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ESSAYS ON THE NEW MONETARY CONSENSUS:

THEORY AND EMPIRICAL EVIDENCE, THE CASE OF MEXICO

T E S I S

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Acknowledgements

Economics is, *inter alia*, a complex mix of axiomatic deductions and inductive inferences derived from empirical data. An appropriate combination of both methods within rigorous logical reasoning is a *tour de force* for those seeking to gain a deeper understanding of the economic world we live in, let alone for the advance of the discipline itself. The frontier of economic knowledge is "a moving target" owing to the continuously evolving interaction between axiomatic principles and ever-growing empirical evidence. Furthermore, sometimes fresh theoretical developments in economics happen to be nothing but camouflaged reincarnations and/or perfected elaborations of some past theories. Thus, the analyst willing to conduct serious economic research must command and come to grips with massive information as she/he is bound to confront new findings and thinking with not only the vastness of data, but also with previous knowledge if she/he is to unravel where the frontier of the discipline lies and what is the best way to move forward.

Clearly, the task appears to be mightily impressive. Therefore, the student's ultimate goal will be best served if research is generously supported by wise guidance. I have been extremely lucky to benefit from the comments and suggestions of a number of outstanding scholars, colleagues and friends. In particular, I would like to thank Dr. Lilia Domínguez for continuous support, sharp advice and fruitful discussions throughout the investigation. Dr. Domínguez enthusiastically backed my undertaking this research project from the very outset and provided most useful ideas throughout. Professors María Elena Cardero, Guadalupe Mántey and Julio López deserve special mention as essential catalysts for the conclusion of this project. Dr. Cardero provided me with thoughtful comments on the theoretical framework and the policy implications of the research, while Dr. Mántey's incredible knowledge of monetary theory and policy was a continual source of intellectual comments and challenging insights; she simply saved me from ill-interpretations all along and focused my attention on the true sources of inflation and exchange rate instability in Mexico. I am most grateful to my friend and co-author Julio López Gallardo -who actually started me off along this line- for being an effective propeller; this research would not have been possible without his advice, intellectual support and stimuli. I should also be grateful to Dr. Teresa S. González, who provided very valuable inputs. Needless to say, none of them should be held responsible for remaining errors.

The research attaches the highest priority to the ongoing debate on the impact of monetary policy on economic growth and exchange rate. This thesis is in various ways linked to the PhD dissertation draft I submitted at The New School for Social Research. For that reason, I must thank Professor Willi Semmler –another vibrant propeller- for useful criticisms, suggestions and continuous critical advice on that manuscript. For this reason, writing the present manuscript meant to me *incidis in Scyliam cupiens vitare Charybdim*.

Finally, I dedicate this thesis to my parents who, apart from love and shelter, taught me that the only way to life is life itself, that *Otium sine litteris mors est et hominis vivi sepultura*.

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PREFACE

A number of central banks of developed and developing countries have abandoned the quantity theory of money and adopted inflation targeting (henceforth IT) as a framework for monetary policy since the last decade. The inflation targeting regime belongs to the so-called new consensus macroeconomics, summarized by Taylor (1997), emphasized by Bernanke et al. (1999), Woodford (2003) and Svensson (2003) and extended to the open economy by Svensson (1997, 1999), Ball (1999) and Clarida, Gali and Gertler (1999). The new consensus macroeconomics claims that monetary policy cannot have long run effects on real economic activity. According to this new monetary approach low and stable inflation is an essential condition for full-employment growth rates of output.

Mexico began a transition to inflation targeting in 1996, adopting a full-fledged IT regime in 2001. Banco de Mexico claims that the new policy regime has been successful in reducing inflation and getting the exchange rate consistent with fundamentals.

The present research deals with the theory and practice of inflation-targeting in Mexico. It is composed of three essays. The first one discusses the main theoretical tenets of the inflation-targeting paradigm as well as its main shortcomings. The paper argues that Taylor rules, where the central bank reacts only to the output and inflation gap, tend to constrain the macroeconomy to stability with high unemployment rate traps, positive sacrifice ratios, income redistribution against wages, fragile balance of payments equilibria and sizable exchange rate pass-through effects. The first essay makes the case for an alternative theory addressing the roots of structural inflation. The alternative theory leads to the hypothesis of long run *non-neutrality* of monetary policy consistent with empirical evidence of hysteresis in the labour market, and the effects of money in a context where potential output depends on accumulation of fixed capital. The analysis shows that the original contribution of the Post Keynesian theory of endogenous money lays in its linking the endogeneity of money with commercial banking activities, on the one hand, and endogenous money with the rejection of the neutral money postulate, on the other.

