors, what is called systematic risk. Both models assume that the general rate of return of the economy, “the market rate of return,” is either a simple sum of components, an average, or a given expected rate, which is not explained. The CAPM captures the effects of the overall economic conditions through the interest rate only, while the APT does it in a case by case ad hoc manner.

In a large well diversified portfolio, unsystematic risk can be diversified away, as more and more securities are added to a portfolio it tends to zero, nevertheless systematic risk cannot be eliminated. In other words, diversification can only eliminate the particular risks of specific securities, so they do not matter in a large well diversified portfolio, only systematic risks will remain and the returns will be positively related to the systematic risk. Here we must note, that if all unsystematic risks can be eliminated and hence they do not matter, then security specific risk premiums are irrelevant. In the APT version, if there are no surprises expected returns are always equal to actual returns, nevertheless we have no clear idea of how these are determined. In the CAPM, considering the economy as a

whole, if security specific risk premiums are irrelevant, then they are zero, so the expected return will be always equal to the risk free interest rate. So with the APT, the actual return is not determined, to say that it is equal to the expected return, cannot be considered an adequate theoretical explanation; and within the CAPM, the returns on capital are once more reduced to the interest rate, and the so called risk remains unexplained. We are back to Smith's ancient idea of the interest rate as the natural price or the cost of capital.

A more precise definition of risk would be the probability of obtaining an expected or required return, given the economy's overall rate of return. If we can determine from general equilibrium conditions a general rate of return, as we did, then we can hypothesize that the probability distribution of returns around this general or average rate, will be of a certain form. For example, a normal distribution. Obviously, the higher the so-called required return on capital relative to the economy's rate of return, the less likely it is that you will realize it. The chances of obtaining the general rate of return or less (or more) will be 50/50, and so on. Clearly if capital markets are more or less in equilibrium, that is if returns on capital had been equalized as the classics would posit, then the probabilities that the price of a stock would either rise or fall, would be exactly 50%. Which is an empirical finding that has appeared over and over in multiple studies. From the perspective of this study this is an obvious prediction, supported by the evidence. From a methodological falsificationist standpoint, our hypothesis should be rejected if we were to find that the probabilities that the price of a stock would either rise or fall, would differ systematically from 50%.

We cannot conceive the overall profitability of the economy as a sum of sums, that is the firm's returns as the sum of the nominal interest rate plus a risk premium, and the economy's rate of return as the sum of the individual returns (i.e. a weighted sum, an average). A proposition that implies the curiosity that when the interest rate rises the overall profitability will rise too. As we have argued before the overall profitability of the economy depends on its capacity to generate residual

profits, and this depends on the competitive advantages of the economy or on its market power in the most general sense. In a general competitive equilibrium, the economy's rate of return is a direct result from the aggregate cash flows that the economy can yield, it is not an average of rates, weighted or not. The individual firms' rates of return, are simultaneously determined, together with the economy's rate, once the prices of all commodities are. When both the aggregate rate and the individual rates are determined, the relative values of the firms' shares of capital will change until the returns on capital are equalized. The equilibrium value of capital is achieved when all shares of capital yield the same returns as the economy as a whole. As we will see, the financial structure of the economy will matter as well.

We postulate that the process of adjustment of capital shares values, will take place in a repeatable, predictable manner, a statement that contradicts the ruling idea that the prices of shares of capital are not predictable. An notion that is expressed in the Random Walks and Efficient Markets Hypothesis. Let us briefly review these notions before concluding the section.

A random walk describes the belief that stock price changes, the prices of capital, are random and unpredictable. It is called a random walk because they reflect the aimless and unplanned lurches of a drunk trying to grab hold of a lamppost. Each observed price is independent of any other observation. The price of a share of capital in a given moment, is whatever it is, regardless of what happened yesterday, a minute ago, or whenever. It is argued that randomly evolving prices are the necessary consequence of intelligent investors competing to discover relevant information to profit from it before someone else does. Clearly there is a lot of truth to this, any prediction about a future price increase, would translate immediately in a current price increase. That is, all available information on the current and future performance of a stock should already be impounded in the current price of the stock. Changes in the price of the stock should reflect only new, previously unavailable, information. Positively, if prices where predictable this

would indicate that not all available information was already incorporated in prices, hence markets would be inefficient. The efficient market hypothesis states that the prices of securities fully reflect all available information about them. In competitive capital markets new information is rapidly reflected in the prices of securities, as every investor is trying to outsmart others. However, new information turns up in a random fashion, hence the prices of capital move in unpredictable ways, capital prices follow a random walk. The parallel with the view of the economy's fluctuations as determined by the sum of random causes is evident.

The CAPM and the APT, both predict fairly stable security prices, these would only change as the commodities markets fundamentals and/or the interest rate would change, the structure of the so-called risk premiums would also be quite stable, resulting in a relatively stable structure of security prices. Nevertheless, in reality capital prices change continuously and quite often minute to minute and potentially in a very drastic measure. The idea of the random walk, is the theoretical response to this reality. The fundamental question is whether capital markets are truly random, or if there is an intrinsic core mechanism that can explain this apparent randomness.

Time series and business cycle studies is the field where some of the oldest applications of computers and advanced econometric analysis was developed. Among the variables of interest the analysis of the behaviour of stock prices, is certainly one that has attracted a lot of attention. Economists would try to trace the evolution of the economies through boom and bust periods and stock prices have been one of the key variables to follow. It was expected that if stock prices reflected the current and future performance of firms, then recurring patterns of peaks and troughs in the overall economic performance should be apparent in stock prices. In 1953 Maurice Kendall,[41] examined this proposition and to his surprise he found no evidence of predictable patterns in stock prices, these seemed to evolve randomly. Prices where equally likely to go up or down regardless of past performance. It seemed to be that price observations would be

independent, just as a throw of the dice is independent of the previous throw. The random walk notion states that each observation of a stock price is independent, statisticians have demonstrated that a large enough number of independent observations of the same event, will distribute themselves in a normal distribution, that is the well known bell curve pattern. Hence, one way to demonstrate that changes in stock prices are in fact independent is to see if they fall in a normal distribution. Also in the 1950s, Harry Roberts, from the University of Chicago,[42] produced some of the initial systematic evidence in support of this view. Using a computer, an innovation in those days, Roberts drew random numbers from a series that had the same mean and the same standard deviation as observed stock market prices, using this information he plotted charts with the sequential series of changes in the randomly generated prices. The patterns that resulted where identical to those observed and to those used by technical analysts of the stock market, random prices generated by computers and real observed prices where indistinguishable from each other.

The repetition maybe useful: the randomly generated numbers assumed a mean and a standard deviation equal to the observed numbers. It should be clear that you just need to have a sufficiently large universe of real observations and computer generated numbers to obtain the same result. And the concrete result depends essentially on the assumption of equal mean and standard deviation, for both samples. The real problem is what determines the mean, in our case what determines the general rate of return of the economy and of the firms' and hence, determines capital values. Robert's results, and many others using basically the same core assumption depend on the mean and the standard deviation that was chosen as a given to begin with. Lets not forget that whatever the rule used to generate random walks, in any system, the overall distribution always obtained, with enough observations of course, will be a smooth continuous Gaussian type distribution.

Again, the question is, if we can consider capital prices movements as random, just as "randomly" generated numbers, or if there is an underlying mechanism that can be elucidated. Scientific advancement or growth of knowledge, can only be achieved through the latter. A brief discussion of randomness based on the work of Stephen Wolfram,[43] may be helpful. Wolfram states: *"In nature one of the single most common things one sees is apparent randomness. And it could be that in each case the cause of randomness is different…I have come to the conclusion that one can in fact identify just three basic mechanisms for randomness…In the first…the one most commonly considered in the traditional sciences…randomness is explicitly introduced into the underlying rules for the system…It corresponds essentially to assuming that there is a random external environment which continually is looking at, and continually injects randomness into it. In the second…there is no such interaction with the environment. The initial conditions for the system are chosen randomly, but then the subsequent evolution of the system is assumed to follow definite rules that involve no randomness. A crucial feature of these rules, however, is that they make the system behave in a way that depends sensitively on the details of its initial conditions…the basic idea of this mechanism for randomness is that the randomness one sees arise from some kind of transcription of randomness that is present in the initial conditions.*

The two mechanisms for randomness just discussed have one important feature in common: they both assume that the randomness one sees in any particular system must ultimately come from outside of the system. In a sense, therefore, neither of these mechanisms takes any real responsibility for explaining the origins of randomness: they both in the end just say that randomness comes from outside whatever system one happens to be looking at…

The crucial point…is that simple programs can produce apparently random behaviour even when they are given no random input whatsoever. And what this means is that there is a third possible mechanism for randomness, which this time does not rely in any way on randomness already being present outside the system one is looking at…

…we have seen that practically every kind of simple program that we can construct is capable of generating such randomness…

…I believe that this mechanism is in fact ultimately responsible for a large fraction, if not essentially all, of the randomness that we see in the world."[44]

The random walk hypothesis applied to financial markets does not explain randomness, it simply assumes that new information is generated in a random fashion outside of the system and that as this new information is received and processed, capital prices change. Nevertheless, the possibility that capital price changes is generated from inside the system is not explicitly considered and there is no way to distinguish between changes originated from within the system and exogenous shocks that may or may not impinge on its dynamics. As Wolram expresses it: *"…we have studied two possible mechanisms that can lead to observed randomness. But as we have discussed, neither of these in any real sense themselves generate randomness. Instead, what they essentially do is just to take random input that comes from outside, and transfer it to whatever system one is looking at… …there is also a third possible mechanism for randomness, in which no random input from outside is needed, and in which randomness is instead generated intrinsically inside the systems one is looking at…"*[45]

Certainly, if we are able to identify clearly an intrinsic mechanism that generates apparent randomness in a system, then the system becomes to a certain extent predictable. Outcomes become repeatable: *"…one can ask how one can tell in an actual experiment on some particular system in nature to what extent intrinsic randomness generation is really the mechanism responsible for whatever seemingly random behaviour one observed. The clearest sign is a somewhat unexpected phenomenon: that details of the random behaviour can be repeatable from one run of the experiment to another. It is not surprising that general features of the behaviour will be the same. But what is remarkable is that if intrinsic randomness generation is the system at work, then the precise details of the behaviour can also be repeatable.*

In a mechanism where randomness comes from continual interaction with the environment, no repeatability can be expected. For every time the experiment is run, the state of the environment will be different, and so the behaviour one sees will also be correspondingly different. And similarly, in the mechanism where randomness comes from the details of the initial conditions, there will again be little, if any, repeatability. For the details of the initial conditions are typically affected by the environment of the system, and cannot realistically be kept the same from one run to another.

…the point is that with the mechanism of intrinsic randomness generation, there is no dependence on the environment. And as a result, as long as the setup of the system one is looking at remains the same, the behavior it produces will be exactly the same."[46]

Nevertheless, even if the system remains essentially unchanged, all systems are always subject to environmental shocks and disturbances, and a supposedly repeatable sequence of outcomes may not come about. Again quoting Wolfram: *"But how easy is it to disturb this sequence? If one makes a fairly drastic perturbation…the sequence will indeed often change…But with less drastic perturbations, the sequence can be quite robust…But the crucial point is that for perturbations below a certain critical size, the sequence always remains essentially unchanged." "…it is never possible to eliminate absolutely all interaction with the environment. And as a result, the system one is looking at will be subjected to at least some level of random perturbations from the environment. But…when such perturbations are small enough, they will have essentially no effect. And what this means is that when intrinsic randomness generation is the dominant mechanism it is indeed realistic to expect at least some level of repeatability when behavior that seemed random was observed in an experiment."*[47]

Speaking about a whole range of physical, biological and other systems, Wolfram concludes: *"…in all of these cases the randomness one sees cannot reasonably be attributed to randomness that is introduced from the environment—*

either continually or through initial conditions. And, instead, there is no choice but to conclude that the randomness must in fact come from the mechanism of intrinsic randomness generation…"[48]

It should be clear, then, that in many or most cases, randomness is apparent, and even though there are always external perturbations, for the most part, they do not change the fundamental behavior of the system and can easily be absorbed by it, which does not mean that the outcomes are going to be simply repeated, regardless of the perturbation. Sufficiently large perturbations, nevertheless, may do change the fundamental behavior of the system. The problem, then, is to identify the particular mechanism of intrinsic randomness generation, for the particular system. Once this mechanism is clearly defined, we should expect repeatability and hence predictability, randomness of results is apparent. Even though it should be recognized that the complete elimination of randomness that is introduced from the environment is impossible, the identification of the precise mechanisms at work that account for most or all of the apparent randomness in the system, will significantly reduce the presence of true randomness and hence increase the predictability of the system.

Even though Wolfram discusses briefly some financial and economic systems, his analysis is quite superficial regarding these particular instances, and he does not provide an alternative to the standard theories which he considers not satisfactory. The alternative theoretical framework we have developed to understand capital, is such a particular apparent randomness generation system.

Once we deal with the role and impact of the financial structure and remaining building blocks, we will advance some ideas about how our theory may help us predict the behavior of capital markets without relying in apparent randomness.

4.4 The structure of Capital or Financial Structure.

How the value of the firm is distributed, depends on the financial arrangements under which the firm was created and/or funded. The securities, shares and bonds at the most general level, that represent the property rights of the firm's stakeholders, as well as most taxes, are contingent claims on the firm's total value. A value which, basically but not only, depends on the firm's, and the economy's, ability to generate net cash flows or residual profits. Lets recall that all the commodities employed in production are remunerated at prices determined by general equilibrium conditions, so the prices of whatever assets the firm may or may not own, are irrelevant for the determination of the firm's capital value as an ongoing business concern.[49] As we have repeatedly stated: *the value of capital is a virtual value dependent on the future profitability of the firm and of the economy, on the interest rate and on the financial structure of both the firm and the economy.* As takeover artists know very well, sometimes the value of a firm is less than the value of its assets, hence it can be profitable to buy the firm at market value and to sell its pieces at market value as well.

How the value of the firm is distributed, depends on the financial arrangements under which the firm was created and/or funded. Producers that are profit maximizing agents identify investment opportunities that create, preserve or enhance competitive advantages. To turn this opportunities into a reality, real resources—commodities—have to be mobilized, these commodities are privately owned, they will have to be rented or sold to the new firm and the rights of its owners will have to be protected. This is done through institutional arrangements that protect the rights of the owners of the resources to be mobilized, either by buying them out or by renting their services, and through other means. These institutional arrangements establish the property rights over the future cash flows of the firm. So we can conceive of the firm as a set of contracts that has at its core the financial arrangements necessary for its inception, which implies a financial structure that establishes the way the value of the firm is to be distributed, and a

financial system that protects and guarantees the property rights of the participants.

Some fundamental questions emerge, is the value of the firm, or in general, is the value of capital independent of the institutional arrangements that determine its distribution? And, if the answer is no,[50] under what precise conditions the institutional arrangements that determine the distribution of capital, as defined, may impinge on the value of capital.

The establishment of the necessary institutional arrangements to fund a firm, and then to protect the rights of its stakeholders, is accomplished mainly but not only, through the services provided by the private and public institutions that conform the financial system. [51] The services involved in the provision of financial services for the firms that produce commodities, are commodities as well. As such, its production requires commodities, that is, the use of real resources. Agents pay for these services, in one way or another, and the cost of financial services is and should be properly incorporated in the final equilibrium prices of commodities. In short, the financial sector is not a provider of a scarce resource called capital, it is, in its amplest sense, the provider of the necessary services to protect and to guarantee the property rights of those involved in production. The securities[52] that represent the property rights of the firm's stakeholders, are contingent claims on total firm value, which ultimately depends on the firm's ability to generate cash flows.

Overall, for a given economy all these claims have to be satisfied from the same pool: the total profits generated by the economy. And this is where the link of financial and general equilibrium economics is established: general equilibrium conditions determine the prices of all commodities and hence total profits, capital markets determine the prices of the claims on these profits. The prices of these property rights are a function of the future profit streams of the firm and the economy, even contractual claims are contingent on profits. And the sum total of

the current and future claims on profits is always equal to current and future profits. The variable that adjusts is the value of the claims. What capital markets essentially price are the residual cash flows of firms over and above their full costs and insurable risks, profits not in the accounting but in the financial sense. Free or residual cash flows then will be used to make good contractual and non-contractual claims on them, interest and principal for creditors and dividends for equity holders, for example.

One of the central tenets of modern financial economics is that the financial arrangements to fund a firm, that is the distribution of the contingent claims on the firm's value, do not affect the total value of the firm.

The first of Miller and Modigliani's[53], M&M, propositions—one of the central results of modern financial economics—is that the financial arrangements to fund a firm, that is the distribution of the contingent claims on the firm's value, do not affect the total value of the firm. The second, M&M proposition, states that given the firm's value and the total return on capital, you can increase the return on equity by taking up more debt, that is by increasing the firm's leverage.[54] The increased return on equity is seen as an increase in the risk of the particular security as the firm increases its debt. The increase in risk leaves the value of the firm invariant, irrespective of the increase in the return of equity.

Miller and Modigliani's, M&M, propositions are considered as a cornerstone of modern financial economics, however theirs is a partial equilibrium analysis, they consider the firm in isolation. The value of the firm and the total rate of return, the so-called average cost of capital—the weighted average of the cost of debt plus the cost of equity—are considered by assumption as given. As a result and under these conditions, M&M, consider that the value of the firm is independent of its distribution. In other words, the firm’s value is independent of its financial structure, hence, there is no-magic in financial policy. Changes in the financial structure of the firm will affect only the returns of its components with risk as part of

them. In particular, M&M, hypothesize that the cost of equity is a linear function of the firm's debt-equity ratio, given the total cost of capital or the firm's total return. M&M analysis is a clear example of the Smithian pricing paradigm applied to securities, where the price of a security, its return, is conceived as a sum of costs, as we saw: *"the sum of the equilibrium real rate of interest, the expected rate of inflation, and a security specific risk premium."* Given that debt usually carries a fixed return—interest payments— the return on equity, can be increased by increasing the leverage, that is the debt to equity ratio, of the firm. For M&M, the return on equity, or the "cost" of equity capital, is positively and linearly related to the firm's debt to equity ratio. But the overall cost of capital, is invariant to changes in the firm's debt-equity ratio, so to keep the Smithian equality in place the risk premium has to increase accordingly. Within this perspective, whatever the returns on capital may be, they are always equal to the cost of capital.

From the equity holders perspective, increasing the leverage of the firm raises the return on equity, and also from their perspective it rises the *risk* of equity, of levered equity. Clearly, the fact that equity capital is considered more risky by equity holders, in a levered than in an unlevered firm, tells us nothing about the intrinsic risk or not of the particular economic activity the firm is involved in. For the equity holder of a levered firm, leverage increases risk because the property rights of the debt holders come first: if there is not enough cash flow to make good these rights, equity will be used to make them good. And if this situation is not reversed, the firm will go bankrupt. That is, the value of equity will be zero and the value of debt will be whatever the creditors can recover. It should be clear that this is an institutional arrangement that deals with the way and the order in which the value of a firm is distributed. The so-called required return on capital, usually referred to as the cost of equity, that is formed by a riskless component plus a risk premium, has its footing not in the capacity of a firm to generate positive cash flows thanks to a competitive advantage, but only in the distribution of the claims against the firm's value.

Lets consider first, a simple numerical example: a firm with a value of $100 and a 50/50 debt/equity ratio, that generates a yearly cash flow of $10 and pays 5% in interest, will yield a return on equity of 15%. If the debt/equity ratio goes to 75/25, the return on equity rises to 25%. Lets suppose now that the cash flow is $5 instead of $10 as before. In the low cash flow scenario the return on equity is 5% for a low leverage and 5% for high leverage. If the cash flow is only $2.5, the return on equity is 0% for a low leverage and -5% (MINUS) for high leverage.

To generalize, consider now the well known formula for Miller & Modigliani II, with no taxes:

$$r_s = r_o + B/S\ (r_o - r_b)$$

where

- r_s is the required return on capital, cost of equity, or expected return on equity;
- r_o is the overall return on the firm, cost of capital, or average cost of capital;
- r_b is the interest rate, cost of debt;
- B is the value of the debt;
- S is the value of equity, shares in the hands of investors;
- B + S = V the value of the firm;

If the overall return on the firm is invariant, the return on equity is positively and linearly related to the debt/equity ratio only when the total return is higher than the interest rate. Which is the only case accepted within the M&M framework, where by definition the interest rate is always lower than the total return because this last one is considered as a sum of the interest rate and the return or cost of equity, both positive magnitudes, weighted by their respective participations in the total value of the firm, in a purely Smithian way. If we view the total return as

determined by the general equilibrium conditions, considering profits as a residual, which is consistent with what happens in the real world. Then the interest rate can be less, equal or higher than the total return.

When the interest rate and the economy's profit rate are equal, the return on equity does not change as the debt/equity ratio varies; and when the total return is lower than the interest rate, as the debt/equity ratio changes, the "required return on equity capital" the so-called cost of equity, can be positive, zero or negative. In the theory and the practice of financial economics the standard approach is to consider always only the first case on the grounds that given that equity is riskier than debt, investors have to be compensated with a higher return, so they are willing to bear the risk of holding such risky securities, which makes perfect sense if you are an investor who is going to receive its share of whatever is left after everybody else does. What is wrong in theoretical terms is to considers the required return on capital as a cost and then impute it on prices, which then are considered equilibrium prices. Doing this means that the required return on equity, becomes the independent variable in the M&M II formula, and given that the interest rate is known and that the debt/equity ratio is a decision variable of management, then the overall return of the firm becomes the dependent variable, determined by the returns demanded by investors! We have a clear case of the tail wagging the dog. A Smithian approach that considers the required return on equity as a cost that, given the interest rate and the firm's leverage, determines the overall return on the firm! And for the economy as a whole the same thing!

Of course, having the demands of investors determining the returns of firms would be very nice for those of us that are in the business. Unfortunately, you can require as much return as you want, you might change the debt to equity ratio as much as your creditors allow you to, but ultimately, you will not affect the firm's cash flows, that is the residual profits that the firm generates. They depend on the firm's capacity to create, preserve and enhance its competitive advantage. And for the economy as a whole and for individual firms the total amount of profits, is given

and determined by general equilibrium conditions. In short, investors in capital markets may require returns, but it is up to the competitive markets in goods and services, to yield profits or not.

Miller and Modigliani's analysis, can be summarized in the following propositions, given the value of the firm, the overall return on capital and the interest rate:

Proposition a.- The value of the firm, V = B+S, is independent of the financial structure of the firm. Leverage, (B/S), that is the distribution of contingent claims, debt and equity over the firm's cash flows, does not affect the value of the firm.

Proposition b.- The return on equity in a levered firm is positively related with the leverage of the firm as measured by the debt/equity ratio.

$$r_s = r_o + B/S\ (r_o - r_b)$$

Proposition c.- The total return on capital or the average cost of capital is the sum of the interest rate and the return on equity, weighted by the relative participation of debt and equity in the value of the firm.

$$r_o = (B/V)\ r_b + (S/V) r_s$$

Proposition d.- The return on equity is independent of the interest rate. Changes in the interest rate do not affect the cost of equity. They affect only the total cost of capital or the total return. The return on equity reflects leverage and a ‘security specific risk’ only.

Proposition a.- As long as we assume that the value of the firm is given, this is correct by definition. However, in chapter three we demonstrated that the value of the firm, the value of shares of capital, is determined by the relationship

between the firm's and the economy's returns. We also demonstrated that the introduction of debt and the interest rate as a variable different from the economy's rate of return could generate capital effects, that is changes in the aggregate value of capital. Clearly, at the firm level the introduction of debt will affect as well the value of capital. In short, we need to stop considering the value of a firm as a given, and we need to analyze how the value of a firm in particular and in the aggregate are determined specifically in the presence of debt. In other words, how and when, changes in the financial structure impinge on the value of capital.

Proposition b.- This is valid only when the interest rate, $r_b < r_o$; that is within a strictly Smithian profits as a sum of costs framework. If, we consider correctly, that the interest rate is determined independently from the total return on the economy, determined by general equilibrium conditions. Then: $r_b \gtreqless r_o$, hence this proposition represents a special case only.

Propositions b.- and c.- are essentially identical given that by definition: B + S = V. M&M's well known *result* that: *"...the firm's overall cost of capital cannot be reduced as debt is substituted for equity, even though debt appears to be cheaper than equity. The reason for this is that, as the firm adds debt, the remaining equity becomes more risky. As this risk rises, the cost of equity capital rises as a result. The increase in the cost of the remaining equity capital offsets the higher proportion of the firm financed by low-cost debt. In fact, MM prove that the two effects exactly offset each other, so that both the value of the firm and the firm's overall cost of capital are invariant to leverage."*[55]

The value of the firm and the firm's overall cost of capital are invariant to leverage, not because equity becomes more risky and hence more expensive, they are invariant because M&M assumed, that they were invariant to begin with. The overall return on capital, the interest rate and hence the firm's value are determined somewhere else.

Proposition d.- This proposition contradicts the well known practical fact that there is an inverse relationship between the interest rate and the returns on equity. Every manager that has had to devote more/less cash to pay interest charges, knows that these payments will reduce/increase the cash available to compensate equity holders. For the M&M proposition to hold, increases in the interest rate should result in a decrease in the risk, unless we abandon the assumption of a given value of the firm or we are willing to swallow the proposition that higher interest rates mean higher returns on equity. When, as market practitioners know too well, higher interest rates mean lower returns on equity.

Certainly, if there is something like a security specific risk it should be independent of leverage. In other words if the effect of leverage on the returns on equity is the same for every firm, given that the interest rate and the total returns of the economy are the same for everybody, then the increased volatility of equity returns, due to an increased leverage should be considered as a systemic not as a firm specific effect.

Also if through diversification firm specific risks are eliminated, then the real problem is in the systemic risk. Standard theory has nothing to say about it, randomness is not an answer.

The conceptualization of the profitability of capital as a sum of costs, cannot be sustained. A simpler more powerful solution is simply to admit that profits are a residual determined by general equilibrium conditions and so are the rates of return of the economy and particular firms. The interest rate is not the cost of capital and it is determined by central bank operations, the structure of the financial system and the demand for money. If the interest rate on debt is lower than the total returns, it is obvious that the more debt the firm uses the more profits will be available after interest payments to remunerate a smaller equity contribution, and equity capital will be more valuable. And this is valid for every economic activity

and for every firm regardless the intrinsic firm specific risk, if it can even be defined in a substantive, not in a formal way.

As we will see, the higher the leverage and the smaller the difference between the interest rate and the total return of the economy, the higher the volatility of the returns on equity. But this is a systemic effect that has nothing to do with some obscure security specific level of risk that is not associated to real or commodities' markets determinants.

4.5 A reformulation of the Miller & Modigliani's capital structure framework.

The previous analysis provides us with the necessary elements to integrate and generalize the Miller & Modigliani's capital structure framework, to the general system developed in previous sections of this study. Using M&M's proposition II formulation presented in the last section. We can have for the economy as whole, that r_o the overall return on the firm in M&M, as equivalent to the economy's general rate of return, r, and the interest rate, r_b , as equal to, i , determined, as of now, by central bank operations.

So with

$r_o = r$ economy's general rate of return.
$r_b = i$ interest rate.

Then we have as one limiting case, a pure equity economy, as presented in the last chapter. In this economy leverage is zero so M&M's formula:

$$r_s = r_o + B/S\ (r_o - r_b)$$

is reduced to:

$r_s = r_o$ and $\mathbf{r_s = r}$

As we saw in chapter three, a competitive market for shares in a pure equity economy, through the workings of the Law of One Price and Arbitrage, will assure that the prices of shares will adjust until they yield the same return as the economy's general or average rate of return. We would see capital gains and loses, at the firm level, but overall the net present value of capital would be zero.

The other limiting case would be a pure debt economy, there is no equity, hence:

$r_s = r = 0$

The relationship between the overall return, r_o, or , *r*, and the interest rate, r_b , or to use a more common notation, *i,* is not determined in M&M. As we know, the interest rate can be higher, equal or less than the economy's general return, and this is because the interest rate is determined by forces that are different and independent from the forces that ultimately determine the economy's general profitability.

A pure debt economy, except in the special case when the interest rate is exactly the same as the overall return of the economy, will generate the need to deal with the problems of assigning the property rights over the residual profits, positive or negative, once interest payments are considered. The difference between interest rates and profits rates provides the foundation for the existence of specialized markets to deal with debt and shares of equity. Capital markets exist because the differences of the interest rate and the profit rate, make the residual valuable. Capital as a property right over the residual profits of a firm, becomes valuable and this value can be traded. Debt and capital markets are not independent as it is implied in the Smithian returns as costs perspective. There is a

direct inverse relationship between the interest rate and the return on equity, because of the simple reason that different forms of capital, which are entitlements, are remunerated from the same source.

In section 3.3, we concluded, that if the interest rate is under the economy's rate of return, the excess cash flows over and above interest payments would have a positive value, the aggregate value of capital would be positive. If the case is reversed, then the aggregate value of capital would be negative. In summary, denoting aggregate capital effects, as κ :

$$If \quad i = r \ \ then \ \ \kappa = 0$$
$$If \quad i < r \ \ then \ \ \kappa > 0$$
$$If \quad i > r \ \ then \ \ \kappa < 0$$

In other words, the value of capital is a variable, and it depends on the interaction of the profit and the interest rates. We cannot consider the value of capital, the value of the firm, as invariant to changes in these variables and to changes in the capital structure of the firm. The M&M framework is clearly superseded.

As we saw, the existence of aggregate capital effects may cause the breakdown of Say's or Walras' Law, with potentially major consequences for the macro dynamics of the system. However, we could only determine the sign, positive or negative, of these aggregate capital effects, because, among other factors, we had not considered in detail the role of the capital structure of the economy. The determination of the aggregate value of capital as a function of the profit rate, the interest rate and the capital structure of the economy becomes essential. This is of course the market value of capital as a property right over residual profits, after interest payments, that is the value of equity capital.

We can achieve this result directly from a modified M&M formula. The starting point is to introduce an alternative measure of leverage. If the market value of the firm is the variable to be determined we cannot measure leverage in the standard way, that is as the debt/equity ratio, B/S, using market values for both. Instead, we need to use a measure of leverage based on costs, that is based on market prices of the commodities required for production or at the inception of the firm. As we know, a long full equilibrium is characterized by the equality of prices and costs, and by a zero value of capital. A cost based measure of leverage would reflect the portion of the costs funded by debt, or to put it in a more general form, in a competitive equilibrium: the proportion of costs secured through financial services that are remunerated at cost. With this definition we can restrict the definition of capital to equity, the property right over residual profits, after all costs are covered.

Lets recall that, how the value of the firm is distributed, depends on the financial arrangements under which the firm was created. This is done through institutional arrangements that protect the rights of the owners of the resources to be mobilized. These institutional arrangements establish the property rights over the future cash flows of the firm. The securities that represent the property rights of the firm's stakeholders, are contingent claims on total firm value, the basic forms of these securities are debt and equity. Debt is a legal promise by the borrowing agent to repay a fixed dollar amount by a fixed date. Creditors expect to receive full payment of the promised amount regardless of what happens to the firm. Shareholders, acquire contingent property rights over the residual cash flows of the firm after debt payments. The shareholder’s claim on the firm's value is the amount that remains after the creditor's claims have been satisfied. In a full long term equilibrium, the interest rate *should* reflect only the cost of providing financial services. Equity is always a residual claim. At the end of the day, capital as a property right over residual profits can be reduced to equity only.

In the standard approach leverage is defined as the debt to equity ratio, considering the value of the firm as a given equal to the sum of the market values of debt and equity, it would then represent the distribution of property rights between creditors and shareholders. Alternatively, we consider that the proper measure of leverage should be the proportion of real costs to be funded with debt. In other words, leverage is defined as the proportion of the costs of the commodities needed for production that are secured through financial services that are remunerated at competitive prices.

This is a very relevant point: if the role of the financial system is to protect the rights of those involved in production, ensuring that everybody gets the competitive equilibrium prices of the commodities they contribute to the process, and the financial system charges for its services, fees that are competitively determined: say *interest*. We can conceive a situation where leverage is 100% and we have a full equilibrium with zero profits and zero value of capital. Contrary to the ideas of financial fundamentalists, under competitive equilibrium conditions, the higher the level of leverage the better. Meaning simply, that if firms are less dependent to finance their operations, on equity that expects to be remunerated with residual profits, the closer the system would be to a pure free market where prices equal costs.

With the general conditions of competitive equilibrium we have been using in mind, we can think of leverage as the proportion of the market value of the commodities needed to start production, that is secured through the provision of competitively priced financial services. By doing so, we do not need to consider the value of capital as a given but as a variable.

Using the same notation of the M&M formula, we have:

$B + S^0 = V^C$ the value at cost of the firm;

Leverage:

$$L = B / V^C \quad \text{and} \quad S^0 = V^C (1 - L)$$

Obviously,

L = 1 in an pure debt economy, and
L = 0 in an pure equity economy

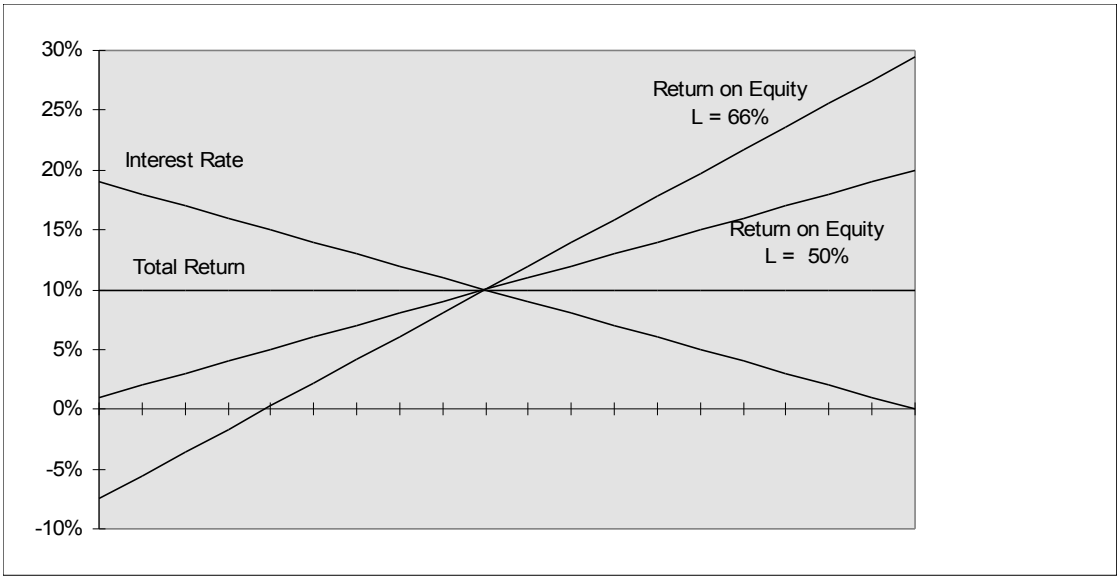
Then we have:

$$r = Li + (1-L)\ r_s$$
$$r_s = (r - Li) / (1-L)$$

where

r_s is the return on equity, or return on capital;
r is the overall return of the economy;
i is the interest rate;

We can illustrate the relationship between the interest rate and the return on equity for two different given levels of leverage, L , assuming that the economy's rate of return is 10%, in the following graphic:



There is a linear inverse relationship between the interest rate and the return on equity for a given level of leverage.

Also there is a direct relationship between leverage and the return on equity. This last relationship is not linear and is strongly affected by the difference between the total rate of return of the economy and the interest rate. Within this framework, it is possible to analyze the relationships between the interest rate, returns on equity and leverage, without the need to introduce any notion about security specific risks[56], or an exogenous market risk, a notion that is not even clearly defined in the literature.[57]

The relationship between the interest rate and the total return of the economy introduces a potentially major element of instability in a capitalist economy: in a situation characterized by high levels of leverage and a small difference between the interest rate and the total rate of return of the economy, small variations in the interest rate and/or the total return of the economy can result in explosive changes, positive or negative, on the returns on equity and hence in the value of shares. The value of shares in levered firms will tend to increase until returns on capital are equalized at the economy's level. As a result of the interplay

of all these variables, the relative prices of shares will change and capital effects will emerge. The dynamics of capital will have distributional and aggregate effects, on both wealth and in aggregate income or demand.

4.6 The determination of Systematic Risk.

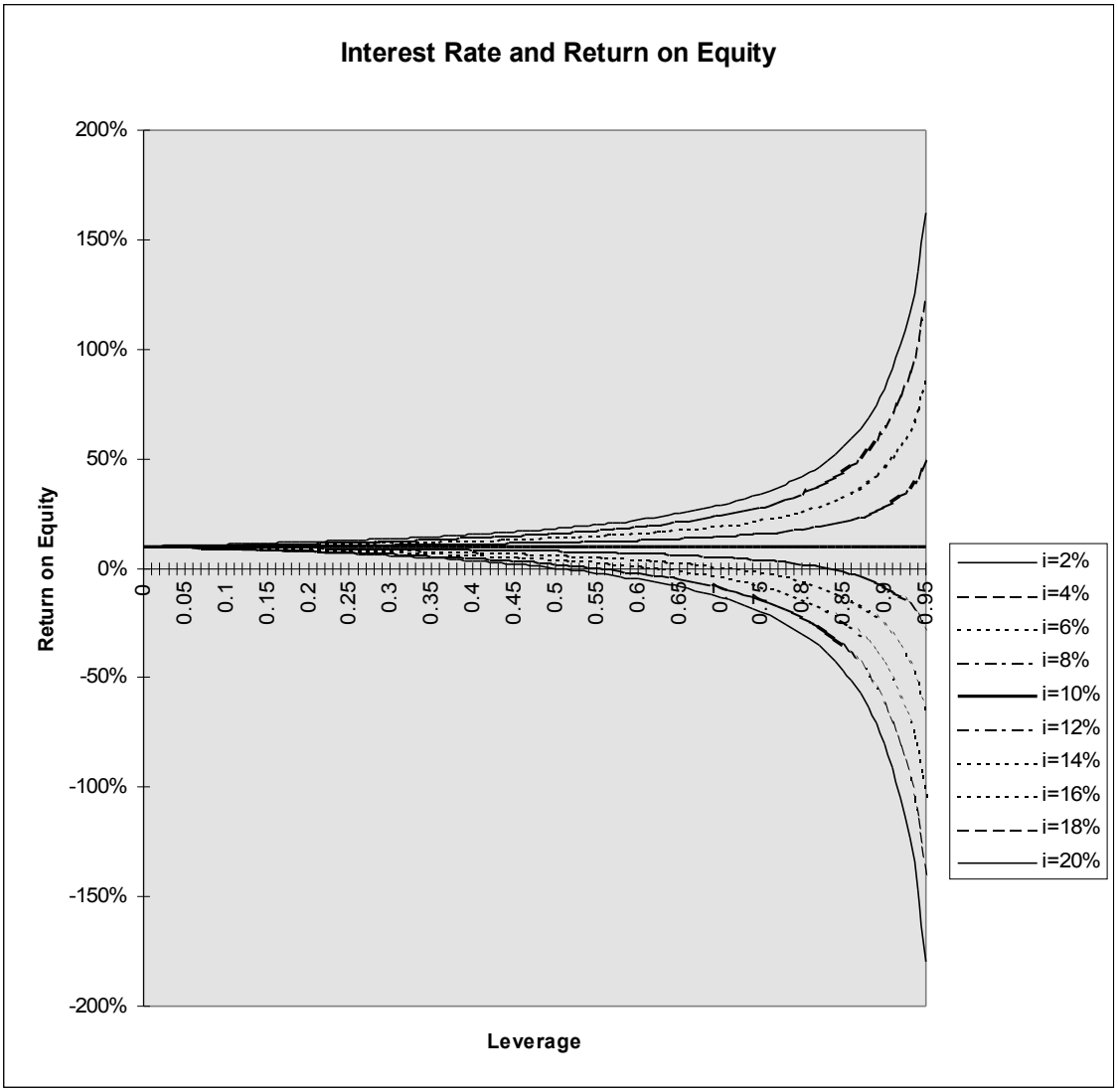
The potentially explosive changes in the returns of capital are of a systemic nature. They explain and represent the true systemic risk, always present in capital markets.

A well known conclusion of the modern financial literature is that firm or security specific risks, nonsystematic risk, can be diversified away, while systematic or market risk always remains. We have argued that if specific risks are irrelevant due to diversification, then the important theoretical question is the determination of systematic risk. The so called systematic risk of the dominant risk and return paradigm, is considered as exogenous, as a reflection of economy wide risks that are not specified.

We will define as systematic risk: the variability of the returns on capital as determined endogenously by the relationship between the economy's rate of return, the interest rate and leverage that we have established, and measured as the standard deviation of returns on capital.

The table at the end of this section presents the different rates of return on capital, return on equity, associated to different levels of leverage and different interest rates, calculated using the formula developed in this work. In this numerical example, the economy's rate of profit is assumed to be 10%, and the interest rate varies from 2% to 20%. The last column presents the standard deviation of returns on capital for each level of leverage, as we vary the interest rate. This last number corresponds to our definition of systematic risk.

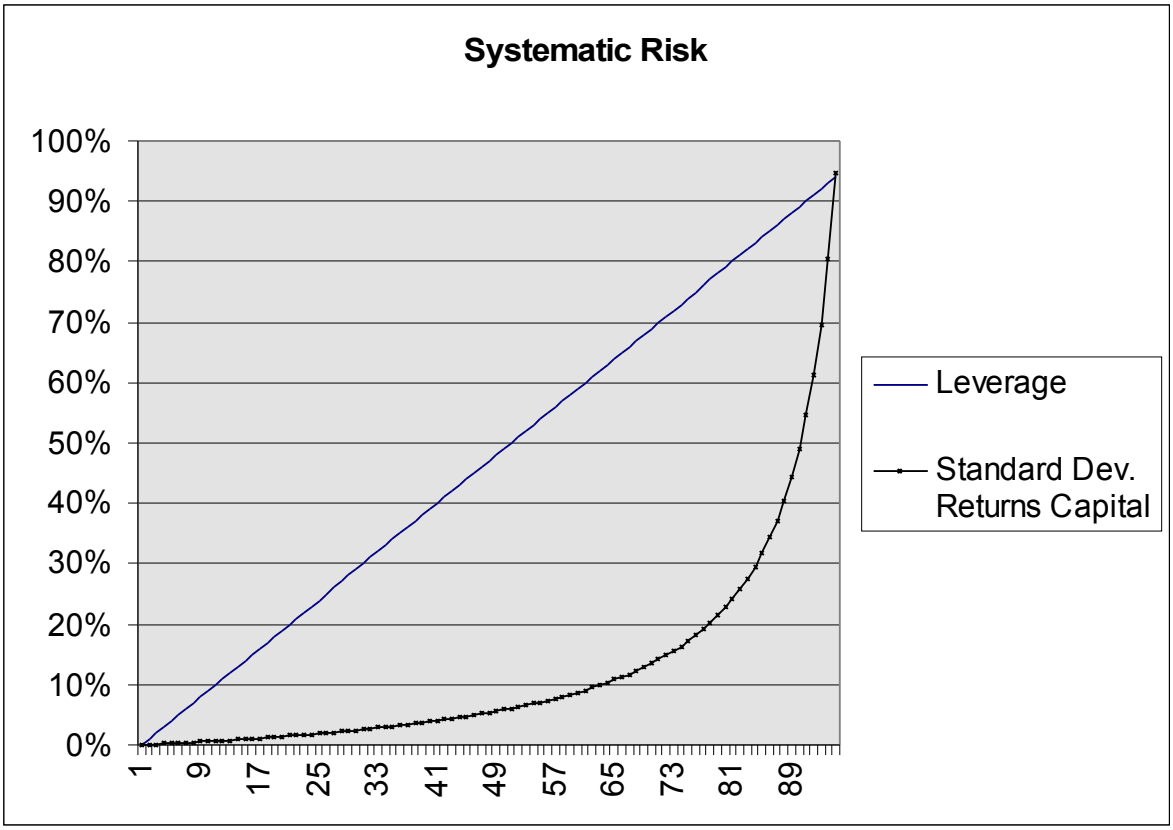
The next graph summarizes the results of this table. It presents the variations of the returns on equity, capital, as the interest rate and leverage vary.



As leverage increases, the higher the difference between the total rate of return and the interest rate, the more explosive the changes in the returns on capital. If the interest rate is above the total returns the changes will be negative. If the interest rate is below the total returns the changes will be positive. In the graph presented above, the horizontal line where total return is equal to the interest rate, that is where debt is indistinguishable from equity will move down or up if the total return of the economy moves up or down, the lower the total return the smaller the range of positive interest rates that will show a positive slope. In other words, as

the total return of the economy is reduced, the more previously upward pointing interest rate curves will shift downward. So a few points down in total return and/or a few points up in the interest rate can wipe out the return on equity of a moderately leveraged firm or economy.[58]

The next graph presents the standard deviation of the returns on capital, what I have defined as systematic risk, as a function of leverage:



The previous analysis has some interesting implications. It provides a precise measure of risk associated to leverage, in the face of changes in the interest rate or in the economy's rate of return. For example: If the economy's rate of return is 10% and leverage is 62%, systemic risk or the standard deviation of the returns on capital is 10%. Which means that variations in the interest rate and/or the general profit rate, might push returns on capital from 17% for an interest rate of 6%, up to 27% or down to 7%. Obviously, if we assume that variations on

returns are distributed normally, we can easily assign probabilities to different levels of return, caeteris paribus.

The absolute level of the profit rate and the differential between the interest rate and the profit rate, is all important. If, the economy's rate of return is 20%, then, a level of systemic risk of also 20%, is associated to an overall leverage of 77%. The higher the profitability of the economy and the lower the interest rate, the more favorable the conditions for the expansion of leverage, that is of credit, without incurring in the risk of obtaining negative returns or capital loses. Clearly the higher the economy's profit rate is, the wider the range of variations that will be in the positive returns territory, and the smaller the range for potential negative returns or capital loses.