The second essay provides evidence that disinflation has been costly in Mexico. Following Shaikh and Moudud (2004), we assess the output loss ratio incurred in the quest for price stability. It is shown that the inflation-targeting monetary policy framework did not improve the output-inflation trade-off, as it is commonly claimed by proponents of the IT framework. Contrary to that, disinflation policies have contributed to diminish economic productivity and long-run output growth performance.

Finally, essay number three challenges the hypothesis of a causal link between lower exchange rate pass-through and the inflation targeting policy entertained by Banco de Mexico (Santaella, 2002; Torres García, 2002; Baqueiro et al., 2003 and Ortiz, 2006). Following Arestis and Milberg (1993-94) and Mántey (2005a), we provide evidence for the existence of a “magnified” exchange rate pass-through and a significant role of the exchange rate in Banco de Mexico’s monetary policy rule. The research ends with some suggestive ideas for an alternative monetary policy framework.

CHAPTER I: THE NEW THEORY OF MONETARY POLICY: INFLATION TARGETING IN A SMALL OPEN ECONOMY

No data yet. It is a capital mistake to theorize before you have all the evidence. It biases the judgement.
Sherlock Holmes

I.1. Introduction

There is today widespread agreement that monetary policy is relevant, though there is less agreement as to how monetary authorities should practice it and the macroeconomic consequences thereby. Visions of policy diverge across schools of thought.

The conventional monetarist model envisages inflation as a monetary phenomenon. Thereby, supports money supply rules and the neutrality of money hypothesis (Friedman, 1956, 1968, 1969, 1970 and 1977). The rational expectations school, in turn, extends the monetarist approach adding super-neutrality of money even in the short run: money only impacts long-run inflation (Lucas, 1972 and 1976; Sargent and Wallace, 1975; Kydland and Prescott, 1977; Barro and Gordon, 1983). The (old) neoclassical synthesis model, while framing its analysis within the Phillips Curve argument, maintains that monetary policy affects unemployment, real wages and inflation in the short run but it only impacts inflation in the long run (Modigliani, 1963, 1977; Patinkin, 1965). The new Keynesian model, alternatively, claims that the effectiveness of monetary policy depends on market imperfections, nominal and real rigidities, menu costs and asymmetric information (Stiglitz and Weiss, 1981; Ball, Mankiw and Romer, 1988; Bernanke and Blinder, 1988; Mankiw, 1994; Akerlof et al., 1996).

In recent years, a new monetary theory emerged, the so-called inflation targeting (IT) framework, later known as the Taylor rule or new Neoclassical Synthesis (Taylor, 1999; Lavoie, 2004). Taylor (1993) showed that a simple reaction function (a short-term interest rate) reacting to changes in some fundamental variables such as inflation and output gaps fitted the data of the US economy in the late 1980s to early 1990s. This model has rapidly evolved into an embryonic new consensus macroeconomics (NCM) with regards monetary policy. According to such fresh theory:

> 'low, stable inflation is important for market-driven growth, and (...) monetary policy is the most direct determinant of inflation. Further, of all the government's tools for influencing the economy, monetary policy has proven to be the most flexible instrument for achieving medium-term stabilization objectives' (Bernanke et al., 1999: 3).

Indeed, the IT regime was first introduced by New Zealand in 1990 and, since then, more than 60 countries around the world have followed suit applying one form or another of IT regimes in order to tame inflation (cf. Bernanke and Mishkin 1997; Bernanke et al. 1999; Angeriz and Arestis, 2006; Rochon and Rossi, 2006). Mexico moved to a full-fledged IT regime by 2001, though her monetary policy had been operating along the lines of the new model since 1996.

Contrary to the aforementioned mainstream models, the Post Keynesian theory, in turn, asserts that money is not neutral; monetary policy impacts employment, growth and income distribution (Kaldor, 1970 and 1982; Kalecki, 1971; Davidson, 1972; Minsky, 1975, 1982 and 1986; Moore, 1988; Chick, 1989; Kregel, 1992; Arestis, 1992; Lavoie, 1992 and 2004; Palley, 1996; Rochon, 1999).

Be that as it may, at the back of these different approaches to monetary policy, lies a general disagreement about the fundamental functioning of the economy, in particular regarding the labour market: Whilst orthodox economic paradigms assume that a capitalist economy automatically tends to a general equilibrium *cum full employment* position, the alternative Post-Keynesian theory, following Keynes (1936) and Kałecki (1971), assumes that there is no such built-in mechanism and that, at normal long-run utilization of productive capacity, the economy will exhibit involuntary unemployment because of deficient effective demand[1]. Hence, growth and employment rate goals ought to be explicitly considered among economic policy targets and ought to be part and parcel of the policy maker's objective function.

In many regards similar to previous orthodox models, the NCM postulates a theory that gives rise to recommendations for framing and conducting monetary policy under the assumption that targeting low and stable inflation will suffice to automatically clear the labour market. Taylor's rule is the new policy instrument: monetary neutrality assures full employment as an unavoidable by-product of targeting low and stable rates of inflation. Opposite to such prescription, Post-Keynesian theory assumes non-neutrality of money, predicts that if inflation is the only unique target monetary policy will worsen income distribution, unemployment, output growth and, in the end, price instability will emerge as a consequence of balance of payments and exchange rate disequilibria.

The contribution of this essay to the literature is threefold. First, it discusses and challenges the main theoretical tenets of the new monetary policy framework of IT. Contrary to proponents of the NCM, we posit that the IT regime, whatever the substance and shape it takes across countries, is not, at any rate an optimal monetary policy framework suitable for less developed economies. The IT regime overlooks the causes of structural inflation and the negative effects of policy on output growth, unemployment rates and income distribution. It also ignores the impact of orthodox anti-inflationary policy on exchange rates and, consequentially, of exchange rate overvaluation –a phenomenon associated with structural inflation- on balance of payments equilibrium and long-run

[1] I should like to thank Julio López for pointing out this basic difference between the two competing economic paradigms. Further, the mainstream presumption of an automatic adjustment to full employment rate of economic activity is based on three fundamental truisms, namely the neutral money, gross substitution (of all goods and factors of production) and ergodic axioms (Davidson, 2007: 26-35).

price stability. For these reasons, the IT regime can hardly be held responsible for the decline of inflation in Mexico over the last decade.

Second, the essay also seeks to surface the theoretical foundations of the NCM and its proposals for framing and conduct of monetary policy. The general aim is to lay down the theoretical framework for our empirical inquiry of the effects of inflation targeting in Mexico. We argue that in a context where the structural unemployment rate is high -like in most peripheral economies-, a central bank that follows the new monetary policy framework (IT), while neglecting explicit higher growth and employment rates targets, will stabilize the economy at a high unemployment rate trap, lower levels of economic activity and feeble balance of payments equilibrium, owing to positive output loss ratios and appreciation of the exchange rate involved therein. Therefore, in such a case price stability will involve high real costs measured as forgone output and employment, exchange rate volatility, fragile equilibrium of balance of payments, slow growth and income redistribution against wage earners. Recognition of the fact that the IT regime is wanting, should pave the way for an alternative theory of (structural) inflation keen to identify the inflationary risks associated with exchange rate volatility, technological dependence and oligopolistic market structures (Arestis and Milberg, 1994; Mántey, 2005). Most importantly, it should certainly bring to fruition a frame of policy with multiple targets including higher growth and employment rates, smaller gaps between income elasticities of imports and exports (surely, a remarkable source of both balance of payments instability and slow output growth) and less arbitrary and inequitable distribution of income and wealth.

Third, the alternative theory of inflation also leads to the hypothesis of long run *non-neutrality* of monetary policy, so long as it provides an analysis of anti-inflationary policies consistent with the overwhelming evidence of long run effects of effective demand, and hence of monetary policy, on unemployment by generating hysteresis in the labour market. Certainly, monetary policy cannot be neutral whenever potential output hinges upon accumulation of fixed capital, as in any modern capitalist economy. Our analysis shows that the original innovation of both Keynes's and Post Keynesian economics lay in a dual link: a connection between endogeneity of money and commercial banking activities, on the one hand, and between endogenous money and the rejection of the neoclassical neutral money postulate, on the other. Of course, such dual link appears as a building-block of Keynes's monetary theory of production.

The remainder of the present essay is committed to the theoretical analysis of inflation-targeting in a small open economy setting. It is organized as follows: Section I.2 summarizes the theory of the inflation targeting regime and shows in what sense Wicksell's norm, developed in the late 19th century, had provided the foundations of its main tenets. A general assessment of the experience of inflation targeting under the basis of available empirical evidence is given in section I.3, followed by a critical analysis of the relationship between the IT regime and the hypothesis of endogeneity of money in section I.4. Such relationship is dealt with, mainly, with a view to derive the need of an alternative theory addressing the structural roots of inflation and the causes of "magnified pass-through" rates in peripheral economies (Mántey, 2005). The last part summarizes and concludes.