Besides the implications of this analysis for financial markets, there are implications for macroeconomic analysis as well. For example: The study of the determinants of credit expansions and contractions, and its impact on macroeconomic performance, business cycles, financial crises, etc., etc., has been a subject of great interest for economists. Our previous analysis permits us to consider the variations of credit, leverage, not as the result of a more or less perfect or imperfect market for loans, but as a result of investors and firms adjusting their portfolios or the financial structure of the firm, to achieve their profitability goals.

In other words, we can see leverage as a function of a targeted rate of return on capital, or a required rate of return—to use the current lingo but within our expanded framework—given the overall conditions of the economy as expressed in the interest rate and the general rate of profits, and the level of systematic risk, that investors and firms are ready to bear. Following the example of the previous page: if the interest rate is 6%, and the investor's required return is 17%, under these conditions, she will select a leverage of 62%.

In the next section, I will present a simple numerical example to illustrate the distributional and aggregate consequences of capital effects will be presented.

Returns on Equity, Capital, as a Function of Leverage and the Interest Rate. Systematic Risk.

Leverage	i=2%	i=4%	i=6%	i=8%	i=10%	i=12%	i=14%	i=16%	i=18%	i=20%	Standard Dev.
0	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	**0%**
0.01	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	**0%**
0.02	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	**0%**
0.03	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	**0%**
0.04	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	**0%**
0.05	10%	10%	10%	10%	10%	10%	10%	10%	10%	9%	**0%**
0.06	11%	10%	10%	10%	10%	10%	10%	10%	9%	9%	**0%**
0.07	11%	10%	10%	10%	10%	10%	10%	10%	9%	9%	**0%**
0.08	11%	11%	10%	10%	10%	10%	10%	9%	9%	9%	**1%**
0.09	11%	11%	10%	10%	10%	10%	10%	9%	9%	9%	**1%**
0.1	11%	11%	10%	10%	10%	10%	10%	9%	9%	9%	**1%**
0.11	11%	11%	10%	10%	10%	10%	10%	9%	9%	9%	**1%**
0.12	11%	11%	11%	10%	10%	10%	9%	9%	9%	9%	**1%**
0.13	11%	11%	11%	10%	10%	10%	9%	9%	9%	9%	**1%**
0.14	11%	11%	11%	10%	10%	10%	9%	9%	9%	8%	**1%**
0.15	11%	11%	11%	10%	10%	10%	9%	9%	9%	8%	**1%**
0.16	12%	11%	11%	10%	10%	10%	9%	9%	8%	8%	**1%**
0.17	12%	11%	11%	10%	10%	10%	9%	9%	8%	8%	**1%**
0.18	12%	11%	11%	10%	10%	10%	9%	9%	8%	8%	**1%**
0.19	12%	11%	11%	10%	10%	10%	9%	9%	8%	8%	**1%**
0.2	12%	12%	11%	11%	10%	10%	9%	9%	8%	8%	**2%**
0.21	12%	12%	11%	11%	10%	9%	9%	8%	8%	7%	**2%**
0.22	12%	12%	11%	11%	10%	9%	9%	8%	8%	7%	**2%**
0.23	12%	12%	11%	11%	10%	9%	9%	8%	8%	7%	**2%**
0.24	13%	12%	11%	11%	10%	9%	9%	8%	7%	7%	**2%**
0.25	13%	12%	11%	11%	10%	9%	9%	8%	7%	7%	**2%**
0.26	13%	12%	11%	11%	10%	9%	9%	8%	7%	6%	**2%**
0.27	13%	12%	11%	11%	10%	9%	9%	8%	7%	6%	**2%**
0.28	13%	12%	12%	11%	10%	9%	8%	8%	7%	6%	**2%**
0.29	13%	12%	12%	11%	10%	9%	8%	8%	7%	6%	**2%**
0.3	13%	13%	12%	11%	10%	9%	8%	7%	7%	6%	**3%**
0.31	14%	13%	12%	11%	10%	9%	8%	7%	6%	6%	**3%**
0.32	14%	13%	12%	11%	10%	9%	8%	7%	6%	5%	**3%**
0.33	14%	13%	12%	11%	10%	9%	8%	7%	6%	5%	**3%**
0.34	14%	13%	12%	11%	10%	9%	8%	7%	6%	5%	**3%**
0.35	14%	13%	12%	11%	10%	9%	8%	7%	6%	5%	**3%**
0.36	15%	13%	12%	11%	10%	9%	8%	7%	6%	4%	**3%**
0.37	15%	14%	12%	11%	10%	9%	8%	6%	5%	4%	**4%**
0.38	15%	14%	12%	11%	10%	9%	8%	6%	5%	4%	**4%**
0.39	15%	14%	13%	11%	10%	9%	7%	6%	5%	4%	**4%**
0.4	15%	14%	13%	11%	10%	9%	7%	6%	5%	3%	**4%**

Leverage	i=2%	i=4%	i=6%	i=8%	i=10%	i=12%	i=14%	i=16%	i=18%	i=20%	Standard Dev.
0.41	16%	14%	13%	11%	10%	9%	7%	6%	4%	3%	**4%**
0.42	16%	14%	13%	11%	10%	9%	7%	6%	4%	3%	**4%**
0.43	16%	15%	13%	12%	10%	8%	7%	5%	4%	2%	**5%**
0.44	16%	15%	13%	12%	10%	8%	7%	5%	4%	2%	**5%**
0.45	17%	15%	13%	12%	10%	8%	7%	5%	3%	2%	**5%**
0.46	17%	15%	13%	12%	10%	8%	7%	5%	3%	1%	**5%**
0.47	17%	15%	14%	12%	10%	8%	6%	5%	3%	1%	**5%**
0.48	17%	16%	14%	12%	10%	8%	6%	4%	3%	1%	**6%**
0.49	18%	16%	14%	12%	10%	8%	6%	4%	2%	0%	**6%**
0.5	18%	16%	14%	12%	10%	8%	6%	4%	2%	0%	**6%**
0.51	18%	16%	14%	12%	10%	8%	6%	4%	2%	0%	**6%**
0.52	19%	17%	14%	12%	10%	8%	6%	4%	1%	-1%	**7%**
0.53	19%	17%	15%	12%	10%	8%	5%	3%	1%	-1%	**7%**
0.54	19%	17%	15%	12%	10%	8%	5%	3%	1%	-2%	**7%**
0.55	20%	17%	15%	12%	10%	8%	5%	3%	0%	-2%	**7%**
0.56	20%	18%	15%	13%	10%	7%	5%	2%	0%	-3%	**8%**
0.57	21%	18%	15%	13%	10%	7%	5%	2%	-1%	-3%	**8%**
0.58	21%	18%	16%	13%	10%	7%	4%	2%	-1%	-4%	**8%**
0.59	22%	19%	16%	13%	10%	7%	4%	1%	-2%	-4%	**9%**
0.6	22%	19%	16%	13%	10%	7%	4%	1%	-2%	-5%	**9%**
0.61	23%	19%	16%	13%	10%	7%	4%	1%	-3%	-6%	**9%**
0.62	23%	20%	17%	13%	10%	7%	3%	0%	-3%	-6%	**10%**
0.63	24%	20%	17%	13%	10%	7%	3%	0%	-4%	-7%	**10%**
0.64	24%	21%	17%	14%	10%	6%	3%	-1%	-4%	-8%	**11%**
0.65	25%	21%	17%	14%	10%	6%	3%	-1%	-5%	-9%	**11%**
0.66	26%	22%	18%	14%	10%	6%	2%	-2%	-6%	-9%	**12%**
0.67	26%	22%	18%	14%	10%	6%	2%	-2%	-6%	-10%	**12%**
0.68	27%	23%	19%	14%	10%	6%	2%	-3%	-7%	-11%	**13%**
0.69	28%	23%	19%	14%	10%	6%	1%	-3%	-8%	-12%	**13%**
0.7	29%	24%	19%	15%	10%	5%	1%	-4%	-9%	-13%	**14%**
0.71	30%	25%	20%	15%	10%	5%	0%	-5%	-10%	-14%	**15%**
0.72	31%	25%	20%	15%	10%	5%	0%	-5%	-11%	-16%	**16%**
0.73	32%	26%	21%	15%	10%	5%	-1%	-6%	-12%	-17%	**16%**
0.74	33%	27%	21%	16%	10%	4%	-1%	-7%	-13%	-18%	**17%**
0.75	34%	28%	22%	16%	10%	4%	-2%	-8%	-14%	-20%	**18%**
0.76	35%	29%	23%	16%	10%	4%	-3%	-9%	-15%	-22%	**19%**
0.77	37%	30%	23%	17%	10%	3%	-3%	-10%	-17%	-23%	**20%**
0.78	38%	31%	24%	17%	10%	3%	-4%	-11%	-18%	-25%	**21%**
0.79	40%	33%	25%	18%	10%	2%	-5%	-13%	-20%	-28%	**23%**
0.8	42%	34%	26%	18%	10%	2%	-6%	-14%	-22%	-30%	**24%**
0.81	44%	36%	27%	19%	10%	1%	-7%	-16%	-24%	-33%	**26%**
0.82	46%	37%	28%	19%	10%	1%	-8%	-17%	-26%	-36%	**28%**
0.83	49%	39%	30%	20%	10%	0%	-10%	-19%	-29%	-39%	**30%**
0.84	52%	42%	31%	21%	10%	0%	-11%	-22%	-32%	-43%	**32%**

Leverage	i=2%	i=4%	i=6%	i=8%	i=10%	i=12%	i=14%	i=16%	i=18%	i=20%	Standard Dev.
0.85	55%	44%	33%	21%	10%	-1%	-13%	-24%	-35%	-47%	**34%**
0.86	59%	47%	35%	22%	10%	-2%	-15%	-27%	-39%	-51%	**37%**
0.87	64%	50%	37%	23%	10%	-3%	-17%	-30%	-44%	-57%	**41%**
0.88	69%	54%	39%	25%	10%	-5%	-19%	-34%	-49%	-63%	**44%**
0.89	75%	59%	42%	26%	10%	-6%	-22%	-39%	-55%	-71%	**49%**
0.9	82%	64%	46%	28%	10%	-8%	-26%	-44%	-62%	-80%	**54%**
0.91	91%	71%	50%	30%	10%	-10%	-30%	-51%	-71%	-91%	**61%**
0.92	102%	79%	56%	33%	10%	-13%	-36%	-59%	-82%	-105%	**70%**
0.93	116%	90%	63%	37%	10%	-17%	-43%	-70%	-96%	-123%	**80%**
0.94	135%	104%	73%	41%	10%	-21%	-53%	-84%	-115%	-147%	**95%**
0.95	162%	124%	86%	48%	10%	-28%	-66%	-104%	-142%	-180%	**115%**
0.96	202%	154%	106%	58%	10%	-38%	-86%	-134%	-182%	-230%	**145%**
0.97	269%	204%	139%	75%	10%	-55%	-119%	-184%	-249%	-313%	**196%**
0.98	402%	304%	206%	108%	10%	-88%	-186%	-284%	-382%	-480%	**297%**
0.99	802%	604%	406%	208%	10%	-188%	-386%	-584%	-782%	-980%	**599%**

4.7 Capital effects: Distributional and Aggregate Implications.

We have argued that the dynamics of capital, that is the variations in the value of capital, may generate distributional and aggregate effects, that can impinge on the level and distribution of wealth with potentially significant macroeconomic consequences. In an initial stage of our analysis, we showed how in a world where equity was the only form of claims against residual profits, the value of these claims, the value of shares of capital, would be determined by the process of equalization of returns on capital due to arbitrage. The returns on capital would equalize at the level of the returns of the economy and the relative prices of shares would adjust accordingly. This process would generate distributional effects: some owners of capital would win, others would lose. Nevertheless, at the aggregate level these distributional effects would cancel out, and no aggregate capital effects would emerge. Once we introduced debt and once we considered that the interest rate—a variable essentially different than the economy's rate of profit—could be the appropriate rate to determine the value of capital, we concluded that an aggregate capital effect may appear and that this effect could generate an aggregate demand excess or a deficiency. This resulted in the breakdown of Say's Law. We concluded that the financial structure of the economy matters.

In this chapter we have developed a new alternative framework to deal with these issues. In this section I will use it to analyze the determination of the direction and the size of these capital effects. In the following notes and tables I will illustrate my argument with a simple numerical example.

Lets consider first a situation with no debt, all initial investment is equity capital. A world with five firms, the returns on capital are equalized at the economy's rate, in this world a one period return.[59] We are interested in the adjustment of capital values, the relative prices of shares, and in the existence of capital gains and loses. Without debt, as we have argued, there are no aggregate

capital effects. There are, however, significant distributional effects as the relative prices of shares adjust.

			Returns on Capital		Capital	Relative		
	Initial	*Profits*	Before	After	Values	Prices of	Capital Gains	
Shares	Invest. K	CashFlow	Equalization		@ r	*Shares*	(+ o -)	
kj	*cf0*	*cf1*	*rj*	*r*	*kjr*	*ki3*	#	%
k1	100	10	10%	30%	33	0.33	-67	-67%
k2	100	20	20%	30%	67	0.67	-33	-33%
k3	100	30	30%	30%	100	1.00	0	0%
k4	100	40	40%	30%	133	1.33	33	33%
k5	100	50	50%	30%	167	1.67	67	67%
K & r	500	150	30%		500		0	0%

Now, lets introduce debt and assume a level of 50% leverage for all firms involved. Our analysis predicts the emergence of aggregate capital effects.

	Economy's	Interest	Leverage	Return on	Debt	Interest	Profits	Capital Values w/Leverage		
Shares	Return	Rate		Equity		Payments	After I	*kjrL*		
kj	*r*	*i-rate*	*Lj*	*rs=(r-Li)/(1-L)*			*cf1-ipymts*	*r=10%*	*r=30%*	*r= 50%*
k1	30%	10%	50%	50%	50	5	5	50	17	10
k2	30%	10%	50%	50%	50	5	15	150	50	30
k3	30%	10%	50%	50%	50	5	25	250	83	50
k4	30%	10%	50%	50%	50	5	35	350	117	70
k5	30%	10%	50%	50%	50	5	45	450	150	90
K & r				50%	250		125	**1250**	**417**	**250**
K	250							***Aggregate Capital Effects***		
r = (cf1 - ipymts)/K		**50%**						***1000***	***167***	***0***

Capital effects emerge. They are positive if we use as the appropriate rate to discount capital values, both the interest rate and the economy's rate of profit.

Only when we use as a discount rate the new leveraged return on capital, which in this example is 50%, aggregate capital effects are eliminated, as the different versions of the finance does not matter perspective would predict. Within this view, an increase in leverage would be accompanied by an increase in the risk

of equity. Given that specific risk does not matter, it would have to be an increase in market risk. If we use the Smithian inspired formula, which states that returns on capital equal the interest rate plus the risk premium ($r_s = i_{rate}$ + *risk premium).* In our example, the new market risk premium should be 40%!!!! The standard paradigm does not explain this, or for that matter it does not provide us with any indication about the determination of systemic risk. Our model does. It predicts a capital risk of only 6% for a leverage of 50%. Using the Smithian formula this would mean that the appropriate rate to discount capital values would be 16% under these conditions. Capital effects would emerge and they would be significant.

It is difficult to expect that aggregate capital effects would be eliminated by an increased level of risk, at least for moderate levels of leverage. So as reality shows, capital appears as a net financial asset of the community with an, usually, positive value. In our simple numerical example, a value of 167 if we use as the appropriate discount rate, the economy's rate of return assumed to be 30%.

The following tables detail this analysis:

	Capital Values	**Relative Prices**	**Capital Gains**	
Shares	**@ r = 10%**	**of Shares**	**(+ o -)**	
Kj	**kjr**	**ki3**	**#**	**%**
k1	50	0.20	0	0%
k2	150	0.60	100	200%
k3	250	1.00	200	400%
k4	350	1.40	300	600%
k5	450	1.80	400	800%
K	***1250***			
Aggregate Capital Effects		***1000***		***400%***

Shares	Capital Values @ r = 30%	Relative Prices of Shares	Capital Gains (+ o -)	
Kj	**kjr**	**ki3**	**#**	**%**
k1	17	0.20	-33	-67%
k2	50	0.60	0	0%
k3	83	1.00	33	67%
k4	117	1.40	67	133%
k5	150	1.80	100	200%
K	***417***			
Aggregate Capital Effects		***167***		***67%***

Shares	Capital Values @ r = 50%	Relative Prices of Shares	Capital Gains (+ o -)	
Kj	**kjr**	**ki3**	**#**	**%**
k1	10	0.20	-40	-80%
k2	30	0.60	-20	-40%
k3	50	1.00	0	0%
k4	70	1.40	20	40%
k5	90	1.80	40	80%
K	***250***			
Aggregate Capital Effects		***0***		***0%***

If the level of leverage is kept constant the relative prices of shares do not change. However, as leverage rises the relative prices of shares change. Predictably, in favor of the shares from the most profitable firms. Also, aggregate capital effects appear and grow with leverage. So we have both, distributional, changes in relative prices of shares, and aggregative capital effects.

As is illustrated in the following table:

Relative Prices of Shares & Capital Effects
Rs = 30% & with Leverage Levels of:

	0%	*25%*	*50%*	*75%*	*95%*	*99%*	*100%*
k1	0.33	0.27	0.20	0.11	0.02	0.00	0.00
k2	0.67	0.64	0.60	0.56	0.51	0.50	0.50
k3	1.00	1.00	1.00	1.00	1.00	1.00	1.00
k4	1.33	1.36	1.40	1.44	1.49	1.50	1.50
k5	1.67	1.73	1.80	1.89	1.98	2.00	2.00
Capital Effects	**0**	**83**	**167**	**250**	**317**	**330**	**333**

As long as the economy's rate of profit is higher than the interest rate, aggregate effects are positive. It is important to note that as leverage rises the absolute size of the capital effects rise as well, but it increases at a slower rate. The size of the capital effect is determined at a 100% or higher levels of leverage. For some firms this would mean a negative capital value. Obviously the returns on capital are not defined at a 100% leverage, with a zero investment any return means an infinite rate.

If the interest rate is higher than the profit rate, there will be negative aggregate capital effects at practically all levels of leverage. The larger the difference between both rates and the higher the leverage, the larger the negative effects. Nevertheless, the negative effects grow slower in absolute terms than the growth in leverage.

The previous analysis has as an implication, that the potentially explosive changes in the returns on capital are dampened down by the absolute size of the capital effects, either positive or negative.

* * * * * * * * * * * *

We can summarize the findings of this chapter as follows: In our formulation the return on capital is a function of the overall return of the economy, leverage as defined, and the interest rate. We concluded that there is a linear inverse relationship between the interest rate and the return on equity for a given level of leverage. Also, we concluded that there is a direct relationship between leverage and the return on capital. This last relationship is not linear and is strongly affected by the difference between the total rate of return of the economy and the interest rate. It was argued that these relationships may introduce a major element of instability in a capitalist economy. These potentially explosive changes are of a systemic nature. They explain and represent the true systemic risk, always present in modern capitalist economies.

Standard theories correctly postulate that non-systematic or firm specific risk can be diversified; hence at the aggregate level this type of risk is irrelevant. Only systemic risk is relevant. If what matters is the systemic risk, then the theory should focus on explaining it. We have provided an alternative explanation within the system. Systemic risk is defined as variability of the profitability of capital, the returns on equity in our simplified world. Given the economy's rate of return and the interest rate, systemic risk is an exponential function of leverage. It is very important to stress that the systemic risk we have identified and defined precisely, is derived from particular institutional features of the system. It is not a permanent feature of the real world. It is not a natural given. And that institutions, capital is one them, can be reformed.

As profits at the firm and industry level change due to competition, the overall profitability of the economy may change as well, generating changes in the relative profitability of firms and then in the relative prices of shares of capital. We postulate in section 6.3 that the dynamics of profits have an oscillatory form, so as they adjust we should observe permanent changes in the relative prices of individual shares of capital. These variations at the individual and at the aggregate

level appear as random movements, we hypothesize that they are a case of apparent randomness.

Regarding some of the distributional and aggregate implications of capital effects, we concluded:

Without debt, there are no aggregate capital effects. There are, however, significant distributional effects as the relative prices of shares adjust. In the presence of debt, capital effects emerge. They are positive if we use as the appropriate rate to discount capital values, both the interest rate and the economy's rate of profit.

It is difficult to expect that aggregate capital effects would be eliminated by an increased level of risk, at least for moderate levels of leverage. As we saw, if we use the Smithian inspired formula, (returns on capital equal the interest rate plus a risk premium), making this last equal to the systemic risk as determined by our model, capital effects would still emerge and they could be significant.

If the level of leverage is kept constant the relative prices of shares do not change. As leverage rises, however, the relative prices of shares change. Leverage generates both, distributional and aggregate capital effects.

As long as the economy's rate of profit is higher than the interest rate, aggregate effects are positive. It is important to note that as leverage rises the absolute size of the capital effects rises as well, but it increases at a slower rate. If the interest rate is higher than the profit rate, there will be negative aggregate capital effects at practically all levels of leverage. The more leverage and the larger the difference between both rates, the larger the negative capital effects. Nevertheless, negative effects will grow less in absolute terms than the growth in leverage. The previous analysis has as an implication that the potentially explosive

changes in the returns on capital are dampened down by the effect of leverage on the absolute size of the capital effects, either positive or negative.

From a dynamic perspective as profits vary and all things considered, what we should expect to see is a series of permanent movements in the relative prices of shares and in the overall value of capital. These changes constitute a case of apparent randomness—in Wolfram's words—because they are endogenously generated through the intrinsic mechanics of the system we have very succinctly described.

As seems to be the case in the real world, capital appears as a net financial asset of the community with a generally, positive value. Let's not forget that a competitive equilibrium admits either zero or positive profits. Zero profits correspond to full long term equilibrium where capital is valueless. Positive profits, and hence a potentially positive value of capital, correspond to a short term temporary equilibrium. Negative profits and negative capital effects constitute a situation of dis-equilibrium. In my perspective the three classical equilibrium conditions: markets clear, prices equal costs and the returns on capital are equalized, are never achieved simultaneously. The first two characterize a full long term general equilibrium; while the first and the last, define a temporary general equilibrium in the commodities and the capital markets.

In summary, the existence of capital as a net financial asset of the community with a positive value is a normal temporary equilibrium situation in modern capitalist economies. However, under some circumstances this equilibrium may prove precarious and small changes in the basic conditions of the problem: in the profit and the interest rates and in the structure of capital; may generate very significant instabilities with major consequences for the macroeconomic performance of the economy, through variations in aggregate demand.

Notes to Chapter 4.

[1] In the next chapter we will study money. As of now, we can define money as abstract acquisition power, as generally accepted means of payment expressed in a generally accepted monetary unit. Capital is a property right, if valuable, it represents acquisition power. For capital to be monetized, it needs to becomes money. That is, a generally accepted means of payment, so capital can be spent.

[2] See, for example, Stern, Joel M. and Chew, Jr. Donald H. Editors, "The Revolution in Corporate Finance" Blackwell Publishers, Finance. Oxford, UK and Cambridge, Mass. USA. 1986. A collection of seminal essays in the field previously published by the Midland Corporate Finance Journal.

[3] "The rise of modern finance has brought about a confrontation, in short, between two very different views of the process by which capital markets establish the values of corporate securities. The traditional view holds that stock prices are determined primarily by reported earnings… We call this the "accounting model of the firm." The rival view, the "economic model," holds that the market value of corporate stock—like the value of a bond or any other investment—is the present value of a company's future expected after-tax *cash flows*, discounted at rates which reflect investor's required returns on securities of comparable risk." Stern and Chew, 1986. Pp. ix.

[4] Even though Frank Knight published his classic "Risk, Uncertainty and Profit" in 1921, and that this book can be considered the first ever to deal with risk and profits together systematically. The emergence of modern financial economics can be traced back to the 1950s and 1960s with the works of Franco Modigliani, Merton Miller, Harry Markowitz, and William Sharpe, to mention only the 'fathers' of modern finance. All of them were awarded the Nobel Prize for economics, the last three specifically for their contributions to financial economics. The seminal papers of these gentlemen are: F. Modigliani and M. Miller, "The Cost of Capital, Corporation Finance and the Theory of Investment," American Economic Review (June 1958). H. Markowitz, "Portfolio Selection," Journal of Finance, (1952). W. Sharpe, "Capital Assets Prices: A Theory of Market Equilibrium under Conditions of Risk," Journal of Finance, (1964).

[5] Stiglitz, Joseph E. 1991. "Government, Financial Markets, and Economic Development." Working Paper Series, National Bureau of Economic Research. Working Paper No. 3669. Stiglitz, Joseph E. et al. "The Economic role of the State" Arnold Heertje, Basil Blackwell in Association with Bank Insinger de Beaufort NV 1989. Greenwald, B. and Sitglitz, J.E. "Externalities in Economics with Imperfect Information and Incomplete Markets," Quarterly Journal of Economics, Vol. 101, May 1986, pp. 229-256. Greenwald, B. and Sitglitz, J.E. "Pareto Inefficiency of Market Economies: Search and Efficiency Wage Models," American Economic Review - Papers and Proceedings, Vol. 78, May 1988, pp.351-355. Greenwald, B. and Sitglitz, J.E. "Financial Markets Imperfections and Business Cycles," NBER, Working Paper No. 2494. January 1988. Greenwald, B. and Sitglitz, J.E. "Financial Markets Imperfections and Productivity Growth," NBER, Working Paper No. 2365. April 1989.

[6] In Stiglitz own words: "Allocating capital is thus a much more complicated matter than the simple 'supply and demand' paradigm suggests. Unfortunately, much of the simplistic advice given by 'free market" economists is based on the hypotheses that markets for capital are just like markets for chairs and tables; that competitive markets--whether for chairs, tables, or capital--ensure Pareto efficient resource allocations; and that policies that move the economy closer to free market solutions are welfare enhancing. All three of these presumptions are incorrect." Stiglitz (1991) pp. 20. Also, Stiglitz argues that market failures in capital markets are pervasive and that their solution require selective government intervention, optimal solutions may lie in seemingly "second" or "third" best policies: "I should perhaps distinguish the Greenwald-Stiglitz view from other market failure approaches to government intervention. Since the formulation of the Fundamental Theorems of Welfare Economics, there has been a well articulated view concerning the role of government intervention, which has been known as the market failures approach. This approach identifies important instances where the assumptions underlying the fundamental Theorem are not satisfied, and argues for a very selective intervention in the market to correct those well-identified instances of market failure.... The market failures approach identifies a role for government in correcting externalities and providing public goods. Beyond that the absence of markets into the future provide a basis for government investment planning. By contrast, Greenwald and Stiglitz argue that market failures are pervasive in the economy and that accordingly there is no presumption that the market, left to itself, would be constrained Pareto efficient. They recognize that this in itself does not constitute a recommendation for government intervention: one must be able to identify the Pareto improving intervention and one must argue that government policies will actual be consistent with such Pareto improving interventions. The difficulties associated with each of these tasks suggests that government intervention should be selective and aimed at what is likely to be the most significant instances of market failure. The problems that arise in financial markets suggest that market as one such candidate." Stiglitz (1991) pp. 21,22.

[7] In the book: "Towards a New Paradigm in Monetary Economics" Joseph E Stiglitz, Bruce Greenwald, and Bruce Greenwood. Cambridge University Press, 2003. The authors reject all transactions based theories of the demand for money. And expanding upon the literature of new institutional economics, the first part of this study stresses the significance of imperfections in information, bankruptcy and banks. The second part examines the policy implications of the new paradigm emphasizing loanable fund demand and supply, as the basis for the "New" monetary paradigm.

[8] **"The critical assumption: perfect capital markets.**

One of the most important developments in economic theory of the past fifteen years has been the exploration of the consequences of imperfect and costly information for the functioning of the capital market. It has been shown that models that assumed imperfect capital markets may have been much closer to the mark than those that assumed perfect capital markets." Stglitz, 2003 pp. 10.

[9] **"The wavering case for the irrelevance of money.**

Research since 1970 has managed to both strengthen –and weaken—the argument that money does not matter. Extending the general approach (Stiglitz 1969, 1971a) to show the irrelevance of corporate financial policy, (Footnote 3) (3.- A general equilibrium proof of Modiglianis and Miller's classic (1958) analysis showing the irrelevance of debt-equity ratios.) public financial policy was shown to have no effect. Establishing a form of Say's law for government debt, Stiglitz (1988a) showed that if the government reduced taxes and increased its debt, the demand for government bonds increased by an amount exactly equal to the increase in supply. Furthermore, a change in the term structure of government debt has no effects. Of course, like any theorem, there were assumptions…" Stiglitz and Greenwald, 2003.

pp. 8-9. "…in a straightforward application of the Modigliani—Miller theorem to the public sector (or equivalently a generalization of the Barro—Ricardo theorem to cover a full range of public financial activities), public financial policy simply does not matter, under the standard perfect market assumptions…" Stiglitz and Greenwald, 2003. pp. 20-21.

[10] The common Latin root of the word is: "fid": fidutia, fides, fidelitas, confidentia.

[11] As was presented in the first chapter Smith conceived of prices as a sum of the costs involved in the production of a particular commodity. The natural price of a commodity was equal to the amount of labor, capital and land required for its production times the natural rates of wages, profit and rent. The usual definition of the price of capital is as the sum of the real interest rate, plus the inflation rate plus a specific risk premium. In this view the price of capital is equal to sum of three costs: the real cost of money, the cost of inflation, and the cost of risk. The Smithian inspiration of this perspective should be obvious.

[12] The balance sheet is usually defined as an accountant's report of the firm's accounting value in a particular date. The balance sheet states what the firm owns and how it is financed. The fundamental accounting identity that defines the balance sheet is ASSETS ≡ LIABILITIES + STOCKHOLDER'S EQUITY. Is very important to note that Stockholder's Equity is defined as a residual equal to the difference between Assets minus Liabilities. From the perspective of the accountant under generally accepted accounting principles (GAAP) the accounting value of the firms assets is based on *costs*. So it is not the *value*, market value, of particular assets at a particular time what is registered in the firm's statements, but its historical cost, also referred to as carrying value or book value. Market value is usually defined as the price at which willing buyers and sellers trade the assets. From the perspective of this study I will look at the financial structure of the economy and the statements that describe it in terms of the market values of commodities, physical assets, as determined by general equilibrium conditions. And, of the values of financial assets as determined by the net present value of its future yields. Following logically my approach and, to some extent, tradition: equity, that is capital, becomes the variable that adjusts.

[13] See section 3.3 previous chapter. The vector of the profits (cash flows) for producer *j*th is: $p^* y_j = cf_j \quad where \quad cf_j \in R^n \quad and \quad \sum_{j=1}^{k}(p^* y_i) = cf\,;\; cf_j / cf = O_j \quad and \quad \sum_{j=1}^{k} O_j = 1$. The profit streams or the cash flow of producer *j*th are represented by cf_j, this is a vector of values, of positive and negative prices times quantities, associated to dates, cf is the sum of the individual producers' cash flows, it represents the cash flows of the economy as a whole. O_j represents the participation of the *j*th producer in the total profits of the economy, the sum of these participations is one. As we saw under the general equilibrium conditions of the CEPOE, model both cash flows, the firm's and the economy's, are perfectly determined. Of course, time is an issue here, typically financial analysts consider a one year period to determine profits, while GEMs use a considerably longer time horizon.

[14] Clearly income taxes are the state's property right over residual profits as defined, that is, taxes are a form of *capital*. And as every form of capital, historically and socially determined.

[15] A typical income (or P&L) statement would include: Total operating revenues, (-) Costs of goods sold, (-) Selling, general, and administrative expenses, (-) Depreciation, (=) Operating Income (+) Other income, (=) Earnings before interest and taxes EBIT, (-) Interest Expense, (=) Pretax income, (-) Taxes (Current & Deferred) (=) Net Income (Retained earnings & Dividends)

[16] Depreciation is the accountant's estimate of the cost of equipment used up in the production process. Usually the way depreciation is reported depends on the particulars of the tax codes.

[17] Of course, some claims may have a negative value.

[18] Net working capital is equal to the difference between current assets and current liabilities.

[19] Customarily only long term debt is considered.

[20] As we know, under GE conditions, a situation with negative profits is NOT a competitive equilibrium, but a disequilibrium situation.

[21] From chapter two, if , θ_{ji} , represents the fraction of the profits of the *j*th producer distributed to the *i*th consumer and all the resources are held by consumers ($\underline{x} = \sum x_i$), then in equilibrium each consumers budget constraint can be written as: $p^* x_i \leq p^* \underline{x}_i + \sum_{i=1}^{m} \theta_{ji}(p^* y_i)$. Where x_i is the consumption vector of *i* and y_i is the production vector of *j*. In chapter three we considered capital effects and rewrote the consumer's budget as: $M_i = p^* \underline{x}_i + \sum_{i=1}^{m} \theta_{ji}(p^* y_i) + \kappa_j$; and we considered the case where $\sum_{j=1}^{k} \kappa_j = \kappa = 0$; If we aggregate over *i,* given $\sum_{i=1}^{m} \theta_{ji} = 1$, then: $p^* x \leq p^* \underline{x} + p^* y$, where $x \equiv \sum x_i$ and $y \equiv \sum y_i$ or expressed as an aggregate excess supply function, $p^* z \geq 0$. (Which, as we know, corresponds to Walras' Law in the general sense when the above relation is used with an inequality or Walras' Law in the narrow or classic sense when it is used with an equality: $p^* z = 0$, that is excess supplies (and excess demands) are zero). Obviously this is a competitive equilibrium where profits appear on both aggregate supply and aggregate demand vectors. In the supply vector, profits are part of the value of the commodities produced, on the demand side, profits are a value over and above the value of the commodities supplied by consumers to the production process, $\underline{x}$. There are capital effects at the firm's level but not in the aggregate. Overall capital is profits. For profits (or capital) to be spent by consumers, they need to appear as money, as a generally accepted means of payment and as an instrument of release of debts and obligations.

[22] Also, Money is the 5th song on Pink Floyd's famous album The Dark Side of the Moon, one of my all time favorites, and was written by Roger Waters. It is the only song on the album to hit #1 in the United States charts, even though in my opinion NOT the best song of the album.

[23] Obviously if these net financial assets, are going to be something more than accounting records—for example, generally accepted means of payment expressed in a generally accepted monetary unit—then, someone has to provide them. In other words, banks can create, and destroy, money through credit operations, but they cannot create the net financial assets that constitute their capital. Banks need a banker's bank, a central bank.

[24] Abstracting from distributional effects.

[25] Certainly for the individual shareholder is profits after interest payments and taxes what is important, what is of interest here is the determination of the value of a firm before it is distributed to its different stakeholders: banks, government, employees, shareholders, etc.

[26] For the financial economist, Net Present Value, is defined as: $NPV = C_o + \Sigma_{t=1}^{T} C_t/(1+r)^t$ where C_t are the firm's cash flows in future periods and r the expected or required return on capital. This formula corresponds to the general definition provided before. We have posited a different conceptualization of r as the economy's rate of return.

[27] We should add plus the value of its growth options. However, we have been assuming that the value of growth options is zero.

[28] See for example, Bodie, Kane and Marcus. "Essentials of Investments", 1992. IRWIN. The required return on capital is defined as "the sum of the equilibrium real rate of interest, the expected rate of inflation, and a security specific risk premium." pp.175.

[29] In a formal way variability of results measured as variance or standard deviation, is a direct expression of the probability in a given distribution and the other way around. In the Capital Asset Pricing Model, CAPM, (See below) risk is measured or defined by the sensitivity of a security's return to movements in a broad capital market index. Within the Arbitrage Pricing Theory, APT, risk is defined in terms of a stock's sensitivity to economic factors, expected returns increase with risk in a direct relationship with sensitivity to those factors.

[30] Assets in this context are financial assets, securities of all kinds.

[31] Lets recall that modern general equilibrium analysis does not require or invoke smoothly differentiable traditional supply functions of this type, that is, marginal productivity based supply functions. It is based on activity analysis.

[32] It can be seen that such a situation would contradict the fundamental and quasi 'universally' agreed upon Law of One Price or Arbitrage, under conditions of a pure competitive equilibrium, CE. See Chapter Three.

[33] See "The Revolution in Corporate Finance" Stern & Chew. pp. 39 & 40.

[34] By now my alternative proposal should be clear, residual profits are a temporary general equilibrium result, they emerge simply because it takes time to replicate a competitive advantage, a competitive equilibrium admits zero or positive residual profits. Profits and the general rate of profits are determined strictly in the commodities markets, and the latter cannot be assimilated to the interest rate.

[35] See for example: Fisher, Irving. "The Theory of Interest: As Determined by Impatience to Spend Income and Opportunity to Invest It."

[36] If the capacity to take up risk was a scarce resource and the cost of capital a compensation for the act of bearing risk, for example.

[37] Following Karl R. Popper, against the vulgar methodological standpoint that theories should be judged by verification of their predictive power. Here falsificationism is adopted as a methodological standpoint that regards theories and hypotheses as scientific if and only if, their predictions are at least in principle, empirically falsifiable.

[38] The original CAPM was developed by Sharpe, W. F. "Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk." *Journal of Finance* (September 1964) and by Lintner, J. "Security Prices, Risk and Maximal Gains from Diversification." *Journal of Finance* (December 1965).

[39] Reversion towards the mean, is a statistical principle discovered by Francis Galton (1822-1911), while researching the laws of heredity experimenting with the reproduction of sweet peas. In the words of Peter L. Bernstein: "This experiment led Galton to propound a general principle that has come to be known as regression, or reversion, to the mean: "Reversion," he wrote "is the tendency of the ideal mean filial type to depart from the parental type, reverting to what may be roughly and perhaps fairly described as the average ancestral type." If this narrowing process were not at work—if larger peas produced ever-larger offspring and if small peas produced ever-smaller offspring—the world would consist of nothing but midgets and giants. Nature would become freakier and freakier with every generation, going completely haywire or running out to extremes we cannot even conceive of." In "Against the Gods" The Remarkable Story of Risk. Ed. John Wiley & Sons, Inc. New York, 1998. pp. 167.

[40] Ross, Stephen A. "The Arbitrage Theory of Capital Asset Pricing." *Journal of Economic Theory* (December 1976).

[41] See Bodie, Kane & Marcus, 1992, pp. 269.

[42] See Bernstein, 1996, pp.145.

[43] See Wolfram, Stephen, "A New Kind of Science." Wolfram Media Inc. 2002.

[44] Wolfram, 2002. Pp. 299, 300, 301.

[45] Wolfram, 2002. Pp. 315.

[46] Wolfram, 2002. Pp. 323.

[47] Wolfram, 2002. Pp. 323-324.

[48] Wolfram, 2002. Pp. 326.

[49] We have assumed that all the resources or commodities employed by firms are owned by consumers and remunerated at equilibrium prices. Capital represented by shares—a form of securities—is the tradeable property right over residual profits. The value of capital is equal to the net present or discounted value of current and future profits, using the economy's rate of return and this value is affected by the capital structure. If we consider that firms own directly some or all of their assets—the things firms own—, then the value of the firm will be equal to the market value of the assets directly owned by the firm as determined by general equilibrium conditions, plus (or less) the value of its capital.

[50] The obvious answer is, of course, yes. Why should the size of a pizza be affected by the way you cut it? The problem is that the value of capital is virtual and does not have a direct physical quid pro quo.

[51] PENDIENTE DE AMPLIAR!!! See Ferguson, Niall "The Cash Nexus" Money and Power in the Modern World, 1700-2000. Basic Books, 2001. Ferguson presents a detailed historical account of the emergence of the institutions, the financial institutions…..That made the emergence and the development of capitalism possible… Also see Fernand Braudel, ….. where he argues that even before the agricultural revolution in England opened the door for the industrial revolution, a financial revolution took place that constituted a pre-condition for both.

[52] As is well known, the basic forms of these securities are debt and equity. Debt is a legal promise by the borrowing agent to pay to repay a fixed dollar amount by a fixed date. Agents that fund debt, are usually called creditors. Sometimes debt is viewed as a non-contingent claim, in the sense that creditors expect to receive full payment of the

promised amount regardless of what happens to the firm. However, given that the total value of the firm might be below the value of the debt, it is more precise to consider debt also as a contingent claim. Agents that fund equity, that is that acquire contingent property rights over the residual cash flows of the firm after debt payments, are usually called shareholders. The shareholder's claim on the firm's value is the amount that remains after the creditor's claims have been satisfied. Equity is always a residual claim. Each form of capital establishes a particular or specific property right, a claim on the profit streams generated by a firm, or a claim in part of the total cash flows generated by a subset or by the set of all the firms. For example, debt is a contractual obligation to repay the firm's borrowing of funds; equity is a non contractual claim to the residual cash flows of the firm; an option is the right to buy or sell a security at a previously established price and date; a share in a mutual fund is a non-contractual claim on the residual cash flows of a group of firms, and so on.

[53] The original paper is: F. Modigliani and M. Miller, "The Cost of Capital, Corporation Finance and the Theory of Investment," American Economic Review (June 1958).

[54] Leverage is defined as debt in relation to equity. It is usually measured by the debt-to-equity ratio.

[55] Ross, Westerfield and Jaffe, "Corporate Finance" pp. 399.

[56] If we define risk as variability of returns, clearly leverage increases the variability of returns on equity, in the sense described above. But this is a result of a combination of factors, the interest rate, the total return of the economy and the distribution and the form of the claims against future profits streams. Lets recall that standard analysis views risk as an exogenous, the risk premium, to be added to a risk-free rate and then used to determine the total cost of capital as a way to determine the price of equity. We believe that risk should be determined in an endogenous and this view is incompatible with the notion of an independently existing risk premium that is specific for a security or a firm, or the market as a whole. What is important is the determination of the systemic risk and this framework provides an alternative explanation.

[57] This framework fully integrates M&M's propositions and explains other observed behavior of capital markets like the inverse relationship between the interest rate and equity values, relationship that contradicts the standard Smithian security pricing approach. To mention an example, this inverse relationship can help us explain why professionally managed portfolio returns have asset allocation decisions as the dominant factor. See, for example, Binson, Hood, and Bibower, 1986. In Bodie, Kane, Marcus. Pp. 233.

[58] Certainly it works both ways: variations in the returns of capital can cause negative capital effects, that may generate a crash and initiate a financial crisis that may translate in a recession or even worse. Positive effects may initiate a boom, fuel monetary expansion and growth and may set up the stage for a future financial crisis, and so on.

[59] The argument holds equally well for a multiperiod world where returns are equal to the Internal Rate of Return. For simplicity and ease of exposition we will use a one period of return only.

Chapter 5. Capital, Money and the Interest Rate.

Introduction.-

Schumpeter recognized a clear distinction between two major analytical traditions in economics: Real Analysis and Monetary Analysis.[1] Walras and the traditional general equilibrium perspective deal with the economy in real terms, within the Real Analysis world money is considered neutral[2], a veil. Keynes and the contemporary Keynesians have criticized this view: monetary and financial phenomena are considered to be crucial for the development of modern economies. A synthesis of both perspectives needs to be attempted. The reality of modern capitalist economies is that monetary and financial phenomena may not be neutral and that they can matter significantly. If money is not what it does: a unit of account, a medium of exchange or a store of value; an analytical foundation for its existence needs to be provided. An economy where money is only what it does, is essentially a barter economy. Money as a simple unit of account, as a numèraire, a transactions device, does not matter, it is neutral. The main problem is to identify the conditions under which money is not neutral. The theoretical challenge is to find a rationale for the demand for money, under conditions of perfect information and zero transactions costs, and without relying on ad hoc hypotheses. The question about the determination of the value of money is inextricably linked to the explanation of the demand for money. The theoretical answer to the last, will lead us to the former.

Following Schumpeter, money needs to be introduced *"…on the very ground floor of our analytic structure…"* By doing so, we may be able to develop an integrated theory of the nominal interest rate, where the central bank and monetary policy play a central function. We will try to advance the inquiry about the potential role of monetary policies with regards of the stability of the system.

The theory of capital we have developed in the previous chapters will help us to provide some answers to these fundamental scientific questions: The emergence of capital effects demonstrates that financial phenomena are not neutral, they may alter the workings of Say's Law and impinge on the level and distribution of wealth, generating real effects. And the essential link we have established between capital and money, can provide us with a solid rationale for the demand for money. We will reformulate the classical quantitative theory of money by incorporating a demand for money directly associated to the value of capital. By doing so we may expand the empirical content and explanatory power of our theories. At the core of this analytical proposal is the theory of capital we have been developing in this work. The interest rate plays a key role in the determination of the value of capital and the emergence of capital effects, and certainly the demand for money may impact the interest rate. Within the framework we have presented we will develop an alternative perspective on the interest rate. These are the tasks of the present chapter.

We have argued, that once the aggregate value of capital differs from zero, it may impinge on the real economy, through distributional and aggregate capital effects that are carried on through the monetary and financial markets. As we saw, the emergence of capital as a net financial asset with aggregate positive or negative value, may impact directly on the level and the distribution of wealth—which then cannot be considered as a given anymore—and on the level of systemic risk, that is on the variability of the returns on capital. These are processes at the core of the dynamics of modern capitalist economies.

However, in order for the changes in the value and in the distribution of capital to have real effects they need to impinge on *effective demand*. They need to affect the spending decisions of consumers and firms. In other words, changes in the value of capital, need to be translated into changes in the spending decisions of agents, say in consumption and investment. If they don't, they will be neutral, and changes in the value of capital will only be virtual. Also, changes in the value

of capital may trigger portfolio adjustments that may have consequences in the demand for money and the interest rate. At least at a very general and preliminary level, some of these consequences and linkages should be explored, considering in particular the role of monetary and financial policies.

The value of capital is highly variable, in terms of the relative prices of shares; in terms of the value of commodities and particular shares, and in terms of the aggregate value of capital and commodities. Thus, shares would be a quite unreliable and cumbersome media to be considered as a generally accepted means of payment. Not to mention to be considered as a good numèraire, a unit of account, particularly if the state's guarantee is absent, or as the appropriate unit to write contracts with. As we concluded in chapter four, a generally accepted means of payment expressed in a generally accepted monetary unit, money, is needed. Shares of capital, would be a very bad unit of account and a means of payment, but they are certainly a widely used store of value. If this is the case, then capital before it is used for consumption or investment, it needs to become money, needs to be transformed into a generally accepted means of payment.

With the theory of capital developed in the previous chapters we have determined the value of capital and its variations. Following the logic of the approach we have adopted, now we need to study the determinants of the value of money and its variations. We have stated that at the highest level of generality, both capital and money, are abstract acquisition power. Now we need to distinguish between capital as an entitlement with a value, and money as the generally accepted mean to settle accounts and unit of account. Money is a financial asset that has a value in terms of commodities, and that can be used to store value. In this context, the difference with capital, is that money is "available" acquisition power, while capital is not. Changing capital into money, may affect the value of capital, its risk and returns, through changes in the interest rate and in the level of leverage. These changes may have real effects and impinge on the profitability of particular firms and on the profitability of the economy as a whole.

Certainly net changes are what counts, if an individual sells shares and another buys them, the first increases its liquid position while the second decreases it. There are no aggregate net changes. As Keynes expressed it: liquidity is an option for the individual, but not—without consequences, I might add—for society as a whole.

As long as the aggregate value of capital is zero, money can be safely considered as fundamentally “neutral”, only a numèraire, only a transactions device. Under these conditions, money can not constitute a net financial asset of the community. The economy is like a barter economy, not like a modern capitalist economy. When we have positive profits, when capital is valuable, and when the economy’s rate of profit is different than the interest rate, then capital may appear as a net financial asset of the community. And money may also be a net financial asset. The essential questions are: under what conditions can money emerge as an aggregate net financial asset? What determines the demand and the real value of money? And, ultimately what are the channels through which monetary policy works, if any?

I will argue, that the demand for money is inextricably linked to capital, and that the main channel through which monetary policy exerts its effects is through changes in the net value of capital, the returns on capital and its variability. That is, variations in the net value of the overall portfolio of financial assets, and in systematic risk. In simpler terms, monetary and financial policies matter because they impact the value of wealth and its distribution. We will lose the overall picture, if we do not consider that the overall value of financial assets ultimately depends on capital. What matters is the value of the complete universe of financial assets. Under these circumstances the value of money in terms of commodities is directly related to the value of capital. And what matters for the economy as a whole, for the macro economy, is the net value of financial assets. The lack of a fundamental rationale for the demand for money under general equilibrium conditions can be solved by positing that agents in general demand money to have a portion of their

capital, or wealth, as available acquisition power—an old Marshalian proposition. More specifically and with more relevance in the real world: investors demand money to make effective their capital gains or loses, keeping some of the value of their capital as available acquisition power, while maintaining the levels of profitability and risk of their portfolios at an acceptable level.

Given that the value of capital in terms of commodities is highly variable and that it may be impacted by the structure of capital, and that for capital to be transformed in effective demand, capital needs to be exchanged into money. Which in turn, may affect the overall value of capital, through potential effects on the interest rate, leverage and systematic risk. Capital effects are the result of a temporary equilibrium, once capital gains or loses are settled—partially or completely—with money[3], they are entered in the consumer's budget restriction, where they may alter the previous initial conditions, and have an effect on investment and consumption decisions and restart a new round of relative prices changes, until a new temporary general equilibrium is achieved. Therefore, an economy where capital emerges as a net financial asset is, we could say by definition, a monetary economy. Variations in the net value of capital are inextricably linked to the demand for money.

The financial and monetary spheres of a modern capitalist economy, may acquire, so to speak, a life of its own.[4]

A life, of course, that is not beyond human comprehension.

In these chapter, we will present a basic framework for monetary analysis, considering the problem of the demand for money and providing a general explanation for the nature and determination of the interest rate.

We will start with a brief analysis of classical monetary theory and Say's Law, followed by section analysing the link of capital and the demand for money. Then we'll review the approach to money from a general equilibrium perspective.

In the final sections, an alternative monetary framework founded on our theory of capital will be outlined, by explicitly linking the demand for money to capital, a reformulation of the classical quantitative theory of money is advanced by explicitly considering the value of capital as one of the central variables in the determination of the value of capital. We also advance an heterodox view of the interest rate and the supply of money.

The main conclusions of our approach are summarized in the body of the relevant sections.

5.1 Classical Monetary Theory and Patinkin's Real Balances.

Say's Law of Markets, states in short that commodities are paid by commodities. In an economy with an advanced division of labor only the capacity to produce goods and services can provide for the means to acquire equivalent commodities. This is far from a trivial proposition, it incorporates for the first time a systemic principle in economic analysis: while it is possible to have an excess or a deficit of a particular product in a given time. It is impossible, for all commodities to be produced in relative excess. Says' Law of Markets and its eventual theoretical successor, Walras' Law[5], demonstrates the inapplicability of partial analysis to macroeconomic or system wide analysis. If a particular product is produced in excess, this means that there is an under-demand for it in terms of other goods. So: the excess supply of one commodity means excess demand for at least one other commodity. This is valid only in a strict sense in a pure barter economy. Once we introduce money in the analysis, as something separate from commodities, then it is possible to have an excess supply of commodities because

there can be an excess demand for money. From the early pre-classical economists to the contemporary New Classical and others, this phase of the analysis has usually been conducted through the integration of the classical quantity theory of money, in some version or other, to a model of trade in real terms.[6]

In general, the classics shared the view that monetary forces—as expressed by the Lockean classic quantity theory of money—would determine absolute prices only, that is prices in terms of a monetary unit, with no permanent effects in relative prices. For now it suffices to say that the classic quantity theory of money, of which Fisher's equation $M = P T / V$ [7] is the best known restatement, in its pure version or in what Harris[8] calls the rudimentary version, implies Says' Law as an identity and vice versa. The value of money, as something different from a commodity with a value of its own—the real product that can be exchanged by a unit of money—would be determined by the quantity of money in circulation only. This means that V velocity of circulation of money and T, output in real terms, have to be considered as given, which turns the former equality into an identity: $MV \equiv PT$, allowing for the dichotomization of the pricing process, that is relative prices or values are determined independently of monetary forces and absolute prices depend on money only, a formulation that has the merit of showing clearly that money can not be assimilated to a commodity in particular, to wealth or to capital. Money is only a unit of account, it is neutral. Certainly, Classical economists did not simply subscribe to a rigid version of Say's Law as an identity, many writers analyzed the effects of monetary forces on real variables and related adjustment processes, in particular the effects of periods of falling or rising prices, crises and depressions, and their effects on real variables. For example, Ricardo's classical analysis of the relationship between the market rate of interest and its natural rate, which he saw as the profit rate on capital. Ricardo thought that an increase in the quantity of money could temporarily depress interest rates, but as soon as the level of prices adjusted, the interest rate would rise back to its natural level. In this analysis the basic idea of Wicksell's theory of the divergences between the natural

and the market rate of interest, is already present. It is a distinct element of classical political economy that the rate of profit on capital and also the interest rate are determined by real forces. Monetary forces can affect the interest rate only when the money market is not in equilibrium and temporarily at most. This view is alive and well today as we can see in the New Classical or Real Business Cycle writings. Nevertheless, there are clearly radical differences between classical perspectives, for example, for Ricardo, in equilibrium the interest rate is determined by the rate of profit on capital, as determined by production conditions. For Smith, the interest rate, as determined in money markets, **is** the rate of profits or the cost of capital.

We argue that the profit rate and the interest rate are essentially different variables: the first is determined solely by general equilibrium conditions—once the prices of all commodities are determined the profit rate is determined—, while the interest rate is determined in nominal terms in monetary markets where institutions play a crucial role. The so called real interest rate is a result of the value of money or the variations in the nominal prices of the economy.

An alternative to the Fisherian quantity theory of money equation, is the Cambridge version. Considering that total transactions in constant money prices, T, are proportional to real output or income, then T, can be substituted by, $\underline{Y}$, income in real terms, then: $MV = P\underline{Y} = Y$. Where, Y, represents nominal income, then, $\underline{Y} = Y/P$, that is real output is nominal output deflated by the price level or the 'value of money' which depends on, M, the money supply. The Cambridge equation is written as: $M = kP\underline{Y}$, where, k, expresses the demand for money as a proportion of nominal output or income. Both equations are formally equivalent, $k = 1/V$, however the Cambridge equation expresses the demand for money in a behavioral form, agents demand money as a proportion of their nominal income. Within standard theories this is the most important basis for the demand for money, agents keep money balances to support their level of transactions, and given real output and the level of prices, the proportion of real monetary balances, k, can be

perceived as a constant in the simplest terms, or in the more sophisticated versions as a stable function of income. As is well known, this view was challenged by Keynes with his theory of the speculative demand for money, which in essence states that the demand for money balances is also a function of the interest rate: agents face the decision to hold their financial assets either as liquid assets that yields no interest or whose prices are not very sensitive to interest rate changes, or as bonds, that yield interest or whose prices are very sensitive to changes in the interest rate, agents speculate about the future movements of the interest rate, and based on their particular views and expectations, they will buy or sell bonds, offering or demanding money in the process.[9] For Keynes, interest is the payment agents demand to part from liquidity. Hence, Keynes' is a liquidity preference theory for the demand for money, as is common knowledge. In modern economies where even, cash and cash like instruments are often interest yielding assets, the venerable Keynesian idea of interest as the price of liquidity loses most of its force. Also as is well known, decades of empirical research have shown that there is not a stable easily predictable relationship between the interest rate and the demand for money.

In the classical perspective, the integration of money to a model of production and trade of commodities in real terms, requires the introduction of a money market, that is the specification of the demand and supply for money functions as well as the definition of a monetary equilibrium. It should be clear that it is the demand for money that plays the central role in such a market. In one way or another, most contemporary macroeconomic analyses rely on demand functions for money that depend on the transactions motive and that assign a more or less prominent effect to the interest rate, if any.[10]

In a monetary economy then, if Walras' Law is accepted, the impossibility of having an excess demand for money is not a logical impossibility but a *disequilibrium* situation, the demand for money cannot be permanently in excess. The fundamental questions are: why people would have a positive demand for

money, when commodities are ultimately paid for with commodities? Also, if there is a positive demand for money, does money matter for the real performance of the economy, or is it neutral? What are the forces, if any, that will take the economy from a situation of disequilibrium to equilibrium again? The problem then is to identify the conditions under which money is not neutral. This requires an explanation for the demand for money and for the determination of the value of money.

One of the most characteristic contemporary approaches to deal with these questions is the Real Balances[11] or the Pigou/Patinkin effect. Within the typical transactions motive for holding money view, the real balances theory provides an explanation for the money demand and also an analysis of its real effects. People will hold money to support their level of desired real transactions, the desired real balances will depend on the level of real output, the level of prices and the interest rate. Agents will adjust their money holdings, by spending more or less, as these variables change. A well known example of the 'real' effects of money goes back to Pigou. It deals with the labor market, if there is an excess supply of labor, that is unemployment, then there is a disequilibrium situation. Such a situation, can have as its counterpart an excess demand for money. Nevertheless, this excess demand for money will be eliminated as people adjust their money holdings, that is their real balances, in response to changes in prices, output and the interest rate. In an unemployment situation prices will fall and the real value of money balances will increase. This will boost private spending and hence aggregate demand until unemployment is eliminated and the economy is back in equilibrium. All the excess demands will be zero, including that for labor and for money. In equilibrium people will hold exactly the level of real money balances that they desire.

The real balances theory in its different versions, includes the demand for money as part of the utility functions of individuals. This transactions based approach to explain the demand for money initially proposed by Hicks, has been

severely questioned—even by Hicks—and is currently considered as an insufficient base for a monetary theory.[12]

5.2 Money in General Equilibrium.

From the contemporary general equilibrium perspective adopted in this study, the problem is that in a general competitive equilibrium the demand for money disappears. The economy is demonetized. At the most fundamental level the demand for money remains problematic to say the least, if not, simply unexplained. The transactions[13]—real balances—and the speculative demand for money—i.e. liquidity trap—,[14] are far from satisfactory explanations. The theoretical challenge is to find a rationale for the demand for money, defined as abstract acquisition power, under conditions of perfect information and zero transactions costs. In previous sections we demonstrated that under such conditions, capital effects could emerge through the interaction of the economy's profit rate and the interest rate, but the existence of the latter was assumed not explained. To explain macro economic capital effects without relying on particular or ad hoc hypotheses, a rationale for the demand for money and an explanation for the interest rate under the same general competitive equilibrium conditions, should be provided.

In 1965, in a pioneering essay[15] Prof. F. H. Hahn of Cambridge UK, put forth the suggestion that money may be worthless: Money is characterized by the quality that it is desired for what it will buy. If, for some reason, it were worthless, it could not be valuable in this way. Hence there would be no excess demand for it. But this means that the nil value in exchange is an equilibrium "price" of money. There is an equilibrium where the economy is effectively demonetized; it no longer appears to be a monetary economy. And clearly not a capitalist economy. In the same essay Hahn, deals with the impact of contracts written in money terms in real economies and how under conditions of flexible wages and prices, the Pigou (Patinkin) effect cannot ensure the existence of an equilibrium with full employment. The existence

of contracts written in nominal terms would cause bankruptcies in a deflation, so the recovery cannot be guaranteed by the adjustment of real money balances. Hahn did not fully develop this seminal insight that, fortunately, has been taken up by other contemporary scholars. The consideration of bankruptcies, implies the analysis of the specific institutional forms that different claims over cash flows may acquire, and the consideration of how the values of these claims are affected by the structure of capital, which then as we have argued, matters.

Prof. Ross M. Starr, has analyzed the problems of money in general equilibrium in an excellent book[16] that collects the seminal works in this regard and where he presents an alternative foundation for a theory of money. The analytic approach followed by Prof. Starr is the Arrow-Debreu[17] model of Walrasian general equilibrium. To generate an endogenous role for a medium of exchange as a carrier of value between trades, the process of trade is modeled adding 'difficulty, structure and complexity'. It is considered as a succession of bilateral trades. To provide a function for money, there must be sufficient variety in agents and goods to make trade desirable, and to generate impediments to trade so that money can ease the difficulty. For Starr, an inquiry into the foundations of the role of money necessarily requires modeling the interaction of multiple traders and goods, a smaller model is insufficient, less detailed approaches may characterize interactions in a monetary economy when the properties of money and finance are assumed, but it cannot provide a foundation for a theory of money. Certainly, in my view, single agent/single good economies, should be left out of the monetary financial field, at least in the aggregate level.

Starr stresses that the Arrow-Debreu general equilibrium model presents a smoothly functioning economy with no money or financial institutions. The conventional functioning of money is otiose because the functions of money and finance are performed by the markets themselves.[18] The initial point of departure is the consideration of money as a device to reduce transaction costs. In this, Starr follows Hicks suggestion that money should be considered a device for overcoming

frictions in the smooth functioning that the Walrasian model assumed. Hicks had urged economists to *"look the frictions in the face"* and *"find the transaction cost and avoid it!"*. This is what Starr does: *"An intertemporal store of value can perform no function here, since markets do not reopen over time. We conclude that a theory of money as a store of value requires a sufficient reason for the reopening of markets, or equivalently, a sufficient impediment to the use of futures markets. This impediment is formalized as a transaction cost structure that favors the use of spot markets. In a non-monetary economy, a breakdown in the efficiency of the equilibrium allocation follows."*[19]

So that distinct functions of money can emerge, Starr replaces the single lifetime budget constraints by a succession of budget balance requirements, in each trade at each date the value of sales is required to equal the value of purchases. However, this distorts the pattern of trade, a solution is the provision of a financial asset[20] so that trade in the financial asset can sustain budget balance without a corresponding change in resource allocation. For Starr, *"if money didn't exist, we should have to invent it."*[21] Introduction of money here takes the form of abstract purchasing power of zero transaction cost. This relaxes the over-determinacy by allowing separation of buying and selling decisions. Transactions can be timed to avoid waste of resources through excessive transaction cost or inappropriate intertemporal reallocation. Money here is a transaction device, Starr had to add frictions, a transaction cost structure, to the A&D world in order to justify a place for money within them.

Certainly, trade in this financial asset, money, is needed to comply with the requirement that: *"the budget constraint applies separately at each date and to each transaction."* Which results in the need for a token of value to carry between transactions. However, trade in this *"token"* means that every operation creates simultaneously an asset for the lender and a liability for the borrower, so in the aggregate assets and liabilities cancel each other out, and money cannot be a net asset for the community. This quasi-monetary economy is indistinguishable from a

barter economy, the introduction of transaction costs provides a weak rationale for the demand for money and no reason at all to expect that monetary and financial phenomena are not neutral.

Another fundamental question is: the maintenance of a positive price of money or a determinate price level in equilibrium. This requires a foundation for the demand for money in equilibrium. Starr concludes*: "In a fiat money economy this is a question that needs to be addressed. Inasmuch as the money is not desired in itself, there is always a possibility that its price will fall to zero, effectively demonetizing the model. Note that the usefulness of money and positivity of its price are not logically equivalent. When the price is zero it is surely useless because it has ceased to be money; when the price is positive, positivity is maintained not by its usefulness but rather by exogenous structures. Sufficient conditions for positivity are expectations of future positivity or the demand created by taxes payable in money…A full analytic rationale is presented for the use of a medium of exchange, for the use of a store of value, and for the holding of idle balances in equilibrium...by explicit modeling of the structure and difficulties of trade, a powerful class of models that had denied a role to money and finance has been shown to provide their foundation."*[22]

In traditional general equilibrium, the use of money as a medium of exchange and as a store of value, is not needed, because other *institutions* perform these functions: the auctioneer himself and full futures markets. Using whatever unit as a numéraire, with, of course, the necessary record keeping systems. Starr models difficulties in trade introducing a structure of transaction costs so that the A&D solution to the problems of exchange and store of value is insufficient and an alternative, money, can emerge. However, Starr acknowledges that ultimately the value of money can only be sustained by exogenous structures, mainly *the demand created by taxes payable in money,* not by the difficulties of trade, the costs of transaction, assumed or real.

As we have argued, when dealing with money and finance we are talking about the institutions that protect the property rights of traders in the market place. The property rights of traders in A&D type models are established in the securities they arrive to the market with, representing their endowments and in the securities they leave the market with, representing their life consumption plans. Securities that are guaranteed, so to speak, by a made-up centralized trading authority, the auctioneer. Certainly, these are ideal institutions that do not correspond to the realities of modern capitalist economies, where money and finance are the existing institutions used to perform trade and to hold or transfer wealth, resting ultimately in the explicit or implicit guarantee of the state. What should be stressed is that a pure free market admits, or is consistent with, or can function with, a variety of different institutions that can perform the functions that in A&D Walrasian type models are performed by the auctioneer, full future markets, etc. Which are a set of imaginary institutions that *deny a role for money and finance*, which are another different set of institutions, but in this case of the real world. Paraphrasing Starr, if the institutions that do what money does didn't exist, we should have to invent them.[23] Walras and A&D did just that, they conceived a centralized trading system that would coordinate the lifetime consumption and production plans of utility maximizing households and profit maximizing firms, that does not use money and where the interest rate plays no role at all. This is a very important point that needs to be stressed: In an A&D world the interest rate, as we know it, does not play any role in the intertemporal allocation of consumption, consumers decide on the basis of the current and future prices of commodities as determined by general equilibrium conditions. The temporal relationships between (general) equilibrium prices, the so called own-rates-of-return, clearly play a role here, but they are not, they cannot be assimilated to, the interest rate as determined in financial markets.

If we accept that the functions of a medium of exchange and of a store of value, often viewed as the defining elements of money, can be performed by alternative institutions, then the primacy of money as a transactions device and of the interest rate on money, as the price that coordinates the intertemporal

allocation of resources, cannot be considered as the fundamentally important part of the monetary problem. As contemporary critics like Stiglitz have stated, transactions based monetary theories, are seriously flawed.

With his always to the point instinct, Sir John Hicks, in his "Critical Essays in Monetary Theory"[24] tackles these fundamental problems. Leijonhufvud in his review of the Hicksian perspective in monetary theory summarizes the core issue in the following way: *"The essential 'social accounting problem'—and I wish Hicks had put even heavier stress on this—is to ensure that no one 'gets away with' systematically appropriating resources from the rest of the collective of a greater value than he contributes. The concept of default thus emerges as fundamental to monetary theory: 'some arrangement which provides a guarantee against uncleared debts…some sanction against the abuse of debt facilities is required' (pp.8-9). If debts and credits to individual accounts are not to be kept track of indefinitely, they must be systematically extinguished."*[25] In these essays, Hicks presents commodity money and clearing as two 'pure' alternative arrangements to provide for this function. The payments mechanism provided by demand deposit banking is considered by Hicks as a mixed form. Initially Hicks deals with a single-once-for-all trading period, á la Walras, in this world money is not demanded as money. Afterwards, Hicks, considers a world with continuous trading periods, where there would always be money, i.e. bank money, but even here the demand for money for transactions purposes in the sense of a voluntary demand like the demand for commodities, cannot be sustained. Hicks notes that the proportion of the total stock of money absorbed by transaction purposes is or can be very large, but considers it, as an involuntary demand. In an A&D world this demand would be non existing, because the centralized payments mechanism does not require money. For Hicks, the crucial part of the monetary problem is the voluntary demand for money: *"…even if it is quantitatively a small part, must be attributed to voluntary holding: and this part, whatever its size, is tremendously important. For it is through the voluntary part that monetary disturbances operate, and, it is on the voluntary part that monetary policy must have its effects."*[26]

However, even tough Hicks developed quite interesting analysis based on holding periods and transaction costs, in the end he did not develop a full rational for this 'voluntary' demand. Leijonhufvud[27] rejects the idea of a voluntary demand for money, different from the involuntary demand derived from transactions requirements, as the important part of the monetary problem, falling back on the traditional idea of the transactions demand for money as the fundamentally important part of money demand, which is the view of the Real Balances perspective and most contemporary analysts.[28] Leijonhufvud, argues that Hicks, after dealing extensively with the Precautionary and Speculative demand for money as a store of value, cannot sustain the idea of a voluntary demand for money[29] as the crucial part of the monetary problem, and also that in the end Hicks comes to his (Axel's) same conclusion: the primacy of the transactions demand.

In my perspective, Hicks intuition is right, even though the terms 'voluntary and involuntary' may not be the most appropriate: the part of the demand for money where monetary disturbances operate and where monetary policy exerts its effects, is NOT the demand derived from the transactions requirements. If this is the case, as I believe it is, we should be able to consider a world where the transactions and store of value demand for money is non-existing, it is zero, like it is in the A&D pure free market world, but where we may have a positive demand for money anyway. And this is the demand for money where monetary disturbances operate and where monetary policy exerts its effects. For Starr, the holding of idle balances in equilibrium is explained by exogenous structures: the expectations of future positivity, that is that money held today will be valuable tomorrow—in my view a very weak rationale in itself because it does not explain why there is positivity in the first place—and, ultimately, by the state with its authority to demand taxes paid in cash, in money. I should stress that the last is a demand for money that is logically independent of the medium of exchange and store of value[30] motives. An A&D world where money and finance play no role at all, would admit the existence of a positive demand for money to pay taxes if only we assume this exogenous burden exists. And of course it does, however, taxes

do have a *quid pro quo* in the form of goods and services provided by the state, and we can conceive of a full equilibrium with a balanced budget where even this demand for money would ultimately disappear.

We have already quoted the recent work by Nobel prize winner Joseph Stiglitz and coauthors, regarding the so called New View on Capital Markets and also his proposed New Paradigm of monetary economics. As we have said there is ample agreement with his critical analysis of standard economics, nevertheless our approach to capital and the demand for money is radically different and does not rely on any particular assumption about imperfect markets and information. For Stiglitz the crucial part of the monetary problem resides in the demand for credit for transactions purposes and in the behavior of banks as fundamental institutions of the financial system. According to Stiglitz imperfect markets and informational deficiencies will cause banks to ration credit, and insufficient or expensive credit, will be at the root of some the most serious macroeconomic problems of modern capitalist economies: unemployment, financial crises, etc., etc.[31]

All in all, we consider that Stiglitz's theories are also a weak foundation for a new perspective, or a new paradigm, on monetary economics. In the next sections, I will present the outline for an alternative, where the theory of capital developed in this work, is at the core of a new approach to monetary and financial economics.

5.3 Capital and Say/Walras' Law.

As we saw in the last section, Starr concluded that: *"…a theory of money as a store of value requires a sufficient reason for the reopening of markets…"* He proposed as an alternative the introduction of a cost structure that favors the use of spot markets, creating the need for a financial asset, money, to overcome these costs. Under these conditions, money is not a net financial asset, money is not part of the wealth of community, the initial conditions of the problem remain unchanged.

Within Starr's proposal, what money does is to overcome a transaction cost that is imposed on the initial structure of the economy, and then the initially efficient competitive equilibrium is restored. As a transactions device, money was neutral to begin with and ends up being neutral as well. We have argued that capital may emerge as a net financial asset, as a net addition to the acquisition power of the community, over and above the value of production and current income, due to changes in the structure of capital and the interaction of the profit and interest rates. Changes in the value of capital as a net financial asset of the community, may affect the distribution and the level of wealth, hence modifying the initial conditions of the Walrasian problem.

These processes can provide a *sufficient reason for the reopening of markets.* They may alter the previous initial conditions, restart a new round of relative prices changes, until a new temporary general equilibrium is achieved. Nevertheless, we have posited, that in order for capital effects to have real consequences, they should impinge on the spending decisions of agents—i.e. consumption and/or investment decisions should be affected. Also, we postulated that for capital to be spent in a monetary economy, it needed to be transformed into generally accepted means of payment. That is, capital needs to become money to have real effects. The lack of a fundamental rationale for the demand for money can be solved by positing that the demand for money is inextricably linked to capital as a net financial asset.

Neither capital or money can be simply assimilated to commodities. The frequent practice of incorporating the demand and supply of capital, 'capital goods' and 'securities', and money, 'liquidity services', into the utility functions of consumers and the production functions of firms, that is treating them as apples and oranges, is considered incorrect.[32] In a competitive equilibrium where markets clear and prices equal costs, i.e. with zero profits, the economy is demonetized, the demand for money disappears. Besides introducing ad-hoc hypotheses to explain the demand for money, for example: the real balances theory, transaction costs or

uncertainty; scholars have argued that at the most fundamental level the demand for money can only be explained by exogenous structures, for example: taxes payable in money, or expectations of future positivity. More recently, other economists dedicated to develop a new monetary paradigm, have rejected the transactions based demand for money approach and concentrated on the demand for credit and the behaviour of banks. We have considered these explanations as insufficient.

The hypothesis that money is demanded by firms and investors so that they can make effective, or dispose of, their capital gains or loses having a fraction of the value of their capital as available acquisition power, while maintaining the profitability and risk of their portfolios at an acceptable level. Constitutes an alternative to explain what Hicks considers the *tremendously important* part of the demand for money, through which *monetary disturbances and policy operate*. It is an alternative directly derived from the theory of capital we have developed within a perspective of general equilibrium, and it is an alternative that does not rely on exogenous structures, but on an endogenously generated demand for money as the only way the value of capital as a net financial asset can be disposed of in a monetary economy. Certainly as long as the changes in the value of capital are not translated into spending decisions they will be neutral.

This analysis requires some elaboration, which we'll present in this and the following sections. The starting point is a temporary competitive equilibrium with positive residual profits where Say's or Walras' Law holds—as is well known the ancient Say's Law is formally equivalent to Walras' Law, we'll use both terms indistinctly with the modern connotation—and where the functions of money as a medium of exchange and as a store of value, are carried on by a centralized hyper-developed payments system á la A&D.[33] That is, a world where the traditional demand for money for transaction purposes and as a store of value is zero. As was stated before, the idea is to establish a rationale for the demand for money under conditions of perfect information and zero transaction costs, and to identify the

conditions under which money can be considered as a net financial asset of the community.

A brief formalization using the analytical apparatus already presented in previous chapters will help us to present the argument more rigorously.

Given the consumer's consumption set and her preference ordering, the individual's demand function, $x_i(p)$, is a function of the price vector, p, which includes the prices of all commodities. The sum of the individual consumers demand functions is the aggregate demand function, that is:

$$x(p) = \sum x_i(p)$$

The aggregate supply function, $y(p)$, is also the sum of the individual producers supply functions, where negative elements of, $y_j(p)$, are inputs for, j. The aggregate supply function is:

$$y(p) = \sum y_j(p)$$

Assuming that there are no externalities among producers and consumers, considering $\underline{x}$ as the total initial supply of resources in the economy, the aggregate excess supply function can be written as:

$$z(p) \equiv y(p) + \underline{x}(p) - x(p)$$

In words, the aggregate excess supply can be zero or positive, and it is equal to the value of the initial supply of resources, all initially available commodities including the services of human capital, plus the value of the profits generated, minus the value of the commodities consumed in an economy.

As is known under the conditions of the A&D model, a competitive equilibrium with positive profits exists and it is sustained by a vector of equilibrium prices that will be denoted by, p^*. Recalling the presentation of chapter two, if , Θ_{ji} , represents the fraction of the profits of the jth producer distributed to the ith consumer and all the resources are held by consumers ($\underline{x} = \sum x_i$), then in equilibrium each consumers budget constraint can be written as:

$$p^* x_i \leq p^* \underline{x_i} + \sum_{i=1}^{m} \Theta_{ji} (p^* y_i)$$

Where x_i is the consumption vector of i and y_i is the production vector of j. If we aggregate over i, given $\sum_{i=1}^{m} \Theta_{ji} = 1$, then:

$$p^* x \leq p^* \underline{x} + p^* y, \text{ where } x \equiv \sum x_i \text{ and } y \equiv \sum y_i$$

or expressed as an aggregate excess supply function,

$$p^* z \geq 0$$

Which corresponds to Walras' Law in the general sense when the above relation is used with an inequality or Walras' Law in the narrow or classic sense when it is used with an equality: $p^* z = 0$, that is excess supplies (and excess demands) are zero, markets clear supply equals demand. Obviously this is a competitive equilibrium where profits appear on both aggregate supply and aggregate demand vectors. That is, profits are part of prices and income. Walras' Law in the strict sense, $p^* z = 0$, holds if and only if the budget constraint of every consumer is satisfied as an equality, however in reality an individual may be satiated and decide not to spend all her income. In which case Walras' Law is an inequality, Walras' Law in the general sense says that whatever the market prices are, the individual wishes to spend an amount that does not exceed the amount they wish to earn. It does not say that consumers spend all their income, consumers can decide to keep part of their income, as money in cash balances.

However, why would people systematically hold idle balances of money? Starr's answer, as we saw, is because of the expectations that money will be valuable in the future, which should be a distant out-of-horizon future to make sense of such a proposition, or because of the need to pay taxes in cash. Both explanations rely on exogenous structures. In the competitive general equilibrium models á la A&D we have been using, the functions of a medium of exchange and a store of value are performed by alternative institutions that preclude the use of money, then the demand for money for 'transactions' and precaution, is zero. As stated however, Walras' Law when it is expressed as an in-equality, $p^*z \geq 0,$ admits the possibility of a demand for money to be kept idle by consumers that decide not to spend all their income, that is hoarding. When used as an equality, $p^*z = 0,$ apparently there is no room for a demand for money. Unless we assume that money is just another commodity, that the demand for money is part of the utility functions of individuals, and that there is equilibrium in the money market, which are the assumptions we consider as incorrect. In such a case a monetary economy would be undistinguishable from a barter economy.

In the competitive equilibrium of the privately owned economy, it is posited that all resources are initially owned by consumers, $\underline{x} = \sum x_i$, profit maximizing firms are also owned by consumers and these property rights are represented by shares, capital. Given that all the resources are priced at equilibrium prices, that is individual agents that sell their resources to a particular firm are remunerated, no more and no less, at equilibrium prices, in the aggregate payments to consumers for the use of their resources represent the aggregate of 'costs' of production, $p^*\underline{x}$, and profits, $p^*y,$ appear as a residual of value created in the production process, given that, $p^*x \leq p^*\underline{x} + p^*y,$ or, $p^*x = p^*\underline{x} + p^*y,$ if we assume that consumers are not satiated and spend all of their income consistent of the remunerations they receive from the sale of the resources they own and their share of residual profits. Let us note that given Walras' Law, this competitive equilibrium

implies that the supplies and demands of every particular commodity are balanced, markets clear, however, as we concluded before this is a temporary equilibrium.[34]

If general equilibrium can be achieved and hence Walras' Law is valid, it is impossible that a physical surplus or deficit of commodities can be systematically produced. Nobody would produce more or less commodities that those that can be ultimately consumed, either directly by the owner/producer or traded to be consumed by someone else, or used in production for consumption. Walras' Law is consistent with the existence of a surplus in the value[35] of the commodities produced and consumed, relative to the value of the commodities used to produce commodities—including the initially available commodities, $\underline{x}$, resources—that is with the existence of profits. Profits only have a value dimension, they represent abstract purchasing power. However, profits are part of the prices of output, Y, and also of income that comprises wages, W, rents, R, and profits, P. So Walras' Law holds in the presence of positive profits.

As we saw before;

$$Y = W + R + P$$

In chapter three we demonstrated that under conditions of general equilibrium with perfect information and zero transaction costs, capital effects may affect at the aggregate level the workings of Say's Law, or Walras' Law. These effects are caused by divergences between the economy's profit rate as determined in commodities markets and the interest rate.[36] Walras' Law is unreservedly valid only when the interest rate equals the economy's profit rate If not, it becomes a special case. The general case is:

$$Y = W + R + P + \boldsymbol{\kappa}$$

Where capital may appear as a net financial asset of the community, with a positive or a negative value. Clearly the net value of capital is not part of the prices of commodities and cannot be considered as one of the previously existing resources. The size of this capital effect as was presented in the previous chapter, depends on the structure of capital, at the most basic level in leverage, the general profitability of the economy and firms, and the interest rate. If the value of capital is variable and as leverage grows systematic risk increases exponentially, we can no longer assume that wealth and its distribution, are a given. As long as there are capital effects, aggregate wealth and its distribution will be changing as well. Nevertheless, as we have posited for changes in the value of capital to have real effects they have to become *effective* demand first. The value of capital represents a *potential* demand, not an *effective* demand. Reality shows that the value of capital is a virtual value, only when the potential acquisition power of capital becomes effective, we can expect to see real effects . We can hypothesize that the owners of capital are interested in maximizing the value of their capital. Most likely only a relatively small portion of the value of capital at a given time will be spent. If an agent sells a portion of its capital holdings to another agent, that has available acquisition power, the net effect is zero. To become effective demand capital has to become money first. That is a generally accepted means of payment expressed in a generally accepted monetary unit.

At the risking of being repetitive let’s recapitulate: capital is the property right over future residual profits, when the profit rate and the interest rate are equal it has zero aggregate value, when they are different—in a normal temporary equilibrium—the value of capital is positive, nevertheless this value is not part of the prices of commodities and does not correspond to any preexisting resource in particular. The value of capital emerges as potential acquisition power over and above the incomes generated in the production process. This potential acquisition power can only be effective if capital becomes money first.

5.4 Capital and the Demand for Money.

In a world where shares of capital are the only financial asset, shares will be money. However, given that the value of capital is highly variable—as we saw in chapter four—shares would be a quite unreliable and cumbersome media to be considered as a good numèraire, a unit of account. Also receivables or whatever other paper(s) individual agents may issue, cannot be considered as a reliable way to settle debts under every circumstance. A generally accepted means of payment expressed in a generally accepted monetary unit is needed, as an expression of available abstract acquisition power. Money, customarily is defined as a generally accepted means of payment, we have adopted the definition often used by general equilibrium theorists of money as a form of abstract acquisition power with zero transaction cost. Obviously, under some circumstances shares of capital, equities, could be used as money, just as in some instances some commodities become money for lack of a better alternative. Nevertheless, and this is quite obvious, not every financial asset nor every other thing that has been used as money can be considered as a generally accepted means of payment.

Capital must be clearly distinguished from money as a unit of account, a medium of exchange or as store of value. The means of payment that can be considered as money, that represent abstract acquisition power, can assume a wide variety of forms under different historical and social conditions. From currency, which can be considered as legal tender, and demand deposits, to whatever other privately issued instrument that can be used to release debts or obligations. The existence of the interest rate makes it necessary to consider a clear separation between different types of financial assets. We have considered initially as forms of capital: debt and equity. Now we have to consider money as a separate financial asset, which under some circumstances may emerge as a net financial asset of the community. Money is a property right, gives the holder the right to acquire commodities or assets, as a property right money is also a store of value, the holder of money may decide or not to spend it now or in the future.

Recapitulating our previous analysis: within the classical approach there was no room for money and finance. We started by considering profits as a residual of value, and capital as the property right over these profits. We determined the value of capital using as the appropriate discount rate: the economy's profit rate. We found that under these circumstances the net aggregate value of capital would be nil in equilibrium, nevertheless the value of particular shares of capital would adjust until the returns on capital would be equalized at the economy's profit rate. So, we found a rationale for the trading of property rights and we found that significant distributional effects may be generated. Then we considered the introduction of a different form of property rights over residual profits: debt that yields interest payments. We found then, that the net aggregate value of capital may be different than zero. We saw the emergence of aggregate capital effects side by side with distributional effects, both with potential real effects. The financial dimension of capitalist economies ceased to be neutral, Say/Walras' Law became a special case of macroeconomic equilibrium. The introduction of debt made the consideration of the interest rate and of money as a financial asset indispensable.

Certainly the determination of the value of money is a central issue as well. If we recognize that the value of capital is determined by general equilibrium conditions, i. e. a given profit rate; the structure of capital and the interest rate; then the value of all financial assets that represent claims on the value of capital, should be exactly the same as the value of capital. Irrespective of the particular form of these assets. At this point of the analysis we have seen that only capital in the form of equities, or capital in short, can emerge as a net financial asset of the community. It is a most relevant question if this can be the case with money.

And if, we hypothesize that money has the potential of becoming a net financial asset, then we can divide the complete universe of capital assets in the same way financial practitioners do: cash, debt and equity. Which may provide us

with an additional advantage when we try to bring our theories closer to the workings of the real world. For example, from the individual agent's perspective when deciding how to transfer acquisition power over time, she must allocate current and future acquisition power in a portfolio comprising different financial assets. In the aggregate generalized changes in portfolio allocation decisions may have potential macroeconomic effects, and certainly changes in macroeconomic conditions and policies may have an impact in portfolio decisions.

We argue that the main determinant in the demand for money is capital and ultimately that the value of money is determined—among other widely accepted factors included in the classical quantitative theory of money—by the value of capital.

The idea that the demand for money is linked to capital, has venerable roots. Alfred Marshall, in his *"Money, Credit and Commerce"*[37] argues that the demand for money, which he characterizes as "available acquisition power," depends not only on the income that agents receive, but also on the value of their properties, the value of their assets. Money or "available acquisition power" is interpreted as including currency, demand deposits and even some time deposits. However, the most important aspect is that Marshall considers that the demand for "available acquisition power" depends both on income and on assets, both physical and financial. Prof. Hansen summarized this relationship with the following expression:

$$M = kY + k'A$$

Where, *M*, represents currency and bank deposits (credit), *Y,* nominal incomes, and *A*, the total value of assets; *k,* represents the portion of incomes that the public considers convenient to keep in the form of money, and *k'* , the proportion of the value of their assets that they wish to keep as available

acquisition power. The second part of the Marshallian expression has been nearly forgotten.

We postulate that the demand for money that ultimately matters in terms of the neutrality or not of monetary and financial phenomena is the demand for money associated to capital.

Almost all current monetary theories are based on income or transactions and they consider the part of the monetary demand that supports transactions, ***kY***, as the fundamental part of the demand for money. Also the majority are variations of the classical quantity theory of money. As is known the classical quantity theory of money is essentially a theory of the demand for money. This is usually expressed using Fisher's equation, $M = P\,T / V$, derived from the exchange identity: $MV \equiv PT$, where *V,* is the velocity of circulation of money: *T,* output in real terms, and *P*, and index of prices. An alternative formulation is the Cambridge version, which is written as: $M = kP\underline{Y}$, where, *k,* expresses the demand for money as a proportion of nominal output or income[38]. In its most simplistic expression both formulations make the real value of money a function of the quantity of money in circulation, and the rationale for the demand for money is to support transactions of commodities.[39] Also both formulations lack an essential link between the commodities markets and financial markets, at the root of the 'severe indeterminacy' problem that we find when trying to introduce money and finance in sequential economies, as we saw in chapter three.

In this and in the next section we will present a reformulation of the quantity theory of money, where we introduce the demand for money as a function of the net value capital.

We can represent all the possible forms of money as: M_1, M_2, M_3…M_n, expressed in generally accepted monetary units. Where the Ms, following tradition represent all the different papers or commodities that can be used and that can be

accepted as means of payment. Certainly the degree of acceptability, or liquidity, of all these instruments is not the same, currency *is* liquidity and when backed by the state it has to be accepted to legally clear debts, while a receivable issued by a firm may not be liquid, or generally accepted, at all. In this formulation the sub indexes, will represent the degree of availability of acquisition power that different forms of money have. Say that, M_1, and M_2, are immediately available to spend or to settle debts and obligations, involving no cost at all; in other words, they can be considered as abstract acquisition power with zero transaction cost, that is money. As we go up the ladder, $M_3 \ldots M_n$, etc., we should expect the transaction costs of turning potential into available acquisition power to go up. Certainly, each financial asset will have different transactions costs associated to the particulars of the case.

Different forms of financial assets that could be considered as money in general, circulate at different velocities, which can be expressed as V_1, V_2, $V_3 \ldots V_n$. So we have a wide variety of financial assets that could be considered as 'money', each with asset specific transaction costs and each with a particular pattern of circulation:

$$\textit{Money in Circulation} = M_1 V_1 + M_2 V_2, + M_3 V_3 \ldots + M_n V_n$$

Clearly, the definition of what is money in strict terms and what is not, is to some extent arbitrary[40]. In the most simple terms money is available acquisition power, it consists in financial instruments that either directly are generally accepted means of payment, currency and demand deposits for example; or financial instruments that can be converted at no cost or at a minimum cost, into generally accepted means of payment, T-bills for example. To use a finance person's expression: cash and cash-like instruments. So we will restrict our definition of money to cash and cash-like financial instruments, contemporarily most likely interest bearing.

Denoting capital with $\boldsymbol{\kappa}$, and the fraction of the value of capital that agents demand as money as with $\boldsymbol{\delta}$. As of now let's simply express the demand for money—see section 5.5—as:

$$M^D_t = k\, P_t \underline{Y}_t + \delta \kappa_t$$

and $$P_t \underline{Y}_t = Y_t$$

eliminating time sub-indexes to simplify we have:

$$M^D = k\, Y + \delta \kappa$$

In this formulation we express the demand for money as a function of the value of transactions and the value of capital. If we would hypothesize that the demand for money for transactions purposes is nil and simplifying notation, we would have:

$$\boldsymbol{M = \delta \kappa}$$

That is, the demand for money would be reduced to the fraction of the value of capital that agents wish to keep as available acquisition power, to use Marshall's expression, as cash that enables investors to make effective capital gains and loses. The basic idea behind this formulation, is similar to Marshall's, $\boldsymbol{k'A}$, nevertheless the definition of capital we have developed in this work is radically different: capital is the property right over residual profits, the value of capital is not connected to the value of physical assets and it is highly variable, it cannot be considered as a given, as the classics did, among other differences. Also, while Marshall's idea presumes that $\boldsymbol{k'}$, is a constant, we will argue that the demand for money, and of credit in particular, derived from the value of capital is a complex function of the profit and interest rates, leverage and systematic risk, and of the

profitability targets of investors. So, δ, can only be considered as a constant in the most simple of cases.

So while the traditional demand for money based on transaction requirements may legitimately considered as a relatively stable function, this may not be the case with the demand for money derived from capital.

The previous expression, $M = \delta \kappa$, allows us to introduce money *"…on the very ground floor of our analytic structure…"* satisfying Schumpeter's strictures. As we have argued, profits are determined in commodities markets by general equilibrium conditions, given profits we can determine the economy's profit rate and hence the value of shares capital, a value which in turn is impacted by the structure of capital and the interest rate. The fundamental link between the real and monetary spheres can be established through capital.

In what follows we are assuming that the demand for money for commodities transaction purposes is nil, so we can focus our argument in the question of capital.

As we have argued capital may assume a variety of forms, we distinguished as the most basic forms debt and equity, a distinction that required the introduction of the interest rate and hence of money. We showed how in the aggregate when the economy's profit rate was above the interest rate—as of now simply introduced from outside the system—the net aggregate value of capital was positive and it corresponded solely to capital in the forms of equities or shares of capital. A result derived from the fact that debt was simultaneously an asset and liability, and in the aggregate the value of debts would cancel out.

Now that we are postulating that agents may decide to keep part of the value of their capital as available acquisition power, that is as money or cash and

cash like instruments, for an individual the value of capital may be expressed as a portfolio of financial assets:

Capital = Cash + Debt + Shares

In the aggregate we saw that debt cancels out and has zero net value; also in a world where securities are indistinguishable from money, cash is just like debt: what is an asset for an agent is someone else's liability, so in the aggregate the net value of capital is:

Capital = Shares

It can be argued that this corresponds to an Arrow and Debreu type economy, where the interest rate and a capital structure comprising debt and equity was simply introduced from outside the system. Here money does not play any essential role, it is just a token of exchange, and the interest rate can be seen as a cost, and/or as the price for financial services.