I.2. Inflation Targeting in Theory

As mentioned, the IT regime emanates from the NCM. However inflation targeting policies might differ across countries, there is a set of seven central tenets which form the core propositions of the model:

1. Price stability is the primary long-term goal of a forward-looking monetary policy and takes precedence over any other policy target. The focus is on a point or a narrow range of inflation

rates which are believed to enhance productivity, boost potential output growth and maximise welfare[2].

2. The interest rate is the policy instrument (Bernanke et al., 1999; Taylor, 1999; Woodford, 2003). Therefore, money supply is endogenous. Interest rate adjustments are said to ensure price stability at negligible employment and output losses. Independence of the policy instrument is a distinctive feature of the model (Mishkin and Schmidt-Hebbel, 2001; Heenan et al., 2006).
3. Intermediate targets (i.e. monetary aggregates, exchange rates, etc.) play no role whatsoever (cf. Haldane, 1998; Bernanke and Mishkin, 1997; Svensson, 1997).
4. A flexible exchange rate regime enhances a central bank's ability to implement an autonomous monetary policy and pursue price stability under inflation targeting (Svensson, 1999 and 2001)[3].
5. Output growth is supply-determined. The principle of effective demand exerts no influence whatsoever (Arestis and Sawyer, 2003a; Lavoie, 2004).
6. The monetary policy regime must address the so-called time-inconsistency problem (Kydland and Prescott, 1977; Barro and Gordon, 1983a and 1983b) and command credibility from financial markets, consumers and investors.
7. Fiscal dominance must be avoided at any rate owing to it conflicts with price stability (Linneman and Schabert, 2003)[4].

I.2.1. The Model

In the real world, inflation-targeter central banks are using some variant or extension of Taylor's rule. Monetary policy will only affect the equilibrium rate of inflation. The model pinpoints how price stability can be achieved through inflation targeting without impinging on either employment or the output gap.

Now we turn to the canonical IT model as presented by Taylor (1993 and 1999) and extended to the expectations-augmented form by Clarida et al. (1998, 1999 and 2001)[5]. The original model consists of three interrelated equations depicting the dynamics of aggregate output, inflation and the interest rate: The IS curve (equation I.1); the NAIRU-vertical Phillips curve (equation I.2) and the

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[2] "In general, macroeconomic policy has many goals besides low inflation, including high real growth, low unemployment, financial stability, a not-too-excessive trade deficit, and so on. Yet a central tenet of inflation targeting is that *price stability must be the primary long-run goal of monetary policy*" (Bernanke et al., 1999:10, emphasis added).

[3] "An inflation-targeting framework for the conduct of monetary policy" is not compatible with hard pegs, albeit "relatively heavy management of the exchange rate" seems to be "appropriate" (Truman, 2003: 189-190).

[4] Arestis and Sawyer (2004a, 2004b) critically assess the neglect of fiscal policy as an instrument of stabilization policy in the new consensus macroeconomics and conclude that such neglect is unwarranted.

[5] We follow the standard version of the model accepted by most, if not all, advocates of the new consensus macroeconomics and its main critics alike. See for example Bernanke et al., 1999; Taylor, 1999; Arestis and Sawyer, 2003a; Lavoie, 2004; Setterfield, 2006.

real interest rate or reaction function of the central bank (equation I.3). This set of equations is epitomized by the so-called Taylor rule (equation I.3) (Taylor, 1993 and 1999):

$$y = y_0 - \alpha r + \varepsilon_1 \qquad \text{IS curve} \qquad (I.1)$$

$$\pi = \pi_{-1} + \beta(y - y_n) + \varepsilon_2 \qquad \text{Phillips Curve} \qquad (I.2)$$

$$\dot{r} = \xi(y - y_n) + \lambda(\pi - \pi^T) \qquad \text{Taylor rule} \qquad (I.3)$$