The interesting case, however, is when money does emerge as a financial asset, with a net aggregate value. If agents decide to keep part of the value of their capital as available acquisition power, in the form of money or cash and cash like instruments, in the aggregate the net value of capital may be expressed as:

Capital = Cash + Shares

Under these circumstances shares of capital or equities and cash may become net financial assets in the hands of consumers. To use Gurley and Shaw[41] expression all money is "internal" money, in an economy where there are no aggregate capital effects—the net value of all financial assets is zero. In a monetary economy with aggregate capital effects, the net value of capital is either

positive or in extreme circumstances negative, and some money may be external money, that is a net financial asset with a net value.

For money to be a net financial asset with a net value, external money is needed. It can be hypothesized that while the demand for money for transactions purposes can be satisfied with internal money, just like debt; the demand for money derived from capital as a net financial asset, can only be satisfied with external money.

In modern capitalist economies it corresponds mainly to the central bank to create external money, and monetary policies may play a crucial role in the macroeconomic performance of the economy. The expansion of the money supply and/or changes in the interest rate by the central bank, may serve to realize net capital gains or to avoid net aggregate capital loses.[42]

Of course, internal money does not matter in the aggregate, what matters is external money, and the provider of external money is the central bank, with the power of the state behind it. What we should see is a game between the monetary authorities, adjusting or not the interest rate—i. e. the money supply—and individual agents adjusting their portfolios: investors deciding how to allocate their present and future earnings among cash, debt and equities; and firms, deciding on the capital structure of their operations. It can be considered that ultimately the monetary authorities would have the possibility to manage the supply of money at least to some degree, given that a major component of the monetary supply can be seen as endogenous. However, whatever the amount of internal money that is created endogenously, it is like debt: it does not have a net aggregate value. So the important part of the money supply is necessarily associated to the state, in modern economies through the central bank.

We can hypothesize, that the state can support a net positive value of capital by accommodating an increased demand for money from investors in a run

towards liquidity, by expanding the money supply and potentially incurring in a fiscal deficit, caeteribus paribus. Certainly, movements in the demand and/or the supply of money may bring up changes in the interest rate, leverage and the level of systemic risk. A powerful state and powerful firms may be a winning combination, if these powers are used wisely. The theoretical framework we are advancing in this essay may prove useful to revise and reconsider existing monetary and fiscal policies paradigms.

Certainly central banks as institutions do not exist in a vacuum, they are part of a network of institutions that depend on each other. What the historian Niall Ferguson[43] has called the "square of power" of the modern world: a tax-collecting bureaucracy; a representative parliament; a national debt; and a central bank. And closely associated to these institutions is the existence of capital markets with different levels of institutionalization. Even tough external money is provided mainly by the central bank, it can be argued the value of the monetary supply that really matters would ultimately be supported by the capacity of the state to impose and to raise taxes. We have not included taxes explicitly in our model, nor the demand for money to pay taxes, as Starr[44] does. However, this capacity is part and parcel of Ferguson's "square of power". The parallel with the value of capital and the capacity of firms to generate residual profits should be evident. If the value of capital can be held as money and/or as equities, it is because behind the potential positive net value of money, lies the taxing capacity of the state; and behind the net positive value of equities, lies the capacity of firms to generate residual profits. Taxes can be considered as the state's property rights over residual profits as well. It could be argued that, all in all, it is in both cases a question of power, either the power of the state, or of the market power of firms. Certainly, and fortunately, there are definite limits to both: the interest rate cannot be manipulated at will[45] and the money supply cannot be expanded or contracted without major consequences, for example, inflation or deflation, in capital and commodities markets. Firms with market power will eventually succumb to competition.

At this point of our analysis money and the interest rate have been introduced to the system without a full explanation. The necessary expansion of the empirical content of our basic theory has required and has allowed us to incorporate these crucial variables in an essential way. Nevertheless, the complete integration of the financial and monetary dimension to our reformulated classical system is far from concluded.

Some brief considerations about the interest rate are needed. We have argued that the interest rate, as we know it in the real world, does not play any role in the intertemporal allocation of consumption, consumers decide on the basis of the current and future prices of commodities as determined by general equilibrium conditions, and firms plan their operations accordingly. The temporal relationships between (general) equilibrium prices, the so called own-rates-of-return, clearly play a role here, but they are not, they cannot be assimilated to, the interest rate as determined in financial markets, where the central bank plays the main role. Also the interest rate does not play a role coordinating savings and investment decisions. To begin with, these concepts rely on arbitrary definitions of what and when is an investment good or a consumption good. By definition savings and investment are always equal, and decades of econometric research have shown that the cherished relationships between the interest rate and savings (positive) and between the interest rate and investment (negative) do not hold in reality. These are very well known objections, however the IS-LM framework, depends completely on these relationships among others, and it is still the main tool used to teach and to understand macroeconomics in many parts of the world.

Another key relationship in standard macroeconomics that needs to be reconsidered is that between the interest rate and the demand for money, also at the core of IS-LM type of analysis. The prevailing views, at least the most common perspectives, can be illustrated with the evolution of Milton Friedman's work[46]: Initially, Friedman presented a money demand function where the level of real balances depends on the interest rate on bonds, the yields of stock, the level of

prices as a measure of the yield of physical durable assets, real output as a proxy for wealth, preferences and the relationship between human and non-human wealth. Agents will maximize their utility of holding money. The result is that the desired real money balances are a stable function of the interest rate, real output (or transactions), and other variables. This perspective is totally consistent with the Pigou-Patinkin tradition. In subsequent works and because of empirical reasons, particularly econometric results that showed a weak or insignificant relationship between the interest rate and the demand for money; and also because of theoretical advances, like the permanent income theory of consumption, Friedman developed a demand for money function dependent entirely on the permanent income or its proxy the anticipated or expected income, without the interest rate playing a role. In short we have two extreme views on the relationship between the interest rate and the demand for money: either, the ancient inverse relationship holds, or the demand for money is completely independent of the interest rate.

We argue for a theory of the demand for money derived from capital. As we have stated, the demand for money is directly associated to the value of capital, it corresponds to the fraction of the value of capital that agents may decide to keep as available acquisition power, is a complex function of the profit and interest rates, leverage and systematic risk, and of the profitability targets of investors. Of these variables the profit rate is given by general equilibrium conditions, the nominal interest rate by the policies of the central bank interacting with the monetary markets, and leverage by the individual decisions of agents. In particular, capital structure decisions by firms and portfolio decisions by investors.

In our theory the interest rate impacts the demand for money through its impact in the value and in the structure of capital. Given that the interest rate interacts with the profit rate and leverage to determine the value of capital, and that also impacts on the level of systemic risk, the direction of changes in the demand for money derived from changes in the interest rate cannot be predicted without considering all other intervening variables. The theory for the demand for money

advanced here integrates in a single framework real and financial determinants. Under some circumstances the model would yield Keynesian predictions; under others, monetarist predictions; as well as previously unpredicted consequences.

If, as we have argued the value of capital, ***K*** , is determined by general equilibrium conditions, the economy's rate of profit, the structure of capital and the interest rate. And if the value of capital can be expressed as ***Capital = Cash + Shares.*** Then, caeteris paribus, changes in the value of capital, would cause changes in the value of cash or net money holdings or in the value of equities. As we know the relative price of capital in terms of commodities is determined in a competitive equilibrium, so nominal changes in the values of net money holdings and shares, after an initial disturbance will continue until the relative price of capital in terms of commodities in equilibrium is restored. Assuming of course that the interest rate and leverage remains the same, which is not necessarily the case. Certainly, there is the possibility that these changes may trigger adjustments in the level of leverage or in the interest rate, generating additional capital effects and then, the relative price of capital will be different in a new equilibrium.

It is a well known fact among financial practitioners that for individual agents the most important decision regarding the profitability of a portfolio, resides in the allocation between debt and equity instruments. A fact that is consistent with our framework where the profitability of capital—equities—is directly associated to leverage, as was shown in chapter four where we argued about the importance of the capital structure. From the monetary policy and macroeconomic performance perspective, we hypothesize that the most important consequences of the aggregate allocation between equities and cash, or shares and money, will come from the impact it may have on the interest rate, potentially on leverage, and ultimately on the level of systemic risk[47].

As we argued in the last chapter as leverage increases, and the higher the difference between the total rate of return and the interest rate is. The more explosive are the changes in the returns on capital. If the interest rate is above the total returns of the economy as determined by general equilibrium conditions, the changes will be negative. If the interest rate is below the total returns the changes will be positive. So a few fractions or points down in total return and/or a few fractions or points up in the interest rate can wipe out the returns on equity of a moderately leveraged firm or economy.

Variations in the returns of capital can cause negative capital effects, these may generate bankruptcies, even a generalized crash in capital values and initiate a financial crisis that may translate in a recession or even worse. Positive effects may initiate a boom, fuel monetary expansion and growth and may set up the stage for a future financial crisis, and so on. As we argued and illustrated numerically, very minor changes in the interest rate or in the total returns of the economy, could generate very large effects in capital values and systemic risk. This in our perspective explains the importance of monetary policy and the interest rate, which ultimately have to do with the preservation of the overall stability of the system.

Changes in the value of capital, may cause changes in the level of effective demand directly through variations in expenditures, and indirectly through variations in the composition of portfolios. For example, we have stated that as the economy moves from one temporary equilibrium position to another, we may see that residual profits tend to diminish due to competition. Then the value of capital may fall as well. From an initial position of equilibrium in monetary markets, say $M^D = k\,Y + \delta\,\kappa = M^S$, we should see two main effects, a reduction in nominal demand due to the fall in the value of capital and a reduction in the demand for money. The excess in the money supply, $M^S > M^D$, may compensate partially the reduced aggregate demand, but not wholly because,

$\delta > 1$, consequently we may see a deflationary situation. However, given that $M^S > M^D$, the interest rate may fall as well, the excess money supply would either be spent or interest rates may fall, stimulating a rise in the value of capital.

Besides the direct aggregate effects that variations in the value of capital may generate they may impact on portfolio decisions, and generate unexpected consequences. It is outside of the scope of this work to develop this last proposition in detail, some brief observations will illustrate this last statement.

In the last chapter we argued that investors and firms that use leverage[48] to achieve their profitability targets and to manage risk, will demand credit for those purposes. For example, given the economy's profit rate and the interest rate, investors and firms will leverage, will demand credit, to achieve their required returns on equity at an acceptable level of risk. Systematic risk, that is. If, caeteris paribus, the interest rate rises, investors and firms, may demand more credit—not less as standard theories predict—so they can maintain their required levels of profitability. How much more will risk be increased as leverage increases? It will depend on the pre-existing level of leverage. If this level was low, then we could expect that in the face of a rising interest rate, the demand for money will continue growing until systematic risk becomes unacceptable, and investors and firms are forced to revise downwards their profitability targets. In an environment of reduced profitability of capital and rising risks, investors and firms will most likely, decrease their leverage and increase their cash holdings, in modern economies mostly interest bearing. Of course, if they still can do it.[49]

From the perspective of investors and firms, at the individual level, the decisions concerning the capital structure—the level of leverage—are perhaps the most important. In the aggregate the net value of debt disappears, but the variability in the returns of capital and hence of capital effects due to leverage, stays. As we know by now, the problem is that the capital structure or portfolio

decisions may affect the value and the variability of returns on capital, through changes in the interest rate and leverage, and may have real effects through changes in effective demand. Also, the demand for money as a net financial asset that may result from portfolio decisions, may simply be impossible to be satisfied, in an environment of decreased profitability and increased systematic risk. If, for example, in order to reduce risk by increasing cash holdings a majority or a significant part of investors, decide to sell their shares, they might not be able to do it without incurring in serious loses. Similarly, firms might be forced to curtail their expenditures programs, or to sell physical assets at a lose, if they are forced to increase their liquidity to service their debts, or to maintain their level of risk at an acceptable level.

In the previous considerations we find another channel through which monetary authorities may have an important role: if the aggregate level of leverage is high, then systematic risk would be high as well. To prevent or to reduce instabilities central banks may decide to buy debt from banks, and/or the private sector in general, reducing leverage. This will reduce the perception of high systematic risk, increase the liquidity of the system and more significantly will help to maintain the value of capital, keeping negative effects at bay.

We have stressed that the structure of capital matters. In this respect our perspective is similar to Tobin's[50] Portfolio theory: he argued that the effects of monetary policy resulted from the monetary authorities changing the relative supplies of different financial assets in the market; for example: the supply of money and bonds; or of short-term and long-term bonds, etc. What was important for the performance of the economy in Tobin's theory was not the demand and supply of money in itself, but the demand and supply of the complete portfolio of financial assets in the economy. Tobin argued that adjustments in financial assets markets would cause changes in interest rates and in the returns on equity. These changes would in turn have real effects.

The perspective of Tobin is based on a liquidity preference approach where there is an opportunity cost of holding money. Also is based on a view, where the prices of financial assets are determined by independent demand and supply conditions and hence the aggregate value of financial assets is simply a sum. Tobin's analysis has been widely criticized: on one hand it is argued that for all practical purposes money is interest bearing and most likely with a very low opportunity cost; and in the proverbial other hand, through an application of the Modigliani—Miller—Barro—Ricardo theory, it has been argued that the structure of capital does not matter and that: *"…public financial policy simply does not matter, under the standard perfect market assumptions…"*[51] Hence, Tobin's critics have argued that changes in the structure of the overall portfolio of financial assets, in the structure of capital, should not have any real consequences.[52] We have shown that variations in the structure of capital matter, that monetary and financial policies may have significant real effects, and that portfolio decisions may be an important channel for these effects.

There is also a similarity with James Tobin's theory of investment, the **q** ratio theory,[53] that states that capital markets do have a short term impact on the level of nominal demand. Tobin's q, is a ratio between the total market value of debt and equity of a firm, and the value of the firm's assets at replacement cost. If the market value of the claims against the firm's value is higher than the costs of replacing them, (q>1), then the firm should invest more, issuing additional equity and/or debt.[54] It should be apparent by now that at the aggregate level, what we have termed as capital effects, are formally similar[55] to Tobin's proposal. Nevertheless, Tobin's theory seeks to explain net investment as a function of the value of equities. Not the value of capital or the emergence of capital effects, for which we have provided an explanation.

Also, we have posited that the link between capital effects and effective demand is mediated through financial/monetary markets, by adjustments in the value and the structure of capital—portfolio decisions—and, we have stated an

explanation for the demand for money linked to capital, that will allow us to develop a preliminary explanation of the interest rate. This last is the purpose of the following sections.

5.5 The monetary market and the interest rate.

A competitive equilibrium in a capitalist economy with positive profits where distinct markets for commodities, capital and money coexist, can be achieved and sustained without any presumptions about its efficiency or optimality in welfare terms, or about the equilibrium level of employment and output. Such an equilibrium is necessarily a temporary equilibrium, a short term situation. In these circumstances capital is valuable and potential divergences between the economy's profit rate and the interest rate may generate capital effects that impinge on the levels and the distribution of wealth. These effects will act side by side, with the long term competition forces that push the economy towards the ideal end state where prices are equal to costs, the value of capital is zero and the demand for money nil. Once a temporary general equilibrium is achieved, together, both short and long term forces, may then, change the initial conditions, the basic data of the problem, in particular wealth and its distribution and re-start the process of determination of relative prices, profits, capital values, demand for money, the interest rate, variations in effective demand and so on, until a new different, temporary equilibrium is achieved. Certainly, nothing can lead us to expect that the optimal long term path of growth, will not be affected by such a succession of short term temporary equilibria that may result from the interaction of commodities, capital and monetary markets. The optimal long term path of growth may be pushed down or may be pushed up, by these changes. Also there is the possibility that a particular economy may simply stay away from its potential path of growth for extended periods of time. In all these processes monetary and financial policies may play an important role through the interest rate, the level of leverage and hence systematic risk.

Through capital effects, new net abstract acquisition power may be created or destroyed. This is an addition or diminution to existing wealth in pure value terms without a necessary correspondence in physical terms, it is financial wealth. In other words, such new wealth can coexist with an addition or a diminution of the real resources available for the community and/or the productive capacity of the economy. Changes in wealth do not correspond directly to changes in savings, as traditionalists claim. Aggregate capital effects depend on the interaction of the interest rate and the profit rate, and on the financial structure of the economy. As a net financial asset, capital is linked to the demand for money and to the creation of external money. If the main determinant of the demand for money is capital, and as the financial and monetary spheres become more important, we should expect to see that the demand for money linked to transactions or to the level of output becomes less and less important. Also we should not see a stable or predictable relationship between the demand for money and the level of income. On the other hand as capital markets develop we should expect that financial and monetary transactions grow without an apparent relationship with output and income.

In this section we will analyze the basic elements of an alternative perspective on the monetary market and the interest rate.

Let us commence with a reformulation of the classical quantity theory of money, by incorporating to it the demand for money that may be generated by capital effects. The restricted definition of money, cash and cash-like or money holdings, corresponds loosely to M_1 .and M_2 . The analysis of the demand for money will be supplemented by the presentation at its most general level of an analysis of the supply of money, where the money supply will be considered as partly exogenous, i.e. high powered or legal tender money supplied by the central bank; and partly endogenous[56], i.e. credit and diverse means of payment supplied by the private sector. As is customary the interest rate will be determined by the

interaction of the demand and the supply of money. In this section the presentation will be restricted to the basic elements of the theory.

The Cambridge quantity theory of money equation is written as: $M = kP\underline{Y}$, where, *k,* expresses the demand for money as a proportion of nominal output or income determined by the real money balances agents desire to hold. This equation and the Fisherian $MV = PT$ are formally equivalent, that is, $k = 1/V$, that is, *k,* is the inverse of the velocity of monetary circulation, *V*. As is known the Cambridge equation expresses the demand for money in a behavioral form, agents demand money as a proportion of their nominal income, agents keep money balances to support their level of transactions, given real output or income, $\underline{Y}$, and the level of prices, *P*. We have rejected this rationale as the ultimate foundation for a demand for money.[57]

Traditionally the demand for money can be represented as,

$$M^D = k\, P\underline{Y}$$

Defining the demand for money for a particular period of time, a day, a week, a month, or whatever equal unit we choose, denoted by the subindex, *t*, then:

$$M^D_t = k\, P_t\underline{Y}_t \ ,$$

Traditionally *k*, is assumed as a constant or as a stable function of income, money balances held for transactions purposes. In the extreme where there is no demand for money for transactions, *k*, will be zero, no relationship at all between income and the demand for money. Also, given that, $k = 1/V$, the inverse of the velocity of circulation, sometimes it is considered as a variable.

We will consider, k , as money balances or cash holdings, held for transaction purposes, most likely small but positive.

The net value of capital, capital effects, $\boldsymbol{\kappa}$, represents a virtual or potential demand for money. Agents as investors will hold shares, capital, as a source of income in the form of profits, à la A&D. In a capitalist economy, capital is valuable, hence, agents may select a portfolio of shares in order to accomplish their life consumption plan, storing value through the acquisition of shares, receiving current profits, and most importantly realizing value through their sale with potential capital gains or loses. In a pure equity economy where only shares of capital represent property rights over future profits, no aggregate capital effects are generated. As we saw, the equalization of returns on capital, could generate distributional effects through capital gains or loses for individual investors, but these, in the aggregate, are compensated. It is only when debt and the interest rate are introduced that we may have aggregate capital effects that are positive, negative or equal to zero, depending on the discrepancies between the economy's rate of return and the interest rate, and on the financial or capital structure of the economy. Under these circumstances both distributional[58] and aggregate capital effects, may have real effects and may have a net impact on the demand for money. As of now, we'll hypothesize that distributional effects due to these processes will have no net effect on the demand for money.

The central question now, is to determine under what conditions changes in the value of capital, capital effects, $\boldsymbol{\kappa}$, can affect the demand for money and aggregate demand. As we saw before,: $\boldsymbol{M = \delta \kappa}$

Expressing the member, $\boldsymbol{\kappa}$, in terms of real output and in nominal terms, and the parameter, δ, *(delta),* with values between 0 and 1, that reflects the extent into which capital effects become effective demand for money, to the previously presented demand for money equation we have:

$$M^D_t = kP_t\underline{Y}_t + \delta\,(\kappa_t / \underline{Y}_t)\,P_t$$

Or to simplify: $M^D_t = kP_t\underline{Y}_t + \delta\kappa_t$ [59]

Lets consider the two pure extreme cases we presented in chapter three: A pure equity economy where there is no debt and no interest rate, the returns on capital are what the economy yields, so

$i = r$ then $\kappa = 0$ then:

$$M^D_t = k\,P_t\underline{Y}_t$$

In a pure debt economy all capital is remunerated at a given interest rate, the discrepancies between this interest rate and the economy's profit rate will cause either positive or negative capital effects, then

If $i < r$ *then* $\kappa > 0$
If $i > r$ *then* $\kappa < 0$

So the demand for money equation is now,

$$M^D_t = k\,P_t\underline{Y}_t + \delta\kappa_t$$

Certainly in the case where debt and equity coexist, the magnitude of the net value of capital—capital effect—will be determined by the levels of the interest and profit rates, and by the capital structure or leverage of the economy, as we saw in the previous chapter.

Also, given that, ***K*** = ***Cash + Shares*** , and that the relative price of capital in terms of commodities is determined in real terms, the nominal prices of shares will vary so the acquisition power of shares in real terms will be maintained, the existence of arbitrage will suffice to achieve this result. The implication of this is that we should see that commodities' nominal prices, and shares' nominal prices, will have relatively independent dynamics. As a result the real value of money holdings will be determined in a residual manner, without considering for now exogenous variations in the money supply.

In my perspective, paraphrasing Hicks, the crucial part of the demand for money, *through which monetary disturbances operate, and, where monetary policy must have its effects.*[60] Is the demand for money associated to capital effects. Or in other words, the dynamics of capital are central for the understanding of monetary disturbances and the impact of monetary policy.

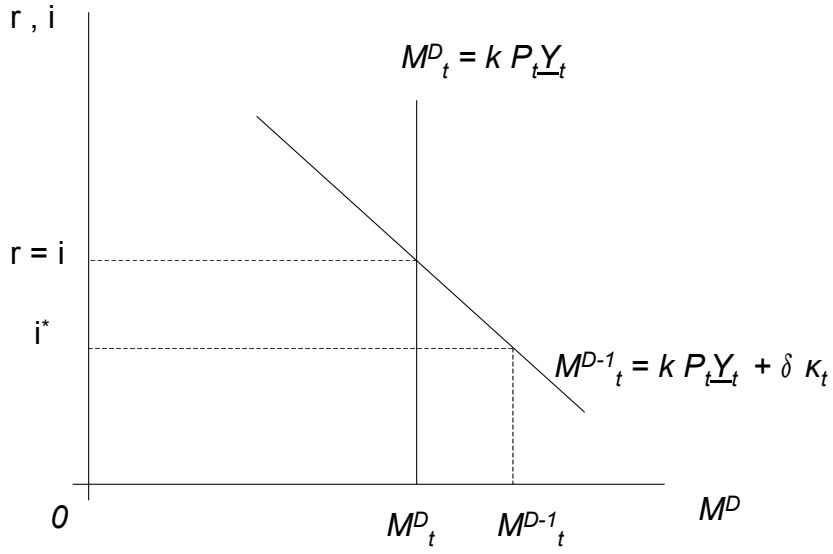
Clearly. the detailed study of these processes is the subject of ample future research. In this work, concerned mainly with capital theory, only some of the initial essential basis of a monetary paradigm founded on capital, are outlined.

The next graph summarizes this initial basic argument:

On the vertical axis we represent the economy's profit rate and the interest rate, on the horizontal axis the demand for money.

The lines representing the demand for money without and with capital effects, respectively $M^{D}{}_{t}$ and $M^{D-1}{}_{t}$ intersect each other at the point where the profit rate and the interest rate are equal, $r = i$.

For a given profit rate, variations in the interest rate will have an inverse effect on the demand for money. Variations in the profit rate will displace the, $M^D_t = k\, P_t \underline{Y}_t + \delta \kappa_t$, schedules vertically.



In this graph we are representing a simple case where the interest rate is below the profit rate and hence we have a positive capital effect and also a positive demand for money derived from it. In the illustration this is equal to:

$$\delta \kappa_t = M^{D-1}_t - M^D_t$$

The segment, OM^D_t , is determined by the demand for money associated to transactions, $kP_t \underline{Y}_t$. In the extreme case where the demand for transactions is zero, M^D_t , would be at the origin.

Certainly, this formulation is quite simplistic. It assumes that aggregate capital gains or losses are always directly translated into demand for money, in one direction or the other, and that they do it in a known proportion, δ.

Reality is a lot more complicated than this, capital gains may be interpreted as a signal of more capital gains in the future, so investors will not sell, that is demand money, to realize their gains now. Instead they may decide to buy more shares in the expectation that more gains are coming. Also, as we have posited capital effects generate portfolio adjustments and they are a complex function of the profit rate, leverage, the interest rate, and obviously a more detailed model would most likely result in a more complex demand for money function.

A very important issue has to do with expectations. An alternative way of conceiving the demand for money based on capital, is to consider that capital effects impinge on the demand for money only when they are not correctly predicted. It can be postulated that past, or previously realized, capital effects, and errors in expectations regarding the value of current capital effects, will impinge on the demand for money.

Let us present a simple example. Based on the well known Muth's rational expectations hypothesis we can represent the optimal expectations of capital effects at time, t, as:

$$\kappa_t^* = E_{t-1}(\kappa \mid I_{t-1})$$

Which reads: κ_t^* equals the optimal expectations, (E_{t-1}), of κ_t, at the time, *t-1,* given all available information at, *t-1,* (I_{t-1}). The idea is that people use all the knowledge and information about the way the economy performs and about the policies followed by the authorities to determine their expectations. As capital becomes a net financial asset of the community it will enter into the initial

conditions of the problem, that is it will become part of wealth, and agents will decide their levels of consumption and investment, considering as income not only current profits but capital profits. To make effective capital gains, to spend, they demand money.

Incorporating the above ideas, in its simplest expression, to the demand for money equation defined above, we have:

$$M^D_t = k\, P_t \underline{Y}_t + \gamma\,(\kappa_t - \kappa_t^*) + \lambda\, \kappa_{t-1}$$

Where, γ , *(gamma),* is a parameter that reflects the measure in which errors in the estimation of current capital effects translate into the period's demand for money, and λ *, (lambda),* is a parameter that accounts for the impact of past realized capital effects in the current demand for money, it accounts for some persistency of past effects. Clearly the impact of errors and unfulfilled expectations about capital values on the demand for money will depend on the assumed values of both parameters, γ and λ. The direction of change is unpredictable. For example, in a situation of unexpected capital gains, will investors decide to sell and profit now? What is called by practitioners 'profit taking'. Or would they expect more profits from capital gains in the future, revise their expectations upwards and invest more in shares. In the first case the demand for money would increase and in the second it would decrease. I believe there is not much we can say a priori about the impact of capital effects on the demand for money in a world where expectations are not always realized.

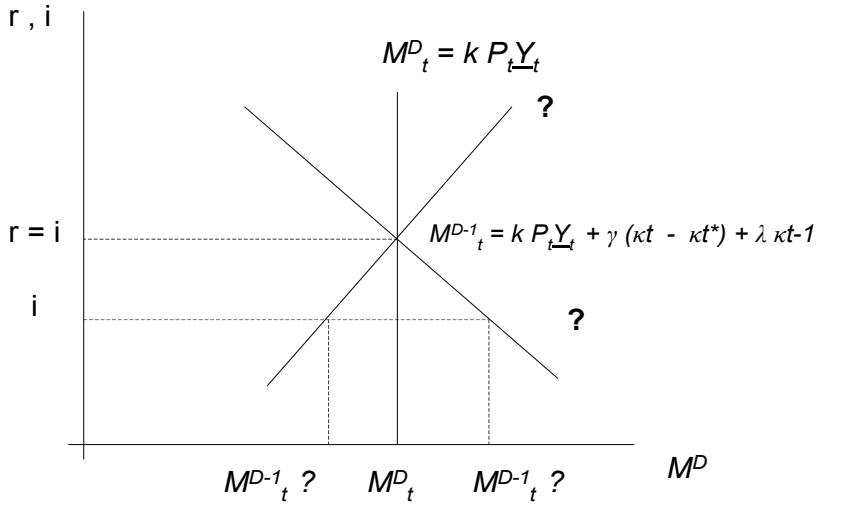
In a world of perfect information the demand for money derived from capital effects will be directly incorporated in the demand for money holdings for transactions. The demand for money equation would simply be:

$$M^D_t = k\, P_t \underline{Y}_t$$

It is clear that the consideration of capital effects in the demand for money equation introduces a very significant element of potential instability and unpredictability in the workings of modern capitalist economies. Capital effects depend on the interaction of the profit rate of the economy and the interest rate, as well as on the capital structure of the economy. If capital effects are generated and they impinge on the demand for money, the interest rate may be affected anew, in a way that will be dependent on the response of investors and the monetary authorities, among other factors.

As was presented in chapter four, very small changes in the interest rate and the profit rate, in a situation of high leverage, may generate enormous, negative or positive, effects on the returns on capital with very significant net effects on the value of capital. So very small errors of estimation and in expectations may cause significant variations in the value of capital and hence in the demand for money and aggregate demand, and there is not much we can say a-priori about the direction of these changes. It is perfectly possible that the demand for money schedule flips over, due to changes in expectations.

The following graph expresses these ideas in a simple form:



Within this framework, the simple positive inverse relationship between the demand for money and the interest rate, characteristic of textbook macro economics (IS-LM), does not hold. The demand for money is independent of the interest rate. Ultimately it depends on portfolio decisions, on the dynamics of capital.[61]

5.6 An overview of the Money Supply.

To finish this section it is necessary to complete this basic initial proposal for a capital based monetary framework, with the consideration of the supply side of the monetary market. As was stated before, at the most general analytical level when studying money and finance we are dealing essentially with the institutions that protect the property rights of traders in the market place.

The consideration of the supply side of the monetary market, implies the analysis of the particular institutions that provide the specific services that the sustainable operation of the commodities and capital markets require. To express this idea in terms of the classical classification, the services consisting in: the provision of a unit of account, a system and a means of payment and a store of value.

A fundamental part of modern capitalist economies are the institutions that constitute the capital market, where capital as a property right is traded, and where the value of capital is determined. In the reality of modern capitalism, even though not in an explicit formal way, the services of the financial system also comprise the protection of the property rights over residual profits, that is of capital.

Historically, the services of the financial system have been provided through a wide variety of institutions and through diverse means. In modern capitalist economies, the central bank is legally entrusted with the provision of a stable unit of account and with an overall responsibility regarding the stability of the monetary and financial system, both essential to protect the property rights of agents, in general, and investors in particular.

We could say that the ultimate purpose of the institutions of the financial system, is to sustain the value of money and implicitly of capital, in terms of commodities, that is in real terms.[62]

Transactions, of course, are performed in nominal terms, in money. Money, as the generally accepted means of payment is denominated in a generally accepted unit of account. The most basic form of money is legal tender money issued by the central bank backed by the 'full faith and credit' of the state. Its value rests ultimately, on the state's capacity to impose taxes. Most of the payments system operation, and an important part of store-of-value related services, are carried on by banks that may be private, public or mixed, and there are many instances of the private non-banking sector that provide similar services. In varying degrees the full faith and credit of the state may provide implicit or explicit guarantees as of these private or semi-private services. The provision of these services is costly, the 'interest rate' and other fees charged by the institutions of the financial system will cover the costs associated with providing them, and depending on their competitive or monopolistic advantages, they may be able to generate residual profits.

In short as every other price the interest rate reflects costs plus the residual profits that the institutions of the financial system may generate. So, as we have argued through this work, the interest rate cannot be assimilated to the profit rate, or seen as a remuneration for some present sacrifice, the cost of capital, or the cost of funds or a premium for parting with liquidity, among other explanations.

Nevertheless, as we argued, the interest rate has a crucial role in the emergence of capital effects, that is in the value of wealth and its distribution, and in the stability of the financial system. The interest rate is a variable that cannot be reduced to a simple price, even though the mechanics of its determination can be presented in a demand and supply framework.

Staying within the tradition, but with all the caveats derived from previous developments, the equilibrium condition in the money market may be defined as the point where the demand and supply for money are equalized, the nominal interest rate will be determined at such level. Within my perspective, there are several differences with the traditional approach regarding the money supply and the interest rate. The main considerations adopted in this study are summarized in the following propositions:

First, the services of the central bank essentially are: the provision of a stable unit of account, a unit of abstract acquisition power, and as the guarantor of the stability of the financial system as a whole. The basic 'interest rate' charged by the central bank could be seen as a fee to cover the costs associated with the provision of a sui generis public good:[63] monetary and financial stability. The profits from the central bank are as taxes without a quid pro quo. The basic interest rate is determined by the central bank's operations, independently of the saving and investment decisions of consumers and firms.

Second, the relationship between the economy's profit rate and the interest rate, plus the variability of the returns on capital generated by leverage, make it increasingly difficult for the central bank to raise the interest rate as it comes near the profit rate, without endangering the stability of the system.

Third, the market or equilibrium interest rate, determined by the supply and demand for money, comprises the central bank basic interest rate, plus a margin added up by banks[64] to cover their operation and transaction costs and the residual

profits generated by banks due to their competitive or monopolistic advantages. Also as leverage increases, and the variability of the returns on capital grows accordingly, banks will perceive a greater risk in expanding credit and may charge higher rates. However, the perceived higher risk, caeteris paribus, will not offset capital effects completely.

Fourth, the money supply has two main components, in its most general expression, ‘state’ money or legal tender money, with a supply that can be controlled by the central bank, and ‘private’ money that comprises the whole spectrum of means of payment and/or value storage, created by private agents in the course of their commercial operations. Among these, credit supplied by banks is perhaps the most important.

Fifth, even though the central bank has an important role to play in the control of monetary aggregates, a significant part of the monetary supply is endogenously determined, through the response of the private sector to variations in the demand for money by the creation/destruction of means of payment. In other words, the central bank cannot control the aggregate supply of money.

Sixth, the aggregate supply of money will always adjust to the demand for money as determined by capital portfolio decisions, comprising leverage decisions of investors and firms to achieve required returns targets; and cash or money holdings decisions triggered by capital effects. Only the last may have effects on aggregate demand. The expansion of debt, leverage, may have indirect effects by impinging on the variability of the returns on capital.

Seventh, if the portion of the money supply controlled by central bank operations is kept constant, successive expansions (contractions) of the demand for money will be met by an expansion (contraction) of private money, credit and diverse means of payment. However, at some point the expansion of the aggregate money supply will be possible only at higher interest rates that reflect a

premium over and above the central bank basic rate. These are caused by positive and increasing transaction costs, associated with the creation of private money, plus the profit margin for banks and other private sector providers of means of payment, determined by their competitive advantages, plus the increased perceived risk due to a higher variability in the returns of capital.

Eighth, money is always abstract acquisition power, nevertheless, only legal tender money, 'state' money, can be considered as abstract acquisition power of zero transaction cost. Private money: bank or commercial credit, bills, cocoa beans, or whatever form it takes, implies the existence of transaction costs. It is hypothesized that the demand for money will be satisfied by the lowest cost alternatives first. Rational behavior by private maximizing agents will sustain such postulate.

Ninth, there is no such thing as 'credit rationing.' The level of employment and the demand for money are determined by general equilibrium conditions and by aggregate capital effects. The supply of money, including credit, will adjust accordingly. If banks limit credit, for whatever reason or with whatever means, the shortfall will be compensated by an expansion of other sources of private money. At most we will see an increase in the interest rate. The tail will not wag the dog. By now it should be obvious that 'equity rationing' is equally without a solid theoretical foundation.

Tenth, given that the central bank enjoys by definition a monopoly position, there are no market forces that will ensure that the long term equilibrium condition, prices equal costs, will entail regarding central bank services. And even if this was the case, there is no reason to expect that the minimum possible interest rate is the best rate under every circumstance. The ultimate constraint to the level of the rate of interest should be the stability of the monetary and financial system.

Eleventh, given that major instabilities may emerge due to the interactions of the profit and interest rates, the financial structure of the economy, unpredictable changes in the expectations of investors, among other factors. Monetary authorities should follow flexible policies regarding the interest rate to maintain the stability of the monetary and financial system. The central bank should particularly monitor the evolution of the overall profitability and the levels of leverage of the economy, among others, and strive to keep capital effects, positive or negative, at bay. Rules based monetary policy schemes will not achieve such purposes. Activist fiscal policies are more likely than not to exacerbate the potential instabilities of the system. Nevertheless, capital gains should be directed towards productive investment, meaning investment that raises the overall productivity of the system, or should be taxed to limit regressive distributional wealth effects.

The previous are, of course, general and preliminary considerations. To complete this section lets summarize the argument regarding the determination of the interest rate.

Denoting the aggregate money supply as, M^S_t , the monetary market equilibrium condition will be:

$$M^D_t = M^S_t$$

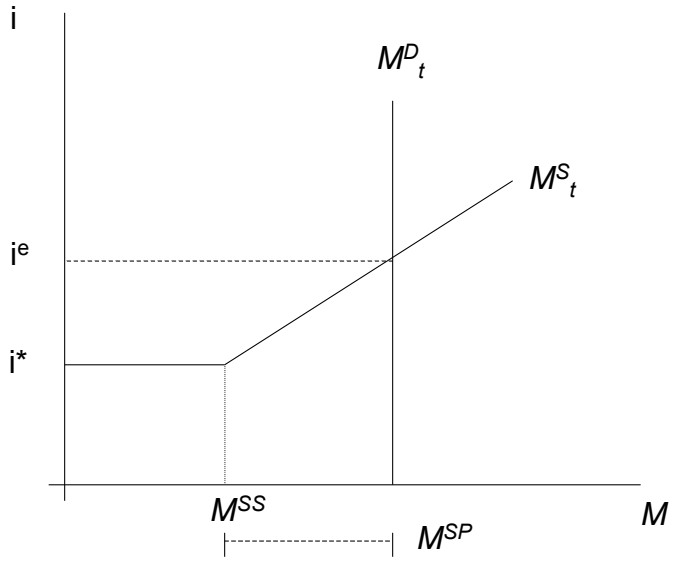
Where the money supply has two main components, in its most general expression, ‘state’ money or legal tender money, with a supply controlled by the central bank at a given basic interest rate, and ‘private’ money that comprises the whole spectrum of means of payment and/or value storage, created by private agents in the course of their commercial operations. The state’s money supply will be denoted by, M^{SS}_t , and the private money supply as, M^{SP}_t . Hence:

$$M^S_t = M^{SS}_t + M^{SP}_t$$

As is customary, both demand and supply of money functions can be represented in a graph with the profit and the interest rate, r, i , on the vertical axis and the quantity of money, M , on the horizontal axis. In a given period, in the simplest case where there are no capital effects, the demand for money will be a vertical line at the level determined by equation, M^D_t ., when $\kappa = 0$, The money supply can be represented for simplicity as a horizontal line at the level of the basic interest rate as determined by the central bank, until the point where, $M = M^{SS}_t$. From this point on, the private money supply function will present a positive slope reflecting the increasing transaction costs associated with the provision of private means of payment, as well as the residual profits of the financial sector as determined by competitive or monopolistic advantages. The money supply is drawn as a linear function for exposition's sake, most likely it would be a curve of increasing slope. The more competitive and developed the economy's payment system is, the less steep the slope of the private money section of the money supply function will be. The interest rate will be determined at the point where demand equals supply.

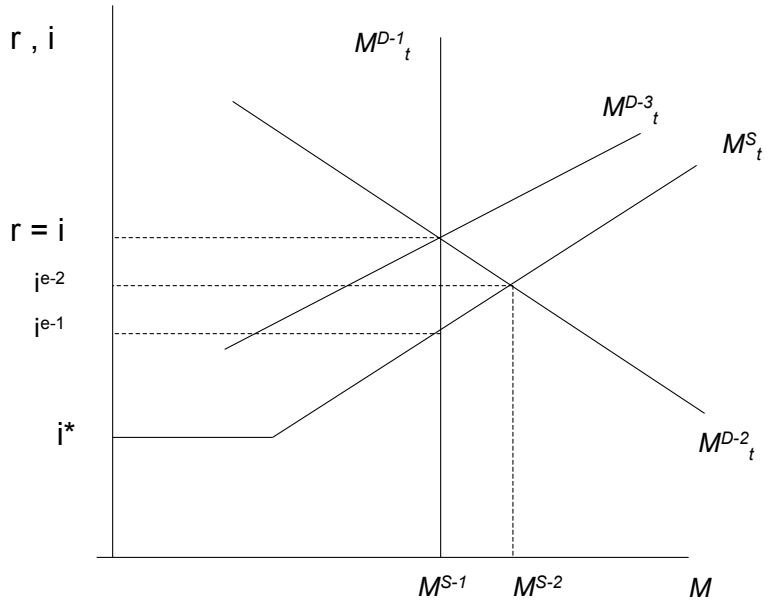
An expansion in the demand for money can also be met by an expansion of state's money. The central bank would expand its money supply in response to the demands from the private banking sector, it can be posited that the central bank targets a certain market interest rate and determines the state's money supply. Given the state's money supply, the private sector's money supply is determined endogenously in a residual manner.

The following graph summarizes the argument in the simplest case where capital effects are assumed to be zero.



The basic interest rate as determined by the central bank is denoted by, i^* , the equilibrium interest rate denoted by, i^e , is determined at the intersection of the aggregate demand and supply of money schedules, $M^D = M^S$. Given the central bank's controlled part of the money supply, M^{SS}, which can be considered exogenously determined by the policies of the state, the privately determined part of the money supply, M^{SP}, will adjust to satisfy the demand for money. The latter corresponds to the endogenous part of the total money supply. For example, it can be posited that given the shape of M^{SP}, the central bank would adjust M^{SS}, to achieve a desired level of the interest rate. Also the central bank, without changing M^{SS}, could achieve the same result by varying the basic interest rate, i^*.

In the following graph, capital effects are considered. As we know, demand for money schedules with capital effects intersect the demand for money schedule with no capital effects at the point where the profit and interest rates are equal. Besides the previous case with zero capital effects, we present two simple cases where only the demand for money schedules, M^D, change.



The demand for money schedule, M^{D-2}, corresponds to the basic case of positive capital effects, they translate into a higher demand for money and a higher interest rate, caeteris paribus, compared to, M^{D-1} . In the other case, M^{D-3} , which we may call reversed expectations, the demand for money explodes and cannot be satisfied within logical levels of the interest rate and the money supply. If the money supply could expand to this level, most likely the result would be hyperinflation. From the perspective of the capital market it makes evident the fact that it is impossible to realize all or a significant part of the value of capital at once, liquidity is not an option for society as a whole. If every investor attempts to sell at the same time the value of capital would dissipate, the efforts the state may make by expanding liquidity to accommodate an explosion in the demand for money most likely will prove insufficient.

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Certainly, this proposed basic monetary framework needs further ample developing, as of now the purpose to present an essential link between the commodities, capital and money markets, through the dynamics of capital has been accomplished. Further research should develop more precisely these initial considerations.

The chain of events that links the commodities market with the financial markets starts from the first, where profits and the economy's profit rate are determined; to the latter, where the returns on capital are equalized, the structure of capital is defined and the interest rate is determined. Through the interaction of the profit rate and the interest rate capital effects may emerge, and they can affect the initial conditions, the basic data as Walras said, of the problem by redistributing, creating or destroying wealth in the form of capital. Capital that may become money, which then will potentially appear as a new different net financial asset, that enters the consumers' budgetary constraint affecting the classic Say's Law of Markets, or Walras' Law as we have been using the term.

Walras' Law in the strict sense only holds when there is no hoarding, and when capital effects are zero, $\kappa_t = 0$. That is, when the returns on capital are equalized at the level of the economy's rate of profit and when this rate is equal to the interest rate. From the above theoretical considerations we cannot identify automatic market forces that will bring about such result. As leverage grows, the variability of the returns on capital grow as well, and capital effects may be reduced but not eliminated. Active monetary policies and a very strong institutional framework are required to ensure the stability of the monetary and financial system. The precise impacts of capital on the demand for money are mediated by financial and monetary markets through portfolio adjustments.

Keynes tried to establish the existence and significance of income and financial effects on the workings of Say's Law, the predecessor of Walras' Law. Building on the Wicksellian theme of the discrepancies between the "natural and

market" rates, Keynes conception of the principle of effective demand and of the role of the interest rate on aggregate demand, relied heavily in the interaction of what he called the marginal efficiency of capital, a concept similar to our internal rate of return, and the interest rate. However, Keynes was not able to conclusively develop a theory that could show how and when were there effects that could make the classic Say's Law case, a special case of a more general theory. A general theory that could establish the existence of situations where excesses or deficiencies in aggregate demand could emerge endogenously from the system, without relying on particular hypotheses. In other words, a general theory that incorporated the existence of effective demand failures with Walras' Law as a special case, a theory that provided an integrated account of real and financial phenomena, within the same general equilibrium framework.

Keynes' theories of the marginal efficiency of capital and of capital could not break completely with the ancient vision of capital as a thing and also as a claim, as a physical entity and as a virtual entity. In fact Keynes' vision of capital as an aggregation of physical and financial capital assets, each with a particular rate of return of its own, made it impossible to develop a clear theory of capital and the rate of return. In particular because to this mixed conception of capital he added, with an Austrian flavor, the problem of the time structure of capital, and the issue of the indeterminacy of expectations. Resulting that in the aftermath of the Keynesian revolution tenet after tenet of its most radical and innovative aspects has been rejected and even some of its most loyal followers have fallen back to a simple loanable funds theory of interest as the basis for the analysis of the profitability of capital[65] and to a string of ad-hoc hypotheses to explain effective demand failures. The incorporation of capital effects as defined, the existence of a net value of capital at the economy wide level different than zero, is enough to establish Walras' Law as a special case of macro-equilibrium in a modern capitalist economy. The hard core of a general theory of capitalism, can only be a theory of capital. If this is the case, then a monetary theory should also be essentially linked to capital. This work presents an alternative.

Notes to Chapter 5.

[1] "Real Analysis proceeds from the principle that all the essential phenomena of economic life are capable of being described in terms of goods and services, of decisions about them, and of relations between them. Money enters the picture only in the modest role of a technical device that has been adopted in order to facilitate transactions...So long as it functions normally, it does not affect the economic process, which behaves in the same way as it would in a barter economy: this is essentially what the concept of Neutral Money implies."[…]"Monetary Analysis introduces the element of money on the very ground floor of our analytic structure and abandons the idea that all essential features of our economic life can be represented by a barter-economy model." Schumpeter, J. A. 1954. History of Economic Analysis. New York: Oxford University Press. pp. 277-78.

[2] Customarily, money is defined as anything that serves as a generally accepted medium of exchange, as a standard or measure of value and a means to save or store purchasing power. When the State declares the national money to be the statutory means of payment (currency): everyone is obliged to accept it as payment for services, then it functions as legal tender, that is as an instrument of release of debts and obligations. In this study and at a very high level of abstraction money is defined as abstract acquisition power, that is acquisition power not linked to a concrete or a specific commodity or group of commodities. Money is considered neutral when it does not have real effects, in other words, when the results, say values and incomes, obtained in a pure barter economy, are not altered by the introduction of money, caeteris paribus.

[3] Under some circumstances, particularly when important capital loses are involved, these processes can take a long time, given that they may involve generalized bankruptcy proceedings or even generalized financial crises where the stability of the system is at stake.

[4] If this is the case, and I believe it is, we should see in reality, for example, that the value of all financial transactions has not a direct and stable relationship with real output, or income as customarily defined. Also we should see that there is not a relationship between savings and wealth, comprising of course capital, against all traditional prescriptions more savings do not mean more wealth. Among other puzzling phenomena. That is, puzzling from the perspective of standard analysis. Certainly, our theories would be falsified if there was a stable relationship between all financial transactions and income, and if wealth was a direct simple function of savings.

[5] Walras' Law posits that if prices are such that all markets for non-money commodities satisfy the general equilibrium condition that excess demands are zero, then the money market should be also in equilibrium, the excess demand for money will be also zero. In other words if supply equals demand on *m-1* markets the same equality should also hold in the m^{th}. As should be well known this is not an arbitrary postulate, besides being a matter of elemental logic, it is an economic postulate derived in a logically consistent way from the principles of general equilibrium analysis, i.e. individual rational behavior and systemic analysis. What Lange defined as Walras' Law is formally equivalent to Say's Law of Markets, at least in the aggregative version of Say's principle, however it has been argued that economically they are not necessarily equivalent. For a detailed treatment from the Neo-Walrasian-Keynesian perspective see: Clower, Robert and Leijonhufvud, Axel. "Say's Principle, What it Means and Doesn't Mean" in Leijonhufvud, Axel "Information and Coordination" Oxford University Press 1981. Chapter Five. Pp. 79,101. The issues at stake are clearly defined and explained but you do not have to agree with their final conclusion that rejects the linkage of Say's Law with rational behavior, given that Walras' Law is derived from individual rational behavior: "Say's Principle is also significantly diminished as a theoretical proposition by suggesting incorrectly that it is valid only if all individuals in the economic system are behaving optimally." P. 101

[6] Of course, heretics exist and have existed that question the validity or general applicability of the quantitative theory of money in its various incarnations, but it is outside of the scope of the present analysis to review them. As I will show, the proposed alternatives developed in this work transcend the neo-quantitative theories of money and in my view also the fragmentary critiques poised at them by 'heretics.' I use the term heretics in the sense used by Axel Leijonhufvud in some of his pieces about monetary theory. (For example, Leijonhufvud (1981) Chap. 8)

[7] M total money supply, V, velocity of circulation, T total transactions in real terms or output in constant money prices, P price level. MV, total aggregate demand. In its rudimentary version, see next footnote, V and T are considered as constants, hence P depends only on M. Moving forward I will say that I agree with the general perspective of the Neo-Walrasians, that typically argue that in a closed economy the absolute levels of money prices and aggregate money income depend *ultimately* on the quantity of legal tender means of payment as determined by the fiscal and monetary operations of government; but that the impact effects of autonomous changes in the stock of legal-tender money cannot be disentangled from other and equally important sources of economic disturbance--technological, phsychological, etc.--not, at least, by visual inspection of historical time-series data and casual study of related events. More pointedly, legal tender money--which does not include either demand or time deposits-- is merely one of many generally acceptable means of payment. The great bulk of objects which people regard as "money" at any given point in time consists of debt instruments, the amounts of which are determined in the short run not by government authorities but by the general public....it is absurd to assign a prominent role in cyclical movements to variations in the stock of legal-tender money, and it is even more absurd to treat the total "stock of money," however one might define it as an independent variable. See, Clower, R. ps. 69-70. My proposed alternative, at least in its general outline, should be clear by now.

[8] Harris, Laurence. "Monetary Theory" McGraw Hill Book Company New York. 1981. See Chap. IV. Harris argues that the rudimentary version of the quantity theory of money, which Keynes associated to the classics, that is the proposition that an exogenous change in the money supply causes a proportional change in the level of prices, is in fact a miss-representation of the writings of classical monetary theorists whom devoted the most significant parts of their work to the analysis of the interactions of the different variables involved in the theory.

[9] Many authors have noted that the idea that the demand for money also depends on the interest rate, the state of "confidence," among other variables was a commonplace by the end of the XIXth century. See for example, Harris, (1981).

[10] Milton Friedman in "The Quantity Theory of Money: A Restament" in Friedman, M. "Studies in the Quantity Theory of Money" Chicago: The University of Chicago Press. 1956. pp. 3-21. States that the quantity theory of money is essentially a theory for the demand for money. In this essay Friedman posits that the demand for money depends on the agent's

total resources or wealth, which constitutes the restriction of the maximization problem, and that it is determined, in a purely neoclassical fashion, by equalizing in the margin the yields of money with those of alternative assets. The yield of money, in this context the utility of money, derives from the services it provides as a transactions device, facilitating trade, and the provision of security against bankruptcy. The yield of alternative assets is considered in real and nominal terms. In short, Friedman presents a money demand function where the level of real balances depends on the interest rate on bonds, the yields of stock, the level of prices as a measure of the yield of physical durable assets, real output as a proxy for wealth, preferences and the relationship between human and non-human wealth. Agents will maximize their utility of holding money. The result is that the desired real money balances are a stable function of the interest rate, real output (or transactions), and other variables. In subsequent works and because of empirical (econometric results that showed a weak or insignificant relationship between the interest rate and the demand for money) and theoretical (the permanent income theory of consumption) reasons, Friedman developed a demand for money function dependent entirely on the permanent income or its proxy the anticipated or expected income, without the interest rate playing a role. See among others, "A Theory of the Consumption Function" 1957. "The Demand for Money: Some Theoretical and Empirical Results." *Journal of Political Economy,* vol. 67, pp. 327-351 August 1959. "A Theoretical Framework for Monetary Analysis". *Journal of Political Economy,* vol. 78, April-May 1970. Needless to say for Keynesians, post-Keynesians et. al. The interest rate still plays a crucial role in the demand for money.

[11] In terms of the Cambridge equation real money balances can be expressed as $M/P = kY$

[12] Patinkin's theory of the real balances effect, follows Sir John Hicks famous "A Suggestion for Simplifying the Theory Money" (1934) essay, included in Starr (1989) book quoted below. Also follows on the lines of Hicks' "Mr. Keynes and the 'Classics' A suggested Interpretation." (1937). Both seminal contributions on which most of postwar monetary theory has been developed. Patinkin handles the demand for money, that is the demand for real balances, by including it in the utility functions of individuals. Thereby following Hicks idea that the old conundrum that "money is not demanded for its own sake" should be abandoned and to deal with money as a good using the proven tools of value theory. Hicks many years after his famous suggestions showed considerable dissatisfaction with this approach: [to follow Patinkin and to add to Walras' barter model] a 'demand for real balances' on the same level as the demand for commodities for want-satisfaction, seems to me to do no more than cut the knot." Sir John Hicks, "Critical Essays in Monetary Theory" Oxford: Oxford University Press. 1967. (p. 3) Also quoted by Leijonhufvud, Axel. Information and Coordination. New York & Oxford. Oxford University Press. 1981. p. 220.

[13] **"A critique of the transactions-based theory of the demand for money"** "We focus our attention on demand deposits, because these are the part of money most directly under the control of monetary authorities, and then slightly more broadly, on M1, which includes currency…Keynes spoke of three motives for holding money: the precautionary, the speculative and the transactions motive. Given our definition, only the third is relevant. The other two motives are related to the use of money as a store of value; and as a store value, money is dominated by T-bills and money market mutual funds, which yield higher rates of interest. Though some economists have suggested that Keynes' definition of money really did include these assets ("L" in the standard terminology), surely this broad aggregate is not under the control of monetary authorities. Even when monetary authorities set the money supply as a target, they never focus their attention on this broad measure. Empirical studies have concentrated their attention on narrower definitions, such as M1 (or, as M1 has done increasingly poorly, on M2)…Thus, an analysis of the demand for *money* (as opposed to dollar denominated government insured short term assets) must focus on the transactions demand for money(…)The past fifteen years have witnessed remarkable changes in transactions technologies. Computers enable the velocity of circulation to become virtually infinite,…The relationship between conventionally measured money and income has not been stable in recent years. That it would change would be predicted by the theory, given the changes in transactions technology. But the fact that the relationship is not *stable*, that the changes in velocity do not seem to be predictable, not only undermines the usefulness of the theory for practical purposes. It also forces us to reconsider the foundations of the theory. Upon reflection, it becomes clear that the transaction demand monetary theory was—and should have been recognized to be—badly flawed." Stiglitz and Greenwald, 2003. Pp 11-12.

[14] "The standard argument behind the liquidity trap, however, is no longer widely accepted. The standard argument is that investors, expecting that the low interest rate will not persist, become increasingly frightened of putting more and more of their money into long-term government bonds. Thus the long-term rate fails to fall—and so longer-term investments fail to increase. The reason that individuals become increasingly adverse to putting their money into long-term bonds is that they believe in mean reversion—that the low interest rates will not persist, so that the price of long-term bonds will fall. But not only is it the case that there is little evidence of mean reversion, but if there were, it would presumably already have been reflected in the price of long-term bonds, so that there would be no presumption of a large fall in price in long-term bonds. (Footnote 25)." Stiglitz and Greenwald, 2003. Pp. 24-25.

[15] Hanh, F. H. "On some problems of proving the existence of an equilibrium in a monetary economy" In *The Theory of Interest Rates* F. Hahn and F. Brechling, eds. 1966, Macmillan, London and Basingstoke.

[16] Starr, Ross M. Editor "General Equilibrium Models Of Monetary Economies" Studies in the Static Foundations of Monetary Theory. Academic Press, Inc. Harcourt Brace Jovanovich, Publishers. 1989. This book deals with one of the classic problems of economic theory: the integration of the theory of money and the theory of value. Questions addressed: the functions of money in the economy, how it promotes efficient allocation, how the value of an intrinsically worthless fiat money is sustained in a market equilibrium. It does not deal with the question of capital and it follows the Smithian tradition, more implicitly than explicitly, of considering profits as a cost. Overall Jaffé's critique applies.

[17] The Arrow-Debreu theory positively denies a role for money as a store of value or as a medium of exchange. "A class of models that so fully repudiates money seems a curious jumping-off place for a monetary theory." Starr, p. 4.

[18] Future markets execute the intertemporal allocation functions which would otherwise be performed using a store of value. Trade is not bilateral, but omnilateral; all trades takes place in a single marketing instant and place where traders meet all other traders at once. Each household and firm executes only a single lifetime transaction. Hence no role for a medium of exchange can arise as a token of value carried between trades.

[19] Starr, op. cit. Pp. 343.

[20] "The financial asset is identified as money, and restoration of efficient resource allocation in equilibrium is shown to result." Starr, op. cit. Pp. 343.
[21] "A single essential modification of the Walrasian model is sufficient to provide the additional complexity of structure needed to provide a role for money in trade: the budget constraint applies separately at each date and to each transaction. The result is a powerful need for a token of value to carry between transactions. Further, the token should be unique and available in sufficient quantity to sustain trade." Starr, p. 343.
[22] Starr, p. 344.
[23] *"if money didn't exist, we should have to invent it."* See footnote 39 above.
[24] Oxford: Oxford University Press. 1967.
[25] Leijonhufvud, Axel. "Monetary Theory in Hicksian Perspective" Chapter Eight "Information and Coordination" pp. 220-221. Oxford: Oxford University Press. 1981.
[26] Hicks, 1961. (p. 15) Quoted by Leijonhufvud (1981) p. 222.
[27] In the context of Leijonhufvud's critical analysis of the traditional Walrasian models where the role of money as a store of value did not have any place. I wish to thank Dra. Mantey for this observation.
[28] I would say that even Stiglitz theory can be considered as a transactions based theory, in his case a theory of the demand for credit to support transactions.
[29] Different than the in-voluntary demand for money determined by transactions requirements.
[30] The Speculative demand for money is simply non-existing in this world of perfect information.
[31] The classic paper on the theme is: **Credit Rationing in Markets with Imperfect Information,** Joseph E. Stiglitz, Andrew Weiss. In *American Economic Review*, Vol. 71, No. 3 (Jun., 1981) , pp. 393-410. "Why is credit rationed? Perhaps the most basic tenet of economics is that market equilibrium entails supply equalling demand; that if demand should exceed supply, prices will rise, decreasing demand and/or increasing supply until demand and supply are equated at the new equilibrium price. So if prices do their job, rationing should not exist. However, credit rationing and unemployment do in fact exist. They seem to imply an excess demand for loanable funds or an excess supply of workers.
One method of "explaining" these conditions associates them with short—or long-term disequilibrium. In the short term they are viewed as *temporary disequilibrium* phenomena; that is, the economy has incurred an exogenous shock, and for reasons not fully explained, there is some stickiness in the prices of labor or capital (wages and interest rates) so that there is a transitional period during which rationing of jobs or credit occurs. On the other hand, long-term unemployment (above some "natural rate") or credit rationing is explained by governmental constraints such as usury laws or minimum wage legislation. (Footnote 1)
The object of this paper is to show that in *equilibrium* a loan market may be characterized by credit rationing. Banks making loans are concerned about the interest rate they receive on the loan, and the riskiness of the loan. However, the interest rate a bank charges may itself affect the riskiness of the pool of loans by either: 1) sorting potential borrowers (the adverse selection effect); or 2) affecting the actions of borrowers (the incentive effect). Both effects derive directly from the residual imperfect information which is present in loan markets after banks have evaluated loan applications. When the price (interest rate) affects the nature of the transaction, it may not also clear the market.
The adverse selection aspect of interest rates is a consequence of different borrowers having different probabilities of repaying their loan. The expected return to the bank obviously depends on the probability of repayment, so the bank would like to be able to identify borrowers who are more likely to repay. It is difficult to identify "good borrowers," and to do so requires the bank to use a variety of *screening devices.* The interest rate which an individual is willing to pay may act as one of such screening device: those who are willing to pay high interest rates may, on average, be worse risks; they are willing to borrow at high interest rates because they perceive their probability of repaying the loan to be low. As the interest rate rises, the average "riskiness" of those who borrow increases, possibly lowering the bank's profits. Similarly, as the interest rate and other terms of the contract change, the behavior of the borrower is likely to change. For instance, raising the interest rate decreases the return on projects which succeed. We will show that higher interest rates induce firms to undertake projects with lower probabilities of success but higher payoffs when successful." Pp. 393.
[32] "Current dicta require that macroeconomics (treating here monetary economics as a branch of macroeconomics) be based on microeconomics principles. Some economists, who, in other respects, seem to insist that models should not be ad hoc, that they should be based on principles of maximization, took the low road around the difficulties posed by these strictures, putting money into the utility function or the production function—a trick, which repeated often enough, took on a resemblance of respectability! Others took the high road, creating a demand for money by assuming that it is required for transactions, modelling it as an old fashioned cash in advance constraint—criticisms that it was an ad hoc assumption that was blatantly false being brushed aside with the remark that these were topics for future research." Stiglitz and Greenwald, 2003. pp. 8.
[33] Some like to say that the A&D world is like a pure barter economy, historically there has never been something like that. As we have said before, the A&D vision of a pure free market world, if it comes from somewhere is from the future. Only a hyper-developed society with hyper-developed payments and credit systems could come close to such an ideal world: Smith's System of 'Natural' Liberty. A lot of social and *financial* engineering would be required to construct such a world. The gargantuan accumulated knowledge and human capital of the world's financial systems could be re-directed towards such a task.
[34] Clearly if this is a temporary equilibrium we should have included time indicators in the formulas, we did not to minimize notational clutter. As we have said before the existence of positive residual profits precludes us from attributing automatically to this particular temporary equilibrium all the optimal characteristics of a full long term equilibrium where the second classical equilibrium condition, prices equal costs, holds. This temporary equilibrium would be a Nash equilibrium, people are doing the best that they can under the circumstances, but it is not a Pareto optimal situation and there is no way of telling if we are near or far from such an ideal long term result. Clearly, under given circumstances the fact that people are doing the best they can, does not mean that they are doing good.

[35] The previous conclusion runs against a quite old view that finds the root of a surplus value in a physical surplus of some kind or another, a vision that is clearly present in Ricardo and Marx, more recently in Fisher's conception of the surplus and the 'own rates of return', in the neoclassical physical marginal productivity of capital, in the single good economy world of the New Classicals and also in the Post-Ricardian theories, like Sraffa's. However, profits are only a surplus value and this cannot be linked to a physical surplus.

[36] At this point of the analysis simply introduced from outside the system.

[37] Chapter IV, Book I, pp. 66. Quoted by Alvin Hansen in "Monetary Theory and Fiscal Policy" McGraw Hill Book Company, Inc. New York. 1949. pp.12. (Spanish Edition "Teoria Monetaria y Politica Fiscal" Fondo de Cultura Economica, 1954. pp. 12.)

[38] Considering that total transactions in constant money prices, T, are proportional to real output or income, then T, can be substituted by, $\underline{Y}$, income in real terms, then: $MV = P\underline{Y} = Y$. Where, Y, represents nominal income, then, $\underline{Y} = Y/P$, that is real output is nominal output deflated by the price level or the 'value of money' which depends on, M, the money supply. The real value of money is considered as $M/P = kY = Y/V$ and $P = (MV)/Y$.

[39] Of course, Keynes, the Keynesians and some post-Keynesians have also argued that there is a link between the financial and monetary spheres through the speculative demand for money as considered in liquidity preference theories, however, the lack of a stable relationship between the demand for money and the interest rate as decades of empirical research have shown, has significantly weakened this approach within monetary theory and policy debates.

[40] It is a well known history that monetary economists with verificationist inclinations, have customarily changed the definitions of money they use so they conform with their statistical models. Some while invoking Popper at the same time...

[41] Gurley and Shaw (1960) introduced the distinction of internal and external money in an effort within macroeconomics to determine if money could be considered as an asset. Their distinction is based on a double entry analysis of the assets and liabilities of the private sector and its relationships with the banking and public sectors. Those monetary or financial assets held by some members of the community that are not cancelled with liabilities towards other agents, are considered as external money, the rest is internal money only. External money constitutes a net asset, in monetary or financial form, of the community. For a review on this debate see Harris, L. (1981) chapter III. Pp. 47-62. In this work, I have argued that capital is the principal determinant of the value of external money.

[42] As some authors have recently suggested these can be endogenous processes in modern economies. Dr. Guadalupe Mantey made this point to me and referred to the following book: The 'New' Monetary Policy: Implications & Relevance, 2005, Cheltenham: Edward Elgar, Michelle Baddeley co-edited with Philip Arestis and John McCombie.

[43] See: "The Cash Nexus: Money and Power in the Modern World, 1700-2000." Ferguson, Niall. Basic Books, 2001.

[44] Note 16 above.

[45] The limits are flexible, for example the central bank can buy financial assets from investors at prices way higher than market prices, to avoid a meltdown, or simply to rescue some groups for political reasons.

[46] See note 10 for references.

[47] We defined as systematic risk: the variability of the returns on capital as determined endogenously by the relationship between the economy's rate of return, the interest rate and leverage that we have established, and measured as the standard deviation of returns on capital.See 4.6 above.

[48] From chapter four, we have: $B + S^0 = V^C$ the value at cost of the firm, funded with debt and equity; Then, Leverage: $L = B / V^C$ and $S^0 = V^C (1 - L)$ then we have: $r = Li + (1-L) r_s$ and $r_s = (r - Li) / (1-L)$ where r_s is the return on equity, or return on capital; r is the overall return of the economy; i is the interest rate. Transactors face as givens the costs of the firm, the interest rate and the economy's profit rate. So to achieve a certain return on capital they can only vary leverage.

[49] Meaning: if they do not fall into bankruptcy first. As we saw very small errors in expectations or variations in the interest and/or profit rates may cause huge changes in the profitability of capital, which can easily bankrupt highly leveraged firms and investors. Certainly, having available acquisition power, reduces the chances of bankruptcy. Or to express it in a different way, cash or liquid reserves in a portfolio reduce the overall level of risk for the individual investor or firm, simply because they allow a rapid reduction of leverage if needed. As is usually stated having money available offers a protection against bankruptcy. In general, banks will demand money from firms to service the loans they have extended them, or will grant them more credit. If banks perceive an increased systematic risk environment, they may refuse to roll over loans and demand payment in cash. Of course, overall internal money, debt, does not have a net value. External money does have a net value and this, we have hypothesized, is directly associated to the value of capital.

[50] See James Tobin, "Liquidity Preference as Behavior Towards Risk" Review of Economic Studies, 67. 1958. pp. 65-86. Also "A General Equilibrium Approach to Monetary Theory" Journal of Money, Credit and Banking, 1. pp. 15-29.

[51] Stiglitz and Greenwald, 2003. pp. 20-21

[52] As we know by now, the former statements rely on the application of Say's Law to finance, or equivalently, on the analysis of the financial world through the optic of the balance sheet only, leaving aside the profits and loses statement. In this vision capital markets have an insignificant, if any, impact on the short and in the long term functioning of the economy. The Hicksian and Knightian belief, that capital effects are an 'insignificant illusion' is assumed. Even when the complete universe of securities is analyzed, as is the case with modern portfolio theory, the problem is stated considering as given the value of wealth to be allocated. For us the value of wealth is a variable to be determined.

[53] Bainard, W. C. and Tobin, James. "Pitfalls in Financial Model Building" American Economic Review, Proceedings. May, 1968.

[54] Empirically it has been shown that there is a close direct relationship between q and investment with a one year lag. In my opinion, the fact that in reality, for example, practically always in the postwar USA, the aggregate q ratio is different than one, is enough evidence that capital effects, positive and negative, exist and are very significant.

[55] In the aggregate the net value of debt cancels out, so the net value of capital, κ , could be considered grossly equivalent to 1 – q.

[56] The consideration of the money supply as endogenous is characteristic of the contemporary Post-Keynesians, see for example: Rochon, Louis-Philippe. (1999) "Credit, Money and Production: An Alternative Post-Keynesian Approach" Cheltenham: Edward Elgar Publishing. (2003) Modern Theories of Money, "On Money and Endogenous Money": post-Keynesian and Circulation Approaches." In Rochon, L-P. and S. Rossi (eds), Cheltenham: Edward Elgar Publishing. Nevertheless our perspective is quite different from the new PKs.

[57] Of course, in the real world money is demanded to support transactions, people do keep monetary balances to support their transactions and for a variety of reasons. We have assumed that in a hyper-developed free market world á la A&D, the demand for money for transactions, an involuntary demand to use Hicks denomination, is non-existent because other institutions perform this role. This in order to develop a foundation for the demand for money directly connected to general equilibrium conditions, perfect information and no transaction costs.

[58] Capital gains or loses at the firm level, may impact the aggregate demand for money. For example, a highly leveraged firm, that experiences capital loses may demand money to cover its liabilities and avoid bankruptcy proceedings. Or a firm that experiences capital gains, may demand money to finance a takeover by increasing its leverage, etc., etc.

[59] Which is a formulation that formally is similar to the Marshallian version that posits that the demand for money depends both on transactions and on the value of assets: **M = kY + k'A.**

[60] See section 3.5 above: "For it is through the voluntary part [of the demand for money] that monetary disturbances operate, and, it is on the voluntary part that monetary policy must have its effects." Hicks, 1961. (p. 15) Quoted by Leijonhufvud (1981) p. 222.

[61] For example, the demand for credit, leverage, is dependent on the profitability goals of firms and investors. Given the profitability of the firm and the economy, and given the interest rate, investors and firms will target their returns on capital and adjust leverage accordingly. The amount of credit would be determined. With a given interest rate, if the economy's profit rate starts to go down, investors and firms may compensate with more leverage, to maintain their required returns. Credit will expand without changes in the interest rate. If, caeteris paribus, the monetary authorities increase the interest rate, investors and firms might as well compensate with leverage and credit will expand. If, the monetary authorities reduce the interest rate, caeteris paribus, investors and firms, may reduce their leverage, given that they may be able to achieve their targeted required returns on capital, with less debt and with less variability in returns or risk.

[62] However, if as we concluded before the net value of capital is determined by the profitability of the economy and the structure of capital, and in a monetary economy capital is held partially in money and partially in shares. Hence the value of money in terms of commodities would be determined in a residual manner and policies designed with the purpose of maintaining the value of shares of capital in real terms, may only be effective at the expense of the value of money. And the other way around. In advanced modern capitalist economies, central banks watch closely the evolution of stock markets and some observers have argued that they should also act to stabilize the prices of shares. Some have argued that even though it is not a legal role to play, central banks do it anyway. In my perspective central banks should let the prices of capital adjust freely, while controlling systematic risk and keeping capital effects at bay.

[63] Goods which, because they cannot be withheld from one individual without withholding them from all, must be supplied communally. The private sector would not supply these services because it does not have the power to oblige the community as a whole to pay for them, and cannot exclude any individual from consuming the public good. The state via taxation can fund the provision of public goods. An environment free of inflation and financial crises is a public good.

[64] By banks we mean commercial banks and other institutions that provide similar services.

[65] See for example Leijonhufvud, Axel. "The Wicksell Connection: Variations on a Theme." Leijonhufvud writes: "How plausible this Keynesian "disagreement" between entrepreneurs and speculators strikes one as being depends on what fables of capital and growth one deems more instructive. Like the Austrians, and more lately the Cambridge Keynesians, but unlike Knightians, I would emphasize the heterogeneity of capital goods and the subjectivity of entrepreneurial demand expectations. There can be no "uniform rate of profit" inferable from production sector relations alone that could be calculated *ex ante* by speculators as a guide to the equilibrium rate of real interest…Entrepreneurial pessimism or optimism cannot be conceptualized as fluctuations in some agreed-upon "number," such as "the" internal rate of return. Rather, whatever coherence in investment activities is achieved comes about through each entrepreneur taking the interest rate established in the market as the appropriate opportunity cost of financial capital and adjusting his rate of investment so as to obtain a subjective efficiency rate at the margin equal to the market rate of interest." In Information and Coordination, pp. 197-198.

Chapter Six. Overview and Research Agenda.

Introduction.-

In this essay I have developed some theoretical alternatives to the main problems identified in the initial chapter of this work:[1] the determination of profits and the profit rate, the nature of capital and its value, the importance of the capital structure, money and the interest rate. To better understand the dynamics of modern capitalist economies. We have argued that the interactions of commodities or real markets, with capital and monetary markets are not neutral. They impinge directly on the level and the distribution of wealth, through changes in the value of capital. Variations in the value and distribution of wealth are at the core of the dynamics of modern capitalist economies.

I have followed a radically different methodological approach[2] inspired by Imre Lakatos' proposals.[3] As Lakatos expressed it, the first step in a serious critique of a scientific theory is to reconstruct and to improve its logical and deductive articulation; a rational critique does not assume the existence of a fully articulated deductive structure, a rational critique creates it. Lakatos saw clearly that it was impossible to understand the evolution of science or to have a totally descriptive historiography of science, without a philosophy of science. That is, a history of science free of methodological considerations. Lakatos as well understood that a pure philosophy of science, that is an a-historical, purely prescriptive methodology of science, was also impossible. This vicious circle can be expressed paraphrasing Popper: those who want to tell it like it is, will end telling it as it should be. Lakatos took as his maxim a paraphrase of one of Kant's dicta: "Philosophy of science without history of science is empty; history of science without philosophy of science is blind"[4] and tried to develop Popper's contributions into a "critical tool of historical research." My Lakatosian inspired rational reconstruction has tried to re-create the deductive structure at the hard

core of the scientific[5] research programme, SRP, of classical political economy. I have used this rational reconstruction as a tool for the critical analysis of some of the most relevant contemporary currents of economic thought, and mainly to develop theoretical alternatives to explain the aggregate dynamics of modern capitalist economies. In other words, I have used epistemology not only as a "critical tool of historical research" but also as a *"critical tool of scientific research."*

In my interpretation, Lakatos's hard core of a SRP should be seen mainly as a set of analytic propositions, a logical deductive structure that was developed slowly, through a long, preliminary, process of trial and error.[6] Lakatos refers to the basic fundamental theories at the heart of a SRP as the programme's hard core.[7] Lakatos also speaks about the hard core as a methaphysical or irrefutable set of propositions or postulates, but distinguishes between programs with a methaphysical hard core and those with a refutable one.[8]

I have argued that classical political economy constitutes a relatively well developed science with a common domain: the generation and the distribution of wealth, with a short and a long-run consideration; and with a relatively complete shared theoretical system, characterized by two alternative explanations regarding the system's dynamics that revolve around two different perspectives on profits. These, I identify as the Smithian, profits as a cost, and the Ricardian, profits as a residual, perspectives. In my view contemporary economics is still fractured around this divide and some of the crucial unresolved theoretical debates of recent times are directly traceable to these central questions: What is the nature of profits and capital, of money and the interest rate? And how profits and capital, money and the interest the interest rate, impinge on the dynamics of free markets and of capitalism as distinct social entities?

In this essay, I have been developing the necessary building blocks to provide answers to some of these questions, in the context of the critico/rational reconstruction[9] of the theoretical system[10] of classical political economy.[11]

In the following sections, I will present the theoretical alternatives developed in previous chapters, regarding profits, capital, the rate of profits, the capital or financial structure, money and interest, in an integrated fashion. The purpose is to present general theory of the economics of capitalism. A theory that can help us explain the dynamics of modern capitalist economies, through the understanding of the day to day, or short term, interaction of the different spheres of economic life: the *real* or commodities' markets, the capital and financial markets, and the monetary market; as well as the consequences of these interactions in the long term dynamics of the economy.

6.1 Classical and New Classical: The economics of the free market.

To summarize the analysis presented in the first chapter and to provide an outline of the main issues regarding the contributions of this work, I will use a basic formalization of The Theoretical System of Classical Political Economy, as developed in my previous work.

Consider an economy with given labor, land and physical means of production, capital, resources that are used for production with a given technology. The wealth of the economy is represented by the total output of commodities: all trade able goods and services. In the spirit of the classics we assume an economy with private property where exchange takes place in equal value conditions and individuals seek to maximize their wealth. In other words, we assume free market conditions or pure competition in modern terms.

Y = Wealth (Total output of commodities)[12]

T = Land (All non-Reproducible Natural Resources)

L = Labor (Homogeneous or Reducible to same type)

K = Capital (Conceived physically as produced means of production)

Total wealth would equal the aggregate income of the owners of the resources employed in production or of the classes involved in the productive process, where:

R : total rents received by the owners of land;

W : total wages received by labor, including managerial wages;

P : total profits accrued to the entrepreneurs or capitalists in control of production process.

The associated distributional variables are:

r = Rent (Rate per unit of Land)

w = Wage (Rate per unit of Labor)

π = Rate of Profits

And,

$$Y = rT + wL + \pi K$$

where:

$rT = R$; total rents

$wL = W$; total wages

$\pi K = P$; total profits

So

$$Y = R + W + P$$

That is, total wealth or production is equal to the sum of all forms of income, demand equals supply. Say's law of markets rules: Supply creates its own demand. This is what we have termed as the first classical equilibrium condition, in Walrasian terms it implies that all markets clear. This equilibrium condition applies both in the short and in the long term.

The Smithian perspective approaches the determination of total output Y, through a supply and demand analysis of independent markets for every individual commodity and for land (T), labor (L), and capital (K), which respond to the demands of self interested individuals acting as consumers and producers, who want to obtain the most out of their resources.[13]

In Smith prices ultimately reflect costs of production. The price of an individual commodity, Y_i , is equal to the necessary resources employed in its production, that is T_i ; L_i ; and K_i , determined by technological conditions, times their market prices:

$$Y_i = rT_i + wL_i + \pi K_i$$

Obviously,

$$Y = \sum_{i=1}^{n} Y_i$$

And

$$Y = R + W + P$$

In each individual market for a commodity the quantities and prices demanded and supplied, will vary affecting the demand for the resources

required to produce it, these changes will affect the markets for labor, land and capital. If the price of a commodity is above its cost of production, producers will tend to increase its production and hence augment the demand for the original factors of production and, to express it in textbook terms, will push their prices up. If the price of a commodity is below its production cost, the use of productive resources in that activity will be reduced and their prices will tend to fall. Ultimately commodity prices will be fixed at the level where costs of production in terms of land, labor and capital are exactly covered. Clearly the prices for land, labor and capital, determined in independent markets by independent demand and supply forces should also vary until a natural or, in contemporary terms, equilibrium price for land in the form of rents, for labor as natural wages, and for capital as the natural rate of profit or interest, ($\underline{r}$, $\underline{w}$, and $\underline{\pi}$) is established.

In the Smithian tradition, the forces governing the dynamics of each one of the original markets are explained by special theories, but in general, the level of rents, wages, interest or profits, is seen as reflecting the usefulness, demand, and the scarcity or supply, of the particular 'factor'. At a certain moment in time, the supply of the original factors is considered as given, land by the generosity of god, labor by the laws of population and accumulated capital by the thrift of its owners, the supply of capital is the result of the saving decisions of individuals that abstain from consumption, the natural price of capital is their remuneration, a compensation for their sacrifice. The natural or equilibrium prices of particular commodities will reflect exactly the amount of resources (T_i, L_i, and K_i), technically determined, employed in its production times its natural prices ($\underline{r}$, $\underline{w}$, and $\underline{\pi}$). That is, for commodity, *i* , its natural or equilibrium price is:

$$\underline{Y}_i = \underline{r}T_i + \underline{w}L_i + \underline{\pi}K_i$$

Which corresponds to the second classical equilibrium condition, prices are equal to costs. Obviously in the Smithian version where returns on capital

correspond to the cost of capital, the natural price of a commodity includes the natural price of capital.

For all individual commodities, the natural equilibrium price would correspond to the cost of production, so it will be a minimum price, and given that when the natural prices of 'original factors' are achieved, its supply is the maximum attainable, total output is a maximum too. These are the positive social welfare effects of the Smithian 'Invisible hand theorem'. Of course, Adam Smith did not state it this way, but the only logical level of output equilibrium is determined at "full employment" and it is a result that implies a 'general equilibrium,' that is the price of a commodity corresponds to its natural level, if an only if, when all the commodities and the necessary resources to produce them, have reached their natural price level. And if profits are to be positive at this point, logic forces us to consider them as a cost: the cost of capital. A necessary cost of production, which corresponds to the 'natural price' of capital. Capital, of course, conceived as a scarce resource in physical terms. In the Smithian long term, the first and the second classical equilibrium conditions: markets clear and prices equal costs, are satisfied. What we have called the third classical equilibrium condition, returns on capital are equalized, posits that competition results in a uniform rate of profits on capital across firms and industries. In the Smithian world, this last third classical equilibrium condition is indistinguishable from the second, because it is assumed that capital has a cost, a uniform cost, and that in equilibrium the cost of capital is equal to its price: the rate of interest which is the same as the rate of profits. We have argued that the assimilation of these two conditions is incorrect, the equalization of the returns on capital should be considered as a different phenomenon from the equalization of prices to costs. This proposition, as we have seen, requires a radical redefinition of capital and the profitability of capital.

Certainly the idea of a uniform rate of profit on capital has very solid grounds on a competitive equilibrium, particularly considering that, more often

than not, capital is assumed to be highly mobile, and that competition guarantees that equal commodities are equally priced. Nevertheless, there are quite serious problems here, what exactly is what is being equalized?

Neither Smith nor his followers have provided us with a satisfactory theory of the determination of the natural level of profits as the price or cost of capital. That is a theory of, $\underline{\pi}$. Of course, within this view a central problem remains unsolved, if capital is a set of commodities, the means of production, the prices of the individual commodities that comprise capital, should be determined the same way as every other commodity's price, that is, by their cost of production. So we have two inconsistent capital pricing mechanisms: one for capital in general, the price of capital or the rate of profit or the rate of interest; and another, that determines the prices of every commodity, including the means of production that constitute capital, based on the cost of producing them or it.

The logic of the classical theoretical system cannot accept both. We need a clear unambiguous definition of capital that corresponds to the realities of a modern capitalist economy. I have argued for the definition of capital as the property right over current and future residual profits, and I have presented an alternative theory of the profit rate.

The facile implicit conclusion that capital can be assimilated to money and that the natural price of capital is the interest rate, characteristic of the ancient loanable funds theory, cannot be logically integrated to the classical perspective. Among other reasons because, capital is defined as the set of physical means of production, commodities that are priced as such; and because money is considered only as a token for trade, a unit of account and/or a measuring device. As such money is intrinsically valueless.[14] The economy in the classical system is essentially a non-monetary economy, undistinguishable from a barter economy, so money cannot be considered as a necessary input for production. The modern reference to the financial markets as the place where the interest

rate, and hence the profit rate is determined, without a logical integration of money and capital markets to the workings of commodity markets is simply not enough. Of course, nobody has explicitly and seriously stated that capital is money, nevertheless the visions of capital as something with a cost equal to the interest rate, has as an implication that capital is indistinguishable from money.

The assimilation of capital to money and the return on capital to the interest rate, as determined by the demand and supply of 'funds,' is essentially flawed. Nevertheless, is amazing to see that the venerable loanable funds theory of the interest rate is alive and well, and has even been resurrected by some of the most critical contemporaneous voices of neoclassical thinking and put at the center of a supposedly new, alternative, etc., paradigm of monetary economics.[15]

The Smithian perspective correctly identifies the competitive pricing mechanism at the core of the day to day workings of market economies and the accumulation of capital, in physical terms, as the dominant force for long term economic development. Nevertheless, the determinants of capital accumulation remain obscure, and the Smithian problem of the existence and determination of the so-called cost of capital is still today an issue. The alternative developed in the previous chapters falls within the Ricardian tradition; profits are considered not as a cost but as a residual of value.

David Ricardo's analysis presents a definitive ambiguity regarding the determination of wealth, or total output. As it is well known his main interest was the determination of the distribution of wealth, and in various instances he remarked that the determination of total wealth was not really possible. [16]

As we said in the first chapter, the Ricardian analysis of profits presents two different scenarios: first, a long term equilibrium where profits as a residual disappear and the complete product is distributed between rents and wages. In this scenario total wealth is determined by the Smithian competitive pricing

mechanism, and it implies full employment of physical capital only. The second Ricardian scenario, which I have termed short-term[17], assumes as given the level and the composition of output, that is the level and the composition of aggregate demand, so then we can have positive profits as a residual. This second scenario does not imply full employment at all.

In the Ricardian short-term perspective, total output and demand, fertility of land and technology are considered given, then the level of labor employed is directly dependent on the volume and the composition of demand, given the level of accumulated capital in physical terms and technology. For a given level of employment, L, the wage bill is determined, $W = wL$, because the wage rate, w, is also considered known as determined by social and historical conditions. Here the implicit assumption is that labor is not mobile, wages are rigid. Ricardo assumes diminishing returns in agriculture given the different productivity of available lands, so rents are determined by the differential fertility of the land at the level where marginal land yields no rent, as a result of competition among entrepreneurs. The amount and the qualities of land are known hence total rents, R, are also determined.

In summary,

Y = Given ;
L = f (Y) ; given demand conditions and technology, the level of employment is determined;
W = wL ; where the wage rate is a socio historical given i.e. a subsistence minimum.
R = rT ; with, r, reflecting the structure of rents adjusted by differential productivities at the level where marginal land pays no rent.

Total profits are determined as a residual:

$$P = Y - W - R$$

In the Ricardian short term perspective, capital is circulating capital only and it is equal to the wage fund, or the total of wages advanced in the production process, hence:

$$K = W$$

And the profit rate is,

$$\pi = P / W \text{ ; or } \pi = P / K$$

Contrary to the Smithian perspective, here the profit rate is a ratio between two values: the value of profits and the value of the means of production. The rate of profits is not associated or assimilated to a real cost, i. e. the cost of capital; or, to a price determined in a specific market. However, within this perspective, in Ricardo somewhat implicitly in Marx explicitly, and notably in the contemporaneous Ricardian analysis, à la Sraffa et al, this rate of profits is considered as a uniform rate of profits over capital that results from competition among capitalists. It is clear that this can happen only if we consider that capital is highly mobile while labor is not. The question remains: if, the Ricardian scenario with positive profits is essentially short term—even though scholars as Kurz and Savadori insist that these are long term positions—and it is dependent on the assumption of a given level and composition of income and demand. How can we picture a process of competition among capitalists only that yields a uniform rate of profits as the ratio of the value of profits over the value of the means of production? Such a process implies that capital flows between firms and industries, so how exactly the means of production flow or 'migrate'? and how they do it without affecting the level and composition of output? There is of course an answer, or better said a non-answer, the uniform rate of profits is the interest rate and then capital is assimilated to money. Some scholars have

argued that the truly classical concept of competition, not the neoclassical pure competition concept, comprises the mobility of capital but not labor, and results in the emergence of the so-called system of prices of production. I find it very hard to see any use for this distinction.

In the Ricardian perspective, prices are equal to costs plus a uniform rate of profits. In the simplest case where wages are the only cost or the only form of capital, prices of production would be:

$$Y_i = w_i (1+ \pi)$$

As a result of competition among capitalists, prices of production would reflect an equal rate of profit over products and industries. Returns on capital would be equalized, to express it in more modern ways. Of course, in this simple formulation returns are profits, capital is the means of production or the ancient wage fund, and the rate of profits is the ratio between these two values.

Within this perspective the level of aggregate demand and or output, usually assumed as given, is sometimes associated to a minimum rate of profits, which then determines the level of physical capital utilization and/or investment, and then aggregate demand and output. Certainly, the determination of this minimum level becomes an issue, and quite often we are back to the old implicit idea of capital as money and the minimum profit rate as the interest rate. That is, back to the most basic Smithian idea of the cost of capital as the interest rate. However, the general idea that the level of capacity utilization and/or investment is dependent on the profitability of capital, is quite sound, but requires first the elucidation of the theoretical issues we are dealing with in this work.

Besides the crucial assumption that aggregate demand and its composition are given, which implies the same for output; the Ricardian model is determined within a set of extremely rigid conditions: it is well known, for

example, that this simple model is valid, if and only if, there is one single homogeneous good in the economy, or if wages represent the only input in a multi-good economy. The different, more or less contemporaneous, attempts to generalize the Ricardian approach to a world with a multitude of inputs and outputs, with or without money, share this essential feature: capital and profits, or the surplus, are physical magnitudes. The original Ricardian model relied on a primitive labour value theory of relative prices that has proven to be inconsistent. The profit rate is determined in 'real terms' as the relationship between the value of the surplus and the value of the means of production. As we saw in chapter three, such a uniform rate of profits is of little theoretical or practical interest, it depends on a series of ad hoc assumptions and agents do not respond to it. It also the source of considerable confusion between profits in absolute and relative terms.

In Ricardo, as capital accumulates the economy is forced to use less and less productive lands, profits will decrease and rents will increase. In a Ricardian long term equilibrium profits will disappear, the rate of profits will descend to zero and capital accumulation will stop. We have essentially the same Smithian competitive mechanism at work, and regarding capital and the rate of profits the same shortcomings. In Ricardo's long term, the complete output will be distributed among wages and rents. The logical structure of Ricardo's model requires the assumption of a given level of employment and output, or of aggregate demand. Without this assumption, the only equilibrium level of output that the model admits implies zero profits. Clearly, this is a very uncomfortable position to be in for a theorist of the distribution between profits, wages and rents.[18]

In summary, there is a major inconsistency within the Ricardian/Marxian framework of profits as a residual. It is posited that in equilibrium the rate of profits is equalized, prices of production are formed when an equal rate of profits —defined as the ratio of the value of profits and the value of the means of

production—emerges due to competition across industries and/or firms. Purportedly a long term result, but predicated on a short term proposition: the assumption of a given level and composition of demand and output; alternatively, predicated on the assumption of a minimum rate of profits as determined by ad hoc theories. The consideration of profits as a residual implies that the second classical equilibrium condition: prices equal costs can only be a long term condition that only occurs when profits are equal to zero. The classic Ricardian/Marxian analysis and definition of the uniform rate of profits cannot be sustained without the introduction of ad hoc hypotheses: for example, the rate of profits is equal to the interest rate, or some special assumption about rigidities in the labor market, including one version or another of exploitation theories. If we maintain the idea of capital as the value of the physical means of production, we must abandon the idea of a uniform rate of profits as defined within this perspective. If we abandon the old idea of capital as a thing, we have to redefine the condition of the equalization of returns on capital.