Where r is the real interest rate, y_0 denotes an autonomous component of aggregate output, y and y_n are real output and potential or natural real output, respectively, π and π^T denote realised and target rates of inflation, respectively, and ε_1 and ε_2 denote temporary random shocks to aggregate demand and inflation, respectively. Now, combining equations (I.1) and (I.3) yields:

$$\dot{y} = -\alpha\xi(y - y_n) - \alpha\lambda(\pi - \pi^T) \qquad (I.4)$$

Manipulating equation (I.2) gives:

$$\dot{\pi} = \beta(y - y_n) \qquad (I.5)$$

The equilibrium conditions in equations (I.4) and (I.5) are

$$\dot{y} = 0$$

$$\dot{\pi} = 0$$

[y_t, π_t] form the vector of the endogenous variables. The inflation-targeting model assumes that the central bank can freely set the nominal (overnight) interest rate on high power money, whilst arbitrage keeps all other market real interest rates aligned with it (Woodford, 2003). Price and wage rigidity implies that setting the nominal interest rate immediately sets the real interest rate. Thus, given market real rates, the general price level of goods will be determined as monetary policy influences agents' expectations. Therefore, the central bank can target inflation through interest rate policy. Interestingly, the key arbitrage condition is nothing but the old Irving Fisher's equation (Woodford, 2003:50):

$$i_t = r_t + [E_t p_{t+1} - p_t] \qquad \text{(I.6)}$$

Where i_t denotes the nominal interest rate on money supply, r_t is Wicksell's natural rate of interest or the real market interest rate, p_t is the antilog of the general price level and E_t is the expectation operator conditional on information at time *t.* Now, using Fisher's equation, inflation expectations will be consistent with the NCM prediction when p_t and i_t are given.

It can be shown that, from the above equilibrium conditions and manipulating equations (I.4) and (I.5), we can obtain the following two equations:

$$y = \left(y_n + \frac{\lambda}{\xi}\pi^T \right) - \frac{\lambda}{\xi}\pi \qquad \text{(I.7)}$$

and:

$$y = y_n \qquad \text{(I.8)}$$

Substitution of (I.8) in (I.7) yields a *stable* equilibrium result for the rate of inflation (π_E), which is consistent with the inflation target:

$$\pi_E = \pi^T \qquad \text{(I.9)}$$

Inspection of equation (I.7) reveals that, clearly, the same is true of the equilibrium real output (y_E), which in a stable equilibrium condition equals the natural rate of output:

$$y_E = y_n \qquad \text{(I.10)}$$

The expectations-augmented Taylor rule for the open economy model, including the nominal exchange rate (*e*), takes the form of a forward looking model as follows:

$$y_{t+1} - y_n = \chi(y_t - y_n) - \alpha r_t - \delta e_t + \varepsilon_{t+1} \qquad \text{(I.11)}$$

$$\pi_{t+1} = \pi_t + \varphi(y_t - y_n) - \vartheta(e_t - e_{t-1}) + \varepsilon_{t+1} \qquad \text{(I.12)}$$

$$i_t = \theta + \kappa(E_t[\pi_{t+n} - \pi^T]) + \gamma(E_t[y_{t+k} - y_{nt+k}]) \qquad \text{(I.13)}$$

$$e_t - E(e_{t+1}) = i_t - i^* + \varepsilon_t \qquad \text{(I.14)}$$

Where $E[\cdot]$ is the expectations operator and the exchange rate is determined by the uncovered interest rate parity (UIRP) condition. If the rule includes more than one policy instrument (say, the interest rate plus the exchange rate), it would become a monetary conditions index (MCI) and the model would be represented as follows:

$$i_t = \theta + \kappa(E_t[\pi_{t+n} - \pi^T]) + \gamma(E_t[y_{t+k} - y_{nt+k}]) + z(E[q_{t+m}] \qquad \text{(I.15)}$$

In this case q (the real exchange rate) also captures risk premia and foreign interest rates. It is clear from the open economy expectations model that the critical values of the parameters in the policy rule are $\kappa = 1$, $\gamma = 0$ and $z = 0$. It is worth remarking that the augmented Taylor rule retains the NAIRU hypothesis, while adding up output gap expectations and the exchange rate determined by the UIRP condition. Clearly, this set of assumptions must lead to the twofold long-term conclusion of neutrality of money and the irrelevance of exchange rate fluctuations in the IT regime of price stability[6].

According to the canonical and the augmented Taylor rule model, the IT regime guarantees long-term aggregate economic equilibrium. Once the central bank selects its inflation target, changes

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[6] Heterodox variants of the above baseline model are usually presented in terms of rates of utilisation of productive capacity (see for example Arestis and Sawyer, 2003a; Lavoie, 2004; Shaikh and Moudud, 2004; Setterfield, 2006). Following Lavoie (2004), equation (I.2) is expressed in terms of the capacity utilisation gap, where u is the actual or realised level of capacity utilisation, u_n denotes the normal level of capacity utilisation: $\pi = \delta_1(u - u_n) + \varepsilon_2$. The equivalent of equation (I.1) is $u = u_0 - \delta_2 r$, where u_0 denotes an autonomous element of aggregate demand. Capacity utilisation varies inversely with respect to the real interest rate as in any investment function. The Taylor rule in heterodox terms then becomes $r - r_n = \lambda(\pi - \pi^T) + \delta_1(u - u_n)$, where r_n is the central bank estimate of the natural rate of interest. In the long-run general equilibrium obtains $\pi = \pi^T$ and $u = u_n$, thereby $r = r_n$. However, the heterodox approach emphasizes that money is non-neutral and that the exchange rate does matter.

in the equilibrium rate of inflation will in the long-run converge to π^T through appropriate adjustments of the exogenous rate of interest. In sum, price stability is costless in real terms.

It should be noted at this point that owing to "constrained-discretion", i.e., the flexibility aspect of the IT framework (Bernanke et al., 1999), temporary disturbances arising out of business cycles volatility are not assumed to thwart the above optimal equilibrium outcome. Quite the contrary, business cycles volatility is taken care of by a reasonable target range[7]. On the other hand, terms of trade shocks and current account disequilibria will be looked after by the flexible exchange rate regime[8]. It ought to be mentioned as well that in this "superior" "constrained-discretion" framework the central bank is also "constrained" to estimate Wicksell's r_n accurately, otherwise aggregate disequilibrium will unleash Wicksell's cumulative processes. All in all, the economy is assumed to attain long-run price stability through inflation-targeting without any significant impact on real equilibrium output.

As mentioned, monetary aggregates play no role. Only output and inflation gaps matter for the relationship between r and r_n. It seems that the rationale of the IT model pivots around Wicksell's natural rate of interest, r_n, which is supposed to preclude inflationary-and-deflationary "cumulative processes". How is such natural rate of interest determined? Wicksell (1898b:102) himself just gave a circular reasoning, he says that it is "the current value of the *natural rate of interest on capital*" (italics in the original), and hints that perhaps it does not exist at all (Wicksell, 1898a,b, 1901, 1906

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[7] Only a few industrialized economies which target inflation deal with cyclical shocks through counter-cyclical fiscal policy based on the structural fiscal balance approach (SFBA), which requires the fiscal budget be balanced over the business cycle. Most peripheral inflation-targeting economies do not practice fiscal policy according to the SFBA; Chile is an exception, to the best of our information. The fact that fiscal policy is no longer a raging issue, prompted Solow (2002) to assert that "serious discussion of fiscal policy has almost disappeared". See also Arestis and Sawyer, 2003b on this issue.

[8] Incidentally, some Post Keynesian critics of the new consensus macroeconomics maintain that flexible exchange rates are effective external shock-absorbers and thus help to stabilise effective demand and employment in small open economies (see Bougrine and Seccareccia, 2004). They also contend that a flexible exchange rate regime allows autonomous monetary policy. A criticism of these tenets is developed in López and Perrotini (2006).

and 1934). So the matter may turn out to be much deeper and more subtle than the NCM seems to suppose.

I.2.2. Theoretical Foundations: Wicksell's Norm and the New Monetary Policy

Woodford (2003) maintains that the foundations of the new monetary theory are to be found in Wicksell's interest-rate theory of price level; the former is a modern restatement of the latter. We should like to substantiate in what sense Knut Wicksell's norm -composed of his two interest rates dynamics and bank mechanism- is part and parcel of the IT regime.

Knut Wicksell's norm, put forth in 1898, was the premise for the Swedish Riksbank price stabilization policy during September 1931-September 1939[9] (see Jonung, 1979 and 1991; Berg and Jonung, 1999). Upon the demise of Monetarism and the dawn of the inflation-targeting regime in the 1990s, Wicksell's norm has reincarnated into the raging Taylor's rule, which postulates "optimizing" interest-rate rules despite full information on Wicksell's natural rate of interest is not available.

Wicksell assumed a "pure credit" economy, introduced a modern banking system into the quantity theory of money, and thus shifted the focus of monetary policy from money supply changes to the role of interest rate adjustments in the process of price formation (Wicksell, 1898a; Myrdal, 1931; Jonung, 1991). When prices are rising, the discount rate should be increased until inflation is halted; conversely, the interest rate should be reduced until stability is attained if deflation is reigning.