We have argued for a redefinition of capital as a trade able property right, we have rejected the classical notion of a uniform rate of profits measured over the value of the means of production—so cherished in all versions of prices of production theories. We postulated that the proposition of equal returns on capital, a third different general equilibrium condition, is achieved through the short term variations on the value of capital due to arbitrage. We also postulated that the appropriate rate to determine the value of capital is the economy's profit rate, defined as the discount rate that makes the present value of future profits equal to zero. It is around this profit rate that the returns on capital are equalized.

From a contemporaneous point of view, it is interesting to note that a theory of the short term determination of total income and output is missing from the classical perspective. Also we can see that such a theory is linked to the problem of the profitability of capital. A crucial point I want to stress here is that within the Ricardian perspective of profits as a residual, the total level of

employment is either considered as a given or there is the logical need to introduce an alternative theory of income and employment. Alternative, that is, to the Smithian invisible hand theorem which constitutes a theory of the determination of the volume and the composition of real output and of relative prices, also present in Ricardo's long term. A theory that is still alive and well today, but lacks a central piece: the determination of the short term level of demand and output. We have argued that such phenomena are inextricably linked to the dynamics of capital. Both approaches, Smithian and Ricardian, lack a satisfactory explanation of capital and its nature, for both capital is an ambiguous entity, sometimes a set of physical things, sometimes money or funds, etc. And both present us with a quite unsatisfactory theory of the rate of profits and its relationship with the interest rate.

In summary, within the Smithian perspective

$$Y = \underline{Y} = \sum_{i=1}^{n} \underline{Y}_i$$

Where $\underline{Y}_i = \underline{r}T_i + \underline{w}L_i + \underline{\pi}K_i$

And

$\underline{Y} = \underline{R} + \underline{W} + \underline{P}$ where $\underline{P} > 0$ because there is a $\underline{\pi} > 0$

That is the invisible hand system in a free market will take real output to its maximum level, $\underline{Y}$, all prices will be natural (equilibrium) prices, $\underline{Y}_i$: minimum prices reflecting only costs of production. Profits will be positive, if and only if, we consider them as a real cost, the cost of capital, as a price different from the price of the commodities that constitute capital, which is an inconsistency. Again, here is where the loanable funds theory comes in handy, capital is assimilated to money, funds, or credit (as in its new paradigm resurrection), and the cost of capital is the interest rate.

You cannot conceive capital as a set of commodities which are priced as every other commodity and also say that capital in general has a unique price, $\underline{\pi}$, that depends ultimately on its scarcity. Strictly in terms of the classical theoretical system if, we assume as valid the Smithian theory of the determination of the volume of output and relative prices and we conceive capital in physical terms, the only logical conclusion under free market conditions is that profits are zero, $\underline{\pi} = 0$, and capital as something different from things will have zero value. If capital is money, funds or credit, then in a full equilibrium it has a zero value too. In a long term Smithian equilibrium, the economy is demonetized as Hahn concluded.[19]

Within the Ricardian perspective:

$Y < \underline{Y}$ by assumption so $P > 0$

An assumption that eliminates the interesting part of the problem[20], which requires a theory of the determination of Y that admits different equilibrium levels of total output and hence positive profits, a theory that is not present in the Ricardian perspective, then and now. Without such a theory the only logical solution is the long term Ricardian equilibrium where:

$\underline{Y} = \underline{R} + \underline{W}$ because $\underline{P} = 0$

In short, the classical system, in its most basic expression, did not have a theory of the short term determination of income and output; this was determined only in the Smithian long term full equilibrium. Also, it lacked a consistent theory of value and distribution, however, these issues were deemed essential for the explanation of the workings of the economic system. Capital was conceived as a physical entity and there was no clear account of the returns or the cost of capital or the profit rate. Without a clear understanding of capital and its profitability, the

questions pertaining the distribution of wealth and the forces that determined the long term development of the economy, could not be answered.

We have argued that in order to complete the theoretical system of the classics, the problems of profits, capital and the profitability of capital should be addressed within the same framework. The classical economists would try to solve the problem of value and the emergence of profits under conditions of free exchange at market values. That is, in conditions of a general competitive equilibrium, vulgar economists[21] would not. This condition: all commodities are traded strictly on an equal value basis, implied the acceptance of Say's[22] law of markets. That is, supply creates its own demand. It also implied that in equilibrium prices would equal costs, and that the returns on capital should be equalized. The rational analysis of the economy as a whole required that three general equilibrium conditions should be considered: aggregate supply equals aggregate demand, prices equal costs, and the returns on capital are equalized.

The classical perspective also implied the consideration of money as a medium of exchange only and hence, the validity of the classic quantitative theory of money. The consideration of the quantitative theory of money as a common element of the classical theoretical system does not constitute an essential addition to its logical deductive structure, concerned with the determination of value and distribution in real terms mainly. As stated is just a way to measure relative prices in an arbitrary unit. Except for temporary disturbances money does not play any other role in the system different than a unit of exchange, and this was the generally accepted view of the classics. As it is expressed in modern lingo, relative prices are determined in real terms in the commodities markets and absolute prices are determined in the monetary markets as represented by the quantitative theory of money.

As we saw in chapter three, Say's Law of Markets or its eventual theoretical successor, Walras' Law, states in brief that commodities are paid by

commodities, only the capacity to produce goods and services can provide for the means to acquire equivalent commodities.[23] Once we introduce money in the analysis, as something separate from commodities, then it is possible to have an excess supply of commodities because there can be an excess demand for money.

The problem of explaining the demand for money becomes fundamental.

The classic quantity theory of money, of which the Fisherian equation $M = P\,T / V$ [24] is the best known restatement, implies Says' Law as an identity and vice versa. The value of money, as something different from a commodity with a value of its own, that is the real product that can be exchanged by a unit of money, would be determined by the quantity of money in circulation only. This means that *V,* velocity of circulation of money, and *T,* output in real terms, have to be considered as given, which turns the former equality into an identity:

$$MV \equiv PT$$

Allowing for the dichotomization of the pricing process, that is relative prices or values are determined independently of monetary forces and absolute prices depend on money only, a formulation that has the merit of showing clearly that money cannot be assimilated to a commodity in particular, to wealth or to capital. In this formulation money is only a unit of account, it is neutral.

An alternative to the Fisherian quantity theory of money equation, is the Cambridge equation. Considering that total transactions in constant money prices, *T*, are proportional to real output or income, then *T*, can be substituted by, *Y*, income in real terms, then:

$MV = PY = Y^{\$}$, where $Y^{\$}$ represents nominal income, then, $Y = Y^{\$}/P$, that is real output is nominal output deflated by the price level or the 'value of

money' which depends on, *M*, the money supply. The Cambridge equation is written as: *M = kPY,* where, *k,* expresses the demand for money as a proportion of nominal output or income. Both equations are formally equivalent, *k = 1/V,* however the Cambridge equation expresses the demand for money in a behavioral form, agents demand money as a proportion of their nominal income.

This is the basis for one of the main explanations of the demand for money, agents keep money balances to support their level of transactions, and given real output and the level of prices, the proportion, *k*, of income held by the community as real monetary balances, is postulated as a constant or as a stable function of the interest rate.

Following Schumpeter's strictures the integrated analysis of a modern capitalist economy requires that money is introduced on very ground floor of our theories. The quantity theory of money as customarily stated does not allow us to do so; however, it can provide us with the general framework to achieve this goal. The demand for money needs to be explained. We have argued that the essential link between real and monetary analysis can be established by considering that the main source for the demand for money is derived from capital: investors chose to have a fraction of the value of their capital as available acquisition power. Also we have posited that the potential emergence of capital and money as net financial assets of the community opens the door for a revision of the ancient Say's law of markets.

Within the theoretical system of classical economics, the central problem to be solved was the question of value and distribution.[25] That is, of the relative prices of commodities, including those used for production. Walras understood this clearly and made this problem the starting point of his work.[26] The central element of the neoclassical theory of value, as it came to be known, was the principle that economic behaviour is maximizing behaviour under constrained conditions, based on the concept of substitution at the margin.[27]

Neoclassical economists treated distribution theory and factor pricing as part of a general value theory. Considering the initial distribution of factors, endowments, among households with given preferences which try to maximize the satisfaction from their expenses, and profit maximizing producers, which with given technologies acquire factors from firms to produce the goods and services demanded by households. They showed how the prices and quantities supplied of final goods and factors are determined in competitive markets. The distribution of income between labor, capital and rents became a theory of factor pricing, the market determined interest/profit rate, wage rate and rents, times the volumes of the factors employed will exhaust the total income or net product. The neoclassical theory of value aimed to provide the Smithian classical theory of wealth determination with the logical foundation it did not have and presented a theoretical alternative to the Ricardian theory of distribution from within the system, ironically by the generalization of Ricardo's rent theory to all factors.

Nevertheless, the theory of profits it offered, within the Smithian perspective of profits as a cost, relied on a notion of capital as a physical entity with a productivity of its own and depended on the assumption of the strict applicability of the equimarginal principle to the substitution of capital for labour in production, at least in the early phases of general equilibrium analysis and until these days within the neoclassical production function[28] tradition.

The production function approach relies directly on the equimarginal principle. With the same notation as before, we have output as a function of the total available resources, land, labour and capital:

Y = f (T, L, K) ; production function
Y = R + W + P; Say's law
r = Rent (Rate per unit of Land)
w = Wage (Rate per unit of Labor)

π = Rate of Profits

And,

$Y = rT + wL + \pi K$

Where in equilibrium:

$\underline{r} = dY/dT$
$\underline{w} = dY/dL$
$\underline{\pi} = dY/dK$

So, $Y = (dY/dT)T + (dY/dL)L + (dY/dK)K$

It is argued that in perfect competition given the initial endowments, that is the distribution of resources among households, the economic system as represented will generate inverse monotonic relationships between the physical quantities of the diverse factors and the corresponding rates of remuneration, and hence the system will converge to the full employment of all factors resulting in an efficient and stable equilibrium, the value of total output will be exactly the same as the aggregate value of all remunerations. The Smithian heritage of this formulation is evident. Nevertheless this result is obtained, if and only if, the production function[29] is of a particular form—homogenous of degree one—that satisfies Euler's Theorem, only then the equation:

$Y = (dY/dT)T + (dY/dL)L + (dY/dK)K$;

Will hold together with Say's law:

$Y = R + W + P$; and

$\underline{Y} = \underline{R} + \underline{W} + \underline{P}$; and obviously:

$\underline{Y} = \underline{r}T + \underline{w}L + \underline{\pi}K$

Only in this particular case, the first two classical equilibrium conditions: Say's Law, valid in the short and in the long term; and prices equal costs, valid in the long term only, come together.[30] With the implication that prices are always equal to costs, total wealth is always maximized, and the economy is always employing fully all available resources. The third classical condition that the returns on capital should be equalized becomes redundant, because the marginal productivity of capital is one and the same with the returns on capital. No wonder the classic's and also Walras' long term condition that prices equal costs has been practically abandoned in the modern literature as such, it has become an implicit assumption.

It seems now that only the market clearing condition is enough.

Despite multiple valid long standing criticisms[31] regarding the use of aggregate production functions for the analysis of macroeconomic phenomena and distributional issues, this approach has become the dominant form of macroeconomic analysis these days. The famous "capital theory controversies"[32] seem to have been forgotten within dominant quarters. From the capital controversies the following two generally accepted[33] central propositions emerged: The conditions to be satisfied in order to aggregate heterogeneous capital goods are so extraordinarily restrictive as to rule out any reasonable possibility of constructing an aggregate physical measure of capital goods. And, due to the existence of the phenomenon of "re-switching of techniques"[34] or "reverse capital deepening." there is no inverse monotonic relation between the quantity of capital and the rate of profits. This is applicable both to the economic system as a whole and to the individual productive processes, and it is a proposition independent of the method chosen for measurement of capital,

whether in physical or in value terms. The famous Samuelson (1962) article about the surrogate production function, attempted to show that the one commodity model which exhibited all the agreeable propositions concerning the workings of competitive capitalism and which reflected the central insight that price is an index of scarcity, carried over to the rigorous general equilibrium heterogeneous goods models. Nevertheless, Sraffa's central critiques have not been proven wrong. Notwithstanding the problems of aggregation, the main definitive result is that the equimarginal principle applicable to production in the form of the substitution of labour for capital could not be sustained as a generally valid proposition.

The idea that employment and production, usually hover at its 'natural' level determined strictly in real terms a la Smith, and that the economy can be best represented by aggregated production functions with micro foundations[35] is the trademark of the contemporary current of the New Classical economists and real business cycle, RBC, theorists.[36] Nevertheless is not a necessary conclusion of the classical theoretical system, where the issues of profits, the short term determination of output and employment and its fluctuations, among others were open questions.

In the New Classical perspective, fluctuations in employment and output, are variations of the natural level *not deviations* from it. The economy, save random shocks, is more or less always in a Smithian long term equilibrium. Their analyses are based on highly simplified competitive models with a single good produced by labor and capital, which is the same single good, with a constant returns technology, usually variations of the two factor Cobb-Douglas production function, and where the main shocks to the system are exogenous stochastic shifts in the production technology. The logical consequence of this view is that the classical difference between the short term and the long term is eliminated.

For the New Classical economists, the theory is reduced to the endless development of the neoclassical aggregate production function approach to growth[37] theory, but *with* micro foundations. What Solow calls the 'ultra-strong neoclassical assumption' that the economy traces out the intertemporal utility-maximizing program for a single immortal representative consumer or of a number of identical such consumers. The crucial shortcomings, accepted by friends and foes, of neoclassical production function analyses are simply forgotten,[38] and this approach is equated to general equilibrium analysis. These models are often supposed to be general equilibrium competitive models, however they are aggregate production function models, plus the representative consumer, where "general equilibrium" is an initial assumption defined as market clearing with the implication of full employment of labour and capital.[39]

The New Classical Economists adopt a quite radical money does not matter view.[40] They would accept, however, that money somewhat matters in the short term and try to model particular circumstances where monetary or financial instabilities can arise, due to imperfect information and uncertainty. What is common to contemporary 'real analysts' is the general presumption that money does not matter very much and the treatment of money and securities as if they were goods, cash goods, credit goods, etc., etc., that are part of the agent's utility functions and that are "consumed" just as apples or oranges. Within this view the demand for money, that is the demand for cash goods, or liquidity services, more than explained, it is assumed.[41] For the New Classical economists, the most important aspects of the economic world can be analysed without references to monetary or financial forces, except when they are considered as exogenous shocks.

The original developments of growth theory were concerned with the long term hypothetical sate of an economy growing while at full employment, this original moderate view of the founders has been challenged: the single good-single agent theoretical models, can be used to account for short term

phenomena. It can explain not only the secular growth trends of advanced economies but also it could explain business cycles, depressions, for example *the Great Depression,* and basically every other economic problem.[42] The founder of the RBC school, Prescott, argued recently that the great depression can be explained with growth theory and concluded that for some reason*: "the unintended consequence of labor market institutions and industrial policies designed to improve the performance of the economy"*[43] was that workers decided to increase their leisure during the Great Depression. Prescott's argument is an implicit recognition of the incapacity of this approach to explain such an important phenomenon. Of course, if money does not matter and finance neither, and the only true way to represent the economy is in terms of an individual utility maximizing agent, or an infinite number of them which is the same, silly conclusions can follow.

We have argued that the Smithian/Ricardian, long term vision corresponds to the workings of an ideal pure free market economy. It can be argued that the vision of the so called New Classical economists is essentially the same. Nevertheless to understand the modern capitalist economies we live in, we need a general economic theory of capitalism. A theory where the real problems we face like crises, unemployment, financial instability, etc., etc., are dealt within the theory not simply considered as the 'sum of random causes.'

We have argued that such a theory can be built on the foundations of the classical theoretical system. Nevertheless, a general economic theory of capitalism requires as an essential addition to the hard core of the classical SRP, a theory of capital.

6.2 Profits as residual in a general competitive equilibrium .

We have defined capital as the property right over residual profits and we argued that profits as a residual, can be logically determined using the classical

value theory in its Walrasian general equilibrium formulation. From the analysis of the competitive equilibrium a la Arrow and Debreu[44] in chapter 2,[45] we have:

There are *k* producers and *m* consumers in the economy. Agents are concerned with "commodities," every tradeable good and service, is a "commodity." There is a "price," a relative price, for each commodity.[46]

The production process, y_j for the *j*th producer is an n-vector whose negative elements denote "inputs" and whose positive elements denote "outputs." The set of all possible input-output combinations for the *j*th producer is the production set of *j* denoted by Y_j. Obviously, $y_j \, E \, Y_j$ where Y_j is a subset of R^n.

If there are no economies or diseconomies of scale, the aggregate production set of the economy, that represents the production possibilities, can be defined by

$$Y \equiv \sum_{j=1}^{k} Y_j$$

Let $y_j \; E \; R^n$ be the production point (input-output combination) chosen by producer *j*th when price p prevails, as we know the negative elements of y_j are inputs and the positive outputs.

Then, $p * y_j$ represents the profits of producer *j*th when price *p* prevails.

The aggregate profits, *P*, when price *p* prevails in the economy will be:

$$P \equiv \sum_{j=1}^{k} p * y_j$$

The initial resources held by consumer i^{th} , are denoted by $\underline{x}_i$ then the initial bundle of commodities held by consumers in the aggregate is

$$\underline{x} \equiv \sum_{i=1}^{m} \underline{x}_i$$

It is important to remember that every commodity is defined by its physical characteristics, its availability location and its availability date. So, for example, labour services are part of the initial bundle of commodities held by consumers, and also defined by physical characteristics, its availability, etc., etc. Also, as Debreu specified: *"They include the capital of the economy at the present instant, i.e., all the land, buildings, mineral deposits, equipment, inventories of goods, ... now existing and available to the agents of the economy. All these are a legacy of the past; they are a priori given."*[47] All resources are owned by consumers, so the property rights as to these resources are considered as given.

In classical terms the initial bundle of commodities, or the resources available in the starting point, the *a priori given,* comprise *labour* (human capital) and *land*. The flow of goods and services they provide is remunerated by *wages* and *rents*.

So when price p prevails, then, $p * \underline{x}$ represents the value of the total wages and rents of the economy.

$$p * \underline{x} = R + W$$

The consumption set for the i^{th} individual is denoted by X_i and consists in the set of possible consumption bundles, x_i, where, $x_j \, E \, X_j$ where X_j is a subset of R^n. The aggregate consumption set of the economy can be defined by

$$X \equiv \sum_{i=1}^{m} X_i$$

Let $x_i \; E \; R^n$ be the consumption point (vector of commodities) chosen by the i^{th} individual when price p prevails:

Then, $p * x_i$ represents the consumption by the i^{th} individual when price p prevails.

The aggregate consumption, x, when price p prevails in the economy will be:

$$x \equiv \sum_{i=1}^{m} p * x_i$$

Given a price vector p and consumers' income M_i, the consumers budget set is $\{x_i : x_i \in X_i \text{ and } p*x_i \leq M_i\}$. Consumers can only consume a value equal or less than their lifetime income.

If the consumption vector of individual i, is x_i taken all its components as nonnegative, denoting her resources as $\underline{x}_i$ and assuming that she gets all her income only by selling $\underline{x}_i$, then when price vector p prevails in the market, her income will be $p^* \underline{x}_i$ and her budget constraint $p^* x_i \leq p^* \underline{x}_i$

However, profits are also a part of the individual's budget.

We can represent with θ_{ji} the fraction of the stock or the shares on profits of the jth producer owned by the ith consumer then

$$\sum_{i=1}^{m} \theta_{ji} = 1 \text{ for all } j \text{ and } \theta_{ji} \geq 0 \text{ for all } j \text{ and } i.$$

So total income (or wealth) of consumer i, prior to any consumption, can be represented as

$$p^* \underline{x}_i + \sum_{i=1}^{m} \theta_{ji} (p^* y_i)$$

The total income of consumer i, is M_i, she can consume a value equal or less than its lifetime income. The budget constraint is:

$p * x_i \leq M_i$, where:

$M_i = p * \underline{x}_i + \sum_{i=1}^{m} \theta_{ji} (p * y_i)$

Or, $M_i = W_i + R_i + P_i$

In the aggregate:

$M = W + R + P$

Or, Y = W + R + P, denoting aggregate income in the customary way.

An array of consumption vectors $\{ x_i \}$ is said to be feasible if there exists an array of production vectors $\{ y_j \}$ such that

$x = y + \underline{x}$

When the equilibrium price vector, $p^$, prevails, with equilibrium production and consumption vectors we have:

$p^ * x^ = p^ * y^ + p^ * \underline{x}$

This represents total aggregate production, in the absence of hoarding equal to income.

As Arrow and Debreu demonstrated, profits in equilibrium can be positive or zero:[48]

$p^ * y^ \geq 0$; then in equilibrium

$$Y = W + R \text{ , if, } \quad p^ * y^ = 0 \quad .$$

$$Y = W + R + P \text{ , if, } \quad p^ * y^ > 0$$

The system is fully determined in its own terms.

The first situation, where all income is in the form of wages and rents, is equivalent to the Smithian ideal free market state, or the true Ricardian "long term," or Walras' full equilibrium, as I have argued. The second situation reflects a simultaneous determination of positive profits and aggregate income or output. We have argued that under these circumstances profits can be viewed as a residual in a temporary general equilibrium, defined as a situation where all markets clear but where we have positive residual profits. So we have a complete solution for the "short term" without relying on considering output and demand as a given Ricardian style, and without introducing new theories for the determination of income.

The classical theoretical system admits a Smithian-Ricardian interpretation of output determined by the Smithian competitive mechanism coupled with Walras' law, and of profits as a residual as long as we introduce a temporal distinction between the short term, where we can observe residual profits due to the differences between market and 'natural' prices and the long term where residual profits will disappear and prices will include only wages, including managerial wages, and rents. That is a long term equilibrium where prices are equal to production costs and include of course the cost of production of the means of production, but no such thing as the cost of capital in general. This is an ancient idea: costs are ultimately reduced to all kinds of human efforts and to the 'natural' resources[49] employed in production. That is with human and "natural" capital. Within the classical theoretical system as defined this solution represents a solid consistent perspective to avoid the need of an alternative theory of aggregate income or of a special theory of the price of capital. All it needs is the

introduction of time, that is, a dynamic approach that recognizes that the free market adjustment processes take time, so profits as a residual are the product of a temporary equilibrium where Say's law holds all the time.

Certainly, the previous model does not have a place for capital as we have defined it and as it appears in the real world, where shares of capital are valuable, they are traded and together with other securities, they constitute the vast majority of the day to day transactions that take place in the world. Neither there is a place for something like the profit rate—the returns on capital—or the interest rate as we know it in the real world.

6.3 The dynamics of profits, a systemic approach.

Let's take a brief look at the dynamics of the system. If the economy is usually in a temporary equilibrium with positive profits and the trend derived from competition is towards the elimination of profits, then the consideration of the form and characteristics of this process can be of significant theoretical and practical interest. Some preliminary ideas and research suggestions follow.

We have considered the state of the system where

$$p^ * y^ = 0 \quad and, \quad Y = W + R \ ,$$

As the full long term equilibrium where both Walras' Law and the prices equal costs condition apply. This is the ideal end state that corresponds to Smith's system of natural liberty. Also we can conceive this state as the neoclassical growth theory 'steady state', where a free market economy grows undisturbed at full employment.

As well, we have considered the state of the system where,

$p^{\wedge} * y^{\wedge} > 0$ *and* $Y = W + R + P$,

As a short term temporary equilibrium, where Walras' Law rules but where prices are different from costs. This can be conceived as the real state of the economy at a given time. So time indexes should be incorporated:

$$Y_t = W_t + R_t + P_t$$

We can denote with, $X^{\wedge}_t$, $Y^{\wedge}_t$, the vector time functions that express a given development law of the inputs and outputs of the system[50]. These are functions independent of the initial state of the system. I will use them to represent the ideal development path of the system in a full equilibrium.

We can represent with, X_t , Y_t , the vector time functions that express the solution to the system's development law, which are dependent on the initial state of the system, say a temporary equilibrium with positive profits. These functions will be used to represent the real development path of the system over time.

The question here is if the system can be considered as a stable system which tends to converge towards a state of full equilibrium which is independent of the initial conditions of the system. That is, if the system is ergodic.[51]

The development of the system is ergodic if:

$$Lim_{t\to\infty} \; X_t = X^{\wedge}_t ,$$

$$Lim_{t\to\infty} \; Y_t = Y^{\wedge}_t ,$$

Or, in terms of our model if the system is converging towards a full long term equilibrium.

We can symbolize by ΔX_t and ΔY_t the deviations from input output states of the system in time, t, with respect to the ideal state of the system, or in Lange's words the deviations from the norm of the state of the system. Lange defines these deviations as *perturbations*:

$$\Delta X_t = X_t - \hat{X}_t ,$$

and $$\Delta Y_t = Y_t - \hat{Y}_t ,$$

The ergodicity of the system can be expressed then, as:

$$Lim_{t\to\infty} \Delta X_t = 0$$

and,

$$Lim_{t\to\infty} \Delta Y_t = 0$$

This means that the perturbations of an ergodic process will disappear over time.

The general form of the solution to the vector functions ΔX_t, in the moment of time, $t = z$, is:

$$\Delta X_t = \Sigma_j K_j (z) \{\lambda(z)\}^t$$

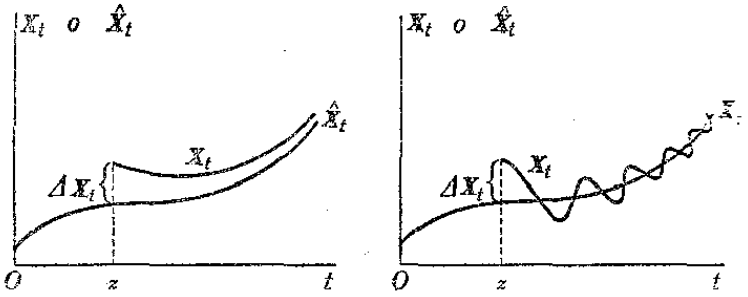
In a stable system the components of this function can be either monotonic or oscillatory.[52] When the feedback coupling is positive, λ, is real and $|\Delta X_t|$ is an increasing or decreasing monotonic function, if, $|\lambda| > 1$ or $|\lambda| < 1$, then:

$$\Delta X_t = K \lambda^t$$

When the feedback coupling is negative, λ , is imaginary and then:

$$\Delta X_t = K\rho^t \sin \omega t$$

This is an oscillatory function and the amplitude of the oscillations would either increase or decrease, if $\rho = |\lambda| >$ or < 1. The following graphs from Lange[53] provide an illustration in a bi-dimensional space.



System theorists have determined mathematically the necessary and sufficient conditions[54] so that the development of a system follows an ergodic process. In lay terms, what is required is the existence of at least one internal feedback coupling in the system, and this feedback coupling should be of a compensatory character. These types of feedback couplings of a stable system are called regulators, a stable system moving towards equilibrium is viewed as a self-regulated system.

For the process to be ergodic, the system should be able to react to deviations from the norm or to perturbations. For example, in the terms of the model we have been exploring, the existence of positive profits should launch processes: new entries, new products, etc., etc., which move the system towards the elimination of profits and towards its pure free market 'undisturbed' state.

In its simplest expression, the classical workings of the supply and demand pricing paradigm would suffice, to have a self-regulated system. The

typical well behaved price relationships where prices fall as supply grows and profits are reduced can be conceived as a type of negative feedback coupling, so we can expect that the form of the ergodic process from a position of a temporary equilibrium towards a full equilibrium, assumes an oscillatory form.

In the standard neoclassical and new classical approach, the perturbations or the differences between the norm, the steady state, and the real performance of the economy are customarily considered as caused by the "sum of random causes,"[55] so they are exogenous. The adjustment path after a random shock can be expected to be monotonic.

In the approach we have been developing in this work, 'perturbations' are endogenous, they are the natural result of a succession of temporary competitive equilibria, and the adjustment process can be expected to be oscillatory. In the standard approach the normative causes the positive. In my approach the positive causes the normative. The norm depends on a set of given conditions, in my approach the real performance of the economic system continuously creates and recreates, the so called given conditions. As Walras expressed it the basic data of the problem changes minute to minute.[56] The generation and distribution of wealth is at the core of these changes.

Certainly, systems can be stable, quasi-stable or unstable. The first converges ergodically towards equilibrium. Quasi stable systems stay in whatever initial state they happen to be or oscillate around such a state. And unstable systems, once away from equilibrium keep on moving away from equilibrium in a cumulative fashion. I hypothesize that while free market economies can be considered as stable systems in general, modern capitalist economies are not necessarily stable.[57] I hypothesize, and this is the subject of future research, that the ease and/or the speed with which residual profits are eventually eliminated are some of the main forces behind the stability or not of a

particular system. The more competitive and the less afflicted by monopolistic barriers a system is; the more stable it is.

We finished chapter two by arguing that positive residual profits can emerge, from the competitive advantage and/or some sort of monopoly rights, privy of some firms. The creation, preservation and the strengthening of barriers to entry is what counts and this is costly. This does not mean that these are necessary costs of production for the commodities involved. We have argued that in some circumstances the use of real resources to sustain the generation of residual profits can be detrimental of social welfare, and we proposed a demarcation criterion to distinguish between value creation and value expropriation profits. The dynamic analysis just presented provides an additional consideration: value creating profits can shift the long term equilibrium growth path, or steady state, up; while value expropriation profits may push it down. All costs that can be imposed on society without a quid pro quo, that is all costs that are not necessary costs of production, have the same negative effect. For example, taxes that do not have as a quid pro quo the provision of public goods, more benefits for unions that do not correspond to productivity increases, etc., etc. Also major variations in the value of capital may have similar effects on the long term path of growth, if positive and sustained they may result in an increase of the growth potential and viceversa.

We have argued that a classical approach to the study of modern capitalist economies, should concentrate in the study of the complex dynamic processes whereby, real world economies, converge or not, either in a stable or in an unstable manner, towards a long term equilibrium where the optimal ideal results of free markets can be realized. A ‘classical’ study of these processes would concentrate the analysis in the generation of profits, the profitability of capital and in its long term trend. A true contemporary ‘classical’ approach would also integrate fully the monetary and financial forces at play. This is an area of future research that I believe is worthwhile exploring.

6.4 A general theory of capitalism must start with a theory of capital.

The theoretical elucidation of a modern capitalist economy, defined as: an essentially monetary economy, where the maximization of the value of capital is a force as decisive as the maximization of utility and profits by consumers and firms, if not the dominant force of the economy; requires that the problems of capital and the returns on capital, money and the interest rate, are solved in a consistent way with value theory. To do so we have presented alternative definitions and theories of the nature of capital, the economy's general rate of profit; the value of capital and its variations. Also we have explored the way the profit rate interacts with the interest rate and how these processes together with the financial structure of the economy impinge on the dynamics of the system.

Debreu's idea that the theoretical problems pertaining the interest rate, and by extension the profit rate—or of money and capital—could be solved as particular cases of value theory, cannot be sustained. A general theory of capitalism must start with a theory of capital.

In standard economics, as with the classics and in A&D type models, capital is conceived in physical terms and as part of the total given resources of the economy. It is assumed that all resources are owned by consumers, and that the structure of the property rights as to these resources is given. All of these resources, and/or their services, are marketed and in equilibrium their prices are determined as the price of every other commodity is.

This presents a problem: if capital is a commodity or a bundle of commodities, how can also be priced as something different than a commodity?

Capital as the property right over residual profits.

This problem has a solution: the prices of commodities are determined by general equilibrium conditions. That is by classical[58] value theory. The owners of the commodities used in production, including all forms of human capital, receive the equilibrium prices for the goods and services they sell or rent to firms. Capital is *only* the property right over the residual profits generated by firms, a property right and an entitlement that is valuable and that can be traded in markets. Capital is not a fund of perpetual productive power a la Fisher, but a fund of acquisition power. In general, the value of capital is equal to the present discounted value of future residual profits and it is a virtual value. The value of the particular shares of a particular firm is determined by the overall rate of return, the firm's rate of return, the level of leverage and the interest rate.

In short, we have to distinguish clearly between two different pricing mechanisms: one, for the prices of commodities, where value theory/general equilibrium analysis applies; and, another for the price of capital—the prices of claims on residual profits—where the Fisherian net present value of future returns paradigm and the Law of Arbitrage applies.

The value of capital cannot be considered as a given, it is a variable undergoing permanent change, not as a result of 'random causes' but as an endogenous outcome of the dynamics of competition. Under some conditions capital may emerge as a net financial asset of the community and enter into the consumer's budget. As the value of capital changes, the level and the distribution of wealth is affected, these variations impinge on the initial conditions of the problem and generate new rounds of adjustment: changes in relative prices, changes in profits, new temporary equilibria, etc., etc. And, ultimately the convergence of the economy towards a Neo/New Classical full equilibrium long term path of growth, is nothing but assured. At the core of the workings of a modern capitalist economy we have the dynamics of wealth and its distribution.

We postulated in the last section, that contrary to the traditional approach were the normative determines the positive, in our approach the positive determines the normative. The long term path of growth of the economy is also dependent on the short term dynamics of the system. The initial conditions are continuously changing, due to changes in profits and in the value capital. The value of capital is also dependent on the structure of capital and the interest rate, and this is the main channel where monetary policy and monetary and financial disturbances operate.

Let's recall that in Walras and in typical A&D models, the value of property rights is not determined, transfers of property lack a theoretical motive. In a modern capitalist economy transfers of property rights, in a financial form, and changes in the value of wealth and its distribution, are of the utmost importance. The vast majority of the day to day transactions that take place in the world are financial transactions, transfers of property rights in some form or another. These last are absent from standard theories.

Certainly financial transactions cannot be considered as a simple reflection of transactions in the commodities markets. The value of financial transactions is not only many times higher than the value of real transactions. But also it has a life of its own, as we have expressed it. Ultimately, in net terms, the value of financial transactions depends on the value of capital, and the value of capital is dependent on the economy's capacity to generate future residual profits.

Besides the equalization of prices to costs, Walras and other classic writers, Marx and Bortkiewicz just to mention some, also dealt with the equalization of returns on capital. We have argued that: the equalization of returns on capital, as an entitlement, is a short term temporary equilibrium condition.[59] The equalization of the returns on capital is properly a capital market[60] short term phenomenon, with potential effects that can impinge on the

consumers' budgets. Returns on capital are equalized through changes in the relative prices of shares. That is, through changes in the value of property rights over residual profits and this may impinge on the value and the distribution of wealth.

The economy's rate of return as the appropriate rate to value capital.

To solve the problem of the value of capital it was necessary first to determine the appropriate discount rate. We have argued that this rate is the overall rate of return of the economy as determined by the prices of all commodities in a competitive equilibrium. The general rate of return on capital is not determined by the workings of a particular market, where the specific demand and supply conditions, say of capital, determine the price of capital, as, say, the cost of capital. Walras' complaint that he had looked for this market in vain, has a reason: such a market does not exist. Instead the general rate of return of the economy is determined by the current and future prices of all commodities, it is a result of a temporary general equilibrium with positive residual profits.[61]

The rationale that supports this idea is quite simple, the total profits of the economy are given, the property rights over these profits is also given, as the owners of capital try to maximize the value of their portfolio of shares, they bid up or down, the prices of individual shares with different levels of profitability. Ultimately, all prices of shares will adjust to a level where they yield the same return, which is the economy's rate of return. NOT an average return, but the return of the economy as a whole, as determined in a competitive equilibrium by the overall 'cash flows' generated by it. These cash flows ultimately that depend on the competitive advantages of firms and of the economy as a whole. Under the theoretical conditions we have been working with, the equalization of returns on capital through changes in the relative prices of shares is the equilibrium solution that requires minimum additions to the system. As long as returns are

different, arbitrage possibilities will exist, nevertheless competition among arbitrageurs will eliminate them.

It is very important to note that the process of arbitrage that yields these results, does not depend on conditions similar to those posited in perfectly competitive markets for commodities: multitude of agents; market clearing; independent supply and demands functions for every good, for example, 'cash goods,' 'equity goods;' etc., etc. The workings of Arbitrage and the Law of One Price in capital markets, require only the existence of one or a limited number of sufficiently powerful arbitrageurs.[62] This would be enough to secure the equalization of the returns on capital. The consideration of perfect or imperfect capital markets in the sense of perfect or imperfect commodities markets becomes irrelevant, once we recognize the real essential difference between the capital market and other markets. And this difference is not a matter of more or less perfection.

We argued that profits are a vector of value, they cannot be reduced to a physical dimension and they appear ultimately because consumers as a whole, the community, assign more value[63] to the finished product than to the commodities used in its production. The profits for producer j^{th} are a vector of dated commodities (inputs-outputs) multiplied by a vector of prices; this product represents the value of the dated profits of the j^{th} producer. Dated profit streams are logically equivalent to the firm's net cash flows. Obviously, net cash flows, can be positive, negative or zero at any given moment in time.

So if the j^{th} producer's net cash flows are determined over the considered time period, which they are because all prices are determined, there is an internal rate of return, IRR, associated to each one of them. In other words, there is, a discount rate, r_j , that would equalize the net present value NPV, of the j^{th} producer's profit streams to zero.

The vector of the profits (cash flows) for producer j^{th} is:

$$p * y_j = cf_j \quad where \quad cf_j \; E \; R^n \quad and \quad \sum_{j=1}^{k}(p * y_i) = cf$$
$$cf_j / cf = O_j \quad and \quad \sum_{j=1}^{k} O_j = 1$$

The profit streams or the cash flow of producer j^{th} are represented by cf_j, this is a vector of values, of positive and negative quantities times prices, associated to dates, *cf ,* is the sum of the individual producers' cash flows, it represents the cash flows of the economy as a whole. O_j represents the participation of the j^{th} producer in the total profits of the economy, the sum of these participations is one. Both cash flows, the firm's and the economy's, are perfectly determined. Just as current cash flows are determined at any given moment in the real world. Simply because all prices are determined.

We ordered the elements of these vectors, from the present time *t (period 0),* to time *t+1, t+2,..., t+n,* where $cf_{j\,t}$, represents the initial cash flow, or the value of the commodities employed in the initial period of production, commodities which are part of the initial a priori givens and whose value represents an outlay. Using the familiar net present value formula, NPV, we have for the *j*th producer:

$$NPV_j = cf_{j\,t} + cf_{j\,t+1} \; (1/1 +r)^{t+1} + cf_{j\,t+2} \; (1/1 +r)^{t+2} + ... + cf_{j\,t+n} \; (1/1 +r)^{t+n}$$

Where, *r*, is the discount rate which is unknown under the conditions of the basic model.[64] Using the value additivity principle we aggregated the cash flows of every producer and obtained the cash flows for the economy as a whole:

$$NPV = cf_{t} + cf_{t+1} \; (1/1 +r)^{t+1} + cf_{t+2} \; (1/1 +r)^{t+2} + ... + cf_{t+n} \; (1/1 +r)^{t+n}$$

The implicit internal rate of return IRR for the economy as a whole, that will make, *NPV = 0* , will be denoted by *r.* In a competitive equilibrium with positive

profits, this rate is determined. I have called this rate, *r,* the economy's rate of profits or general rate of return. I have argued that this is the appropriate rate to discount future cash flows and hence to determine the value of capital of individual firms. That is the value of the property rights over the residual current and future profits generated by a firm.

The economy's profit rate is not determined by the supply and demand for a particular commodity, call it capital, money, or what you will, it is determined by the supply and demand conditions of all commodities' markets simultaneously. It is a result of the equilibrium in commodities markets: in a short term temporary equilibrium with residual profits, this rate is positive; in a full long-term equilibrium with zero profits, this rate obviously disappears.[65] Ultimately this rate depends on the overall competitive advantage of the economy. Capital can only yield what the economy yields.

The overall rate is not and cannot be considered as an average rate.

This rate cannot be reduced to a simple percentage relationship between to known magnitudes: the value of profits and the value of capital.

We used the general rate of return as the "appropriate discount rate" for every individual producers' profit streams, and directly obtained the net present discounted value of the individual firm, the value of its shares of capital. For the *j*th producer, we have:

$$NPV_j = cf_{j\,t} + cf_{j\,t+1}\ (1/1+r)^{t+1} + cf_{j\,t+2}\ (1/1+r)^{t+2} + \ldots + cf_{j\,t+n}\ (1/1+r)^{t+n}$$

If we make the NPV_j equal to zero, we obtain the internal rate of return IRR for producer *j*th, that will make $NPV_j = 0$, as r_j .

$$0 = cf_{j\,t} + cf_{j\,t+1}\ (1/1+r_j)^{t+1} + cf_{j\,t+2}\ (1/1+r_j)^{t+2} + \ldots + cf_{j\,t+n}\ (1/1+r_j)^{t+n}$$

As we saw, for the economy as a whole:

$$NPV = 0 = cf_t + cf_{t+1}\ (1/1+r)^{t+1} + cf_{t+2}\ (1/1+r)^{t+2} + \ldots + cf_{t+n}\ (1/1+r)^{t+n}$$

Where the rate of return for the economy as a whole, that will make, the net present value of future cash flows equal to zero, $NPV = 0$, is r.

In summary, using the general rate of profit, r, as the appropriate discount rate to obtain the value of the capital of the individual firm, we will have:

$$If \quad r = r_j \ then \ NPV_j = 0$$
$$If \quad r < r_j \ then \ NPV_j > 0$$
$$If \quad r > r_j \ then \ NPV_j < 0$$

Those firms with a net present value of their future profits or cash flow streams equal to zero, would be returning the same yield as the economy as a whole. Those firms with negative values would be below normal profitability. And, those with positive NPVs would be above average profitability.

Arbitrage will equalize the returns on capital at the economy's rate.

We concluded that the workings of the capital market will assure that the prices of shares will adjust until every share will yield the same return and this return will be exactly the same as the average return for the economy as a whole. Due to the workings of to the Law of One Price and arbitrage, capital yields what the economy yields. The prices of shares of firms with above average profitability will increase relative to the prices of shares of firms with profitability below average. Some shares will show capital gains and some will show capital loses, resulting in distributional effects, some consumers, as investors, will win and others will lose, in terms of the acquisition power represented by the value of

their shares. Once the returns on capital are equalized, the relative prices of shares are determined in terms of commodities and in terms of each other.

To express the same idea in a different way, we can say that the supply of cash flows, profits, and its demand, property rights, are given. At the end of the day competition among investors will assure that arbitrage opportunities are eliminated, which means that the returns on capital will be equalized around the economy's rate of return, as determined by all the prices of all commodities that are traded. The variable that adjusts is the value of the financial assets that represent claims on residual profits, shares in short. NOT the assets of the firm in general, or the price/cost of capital, as argued within the standard view.

In a world where shares are the only form assumed by claims over residual profits, in a pure equity economy, where the appropriate rate to value capital is the economy's rate of return and returns on shares are equalized, capital effects, that is capital gains and loses at the individual share level, will have only distributional consequences and will cancel out in the aggregate. Capital effects, that are changes in the aggregate supply and demand conditions due to changes in the value of capital, will be neutral[66] in a pure equity economy. Walras' Law would still be irrevocably valid. This is not the case in an economy where debt and equity coexist and where the profit rate and the interest rate differ from each other.

6.5 The value of capital and Say's/Walras Law.

In any given point in time then, the budget of the consumers will include all the real resources, commodities, owned by them; the profits paid out by firms; and a portfolio of shares; each representing the net present value of the firm's future profits, that is the value of its capital.

Denoting as $\kappa_j = NPV_j$

The participation in the ownership of κ_j , by consumer, i, is denoted by θ_{ji} , clearly profits and capital gains or loses are distributed in the same proportions as ownership among consumers.

We had defined the total income of consumer i, as M_i . Now the budget constraint is:

$$M_i = p * \underline{x}_i + \sum_{i=1}^{m} \theta_{ji} (p * y_i) + \sum_{i=1}^{m} \theta_{ji} \kappa_j$$

Or, $M_i = W_i + R_i + P_i + \kappa_{ji}$

In the aggregate:

$$M = W + R + P, \quad \text{Or,} \quad Y = W + R + P$$

Because in the aggregate,

$$\sum_{j=1}^{k} \kappa_j = \kappa = 0;$$

The net aggregate value of capital is zero, if and only if, shares are the only form of claims against residual profits and the returns on capital are equalized at, r, the general rate of profits.

It is when the interest rate is introduced and when the property rights over the residual profits of firms adopt different forms, particularly debt that yields an interest rate that is different from the economy's general rate that the aggregate value of capital can be different from zero, and hence a new element is introduced in the workings of Walras' Law.

As an alternative to a pure equity economy, we considered a pure debt economy where instead of shares, property of capital adopts the form of fixed interest rate securities, and this interest rate is used as the appropriate discount rate to value capital.

If the interest rate, i , is equal to the economy's aggregate rate of return, r, then capital effects are neutral, the economy's $NPV = \kappa = 0$.

However, if the interest rate is under the economy's rate of return, the excess cash flows over and above the interest rate have a positive value, the aggregate net present value of capital is positive. If the case is reversed, that is if the interest rate is above the general rate of return, then the aggregate value of capital is negative. In summary, denoting the interest rate as, i, and aggregate capital effects, NPV, as κ :

$$If \quad i = r \ \ then \ \ \kappa = 0$$
$$If \quad i < r \ \ then \ \ \kappa > 0$$
$$If \quad i > r \ \ then \ \ \kappa < 0$$

The previous analysis demonstrates that under conditions of general equilibrium with perfect information and zero transaction costs, capital effects may affect at the aggregate level the workings of Say's Law, or Walras' Law in its equivalent modern usage. These effects are caused by divergences between the economy's profit rate as determined in commodities markets and the interest rate, at this point of the analysis simply introduced from outside the system. Walras' law is unreservedly valid only when the interest rate equals the economy's profit rate. If not, it becomes a special case. The general case is:

$$Y = W + R + P + \kappa$$

Let's recall that, essentially, the ancient Say's Law of markets and Walras' Law, states that commodities can only be acquired with commodities. Capital is not a commodity; however it appears as an additional asset, a net financial asset, in the consumer's budget. Commodities can now be acquired with financial assets with a positive value, which do not have a physical quid pro quo. Or commodities will not be acquired because of the negative value of some financial assets. Certainly, in a perfectly competitive economy we should expect that most effects would translate into relative prices changes and distributional effects, once this assumption is relaxed we may consider adjustments in quantities as well. In an economy where capital is the only form of property rights over residual profits, aggregate capital effects will be neutral. However, when equity coexists with debt, capital may have a net aggregate value; aggregate capital effects will not be neutral.