The irrelevance of monetary aggregates for Wicksell's norm is best manifested by his two-interest-rates theory of price stability. The dynamics of prices depends on the relationship between the natural rate of interest (r_n) and the shifting loan market interest rate (r) set by the banking system.

[9] The Swedish Riksbank was the first central bank to ever adopt price stabilization as a monetary policy goal (cf. Berg and Jonung, 1999). Interestingly, such goal was implemented at a time when a flexible exchange rate regime had substituted for the fixed exchange rate which had collapsed along with the Gold Standard.

Whilst the money supply is endogenous, r_n is exogenous and depends on economic agents' thrift and on the marginal productivity of capital. The interest rate gap (r - r_n) affects investment-savings balance, triggering saving-investment imbalances, thus bringing about changes in the price level (Wicksell, 1898a, 1898b; Fontana, 2006):

$$(I - S) = \zeta(r_n - r), \zeta > 0 \tag{I.16}$$

The natural rate of interest equilibrates investment and savings; it is the centre of gravity of the whole system's dynamics (Wicksell, 1898b). Commercial banks create credit endogenously so as to accommodate firms' demand for credit[10]. Thus, interest rate discrepancies trigger off investment booms (slumps), ensuing inflation (deflation) spirals:

$$\pi = \frac{dP}{P} = \zeta(r_n - r) \tag{I.17}$$

In Wicksell's norm inflation (deflation) depends upon disequilibria between investment and savings (Wicksell, 1898a, 1898b; Fontana, 2006). This relevant feature of Wicksell's theory is associated to his bank mechanism: Banks' endogenous capacity to create credit unleashes cumulative processes of cyclical expansion and recession. Thus, price stability, "the ideal position" of a "perfectly invariable and stable" price level (Wicksell, 1898a), becomes to hinge upon a zero interest rate gap. However, the equilibrium between the natural and the loan rates of interest belongs to the realm of the steady state and need not occur but as a fluke[11]. After all, as Wicksell himself stated, in a "pure credit" dynamic economy it is almost impossible to determine r_n. Unfortunately, proponents of the IT regime have hitherto bluntly ignored this relevant feature of Wicksell's norm. Moreover, it

[10] Interestingly enough, Wicksell conceives of money essentially as endogenous credit, very much like contemporary Post Keynesian authors (*cf.* Arestis, 1992, ch. 8; Davidson, 1972, chs. 6 and 10; Lavoie, 1992, ch. 4; Minsky, 1982; Moore, 1988, chs. 1 and 5 and Palley, 1996, chs. 7 and 8).

[11] Actually David Davidson, a colleague of Wicksell's at Uppsala, called the latter's attention upon this case. Wicksell admitted Davidson was right and, as a result, pointed out that before such equilibrium may occur rather restrictive and unrealistic conditions must be met (cf. Jonung, 1979).

has even been overlooked by Woodford's (2003) encompassing study of interest-rate control monetary policy in "an economy without money".

Wicksell's norm makes no presumption about r_n because it keeps changing through time, and the commercial banking sector simply does not know it. Thus when setting the loan interest rate, most likely commercial banks tend to bring about (a) interest rate gaps, (b) savings-investment imbalances which the banking system accommodates via systematic endogenous creation of credit, and hence (c) inflation. Therefore, according to Wicksell's norm the banking sector –not wage earners- is found responsible for the disequilibrium conditions leading to price instability: inflation is a banking-sector-induced phenomenon, maybe attributable to interest rate rigidities[12].

Wicksell assumed endogeneity of the credit supply, while paradoxically entertained the hypothesis of neutrality of monetary policy. For that reason, he put forward a theory of the rate of interest as the mechanism ("the Wicksell connection", Leijonhufvud, 1981) that ensured full employment and price stability under perfectly competitive markets. Unlike Keynes (1936), he did not deal with the more realistic case of equilibrium with involuntary unemployment where the interest rate will not clear the labour market (the Keynes connection).