A capitalist economy is characterized by continuous adjustments in the value of capital that are endogenously generated, not the result of exogenous shocks and stochastic disturbances. They come from the permanent process of competition that causes residual profits eventually to disappear. Aggregate effective demand may be affected, positively or negatively, because of changes in the value of capital. The variations in the value of capital and potentially its effects on nominal aggregate demand can be exacerbated by the financial or capital structure of the economy and by the interaction of the interest and profit rates.

As we will see, these potential aggregate and distributional effects are mediated by financial and monetary markets.

6.6 The value of capital also depends on the structure of capital.

The capital structure of the economy depends on the financial arrangements under which the firms are created and/or funded. It comprises the

institutional arrangements that protect the rights of the owners of the resources that need to be mobilized for production. These institutional arrangements establish the property rights over the future cash flows of the firm. We have argued that the firm can be conceived of as a set of contracts that has at its core the financial arrangements necessary for its inception and operation, which implies a financial structure that establishes the way the value of the firm is to be distributed, and a financial system that protects and guarantees the property rights of the participants.

The establishment of the necessary institutional arrangements to fund a firm, and then to protect the rights of its stakeholders, is accomplished mainly but not only, through the services provided by the private and public institutions that conform the financial system. It was argued that, the financial sector is not a provider of a scarce resource called capital, it is, in its amplest sense, the provider of the necessary services to protect and to guarantee the property rights of those involved in production. Essentially, what capital markets price are the property rights over residual cash flows of firms over and above their full costs. The cash flows that eventually will be used to make good contractual and non-contractual claims on firms. For example: interest and principal for creditors and dividends for equity holders.

In a pure equity economy, variations in the value of capital, the relative prices of shares, would depend strictly on the overall profitability of the economy, i. e. the general rate of return, and in the relative profitability of firms. Real world capitalist economies are not pure equity economies; besides equity, a variety of securities representing claims on the profits of firms coexist, of which debt that commands interest is the most important. In such an economy the value of capital, in the aggregate and the relative prices of shares, also depend on the structure of the claims, that is on the financial, or the capital, structure of the economy. Leverage and the interest rate play a role.

Characteristic of modern financial economics is that the two central variables of finance, the market rate of return—the general rate of profit—and the interest rate, either are considered as given independent variables determined outside of the system. Or, in the case of the market rate of return, as an average of the individual securities or firm's returns conceived as the cost of capital or its required return. Or, in the case of the market interest rate, as if it was determined by some form or another of the ancient loan-able funds theory. Also, central to the analysis of modern financial economics is the postulate that the financial structure of the economy, and hence financial policy, is irrelevant. A postulate enshrined in the so called, Modigliani—Miller—Barro—Ricardo theorem, which is an extension of Say's law of markets, or Walras' law, or the market clearing principle, to the world of finance. Within this perspective what we have deemed as capital effects would be non existent. We have argued that capital effects are not an 'insignificant illusion' contradicting the views of Knight, Hicks and other very distinguished economists.

A reformulation of Miller and Modigliani's: finance does not matter.

In chapter four, we developed a critique of the Smithian paradigm of the returns on capital, and of the ruling approaches to capital assets pricing. We also developed an alternative to the basic M&M propositions that demonstrates that the capital structure of firms, and hence of the economy, does matter, and that sometimes it may matter a lot.

Standard financial economics argues that changes in the financial structure of firms are irrelevant, because the risk of levered equity rises together with leverage in the exact proportion to maintain the value of capital invariant. If this is valid for individual firms, it should hold in the aggregate: capital effects should be nil. Given that specific risk does not matter, the increased risk should be an increase in market risk. The standard paradigm does not provide us with any indication about the determination of systemic risk.

Within the prevalent approach, leverage which is the measure of the capital structure, is defined as the debt to equity ratio, considering the value of the firm, or capital, as a given. Alternatively, with the CE models we have been using in mind, we have argued that the proper measure of leverage should be the proportion of real costs to be funded with debt. In other words, leverage was defined as the proportion of the costs of the commodities needed for production that are secured through financial services remunerated at competitive prices, or through debt that yields interest. By doing this, we can consider the returns on capital and the value of capital as a variable, not as a given.

As we saw in chapter four, we have:

$$r = Li + (1-L)\ r_s$$
$$r_s = (r - Li) / (1-L)$$

Where

r_s is the return on equity or return on capital;
r is the overall return of the economy;
i is the interest rate;
L…is leverage

In our formulation the return on capital is a function of the overall return of the economy, leverage as defined, and the interest rate. We concluded that there is a linear inverse relationship between the interest rate and the return on equity for a given level of leverage. Also, we concluded that there is a direct relationship between leverage and the return on capital. This last relationship is not linear and is strongly affected by the difference between the total rate of return of the economy and the interest rate. As leverage is increased returns on capital vary exponentially. It was argued that these relationships may introduce a major

element of instability in a capitalist economy. These potentially explosive changes are of a systemic nature. They explain and represent the true systemic risk, always present in modern capitalist economies.

Standard theories correctly postulate that non-systematic or firm specific risk can be diversified; hence at the aggregate level this type of risk is irrelevant. Only systemic risk is relevant. If what matters is the systemic risk, then the theory should focus on explaining it. Standard theory does not explain systemic risk, it is considered exogenous. We have provided an alternative explanation within the system. Systemic risk is defined as variability of the profitability of capital, the returns on equity in our simplified world. Given the economy's rate of return and the interest rate, systemic risk is an exponential function of leverage. As leverage is increased, the systemic risk grows in a more than proportional manner. And this risk cannot be diversified away. In the examples we developed in chapter four we calculated systemic risk, and then using the Smithian inspired formula, which states that returns on capital equal the interest rate plus a risk premium (r_s = i_{rate} + *risk premium),* we showed that using this rate as the appropriate discount rate, aggregate capital effects are not eliminated. They remain positive and significant. The structure of capital matters.

It is very important to stress that the systemic risk we have identified and defined precisely, is derived from particular institutional features of the system. It is not a permanent feature of the real world. It is not a natural given. And that institutions, capital is one them, can be reformed.

6.7 Distributional and aggregate consequences of Capital effects.

At the end of chapter four we analyzed some of the distributional and aggregate implications of capital effects. We concluded:

Without debt, there are no aggregate capital effects. There are, however, significant distributional effects as the relative prices of shares adjust, obviously in favor of the most profitable firms. In the presence of debt, net aggregate capital effects emerge. They are positive if we use as the appropriate rate to discount capital values, both the interest rate and the economy's rate of profit.

It is difficult to expect that aggregate capital effects would be eliminated by an increased level of risk, at least for moderate levels of leverage. As we saw, if we use the Smithian inspired formula, (returns on capital equal the interest rate plus a risk premium), making this last equal to the systemic risk as determined by our model, capital effects would still emerge and they could be significant.

If the level of leverage is kept constant the relative prices of shares do not change. As leverage rises, however, the relative prices of shares change. Predictably, they change in favor of the shares from the most profitable firms. Also, aggregate capital effects appear and grow with leverage. Leverage generates both, distributional and aggregate capital effects.

As long as the economy's rate of profit is higher than the interest rate, aggregate effects are positive. It is important to note that as leverage rises the absolute size of the capital effects rises as well, but it increases at a slower rate. If the interest rate is higher than the profit rate, there will be negative aggregate capital effects at practically all levels of leverage. The more leverage and the larger the difference between both rates, the larger the negative capital effects. Nevertheless, negative effects will grow less in absolute terms than the growth in leverage. The previous analysis has as an implication that the potentially explosive changes in the returns on capital are dampened down by the absolute size of the capital effects, either positive or negative.

From a dynamic perspective as profits vary and all things considered, what we should expect to see is a series of permanent movements in the relative

prices of shares and in the overall value of capital. These changes constitute a case of apparent randomness—in Wolfram's words—because they are endogenously generated through the intrinsic mechanics of the system we have very succinctly described.

As seems to be the case in the real world, capital appears as a net financial asset of the community with a generally, positive value. Let's not forget that a competitive equilibrium admits either zero or positive profits. Zero profits correspond to full long term equilibrium where capital is valueless. Positive profits, and hence a potentially positive value of capital, correspond to a short term temporary equilibrium. Negative profits and negative capital effects constitute a situation of dis-equilibrium. In my perspective the three classical equilibrium conditions: markets clear, prices equal costs and the returns on capital are equalized, are never achieved simultaneously. The first two characterize a full long term general equilibrium; while the first and the last, define a temporary general equilibrium in the commodities and the capital markets.

In summary, the existence of capital as a net financial asset of the community with a positive value is a normal temporary equilibrium situation in modern capitalist economies. However, under some circumstances this equilibrium may prove precarious and small changes in the basic conditions of the problem: in the profit and the interest rates and in the structure of capital; may generate very significant instabilities with major consequences for the macroeconomic performance of the economy, through variations in nominal aggregate demand.

As we have said these consequences are mediated by the financial and monetary systems, questions that were addressed in our last chapters.

6.8 The relevance of the capital structure and corporate financial policies.

If our previous analysis concerning the structure of capital is valid, it should also provide answers to some of the analytical puzzles present in financial economics. In a brief manner a few ideas are explored.

Standard analysis is predicated upon the thesis that the financial structure does not matter. Then certainly it cannot explain why the corporate financial structure is, what it is, without resorting to ad hoc hypotheses. Why we see in reality that agents follow very well defined financial policies? For example: The use of credit and the issuance of equity tend to be limited in most circumstances; firms prefer to constrain their spending to available internal funds, rather than issue more debt or equity. These phenomena are often referred to as credit and equity rationing. Some distinguished critics have analyzed them based on the imperfections of capital markets.[67] Our framework can provide us with some alternative explanations, which I will explore them briefly.

We can postulate that for investors, and/or for the firm, the economy's rate of return and the interest rate appear as givens, so they can decide only on the level of leverage. That is, on the distribution of their portfolios between debt and equity or, on the financial structure of their operations. Investors, or firms directly, will target a certain return on equity and they will use leverage to obtain their **required returns on capital**. Certainly, this strategy has definitive limits: profits need to be positive to begin with, and as leverage increases so does the variability of returns. Certainly, it is a matter of negotiation between agents with different attitudes towards risk regarding the distribution of possible costs and benefits. So it is always a game of strategy. Within limits defined by strategic considerations: positive cash flows, interest payments and risk, etc., leverage can be manipulated by agents to achieve profitability targets. As seems to be the case in reality, caeteris paribus, the financial structure decision, becomes one of

the most important decisions regarding the profitability of capital. This is an implication that is impossible to reconcile with the idea that the financial structure does not matter.

The increased systemic risk provides a limit to leverage. As leverage is increased the returns on equity grow but also and in an exponential way the variability of returns. So firms and investors would limit their leverage and in doing so they will consider the levels of the interest rate and the economy's rate of return. So what may appear in a superficial analysis as credit rationing[68] due to the imperfections in the loan market, may be caused by a general equilibrium result of the interplay of the above described variables.

In other words, the amount of credit that is extended by the financial system would not be determined by the degree of perfection or imperfection of the market for loans,[69] it would be determined by the profitability targets of investors and firms, that demand a certain level of leverage, given the level of risk tolerance of the agents involved. Another consequence of the previous case is that the demand for credit, cannot be seen as a simple function of the interest rate, as in the capital as apples & oranges paradigm. The demand for credit is a complex function of the targeted returns of investors, the overall profitability of the economy and the interest rate, and the level of systemic risk that agents are willing to tolerate. We cannot assume a simple monotonic relationship between the demand for credit and the interest rate, or of the supply of credit as a simple function of decreasing expected returns. From a dynamic perspective our analysis can provide us with a fundamental explanation for cycles of expansion and contraction of credit, without relying on ad-hoc hypotheses.

Clearly if the level of leverage is determined in the manner we have suggested, the capital structure of firms is determined. So not only the explanation of credit rationing becomes redundant, our analysis also provides some crucial insights into the so-called equity rationing puzzle, which suggests

that there should not be a market for shares.[70] There is one for sure, and if the value of capital is determined in the manner we have suggested, selling more or less shares on the same value will not have any effect on it. Of course, the value of individual shares may be affected.

There is however a crucial point that Stiglitz stresses in his above quoted book: the probability of bankruptcy associated with debt, and the other side of the coin, the smaller probability of bankruptcy the larger the proportion of outside finance that is raised through equity.[71] The costs of bankruptcy constitute a drain of resources for the community; they affect not only lender and borrower directly, but also, workers, suppliers, the public sector, etc., etc. And quite often firms may face bankruptcy because of systemic circumstances. A level of leverage that seemed appropriate given a certain level of the profit and interest rates may turn out deadly, under changed conditions. Generalized financial crises may be such an example. The financial system of a country may be bankrupted, not because moral hazard, or because the inherent malevolence of bankers, corrupt politicians, or the like, but because of abrupt changes in the value of capital resulting from the described mechanics of the system.

Another point I find very important to stress, is that financial capital gains or loses from the perspective of society as a whole are virtual gains or loses, without a necessary real counterpart. In other words, human capital and physical capital—natural resources and equipment—are not augmented or diminished as the value of capital changes. Indirectly, as we have argued there can be real aggregative and distributional effects if these changes impact effective demand. Certainly, in the case of capital loses, for those individual agents that are losing their money, the pain (or the gain!) can be very real. However, essentially when facing bankruptcy or in more general terms financial crises, we are talking about the resolution of conflicting property rights over future residual profits. That is, conflicts over institutionally determined entitlements. Bankruptcy proceedings or the resolution of financial crises, should try to minimize the costs for society in

terms of real loses: human capital that is lost, commodities that are not produced, etc., etc. And to recognize capital loses as soon and as painlessly as possible. Certainly, private loses should remain private. All in all, the best remedy for malaises is to avoid them. Preventive measures are the best medicine and they may require profound institutional reforms.[72]

6.9 Capital and Money.

We postulated that the demand for money is inextricably linked to capital, and that the main channel through which monetary policy exerts its effects is through changes in the net value of capital, the returns on capital and its variability; a view that finds an early expression in Tobin's works. That is, variations in the net value of the overall portfolio of financial assets and in systematic risk, which may generate effective demand changes. The lack of a fundamental rationale for the demand for money under general equilibrium conditions with zero transaction cost was solved by positing that investors chose to keep a fraction of their capital as available acquisition power and demand money to make effective their capital gains or loses, while maintaining the levels of profitability and risk of their portfolios at an acceptable level. In a similar way of what Marshall argued, we posited that:

$$M = \delta \kappa$$

Where, κ, equals the net aggregate value of capital, and, δ, the fraction of the value of capital that agents demand as money. That is, the fraction of the value of capital that agents wish to keep as 'available acquisition power', to use Marshall's expression. The fundamental link between the real and monetary spheres was established through capital.

Let's recall that the value of capital is virtual acquisition power, only money is available acquisition power. Capital needs to become money to be spent; and

it needs to be spent to have real effects. Once capital gains or loses are settled, agents will adjust their money holdings, and the new data will be entered in the consumer's budget restriction, with a potential effect on investment and consumption decisions. This hypothesis constitutes an alternative to explain what Hicks considered the *tremendously important* part of the demand for money, through which *monetary disturbances and policy operate*. It is an alternative directly derived from the theory of capital we have developed within a perspective of general equilibrium, and it is an alternative that does not rely on exogenous structures, but on an endogenously generated demand for money. That is independent from the traditional demand for money based on commodities transactions.

Ss we saw before considering that the demand for money for transactions purposes was nil, we then have:

$$M = \delta \kappa$$

And, [73]

$$\kappa = M + (1-\delta) \kappa$$

Then, in the aggregate, the net value of capital in nominal terms is:

$$Capital = Cash + Shares$$

Under these circumstances, both shares of capital or equities and cash become net financial assets in the hands of the community. If as we have argued the value of capital, K , is determined by general equilibrium conditions, the structure of capital and the interest rate. Then, caeteris paribus, changes in the value of shares of equity, would be compensated with equal changes in the value of cash or money holdings, and the opposite. Money is demanded to keep a fraction of the value of capital as available acquisition power, and the aggregate net value of cash and equity is determined by the value of capital. Contrary to the

prevailing view that explains the positive price of money or the existence of a determinate price level in equilibrium—conditions sine qua non for a monetary economy—by the introduction of exogenous structures, transactions costs or other ad hoc hypotheses. We provide an endogenous explanation whereby the positivity in the value of money is directly linked to the value of capital.

The conceptualization we have developed in this work, results in predictions that are counterintuitive and go against the predictions of standard theories. For example: If agents—investors—perceive a deterioration of the economic and financial situation, they might decide to increase their cash holdings. In such a situation we might see a run towards cash—liquidity—that would reduce the value of shares. If the fundamentals have not changed—the economy's rate of profits is invariant—the overall value of capital would be affected only through changes in the interest rate and leverage. Clearly this can be the case: if the monetary authorities adopt a restrictive policy and contain liquidity, the increased demand for money will result in higher interest rates and in more leverage. The perceived deterioration of economic conditions would result in a reduction of the value of capital and in an increase of systemic risk. Even tough the fundamentals have not changed the prophecy can be self fulfilled. And if it does, the potential reduction in spending will in time affect the fundamentals. The other case would be that monetary authorities adopt a relaxed policy and expand the liquidity of the system, the additional demand for money could be accommodated without changes in the interest rate, and as long as the fundamentals are sound the value of equities should not be significantly affected. Systemic risk might increase as leverage does. However as long as the difference between the profit and the interest rate is positive and significant, this would mean a higher variability in the returns of capital, but within the positive territory.

The previous simple analysis provides an example of the use of our capital theory integrated with the monetary framework we have developed to explain

some apparent anomalies from the perspective of standard theorizing. As can be seen we can deal with both micro and macroeconomic issues in an integrated fashion. I'll briefly present other considerations.

Within this framework, the simple positive inverse relationship between the demand for money and the interest rate, characteristic of textbook macro economics (IS-LM), does not hold. The demand for money is mostly independent of the interest rate. Ultimately it depends on portfolio decisions, on the dynamics of capital. We should expect to see that the demand for money linked to transactions or to the level of output becomes less and less important. Also we should not see a stable or predictable relationship between the demand for money and the level of income. The transactions based approach to monetary economics is superseded. There are also implications regarding the relationship between the interest rate, investment and consumption: It cannot be considered as a direct positive function in the first case and the reverse in the second. The potential impact of interest rate changes in both investment and consumption, depends mainly in the value of capital and is mediated through portfolio adjustments.

From a general equilibrium perspective, when consumers determine their lifelong consumption plans, they take into consideration the present and future prices of all commodities. It is an extreme and misguided simplification to reduce all prices for all periods, to a single price and then, to call it the interest rate. Certainly such a hypothetical price has nothing to do with the interest rate(s) that we can observe in real world markets. Once the consumers' consumption plans are determined, firms determine their lifelong gross investment plans, which include period by period net investment schedules. So, investment cannot be associated directly to the interest rate as its main determinant. In our perspective we have considered that as long as there are positive profits, capital effects, etc., etc., general equilibrium positions are temporary and the basic conditions of problem change. Over time new equilibria are continuously generated. These

imply of course, modifications in the agents' lifelong consumption and investment plans. And these do not correspond to changes in the interest rate, as we have defined it, in a simple predictable way. The old proposition that the interest rate is the price that equilibrates savings and investment decisions should be abandoned.

As we have argued, the interest rate at the most fundamental level is better conceived as the price paid for the services of the financial system which consist in the protection of the property rights of traders in the marketplace. Among these services, the most relevant services provided by the central bank and related institutions consisting in maintaining the monetary and financial stability of the system.

Contrary to the standard prescriptions, we may observe the opposite relationship between the demand for money and the interest rate. As we argued, for example, given the economy's profit rate and the interest rate, investors and firms will leverage, will demand credit, to achieve their required returns on equity at an acceptable level of risk. If, caeteris paribus, the interest rate rises, investors and firms, may demand more credit—not less as standard theories predict—so they can maintain their required levels of profitability. How much more, will risk be increased as leverage rises? It will depend on the pre-existing level of leverage. If this level was low, then we could expect that in the face of a rising interest rate, the demand for money will continue growing until systematic risk becomes unacceptable, and investors and firms are forced to revise downwards their profitability targets. In an environment of reduced profitability of capital and rising risks, investors and firms will most likely, decrease their leverage and increase their liquid or cash holdings. As we said: if they still can do it.

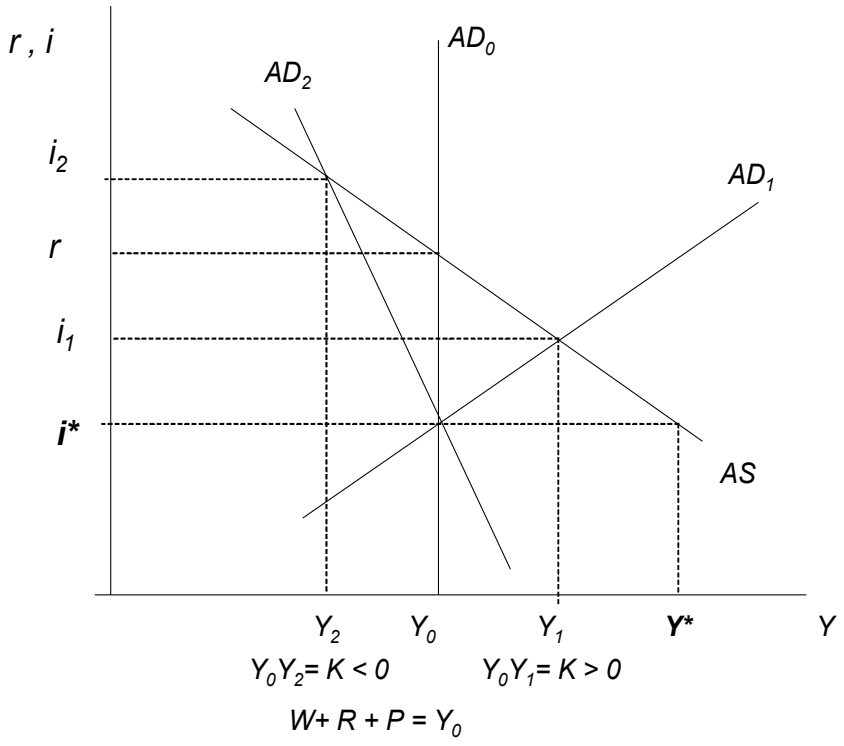
The consideration of capital effects in the demand for money and hence in the level of aggregate effective demand, introduces a significant element of potential instability and unpredictability in the workings of modern capitalist

economies. In general, we can expect that the value of capital is positive and important in size. We can expect that in normal conditions, capital has a positive impact on effective demand. In the classical version of Say's/Walras' Law, supply creates its own demand, capital has a nil impact on aggregate demand. In our formulation, capital would normally have a positive effect on aggregate demand over and above the incomes generated in the production process equal to wages, rents and profits.

6.10. Capital and Effective demand.

Another area for future research would be the construction of a framework that summarizes some of the macroeconomic implications of the previous considerations. In this section I will outline a highly simplified aggregate supply and demand analysis. This is a schematic preliminary representation of some basic ideas and does not have any pretensions of completeness, certainly it cannot substitute the more detailed analysis we have presented throughout this work.

The following presents a schematic of both aggregate demand and supply, AD/AS, in nominal terms, as functions of the profit and the interest rate. The intersection of these two functions determines nominal income and the interest rate.



The aggregate supply function represents the idea that the higher residual profits the lower the aggregate production of commodities. Let's recall, that all costs that are imposed without a quid pro quo on production, have the same negative effect as pure residual profits. Among those for example, we have taxes that are not channeled back to the productive system as public goods; higher monopolistic prices of scarce natural resources; politically determined union benefits that do not increase real productivity, etc., etc. The aggregate supply function is determined by the general equilibrium conditions in the commodities markets. The ideal long term equilibrium where prices equal costs, is represented as the point where the interest rate, ***i****, represents exclusively the costs of the financial system as the guarantor of the property rights of participants in the market place, and the costs of maintaining the financial and monetary stability of the system. This point, ***Y****, can be conceived of as the traditional full employment level of output and income.

In its simplest version the point, Y_0 , is the point where in classical terms supply creates its own demand, the value of the product equal the value of the incomes, wages, rents and profits, generated in the production process, $Y = W + R + P$. Here, capital effects are zero; the interest rate is equal to the profits rate. If the interest rate goes down, say from, r , to i_1 , the aggregate demand function shifts to the right, AD_1 , pivoting around the point where, $r = i^*$,and so does the aggregate level of income, Y_1 . Now aggregate demand or effective demand includes capital effects, $+ \boldsymbol{\kappa}$. How much of this additional effective demand would translate into higher real output or into higher prices? This would depend on general equilibrium conditions: if the additional spending goes to net investment that increases the productivity of the system, aggregate supply would shift to the right and real output will grow for given level of the profit and the interest rate. More demand can also mean a higher utilization of existing capacity and hence more output and lower prices. However, if the productive structure is very rigid, meaning fixed relative prices, an increase in effective demand would only raise nominal prices.

These are some simple preliminary considerations; the purpose of presenting them is to show that the theory of capital we have been developing has quite clear and potentially interesting macroeconomic implications. The simple AD/AS diagram that we have presented determines the level of aggregate effective demand as a function of the profit and the interest rates. It can be a quite useful supplement to the traditional AS/AD approach where real output is considered as a function of prices only. The development of these ideas is a matter for future research.

For the time being, some brief observations may prove suggestive for future considerations. If, investors and firms can decide only on the level of leverage, and they will target a certain return on equity. This behavior would have aggregate consequences as well, for example, as investors and firms try to “beat the market” and to systematically obtain returns over and above the overall

returns of the economy, determined by general equilibrium conditions in commodities markets, they will tend to increase the overall leverage and hence the systemic risk of the economy. In normal times, as long as the real profitability of the economy stays high and if the real interest rate is low, the systemic risk may not grow significantly, capital values will be positive and significant in size. They will expand effective demand and income will grow accordingly. However, as competition tends to drive profits down, investors may increase their leverage to compensate for perceived reductions in the real profitability of the economy. In an initial phase, we will see an expansion of effective demand fueled by an expansion of credit, which may be accompanied with an expansion of the returns on capital—lets recall that these will grow faster than leverage—and hence in the value of capital. As the value of capital expands, investors in the face of declining investment opportunities in commodities markets, because of a reduced real profitability, will channel resources towards rent generating assets, towards land for example. Land prices will tend to boom as well. So we have the good times rolling: incomes, credit, capital and land values will expand in tandem. If the monetary authorities decide to take the tequila bottles away when the party is getting good, by raising interest rates, they may stop the expansion, but they may start a recession or worse. Bearing in mind, that very small changes in either one of the crucial variables of our model, may have exponential consequences in the level of systemic risk, and hence in the potential magnitude of capital effects and their impact in aggregate effective demand. A sudden shift of effective demand to the left may trigger a downward spiral, decreased incomes, higher interest rates, and potentially a chain of bankruptcies followed by a generalized financial crisis.

Earlier in this chapter we postulated that the adjustment process towards long term equilibrium with zero profits, as determined by competition, exhibits a cyclical or wave-like, form. Which corresponds to the behavior of residual profits in a competitive environment, as the system adjusts towards a prices equal costs hypothetical situation. Periods of high, or above average, profits for some firms and industries, will most likely be followed by periods of below average, or low,

profits; a regression to the mean of sorts. We can expect that overall in most circumstances, the ups and downs of profits of particular firms and industries, would tend to cancel out in the aggregate. That is, when some industries are up, others are down and the overall profitability of capital will tend to show smaller variations in either direction. However, it is perfectly possible that, occasionally, the cyclical behavior of profits becomes synchronized, so the normal ups and downs in profitability of firms and industries can be amplified. These already amplified cycles resulting from commodities markets, can be exacerbated even more by the dynamics of financial markets, generating periods of explosive inflation or disinflation in the value of capital, with potential consequences in either direction. Certainly, even with moderate changes in the profitability of real markets, the dynamics of capital can have significant impacts on the macroeconomic performance of the economy.

6.11. Free Markets and Capitalism.

I have argued that free market economies should not be made equal to capitalist economies, also I have argued that Arrow & Debreu *'general theory of commodities'* should be seen as a *general theory of free markets*, which is not a *theory of capitalist economies*, for which a general theory is required. In this work we have provided an alternative for such a general theory of capitalism which incorporates and supersedes A&D theory of free markets. The core of our theory is a conceptualization of capital as the property right over residual profits, as an entitlement that is valuable and that can be traded. We left behind the idea that capital is a scarce resource whose price is a compensation for some kind of sacrifice or another. We abandoned the idea that the financial system and capital markets have as *the* central function the allocation of this purportedly scarce resource. In our perspective the financial system as a whole is essentially the guarantor of the property rights of traders in the market place and of the stability of the system. We found that the value of capital has significant, positive and

negative, effects on the macroeconomic performance of modern capitalist economies. We saw that the financial and monetary spheres of the economy can acquire a life of its own, and that the characteristic instabilities of capitalism are more often than not associated to the dynamics of capital. In particular we found that the potential for mishap comes from the structure of capital.

On the bright side we saw that the structure of capital is institutionally determined. Shares of capital, titles of debt, etc., etc., are institutions created by us, humans, in the course of our history. And, as such they can be reformed. Ultimately, the power of capital comes from recognizing today, acquisition power to be generated in the future. Certainly the future is practically unlimited and so can be the power of capital. We need to reform capital so we can harness its power for the common good, enhancing the best of free markets.

I will finalize this work with a note of a more sociological tone. Unfortunately free market and capitalist economies are, more often than not, assimilated.[74] Perhaps, the problem is ideological, using a political geometry that should have been abandoned long ago but that still is with us, we can say that from the perspective of the left all the sins of capitalism are attributed to free markets, and from the perspective of the right all the virtues of free markets are attributed to capitalism. Leaving behind a geometry that has proven to be an obstacle to scientific understanding lets stress that from a critico-rational standpoint, both social phenomena should be clearly distinguished.

The historian Fernand Braudel based on his seminal studies of the emergence of the modern world wrote:

"But does the readiness of historians to equate capitalism and rationality really stem from admiration for modern trading techniques at all? Does it not rather arise from a general feeling—the word argument is hardly appropriate—that capitalism equals growth; that capitalism is not one stimulus among many,

but the stimulus, the tiger in the tank, the prime mover of progress? Once more, this is to identify capitalism too closely with the market economy—an arbitrary equation in my view, as I have already explained, though an understandable one, since the two things coexisted and developed simultaneously, one because of the other and vice versa. People have been quick to go one step further and credit capitalism with the 'rationality' which they have seen in the equilibrium of the market, in the operation of the market system. But is there not a contradiction here somewhere? For the famous rational process of the market, about which so much has been written, operates precisely through ***spontaneous*** *exchange, trading which is above all free, competitive and in no way directed: wether it is described as the hidden hand (Adam Smith) or the natural computer (Lange) it results from the 'natural order', from the meeting of collective supply and demand, going far beyond individual calculations. A* ***priori****, this cannot be the same thing as the rational behaviour of the individual entrepreneur who seeks the path of maximum profit to himself. According to Smith, the entrepreneur has no need, any more than the state, to worry about the proper operation of the whole, which is automatically guaranteed. For 'no wisdom or human knowledge' could possibly undertake this task. That capitalism could not exist without rationality, that is without the continual adaptation of means to ends, without an intelligent calculation of probabilities, I will readily agree. But that takes us back to relative definitions of what we mean by rational, which can vary not only from one culture to another, from one social group to another, depending in each case on the ends and means. There can be different versions of rationality within a single economy. There is the logic of free competition; and there is the logic of monopoly, speculation and power."*[75]

That is, the logic of free markets and the logic of capitalism. Braudel criticizes the view that capitalism is a late result from the development of market economies, and argues that between the 15th and 18th centuries, and even before, relatively free markets and monopolies of different degrees always with some sort of political protection, coexisted side by side.[76] With free markets

representing a progressive force emerging from a relatively spontaneous social order, and capitalism as an external force intruding in the 'system of natural liberty', as Smith expressed it. Quoting Braudel again:

"Putting it in my own words, I would say: 'Capitalism (both past and present, with phases which are monopolistic to a greater or lesser degree) never entirely eliminates the free competition and market economy from which it has grown (and upon which it still draws) but continues to exist over and alongside them.' That is I would maintain that the economy between the fifteenth and eighteenth century—which consisted essentially of the conquest, from certain long-established 'bases', of a wide area by a fluorishing exchange and market economy—also had two levels as distinguished by Lenin in his analysis of late nineteenth-century imperialism: monopolies, open or concealed, and free competition; in other words, capitalism as I have been seeking to define it, and the developing market economy."[77]

As it is suggested in this essay, the analysis of the conditions for the sustainability of alternative social modes of organization for the creation and the distribution of wealth should be considered as the central theme of political economy as a scientific discipline. Adam Smith posited a free market as the most conducive form of social organization to increase production and welfare. He saw in free markets, the solution to the moral problem of the compatibility between the selfish search for private gains and the common good, assuring the sustainability of the social order. Smith argued against mercantilism, what Braudel sees as the capitalism of the time, and argued for a future ideal system based on natural liberty. David Ricardo defended free markets, free trade, and fought the power of the landed aristocracy, on the grounds that they would generate more and cheaper products for everybody. Marx recognized the importance and historical strength of free market forces, for him equal to the capitalist system[78], in the process of overcoming the anciéne régime, nevertheless, he postulated that it

was not sustainable in the long-run and carried within the seeds of its own demise.[79]

As the discipline of political economy developed and the political discourse evolved, free markets and capitalism became synonymous. Conceptually, Braudel has argued for a political distinction, which I would express with the idea that capitalism thrives through its alliance with the state, capitalism is ultimately sustained by power relationships with social and political roots. Nevertheless, Braudel does not provide us with an analytical definition of a capitalist economy. An extreme version of Braudel's idea could be that capitalism is mercantilism, the antithesis of the Smithian natural liberty system.

A preliminary definition can be advanced: In contrast with a pure free market economy á la A&D, where capital and its value do not play a role, in a capitalist economy the maximization of the value of capital as one of the driving forces of the economy is, at least, at par with the maximization of utility by consumers and the maximization of profits in production by firms. As we saw profits, capital, money and the interest rate are inextricably linked. The maximization of the value of capital motive is at the center of monetary and financial phenomena, and it may, under some circumstances, dominate over the utility and profit maximization motives as the main driving forces of the economy.

A capitalist economy may generate endogenously levels of output, employment and welfare systematically below those of a pure free market. The endogenous emergence of major instabilities and the existence of non-optimal long term paths of growth are perfectly possible in capitalist economies. A good number of Latin American economies are sadly good examples of this. But also, if an economy can develop its competitive advantages to generate residual profits and can *capitalize* them today, by using its future capacity to generate earnings to transform for the better the initial conditions of the problem. Then, such an economy may be able to push significantly up its long term path of

development. Some Asian economies are perhaps the best example in this regard.

Certainly, there are ample regions of modern economic life where production and distribution take place in a manner consistent with the principles and results of free markets. However, we have to admit that power still plays a dominating role in many areas of the contemporary world economy. Certainly, how close or how far are economies from a free market is a matter of degree, and even though it capitalism can injects an extra dose of dynamism to free markets, it is the potential major instabilities and deviations from otherwise perfectly achievable long term paths of sustainable growth, that may arise from the dynamics of capital that need to be addressed. The theoretical contributions of this work can prove to be useful in this respect.

It is an historical shame that the a-critical identification of free markets with capitalism caused the elimination in almost half the world of the two pillars of open societies: individual liberty and private property rights. As happened in the name of freedom and social justice, under the communist Marxist-Leninist regimes of the XXth Century. This historical aberration is practically gone. Nevertheless, it will be the historical shame of the XXIst Century, if because of ideological reasons or the blind defense of the status quo; we are not able to deliver on the promises of free markets and open societies, opening the door for new aberrations to take over.

The explicit consideration of the alternative modes of social organization for production and distribution should be brought back to the center of the debate. We need to find the most appropriate ways to get the best out of free markets, we need to reform the institutions of capital to harness its power. The foundations of the monetary and financial systems of individual nations and of the world need to be reconsidered. Paraphrasing Koopmans, I expect that this

work can be a solid stepping stone for the long and steep climb laying ahead of us.

Notes to Chapter 6.

[1] This is a continuation of my ongoing research programme on the macroeconomics of Free Markets and Capitalism. The first part consisted on a rational reconstruction of the classical political economy system plus a brief overview of the current state of our discipline adopting an epistemological stance based on the contributions of Karl Popper and Imre Lakatos. See: Castorena Davis, Victor Manuel "The Theoretical System of Classical Economics. Continuity and Rupture." Tesis para obtener el grado de Maestro en Docencia Económica, Posgrado en Economía, Facultad de Economía. Universidad Nacional Autónoma de México, UNAM. Octubre del 2004.

[2] My approach to the philosophy of science is radically different to the prevailing two views in mainstream social sciences: On one hand, the rampant Millian verificationism of the so called New Classical Economists and the so-called school of the Scientific Inference in Qualitative Research, to name just two examples of the "main" mainstream view. And on the other hand, the somewhat marginal perspective of methodological pluralism, where everything goes, as long, of course, it is 'alternative', and politically correct. This is another story: the epistemological discussion will be kept at the minimum necessary. For references and discussion see Castorena Davis, 2004.

[3] Lakatos, Imre. "La metodología de los programas de investigación científica." Alianza Universidad AU 349. 1983. The core of Lakatos contribution can be expressed succintly as follows: theories and hypotheses cannot be judged in isolation, they belong in groups or sets of theories, theories are interdependent and can only be evaluated as they develop historically, either in a "progressive" or in a "degenerating" way. The proper form to evaluate a theory is as a part of a Scientific Research Program, SRP. The history of science is not the history of theories but the history of scientific research programmes, SRPs. These research programs are characterized by a "hard core" that consists of a set of irrefutable propositions by the methodological decision of its protagonists, plus a "positive" and a "negative" heuristics. The "hard core" is surrounded by a "protective belt" of auxiliary hypotheses, that can and should be tested. For Lakatos, Popper's falsifiability criterion is correct, but it is not enough, a scientific theory not only should be testable, but independently testable, that is, it should be able to predict an outcome that is not predicted by a rival theory. If a SRP accounts for all the facts predicted by a rival SRP and in addition predicts other novel facts as well, then it is considered superior. A SRP is considered *"Theoretically Progressive*" if succesive formulations contain *"excess empirical content"* that is, if the new formulation predicts "some novel, hitherto unexpected fact." It is *"Empirically Progressive"* if "this excess empirical content is corroborated." An SRP is considered as "degenerating" if, it is characterized by a continuous addition of ad-hoc adjustments to account for new facts. Lakatos, 1978, I, pp. 33-34. Also, see Blaug, 1997, p.33.

[4] Lakatos, 1978, I, p. 102. See Blaug, 1997, p.31.

[5] A definition of science consistent with Popper's and Lakatos' view is: "it is the desire for explanations that are at once systematic and controlled by factual evidence that generates science; and it is the organization and classification of knowledge on the basis of explanatory systems that it is the distinctive goal of the sciences." Nagel, E. "The Structure of Science. Problems in the Logic of Scientific Explanation." 1961. p. 4. London: Routledge & Kegan Paul.

[6] In a footnote Lakatos writes (From the Spanish translation): "El auténtico centro firme del programa no nace ya dotado de toda su fuerza como Atenea de la cabeza de Zeus. Se desarrolla lentamente mediante un proceso largo, preliminar, de ensayos y errores. En este artículo no analizo ese proceso." Footnote 161. "La metodología de los programas de investigación científica." p.67. Alianza Universidad AU 349. 1983.

[7] "La ciencia newtoniana, por ejemplo, no es sólo un conjunto de cuatro conjeturas (las tres leyes de la mecánica y la ley de gravitación). Esas cuatro leyes sólo constituyen el "núcleo firme" del programa newtoniano. Pero este núcleo firme está tenazmente protegido contra las refutaciones mediante un gran "cinturón protector" de hipótesis auxiliares. Y, lo que es más importante, el programa de investigación tiene tambien una heurística, esto es, una poderosa maquinaria para la solución de problemas que, con la ayuda de técnicas matemáticas sofisticadas, asimila las anomalías e incluso las convierte en evidencia positiva." Lakatos, Imre. La MSRP, Introducción: Ciencia y Seudo Ciencia. P. 13.

[8] As he wrote: "La metodología de un programa de investigación con un "núcleo" metafísico no difiere de la metodología de otro dotado de un núcleo refutable excepto, tal vez, por lo que se refiere al nivel lógico de las inconsistencias que son la fuerza motriz del programa."Lakatos, Imre. La MSRP, P. 59. Unfortunately, Lakatos did not present us with a complete development of the above ideas, and the view of the 'hard core' as the purely methaphysical beliefs that unite the protagonists of a SRP has tended to prevail. If we look at the paradigm or at the hard core of a discipline as a purely methaphysical set of beliefs, it is impossible to compare a specific SRP with another, and I would say even to consistently define them, let alone to advise scientists about the progressive or degenerating character of a SRP, and hence to inform a decision about supporting or abandoning one program or another. Not to mention the impossibility to judge, on such grounds, if our discipline has progressed or not.

[9] A rational reconstruction as defined, is an exercise in theoretical minimalism. It seeks to capture as precisely as possible a particular domain of the "real world," at the highest level of abstraction, establishing the most important causal relationships among its constituent parts, and then logically deducing implications about the real world, that are, in principle, falsifiable in Popper`s terms. It is, to use the current buzzwords, an exercise in description, explanation and prediction.

[10] A well developed theoretical system is a deductive structure of scientific hypotheses with a form that is sufficiently defined and definitive that it is impossible to introduce a new assumption without modifying or revising the system. In other words the theoretical system has to be formulated in a clear and well defined way, so that every new assumption can be easily identified as a modification and hence as a revision of the system. It is a rigorous logical structure formed by axioms or primitive propositions, from which every other element of the system can be derived through purely logical operations. Of course, the use of some or other primitive propositions, does not imply a statement about their truth, or of their immediate empirical validity. In a theoretical system there is interdependence among its parts, and revisions of the system must allow us to observe how changes in the basic assumptions and propositions change the derived implications of the original system. If we recognize that at the heart of every scientific discipline, in a more or less explicit way, and in a more or less developed manner, lies a theoretical system that can be analyzed in strictly logico/analytical terms. Then, we can conceptualize the 'hard core' of a scientific research programme as containing not only a set of beliefs, values, visions, etc., that are analitically incommensurable; but also containing, or better said characterized by, an analytical part that is commensurable: the theoretical system of the discipline. Such a theoretical system corresponds

to the “authentic hard core” Again in Lakatos: *“El auténtico centro firme del programa no nace ya dotado de toda su fuerza como Atenea de la cabeza de Zeus...”* However, at some point in time, this authentic “hard core” can be considered “by the methodological decision of its protagonists” as irrefutable, that is as provisionally given.

[11] For a more detailed discussion of these issues see Castorena Davis, October, 2004. Ch. 1.

[12] At this point of the analysis we can abstract national accounting considerations.

[13] As it is known, the demand for land, labor and capital, is derived from the demand for commodities in general, however every demand for a particular commodity is a demand for the resources needed to produce it, and commodity prices ultimately reflect the prices of the resources involved in its production. When the price of a commodity is either above or below its natural price it means that the land, labour or capital employed in its production is being remunerated above or below its natural level. If, for example, capital is obtaining more profits in a particular activity than in the economy as a whole, the most profitable activity will attract more capital until profits will descend to its normal levels again, and the price of the particular commodity will go down as well. The exact same argument applies, of course, to labor and wages. As profits and wages vary, so will rents until, every type of land, that is, of natural resources, yields for her owner its natural level.

[14] See the discussion in Ch. 3.

[15] In the book: “Towards a New Paradigm in Monetary Economics” Joseph E Stiglitz, Bruce Greenwald, and Bruce Greenwood. Cambridge University Press, 2003. The authors reject all transactions based theories of the demand for money. And expanding upon the literature of new institutional economics, the first part of this study stresses the significance of imperfections in information, bankruptcy and banks. The second part examines the policy implications of the new paradigm emphasizing loanable fund demand and supply, as the basis for the “New” monetary paradigm.

[16] For example, in a letter from Ricardo to Malthus, Kurz and Salvadori find the following statement: “Political Economy you think is an enquiry into the nature and causes of wealth—I think it should rather be called an enquiry into the laws which determine the division of the produce of industry amongst the classes who concur in its formation. *No law can be laid down respecting quantity, but a tolerably one can be established respecting proportions.* Every day I am more satisfied that the former enquiry is vain and delusive, and the latter only the true objects of the science.” David Ricardo in a letter to Thomas Malthus October 9th 1820. Quoted by Kurz, Heinz D. and Neri, Salvadori. “Blaug on the Sraffian Interpretation” 2002. HOPE 34:1 (2002) pp. 226. In this quote from Ricardo we find a quite disturbing idea of rigor and analytical precision: How can you established the proportions into which something that is ‘vain and delusive’ can be divided? Only by assuming you know the whole to be distributed. Which is exactly what Ricardo did in order to be able to consistently determine a positive rate of profits.

[17] Neo-Sraffians like Kurz and Salvadori, refer to this scenario: total output is assumed as given, as a long term position, they do not explain how the economy got there, in their view the analytical method of classical economics consists of comparing such long-term positions. In my view this is only the Ricardian short term perspective.

[18] Contemporary Ricardians like Kurz and Salvadori, have tried very hard to turn this obvious limitation of Ricardo’s perspective: the assumption of a given level and structure of demand, into a virtue. And into one of the defining elements of the logical structure of classical economics. See section 3.1.

[19] See chapter 3. Section 3.

[20] See Castorena Davis, 2004 pp. 60-69. For a discussion of this problem in the context of contemporary interpretations of Classical Economics.

[21] For Marx, Malthus was the paradigm of this species. Ricardo was no so symphatetic either. In a letter from Ricardo to James Mill 1st of January 1821, referring to Malthus, he writes: “Political Economy he [Malthus] says it is not a strict science like mathemathics, and therefore he thinks he may use words in a vague way, sometimes attaching one meaning to them, sometimes another and quite different. No proposition can be surely more absurd.” Kurz and Salvadori, 2002, Footnote 2.

[22] After Jean Baptiste Say.

[23] This proposition, incorporates for the first time a systemic principle in economic analysis: it is impossible, for all commodities to be produced in relative excess. If a particular product is produced in excess, this means that there is an under-demand for it in terms of other goods. So: the excess supply of one commodity means excess demand for at least one other commodity. This is valid only in a strict sense in a pure barter economy.

[24] M total money supply, V, velocity of circulation, T total transactions in real terms or output in constant money prices, P price level. MV, total aggregate demand. In its rudimentary version, V and T are considered as constants, hence P depends only on M.

[25] This in order to understand the long term dynamics of modern conomies.

[26] Walras, Leon. *Elements of Pure Economics or the Theory of Social Wealth.* English translation by W. Jaffé, London: George Allen & Unwin. 1954. To determine relative prices the great neoclassical writers, Walras, as well as Jevons and Menger concentrated in the static analyses of resources’ allocation. They posited given resources, the quantities and the quality of which were determined outside the economic system. The problem of economics then, was to establish the conditions under which given resources, land, labor, capital, raw materials, or in general, productive services, were allocated among competing uses, generating maximum consumers’ satisfaction, the vector of prices that produced this result was the equilibrium solution.

[27] The equimarginal principle in production means that the agent in control of the production process, will employ additional units of a productive factor, land, labour or capital, until the value of the additional output, obtained by the use of such factor, is equal to the cost of the factor, which equals the remuneration of the factor’s owner. For example, more hours of labour will be employed if the hourly wage is less than the value of the additional output that is produced with that labour. In a pure competition equilibrium, the wage, rent or profit rate will be equal to the marginal product of labour, land, and capital, respectively. Using calculus, the marginal product of productive factors is expressed as the partial derivative of output with respect to the factor.

[28] The theory of the firm states that it is always possible to specify a function which expresses the maximum volume of physical output obtainable from all technicallly feasible combinations of physical inputs, given the knowledge about input-output relationships and considering that technical knowledge is freely available. Inputs are usually classified into more or less homogenous classes and both outputs and inputs are measured in flows. It is assumed for convenience that the production function so defined is smoothly differentiable. In this view is is strictly necessary to assume that firms are profit maximizing. The input demand functions or the factors demand, are derived as an inverse form of the marginal product equations. In perfectly competitive factor and product markets firms will hire workers, machines, and space until wage rates, machine rentals, and land rentals are equal to their respective marginal value or marginal revenue products.

[29] Most recent formulations of production functions, have left land out of the equation and concentrated on aggregate production functions with labour and capital only, maybe the best known of these functions is the two factor Cobb-Douglas, production function: $Y = AL^{\alpha} K^{\beta}$ Where A, β, α, are parameters to be estimated, and $\alpha + \beta$ is expected to be 1; so, $\beta = 1 - \alpha$; to satisfy Euler's theorem. Under circumstances were factor prices are determined by pure competition conditions wages and profits would be equal to the marginal products of labour and capital, full employment and all the good things would entail. Additionally, α, would represent the share of wages in national income, and, β, the share of profits. These parameters would be considered as technical constants and as such, it is implied that policy attempts to change them would affect the efficiency and stability of the system.

[30] So that the typical well behaved neoclassical results entail, the production function has to be a linear, homogeneous of the first degree, continuous, smoothly differentiable function, and there is nothing in the real world that permits us to conclude that such is the general case. In short linearly homogeneous production functions imply that: (1) the marginal product of a factor varies only with changes in the relative amounts of the factor employed; (2) the participating factors are complementary, an increase in a variable factor depresses its own marginal productivity but increases the marginal productivity of the fixed factor; and (3) the total product is exactly exhausted by payments to the participating factors in accordance with their marginal productivity. If the production functions are not of the first degree, the total product will either exceed or fall short of the sum of the distributive shares. In the case of diminishing returns to scale, the sum of market-imputed factors payments will fall short of the value of output, leaving a residual to be earned by the 'fixed' factor. In the case of increasing returns, the total product is insufficient to reward all the contributing factors according to their marginal productivity, and some factors are not getting what they are supposed to according to the theory; increasing returns to scale destroys competition and hence the basis of marginal productivity factor payments. The basic point is that only in a very particular case Say's Law in the classical sense $Y = R + W + P$; and the neoclassical postulate $Y = (dY/dT)T + (dY/dL)L + (dY/dK)K$; coincide and there is no evidence that supports that this is the general case.

[31] The initial attack came from Joan Robinson in her famous essay "The Production Function and the Theory of Capital" (1953-1954). She posed the central questions that dominated the debate: What do we mean by capital in neoclassical economics? How do we measure it in technical units (or) in a way that it is independent of distribution and prices, so it can be used coherently in a production function and legitimately regarded as one of the determinants of distribution? What sense can be made of the notion of an economy getting into equilibrium? Either it is in equilibrium (plans and expectations are fulfilled) and always have been there or not. There is no guarantee or sense in the notion of convergence on, or fluctuations around an equilibrium position. What sort of society is being analyzed? What is the meaning of capital? In short she argued that capital as employed in production functions could not be used to determine the interest rate or the profit rate and hence the distribution of output, because the aggregate value of capital depended on prices and hence on the distribution of income. Capital was a set of heterogeneous capital goods and could not be reduced to a single homogeneous entity with a dimension independent of prices.

[32] The literature on this theme is voluminous and has been amply surveyed and reported, just to mention a recent recapitulation by one of the great survivors on the Cambridge, UK, side, see: Harcourt, G. C. (1994) "The Capital Theory Controversies" in "Capitalism, Socialism and Post-Keynesianism" Selected Essays of G. C. Harcourt. 1995. Aldershot, Edward Elgar. Harcourt concludes with a very sad note: "…the current position is an uneasy state of rest, under which a time bomb is ticking away, planted by a small, powerless group of economists who are either ageing or dead." P. 45.

[33] As the editor of the 1966 Symposium Paul Samuelson concluded:"[...] the phenomenon of switching [...] of techniques [...] shows that the simple tale told by Jevons, Böhm-Bawerk, Wicksell and other neoclassical writers alleging that as the rate of interest falls in consequence of abstention from present consumption, in favor of future, technology must become in some sense more roundabout, more 'mechanized', and 'more productive' cannot be universally valid [...]. There often turns out to be no unambiguous way of characterizing different processes as more 'capital intensive' [...].[...] If all this causes headaches for those nostalgic for the old time parables of neoclassical writing, we must remind ourselves that scholars are not born to live an easy existence. We must respect, and appraise, the fact of life." (Samuelson, 1966b, pp. 568, 582-3). Charles Ferguson (1969), in a book dealing specifically with the neoclassical theory of production and income distribution, reiterated Samuelson's propositions: "... the Cambridge Criticism definitely shows that there may be structures of production in which the Clark parable may not hold [...]. The crux of the matter is that economists may be unable to make any statements concerning the relation of production to competitive input and output markets. I believe they can; but that is a statement of faith, [...]". (Ferguson, 1969, p. 269). See Pasinetti, Unpub. P. 34-35. Prof. Blaug in his Economic Theory in Retrospect (1978) wrote: "The fact remains, however, that the Switching Theorem suffices to show that the Austrian theory of capital—meaning the theory which reduces the differences between capital goods to 'time' and which then measures 'capital' as an 'average period of production', the rate of interest being determined by the interaction of the average period and the three reasons for positive time-preference on the part of individuals—is untenable." P. 557.

[34] The publication of Piero Sraffa "Production of Commodities by Means of Commodities" in 1960, constitutes another landmark in the capital theories' debate. The phenomenon of "re-switching of techniques", went virtually unnoticed when Sraffa's book (1960) was published, until the mid 1960s through a series of essays forming a "Symposium" edited by Samuelson in 1966. The opening article of such Symposium, was written by Pasinetti (1966) as a criticism of a previous article by Levhari (1965). The Symposium was followed by a copious literature (For surveys see Harcourt, 1969, 1972). As Luigi Pasinetti recently wrote: "The main theoretical finding of these contributions is that in general there is no inverse

monotonic relation between quantity of capital (whatever the method chosen for its measurement, whether in physical or in value terms) and rate of profits, a phenomenon also known as reverse capital-deepening." In "Critique of the neoclassical theory of growth and distribution" Unpublished. Pp. 33-34.

[35] In the words of the leader of the New Classical Economists Robert E. Lucas, Jr. : "The most interesting recent developments in macroeconomic theory seem to be describable as the reincorporation of aggregative problems such as inflation and the business cycle within the general framework of 'microeconomic' theory. If these developments succeed, the term 'macroeconomic' will simply disappear from use and the modifier 'micro' will become superfluous. We will simply speak, as did Smith, Ricardo, Marshall and Walras, of *economic* theory. If we are honest, we will have to face the fact that at any given time there will be phenomena that are well-understood from the point of view of the economic theory we have, and other phenomena that are not. We will be tempted, I am sure, to relieve the discomfort induced by discrepancies between theory and facts by saying that the ill-understood facts are the province of some other, different kind of economic theory. Keynesian 'macroeconomics' was, I think, a surrender (under great duress) to this temptation. It led to the abandonment, for a class of problems of great importance, of the use of the only 'engine for the discovery of truth' that we have in economics." Models of Business Cycles, Basil Blackwell Oxford and Cambridge, MA. 1987. P. 108.

[36] See Chapter 1. Edward C. Prescott, one of the founding fathers of Real Business Cycle theorizing, writes: "The Keynesians had it all wrong. In the Great Depression, employment was not low because investment was low. Employment and investment were low because labor market institutions and industrial policies changed in a way that lowered normal employment." In: "Some Observations on the Great Depression" Federal Reserve Bank of Minneapolis Quarterly Review Winter 1999, vol. 23, no. 1, pp. 25-31.

[37] Growth theory has traditionally been studied as part of macroeconomics, focusing on the undisturbed evolution of potential output, or of the level of production at normal capacity utilization. The fundamental **assumption** is that the goods and labor markets clear, that is, labor and capital are always fully or normally employed or that the employment level does not vary, the prices equal costs condition is implicitly assumed as well. Growth theory uses mostly completely aggregated one-sector models, usually a single good is produced by capital and labour and all consumers are assumed to be infinitely-lived and identical, which is exactly the same as positing a single agent.

[38] An impeccable critique is that of Pasinetti: "The growth models with endogenous technical progress that have emerged are extraordinarily refined in terms of the analytical tools used and at the same time naively simplistic in their vision of the world. Basically, using few but fascinating elegant analytical tools, they offer a re-edition and a restrictive re-adaptation of a mathematical model of inter-temporal maximisation which Frank Ramsey, a young mathematician in Keynes's Cambridge group, had proposed in 1928. His model was in fact conceived as an exercise in bringing out the analytical properties of a hypothetical economic system where an omniscient central planner, endowed with eternal life, decides on the distribution of production and consumption over time for all his subjects, being himself acquainted with all their preferences and all the constraints imposed by the technical conditions. But the authors of the growth model with endogenous technical progress have had greater ambitions, aiming at providing a descriptive scheme of the real world, and it is here that they have shown surprising naivety. None have had any hesitation in using neoclassical aggregate, continuous and differentiable production functions of the very type for which abandonment had been advocated twenty years earlier. None felt the need to justify or explain the use of notions like aggregate physical capital, which, moreover, they would most of the time include in Cobb-Douglas type production functions, resting on decidedly shaky empirical support. These are applied as if they were part and parcel of everyday economic reality, not the slightest doubt being shown about them." […] (the savings rate and the capital/net income rate) "…are "modelled" in such a way as to emerge from a process intended to represent maximising behaviour. In accordance with an approach that has found recent favour and diffusion, they are presented as having "microfoundations". It is from this feature that the growth models with endogenous technical progress acquire their elegance and at the same time reveal their naivety. Basically, they reduce their aim at analysing the behaviour of a single individual considered as "representative"; no longer a planner for all the other individuals but for herself. This extraordinary and queer individual lives forever, has perfect knowledge of the technical production functions, actually of the production function for one single good, and knows how to improve it (in other words how to produce technical know-how). She knows her utility function, from now to infinity; she adopts a (given) rate of inter-temporal preference and knows perfectly how to allocate efforts and consumption over time, in such a way as to achieve maximisation of the present value of her satisfaction, again from now to infinity, given the characteristics of production, learning, and consumer preferences, from now to eternity. It is hard to think how such singular individual could possibly be attributed the characteristic of "representativeness". Whether she is "representative" or not is precisely the question that one would wish to see demonstrated." Pasinetti, Luigi. "Critique of…" Pp. 46-47-48.

[39] As we said in chapter 1, the explicit and the implicit equilibrium conceptualization of the New Classical' view, is clearly at odds with the Walrasian treatment of the conditions and consequences of economic progress. For Walras different adjustment processes operate at different speeds: market clearing can be determined in a matter of minutes. In contrast, the achievement of "full" equilibrium, where prices equal costs, is a considerably longer and slower adjustment process and in this process the evolution of profits and the role of the financial system and markets are central.

[40] "I should think we would view any monetary model that did *not* have this neutrality property with the deepest suspicions, the way we would view a physical model that predicted different times for the earth to complete its orbit depending on whether distance is measured in miles or kilometers." Robert E. Lucas Jr. "Models of Business Cycles" p. 74.

[41] For example: "Here, to motivate the use of money, a subset of consumption goods—'cash goods'—will be thought of as exchanged in circumstances where the buyer is unknown to the seller, so that the latter is unwilling either to accept as payment claims issued in earlier securities trading or to issue trade credit to be discharged later. Such goods, if purchased at all, *must* be paid for with currency acquired in advance…" p. 74. […] "…it is central to monetary theory that there are intertemporal movements in purchasing power that cannot be effected with securities: otherwise, we wouldn't need the money!" p. 78. Robert E. Lucas Jr. "Models of Business Cycles"

[42] The intellectual leader of the RBC school and Nobel Prize winner, Edward C. Prescott provides us with an excellent summary of growth theory, business cycles and the Great Depression among other questions. The long quote is justified:

“The now-textbook [growth] theory includes two basic decisions. One is the consumption-investment decision, […] Less consumption and more investment today can increase consumption in the future. The other decision is the labour-leisure decision. (Leisure is shorthand for productive time allocated to nonmarket activities and not leisure in the conventional sense of the world.) More labour and less leisure today results in more market output today. This added output can be used for greater consumption today or for greater investment today, which permits greater consumption in the future [...] if technology advances smoothly and there are no changes in market distortions, the economy grows at a steady rate with constant shares of output being allocated to consumption and investment and a constant fraction of time being allocated to the market. The theory predicts the consequences of changes that affect the constraints people face […] Growth theory without the labour-leisure decision was developed to account for secular growth. With the natural extension to include the labour-leisure decision, the theory has proved successful in accounting for phenomena other than what it was designed to explain […] Another dramatic empirical success of growth theory is in the study of business cycle foundations. The developers of growth theory thought the theory would be useful for studying long-term growth issues but that a fundamentally different theory would be needed for studying business cycle fluctuations. Once the implications of growth theory were derived, however, business cycle fluctuations turned out to be what the theory predicts […]

The Great Depression and business cycles are fundamentally different in terms of magnitude and persistence […] business cycles are responses to persistent changes, or schocks, that shift the constant growth path of the economy up or down. This constant growth path is the path to which the economy would converge if there were no subsequent shocks. If a shock shifts the constant growth path down, the economy responds as follows. Market hours fall, reducing output; a bigger share of output is allocated to consumption and a smaller share to investment; and more time is allocated to leisure. Over time, market hours return to normal, as do investment and consumption shares of output, as the economy converges to its new lower constant growth path. The level of the new path is lower, not the growth rate along the path.

I’ve just described the response of the economy to a single shock. In fact, the economy is continually hit by shocks, and what economists observe in business cycles is the effects of past and current shocks. Business cycles are, in the language of Slutzky (1937), the “sum of random causes”.

The fundamental difference between the Great Depression and business cycles is that market hours did not return to normal during the Great Depression. Rather, market hours fell and stayed low. In the 1930s, labor market institutions and industrial policy actions changed normal market hours. I think these institutions and actions are what caused the great Depression.” Prescott, Edward C. “Some Observations on the Great Depression” Federal Reserve Bank of Minneapolis. Quarterly Review. Winter 1999, vol. 23, no. 1, pp. 25-31

[43] Prescott, writes: “From the perspective of growth theory, the Great Depression is a great decline in steady-state market hours. I think this great decline was the unintended consequence of labor market institutions and industrial policies designed to improve the performance of the economy. Exactly what changes in market institutions and industrial policies gave rise to the large decline in normal market hours is not clear. But, then, neither is clear why market hours are so low in France and Spain today. The Marxian view is that capitalistic economies are inherently unstable and that excessive accumulation of capital will lead to increasingly severe economic crises. Growth theory, which has proved to be empirically successful, says this is not true. The capitalistic economy is stable, and absent some changes in technology or the rules of the economic game, the economy converges to a constant growth path with the standard of living doubling every 40 years. In the 1930s, there was an important change in the rules of the economic game. This change lowered the steady-state market hours.” In: “Some Observations on the Great Depression” Federal Reserve Bank of Minneapolis Quarterly Review Winter 1999, vol. 23, no. 1, pp. 25-31.

[44] The so-called Arrow-Debreu competitve equilibrium, CE, model, was developed by Kenneth Arrow and Gerard Debreu in the 1950s as published in several papers (See first footnote Section 2.2). The classic book of modern value theory is Gerard Debreu's *Theory of Value*, published in 1959. (See references in chapter 2.)

[45] The general equilibrium approach in its modern Arrow-Debreu, A&D, derived formulations, that do not rely on the traditional production function approach using activity analysis instead, are inmune to the re-switching critique and have succeded in providing a consistent theory of value for all commodities. They are capable of determining relative prices for all present and future commodities. However, their treatment of capital and of the profitability of capital, financial markets and money is still very far from satisfactory. The revolutionary character of activity analysis lies, from the instrumental perspective in the set-theoretic approach which is more fundamental and powerful than the smooth differentiable production function traditional approach. From the more ample theoretical perspective it provides the foundations to analyze production in a strictly technical resource allocating way. Without making confusing and arbitrary distinction between the commodities used in productions and without endowing arbitrarily defined aggregates like land, labor or capital, with physical productivities of its own that are independent of its use. Some early versions of activity analysis often made a distinction among primary, intermediate, and desired commodities. Primary commodities defined as the ones which flow into production from outside the production system; intermediate commodities which are the ones produced only for use as inputs for further production; and desired goods as those produced for consumption or other uses outside the production system. These are clearly arbitrary definitions that cannot illuminate the fundamental issues pertaining capital and distributional theories.

[46] A commodity bundle is considered to be an element of R^n, that is an *n*-dimensional vector whose components are real numbers. A commodity is defined by its physical characteristics, its availability location and its availability date. The price vector is also an element of R^n .

[47] Gerard Debreu's “Theory of Value”, 1959, p. 75.

[48] See chapter 2. For A&D maximum profits can be either zero or positive (See Arrow and Debreu, 1954, section 3.1.2. pp. 275) The existence of positive profits is justified by the introduction of a particular hypothesis: factors that are private to the firm and are non marketed. “If, however, we assume that among the factors used by a firm are some which are not transferable in the market and so do not appear in the list of commodities, the production possibility vectors, if we consider only the components which correspond to marketable commodities, will not satisfy the additivity axiom.

(Footnote, 2.)" "(2.) The existence of factors private to the firm is the standard justification in economic theory for diminishing returns to scale. See, e.g., the discussion of "free rationed goods" by Professor Hart [9], pp. 4, 38; also Hicks [10], pp. 82-83; Samuelson [18], pp. 84." Arrow and Debreu, 1954, pp. 267.

[49] A channel, a dam, a bridge, etc. Are far from natural resources, but at some time can be considered, as Debreu expressed it, *as a priori givens*, and treated as the classics treated land. As rent yielding assets. It is extremely hard if not impossible, to separate pure natural resources, from man made or man affected resources! Our definition of "natural" capital should also comprise all man made tangible and intangible assets, that yield rents. A comprehensive definition of natural capital is needed, it should include the natural, historical and cultural patrimony of mankind.

[50] Oskar Lange, "Wholes and Parts. A general Theory of System Behaviour. 1965, Pantswowe Wydawnictwo Naukowe Varsovia. From the Spanish version: "Los 'Todos' y las Partes. Una Teoría General de Conducta de Sistemas. Fondo de Cultura Económica 1975. See Section IX. Pp. 70-84.

[51] See Lange, 1975, pp. 70. In the Principia Cybernetica Web we find the following definitions: ERGODIC.(I) of or relating to a process in which a sequence or sizable sample is equally representative of the whole (as in regard to a statistical parameter); (2) involving or relating to the probability that any state will recur, especially having zero probability that any state will never recur. (WEBSTER'S DICTIONARY) A collection of systems forms an ergodic ensemble if the modes of behavior found in any one system from time to time resemble its behavior at other temporal periods and if the behavior of any other system when chosen at random also is like the one system. We do not require identical performance, only quite similar time averages and number averages. (If you cannot tell one youth from another or one adult from another, they belong to an ergodic ensemble.) In an ergodic population, any single individual is representative of the entire population. The salient characteristics of this individual are essentially identical with any other member of the group. (Iberall). Also: Attribute of a behavior that involves only equilibrium states and whose transition probabilities either are unvarying or follow a definite cycle. In statistics, ergodicity is called stationarity and tested by comparing the transition probabilities or different parts of a longer sequence of events. Ashby's "theory of incessant transmission" refers to the analysis of information flows in systems whose transition probabilities are unvarying and hence ascertainable for the analysis. All systems eventually converge toward ergodic behavior.

[52] Lange, 1975. pp. 59-60.

[53] Lange, 1975. pp. 74.

[54] Lange, 1975. pp. 72-73.

[55] For a discussion on randomness see Chapter 4, section 4....

[56] As we have argued, Walras uses an abstract theoretical end state of the economy, which corresponds to a stationary free market full equilibrium, as an analytical first step to try to understand the day to day real operation of a modern capitalist economy and the dynamic forces that propel its long-term development. Walras view of the reality of a modern capitalist economy is that of a continuous equilibrium, the economy is always in a temporary equilibrium and this is different from day to day, moment to moment. Walras ultimately wanted to understand the process by which this continuous movement tended towards an abstract final state of full equilibrium. Walras dynamic vision is different from the perspective of the contemporary neoclassical and the new classical views which consider that the economy is in reality most of the time close to, if not in, a full equilibrium, and that deviations from this full equilibrium growth path, as defined in neoclassical growth models, are the result from various exogenous disturbances and shocks. So the economy moves from a full or close to full equilibrium situation, to another similar situation. However, as long as there are profits and loses, capital and capital markets, credit operations, migration of investment within industries, etc., etc., for Walras the real economy is not in a full equilibrium. Unfortunately, he merely outlined this vision.

[57] As Jaffé correctly pointed out, the economies portrayed in general equilibrium analysis are not modern capitalist economies. I have said that the frequent assimilation of free markets and capitalism is more ideological than analytical.

[58] In its modern, general equilibrium/activity theory, version.

[59] The proponents of the efficient capital markets hypothesis would say that the process of equalization of returns on shares is immediate.

[60] That is the market where property rights on future profits are traded. Certainly, capital markets have nothing to do with the markets of the things used in production.

[61] Certainly the profit rate cannot simply be determined as the ratio of the value of profits and the value of capital defined as the means of production.

[62] As we have said before, arbitrage is one of the most fundamental concepts in financial economics, is usually defined as *"the act of buying an asset at one price and simultaneously selling it or its equivalent at a higher price."* Thanks to the activities of arbitrageurs, that continuously try to profit from price differentials buying and selling securities, the prices of securities adjust until every security ends up yielding the same return. Hence, we have the Law of One Price: two securities or groups of securities with the same payoff, or returns, structure must sell for the same price: *"If two identical securities (or packages of securities) are selling in two markets at different prices, it should be profitable to buy the security in the low-priced market and sell it in the high-proceed market simultaneously. In the process, arbitrageurs, who engage in this activity for a profit, drive up the price in the low-price market and drive down the price in the high-priced market, eliminating the price differential."* There are many differences between professionals of finance within the ruling Smithian camp regarding the right way to define equilibrium yields and price relationships among securities, but almost everyone agrees that the Law of One Price rules almost all of the time in securities markets: securities or bundles of securities with equivalent returns will be priced so that risk-free arbitrage is not possible.

[63] It might be said that under some circumstances, consumers or society, has no choice, given the market power of corporations, unions, public enterprises, etc.

[64] Or sometimes considered as the own-rate of return of a certain commodity, which is an unsustainable proposition.

[65] Once we take into account the structure of capital and the interest rate, which we conceive essentially as the cost of the monetary and financial stability of the system, we could say that in a long term full equilibrium with zero residual

profits, the appropriate rate to discount future cash flows will equal this interest rate. The present value of capital will be zero just as well.

[66] Abstracting from distributional consequences. For example, assuming that the preferences of those consumers that win and those that lose are not significantly different.

[67] "Credit and equity rationing—or, more broadly, the informational problems associated with the capital market—provide insights into three of the puzzles we have noted above. *If* credit rationing is important, it could explain *both* why corporate financial policy is not irrelevant and why public financial policy is not irrelevant…" Stiglitz and Greenwald, 2003. pp. 38.

[68] The classic paper on the theme is: **Credit Rationing in Markets with Imperfect Information,** Joseph E. Stiglitz, Andrew Weiss. In *American Economic Review*, Vol. 71, No. 3 (Jun., 1981) , pp. 393-410. "Why is credit rationed? Perhaps the most basic tenet of economics is that market equilibrium entails supply equalling demand; that if demand should exceed supply, prices will rise, decreasing demand and/or increasing supply until demand and supply are equated at the new equilibrium price. So if prices do their job, rationing should not exist. However, credit rationing and unemployment do in fact exist. They seem to imply an excess demand for loanable funds or an excess supply of workers.

One method of "explaining" these conditions associates them with short—or long-term disequilibrium. In the short term they are viewed as *temporary disequilibrium* phenomena; that is, the economy has incurred an exogenous shock, and for reasons not fully explained, there is some stickiness in the prices of labor or capital (wages and interest rates) so that there is a transitional period during which rationing of jobs or credit occurs. On the other hand, long-term unemployment (above some "natural rate") or credit rationing is explained by governmental constraints such as usury laws or minimum wage legislation. (Footnote 1)

The object of this paper is to show that in *equilibrium* a loan market may be characterized by credit rationing. Banks making loans are concerned about the interest rate they receive on the loan, and the riskiness of the loan. However, the interest rate a bank charges may itself affect the riskiness of the pool of loans by either: 1) sorting potential borrowers (the adverse selection effect); or 2) affecting the actions of borrowers (the incentive effect). Both effects derive directly from the residual imperfect information which is present in loan markets after banks have evaluated loan applications. When the price (interest rate) affects the nature of the transaction, it may not also clear the market.

The adverse selection aspect of interest rates is a consequence of different borrowers having different probabilities of repaying their loan. The expected return to the bank obviously depends on the probability of repayment, so the bank would like to be able to identify borrowers who are more likely to repay. It is difficult to identify "good borrowers," and to do so requires the bank to use a variety of *screening devices.* The interest rate which an individual is willing to pay may act as one of such screening device: those who are willing to pay high interest rates may, on average, be worse risks; they are willing to borrow at high interest rates because they perceive their probability of repaying the loan to be low. As the interest rate rises, the average "riskiness" of those who borrow increases, possibly lowering the bank's profits. Similarly, as the interest rate and other terms of the contract change, the behavior of the borrower is likely to change. For instance, raising the interest rate decreases the return on projects which succeed. We will show that higher interest rates induce firms to undertake projects with lower probabilities of success but higher payoffs when successful." Pp. 393.

[69] Certainly market imperfections can be extremely important under particular circumstances, however they cannot provide us with the fundamental explanations that are needed.

[70] Equity Rationing: "…even in well-developed capital markets, a relatively small fraction of new capital is raised through new equity."…firms might actually be able to raise new equity, they simply choose not to do so. They choose not to do so because issuing additional equity has a marked negative effect on firms' net worth, (Footnote 9) net of the additional capital raised, so firms act as if they were equity rationed. These firms finance investment beyond retained earnings by borrowing. (Footnote 10) When they are denied bank credit, they do not raise capital by issuing new equity, but rather constrain their capital expenditures to retained earnings. (Footnote 11).There are strong theoretical reasons why this should be so. The willingness of insiders to sell shares to outsiders conveys information; on average firms that are willing to do so are more likely to believe that the market has overpriced their shares. This argument would suggest that there is never an equity market, but of course, in the real world, the original owners of a firm, while they may have more information than an outside investor, are still imperfectly informed, and are still risk averse; so they are willing to accept a bid at a price which is slightly lower than the actuarial value of their estimate of the value of the asset. Nonetheless, it is still the case that willingness to sell shares conveys a negative signal to the market and this negative signal is reflected in the price of shares. And accordingly, firms will be reluctant to sell shares, including selling shares to finance new investment." Stiglitz and Greenwald, 2003. pp. 34-35.

[71] "Equity rationing is particularly important, because it means that firms cannot (or choose not to fully diversify their risks; the original owners cannot fully share the risks throughout the economy, and consequently the firms do not act in a risk neutral manner. If firms have to rely on debt financing, there is a chance that they will not be able to meet their debt obligations, in which case they go bankrupt. There is a cost to bankruptcy not only for lenders. (Footnote 16) Firms (and we need to think of banks as a special category of firm) maximize their expected profits, taking into account the effects of their decisions on their bankruptcy probability. Higher levels of production—for banks, as we shall see, this translates into higher levels of lending—imply higher probabilities of default. If banks, and firms more generally, were not "equity-constrained," they would prefer to use more equity, as equity has a distinct risk diversification advantage over debt. In particular, the larger the fraction of outside finance that is raised through equity, the smaller the probability of bankruptcy." Stiglitz and Greenwald, 2003. Pp. 37-38.

[72] An interesting idea was expressed by an old master of practical finance: debt should be more like equity. Soros, George. 1998. See chapter 8, pp. 175-194. We have provided ample analytical support for such intuition. The value of capital is highly variable: the more we try to avoid variations in a subset of its components, the more we'll increase variability in others.

[73] Lets recall that now K is expressed in nominal terms, that is the value of capital in real terms times the level of prices, P. To express K, in real terms we would have to divide the right side of the equation by P. See p. 236. We argued that at the most simplistic level the fraction of the value of capital, δ, that agents may decide to have as available acquisition

power, could be considered as a constant, as Marshall's, ***k'***. Nevertheless, δ, the fraction of the value of capital that becomes demand for money, may be better conceived of as a variable depending on portfolio decisions, mainly on leverage and the rate of interest. Also, the proposed formulation permits us to consider the link between the level of prices and monetary demand, through the ancient, now reformulated, quantitative theory of money. As we saw the demand for money when transactions' demand is not nil, is: $M^D_t = k\, P_t \underline{Y}_t + \delta \kappa_t$

[74] See for example the following definitions: "CAPITALISM economic system in which (1) private ownership of property exists; (2) aggregates of property or capital provide income for the individuals or firms that accumulated it and own it; (3) individuals and firms are relatively free to compete with others for their own economic gain; (4) the profit motive is basic to economic life. Among the synonyms for capitalism are LAISSEZ-FAIRE economy, private enterprise system, and free-price system. In this context economy is interchangeable with system." Dictionary of Finance and Investment Terms, John Downes, Jordan Elliot Goodman. BARRON'S Financial Guides. 1985. Pp. 53. Also from the "The Penguin Dictionary of Economics", see: **"Capitalism.** The politico-economic system, based on private property and private PROFIT, censured by KARL MARX for its exploitation of labour. >>FREE MARKET ECONOMY. Pp. 69. **"Free market.** A MARKET in which the forces of SUPPLY and DEMAND are allowed to operate unhampered by government regulation or other interference. **Free market economy.** An economy in which RESOURCES are allowed to be allocated by the operation of FREE MARKETS. >>PRICE SYSTEM." Pp. 190. **"Price system.** The system of RESOURCE allocation based on the free movements of prices. In an economy in which MARKETS are permitted to work without outside intervention, the decisions taken by individual buyres and sellers are coordinated and made consistent with each other by movements in prices. Thus, if buyers wish to purchase more than sellers wish to supply, PRICE will rise. As price rises, this causes buyers to reduce the quantities they wish to buy, and sellers to increase the quantities they wish to sell, until, at some particular price, these quantities are equal, and the separate decisions of buyers and sellers are thus made consistent. Similarly, if sellers wish to sell more than buyers are prepared to take, price falls, causing sellers to reduce the quantities they wish to sell, and buyers to increase the quantities they wish to buy, until the quantities are again equal, and decisions are consistent. If every good, SERVICE, and FACTOR OF PRODUCTION in the economy is sold on such a market, then we can see how the movements in prices bring about consistency of decisions or plans of all buyers and sellers. This mechanism by which movements in prices coordinate individual decisions is known as the price system. Several things should be noted. First, the process of coordination is quite decentralized. No single central authority collects information on buyer's decisions and seller's decisions, finds the level at which they are consistent and then transmits information on the necessary sales and purchases to individual buyers and sellers. Whatever one's view of the ethics of centralization, a decentralized system is, other things being equal, likely to be more efficient as a coordinating device; simply because it saves the costs of a two-way transmission of information, it may operate more quickly and with fewer mistakes. Secondly, however, we must take care not to identify too readily the workings of the idealized price system with the workings of any actual FREE MARKET ECONOMY. Many frictions and imperfections may exist in the real world which may be judged to tilt the balance of efficiency from the decentralized price system to a centralized PLANNED ECONOMY—altough state ownership of the means of production by no means precludes the use of a price system to solve the technical problem of resource allocation. Finally, even if markets in the real world worked smoothly, without frictions and imperfections, the price system does not solve all the problems of resource allocation. Some goods, often called PUBLIC GOODS, cannot be bought and sold on markets. The price system does not take into account EXTERNALITIES, and so does not ensure that the socially optimal level of an activity is in fact achieved. The ability to buy goods and services through the price system depends on one's INCOME, and this may create social problems. The conditions under which the price system will bring about an optimal allocation of resources (>>ECONOMIC EFFICIENCY) form a major area of study of WELFARE ECONOMICS. Pp. 354-355.

[75] Braudel, Fernand, "The Wheels of Commerce" Civilization & Capitalism 15th-18th Century,Vol. 2. Harper & Row, Publishers. 1986. Pp. 575-577.

[76] "It is important not to attribute to capitalism the virtues and 'rationalities' of the market economy itself—even as Marx and Lenin both do, implicitly or explicitly, by regarding the development of monopolies as an inevitable but **late** development of capitalism. For Marx, the 'capitalist system', when replaced the feudal system was a 'civilizing' force in that it 'was more favourable to the development of productive forces and social relations' which made for progress, and in that 'it brought about a stage of development from which were absent both coercion and the **monopolization of social progress (including its material and intellectual advantages) by one class of society at the expense of the other'**. If Marx elsewhere condemns 'the illusions of competition', it is in the course of an analysis of the nineteenth-century system of production itself, not in a passage criticizing the behaviour of capitalists. For the latter derive their 'stern ruling authority' entirely from their social function as producers, not as in the past from a hierarchy which made them 'political or theocratic masters'. It is the 'social cohesion of production' which now appears 'as a natural and omnipotent law vis-á-vis individual arbitrariness'. My own view is that a case can be argued for the 'external' nature of capitalism both before and after the nineteenth century.

Lenin, in a well-know passage written in 1916[395] argues that capitalism only changed its character (becoming in the early twentieth century 'imperialism') 'at a definite and very high stage of its development, when certain of its fundamental attributes began to be transformed into their opposites… Economically, the main thing in this process is the substitution of capitalist monopolies for capitalist free competition…(which had been) the fundamental attribute of capitalism and of commodity production generally.' I do not of course agree on this point. But, Lenin goes on, 'at the same time, monopoly which has grown out of free competition, does not abolish the latter, but exists over it and alongside it'. And here I am in complete agreement." Op. Cit. Pp. 577.

[77] Op. Cit. Pp. 577-78.

[78] Marx never used the term capitalism.

[79] For a brief presentation of these classics see Chapter One.

Summary of Conclusions.

In this work we have argued for a research programme based on a rational reconstruction of the theoretical system of classical political economy, also we have used this reconstruction as a tool for evaluating alternative theories and for theory building. Following Lakatos, our rational critique did not assume the existence of a fully articulated deductive structure at the hard core of the classical system. We pursued a critique of a wide range of economic theories to reconstruct and to improve the logical and deductive articulation of the classical grand vision; which can be expressed from a contemporary perspective: as the analysis of the conditions for the long-term sustainability of alternative social modes of organization for the creation and the distribution of wealth.

At the hard core of the classical analysis of modern capitalist economies we find a theory of competitive markets where the relative prices of commodities —its value—are determined jointly with incomes. The dynamics of the system are centred on the profitability of capital, with capital conceived as a scarce resource, as a physical entity comprising the commodities used to produce commodities. In the Smithian vision the cost of capital is a price; in the Ricardian profits are seen as a residual and the rate of profit as a measure of profitability. We saw that for the classics: capital, the profit rate, money and the interest rate, were fundamental variables that required theoretical elucidation. However, monetary and financial phenomena did not play an essential role in the classical theoretical world. Nevertheless, it is considered that monetary and financial problems and policies, do play a very important role in the real world where we live.

We argued that the stability or instability of modern capitalist economies, financial crises, the problems of growth and the elimination of poverty, the likelihood of major environmental catastrophes, the new architecture of the world's financial system, among other central issues, required a radical re-thinking about the foundations of our knowledge to come up with new answers

and policies. In particular we argued that the scientific foundations of monetary and financial policies needed to be reconsidered, and that this required a solution to the theoretical problem of the integration of monetary theory to general equilibrium value theory. I concluded that the necessary integration of value and monetary theory passes through a theory of capital; as a category distinct from the commodities used in production. We conceived capital as the property right over residual profits, as an institution, as an entitlement. Capital is not a scarce productive resource, so the financial system cannot be seen as the locus where a scarce resource named capital is allocated to competing uses. Capital represents acquisition power, it is traded and its value plays a very significant role in the dynamics of the system.

We presented a contribution to the development of a general theory of the economics of capitalism, that complements the classical theory of value with a theory of capital, to study in an integrated manner, the workings of real, financial and monetary markets.

A true contemporary 'classical' approach should advance the understanding of when and how the dynamics of capital may affect the short and long-term dynamics of the economic system, particularly cycles and financial crises, through variations in the value of capital and hence through changes in the value and distribution of wealth that may impact aggregate effective demand, recognizing that financial forces can have real effects and that these can be negative, severe and long lasting. As we stated in the introduction: *"The problem is to understand the conditions where significant instabilities in modern capitalist economies can emerge endogenously so that they can be avoided. Also we want to understand the real workings of the monetary and financial systems so we can identify the conditions where they can contribute their best to the long term development of our economies and to the social and environmental sustainability of the global community."*

Recapitulating our analysis: within the classical approach there was no room for money and finance. We started by considering profits as a residual of value, and capital as the property right over these profits, current and future. The reinterpretation of profits as a residual, within a general equilibrium setting à la Arrow and Debreu, implied that a sequential view of the economy should be adopted. As long as profits are positive equilibrium is temporary: markets clear but prices differ from costs. Only when prices equal costs, a full optimal equilibrium ensues.

The consideration of capital as the property right over residual profits only, implies that capital is essentially different from commodities and that the securities that represent capital cannot be treated as apples and oranges to determine its value. The mechanism to value capital is essentially different from the mechanics of pricing commodities. We determined the value of capital using as the appropriate discount rate: the economy's profit rate. We found that under these circumstances the net aggregate value of capital would be nil in equilibrium, nevertheless the value of particular shares of capital would adjust until the returns on capital would be equalized at the economy's profit rate. The value of capital at the firm level would adjust until the returns on capital would be equalized at the level of the economy's rate of profit. We argued that Arbitrage and the Law of One price would suffice to achieve this result; the application of the standard value theory tools to capital markets becomes redundant. So, we found a rationale for the trading of property rights, a market for capital emerged and we found that significant distributional effects may be generated.

We concluded that the standard assumption that the value of capital is a given should be abandoned. The variations in the value of capital are a case of apparent randomness. The movements in the relative prices of shares and in the overall value of capital relative to commodities are endogenous: the explanatory intrinsic mechanism is identified. We also demonstrated that in a situation where shares of capital, equity, are the only form of property rights over residual profits,

the aggregate net present value of capital is zero and Say's Law is irrevocably valid.

Then we considered the introduction of a different form of property rights over residual profits: debt that yields interest payments. We found then, that the net aggregate value of capital may be different than zero. Once the interest rate is introduced; a new element appears in the aggregate budget's constraint: the net value of capital. Say's Law becomes a special case of macroeconomic equilibrium: the case where the interest and the profit rates are equal. Capital appeared as a net financial asset of the community. We saw the emergence of aggregate capital effects side by side with distributional effects, both with potential real effects.

It follows from the previous conclusions that the structure of capital matters. Against the traditional view that argues that the financial structure of the firm and the economy are irrelevant. We demonstrate through a reformulation of the well known Miller and Modigliani's propositions, that the financial structure matters and that sometimes matters a lot. Under some circumstances very small changes in the interest rate, the profit rate or leverage may cause very large variations in the returns and in the value of capital with potential impacts in the aggregate supply and demand conditions.

Standard theory does not explain systemic risk, it is considered exogenous. Alternatively systemic risk is defined as variability of the profitability of capital. Given the economy's rate of return and the interest rate, systemic risk is an exponential function of leverage. As leverage is increased, systemic risk grows in a more than proportional manner. Systemic risk cannot be diversified away and, it is derived from particular institutional features of the system.

The introduction of the interest rate made the consideration of money indispensable. Money was introduced as a financial asset representing abstract

acquisition power of zero transaction cost, in our definition restricted to cash and like instruments in the widely used expression. We argued that the value of capital is virtual and that the potential of capital to be monetized, could be considered as one of the main forces that ultimately causes the effects and disturbances, associated with the non-neutrality of money.

We presented a reformulation of the classical quantity theory of money where the demand for money derived from capital is incorporated explicitly: $M^D = k\,Y + \delta\,K$ together with the demand for money derived from commodities' transactions. Also we concluded that if agents decide to keep part of the value of their capital as available acquisition power, in the form of money or cash and cash like instruments, in the aggregate the net value of capital may be expressed as: ***Capital = Cash + Shares***. Under these circumstances shares of capital or equities and cash may become net financial assets in the hands of consumers. The interest rate was shown to be determined in monetary markets where the central bank played the central role. The previous theoretical reformulations allowed us to determine the crucial variables of the economy, particularly capital and the interest rate, in nominal terms, achieving an essential integration of the real, monetary and financial dimensions of the economy.

In modern capitalist economies it corresponds mainly to the central bank to create external money, and monetary policies may play a crucial role in the macroeconomic performance of the economy. The expansion of the money supply and/or changes in the interest rate by the central bank, may serve to realize net capital gains or to avoid net aggregate capital loses. The first may stimulate the economy and the last may avoid a recession or worse.

We hypothesized, that the state can support a net positive value of capital by accommodating an increased demand for money from investors in a run towards liquidity, by expanding the money supply and potentially incurring in a fiscal deficit, caeteribus paribus. Certainly, movements in the demand and/or the

supply of money may bring up changes in the interest rate, leverage and the level of systemic risk. A powerful state and powerful firms may be a winning combination, if these powers are used wisely. The theoretical framework we are advancing in this essay may prove useful to revise and reconsider existing monetary and fiscal policies paradigms. If the value of capital is highly variable and systemic risk is directly associated to the structure of capital, leverage, then monetary and financial policies become extremely important. Small changes in the interest rate may generate huge consequences in the profitability of capital and systemic risk. Also monetary authorities can influence the structure of capital of the economy by actively buying or selling financial assets.

Certainly, if the profit rate, the value of capital and leverage, cannot be controlled by monetary authorities and they are variables subject to continuous change, then the authorities should adopt an active policy adjusting the interest rate and the money supply to keep capital effects at bay. Also the authorities should supervise the structure of capital seeking to keep the economy's level of leverage within levels of acceptable systemic risk.

Against the view of financial markets as the place where a scarce resource, say capital, is allocated. We argue that the essential role of the financial and monetary system is the protection of the property rights of traders in the market place, by sustaining the stability of the system as a whole. We also argue that ultimately the interest rate is the price of the sustainability of the system.

Certainly if variations in value of capital are not random and typically business cycles, depressions, financial crises, among other pathologies of modern economics, are closely associated with drastic changes in the value of capital, the contributions of this work may help us better understand them.

The final note is positive. The power of capital is enormous: acquisition power to be generated in the future that can be used today. The more competitive the economy is, and stronger the monetary and financial systems are, the more of the powers of capital that can be harnessed now to resolve the crucial problems of this day. If capital is ultimately an institution, not a scarce resource, then we can reform it. The only limits will be in our impertinence towards accepted notions, and in our capacity to imagine and to implement the necessary changes. A first step that may prove helpful is to get rid of some old dogma that clutters our minds.

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