Now, let's appeal to experience and ask for some explanation of the manner in which Wicksell's norm and the new monetary policy come to grips with imperfectly competitive markets where money (credit) is endogenous. Imperfect competition and involuntary unemployment are ubiquitous in today's world economy. How does this bear upon the matter of interest rate policy rules of Wicksell's and Taylor's kinds? First and foremost, if such policies were undertaken under oligopolistic competition and asymmetric market information conditions, inflation targeting would be likely to produce economic stagnation, rising unemployment, exchange rate and balance of

[12] This insight is quite appealing in that it may provide a link between inflation dynamics and oligopolistic competition in the banking sector (see Mántey and Levy, 2005).

payments instability and income redistribution against wage earners. Moreover, under imperfect competition aggregate demand can hardly be held guilty of price instability; hence the NAIRU hypothesis fails to account for the dynamics between the labour market, money and inflation. If inflation is treated as a purely demand-pull phenomenon, then Wicksell's norm and Taylor rule policies will in all likelihood impose an interest rate level that will generate low investment, slow growth and rising unemployment. Secondly, under imperfect competition the exchange rate is mainly an asset market-dominated variable and flexible exchange rate regimes become a potential source of inflation because of large pass-through rates from exchange rate fluctuations to the price level. This gives rise to structural inflation in peripheral economies (cf. Mántey, 2005a, b). Thus, interest rate policy rules are likely to impose positive real output loss ratios whenever structural inflation is a stylized fact. The flow loss of output and employment, associated with interest rate changes and currency overvaluation, may render disinflation excessively costly, particularly so if the economy is shown to be path-dependent and/or economic growth is endogenous to aggregate demand. Third, under imperfect competition, peripheral inflation-targeting economies face asymmetric access to international financial markets, which impairs their ability to finance investment projects aimed at taming structural inflation and balance of payments disequilibria that constrain economic growth[13]. So it appears that Thirlwall's law (Thirlwall, 2000) establishes the dividing line between credit rationing and credit expansion as much as it sets the boundary for the success/failure of Taylor rules in peripheral capitalism (Mántey and Levy, 2004). Finally, mark-up pricing behaviour of oligopolistic and monopoly firms operating in developing economies characterised by large pass-through rates allows those very enterprises to circumvent the inflation-targeting straitjacket.

[13] In peripheral countries it is of the first importance to stimulate "activities that lower the income elasticity of imports and/or raise the income elasticity of exports" (Mántey and Levy, 2004:24).

Furthermore, the problem is that those firms are “entrenched in imported capital goods” and “ingrained in activities with technological dependence” (ibid.).

Clearly, indulgency and fairness must allow certain touch of logic to Knut Wicksell, whose theory addressed price instability in 19th century capitalism, so long as it was not yet as obvious that the axioms of the classical quantity theory of money required a “drastic remedy”, to use Keynes’s terms (Keynes, 1924, quoted in Davidson, 2007:16): Even Keynes (1923) himself was in the habit of relying “on the Cambridge version of the quantity theory of money to explain how price stability could be established” (Davidson, 2007:15). Yet, the same is not true of the new theory of monetary policy, which is expected to address the output-inflation trade off under current imperfect competition, monopoly capital and oligopolistic pricing behaviour of firms[14].

I.3. Inflation Targeting in Practice

Supporters of the new monetary policy claim that the inflation-targeting strategy has been quite successful in industrialized and developing economies. They assert that, while allowing a steadfast anchor to monetary policy, it has enhanced central bank’s accountability, credibility and transparency and reduced the real costs of disinflation (cf. Leiderman and Svensson, 1995; Bernanke et al., 1999; Taylor, 1999a, b; Mishkin, 2000 and 2004; Loayza and Soto, 2002; Torres García, 2002). It is to the general assessment of the experiment of price stabilization through inflation-targeting that we now turn our attention. The focus is on the impact of the new monetary policy framework on the behaviour of four important variables, namely inflation rates, economic growth, income distribution and the exchange rate.

[14] “By the early 20th century, this neutrality of money presumption became one of the basic axioms of the prevailing orthodoxy in economics textbooks. Even today, neutral money remains one of the fundamental axioms of modern mainstream economic theory” (Davidson, 2007:27).

Most modern mainstream economists entertain an optimistic opinion about the suspected successful achievements of the new monetary policy framework with respect to inflation. Some blissful conclusions reached by Taylor rule advocates are in order. For example, Mishkin (1999:595), at a somewhat early stage though, maintained that inflation and inflation expectations had been reduced “beyond that which would likely have occurred in the absence of inflation targets”, while Neumann and von Hagen (2002) asserted that observed “inflation convergence” across countries is the outcome of the new policy. King (2002) found that volatility of inflation had declined and Fraga et al. (2004:365), in turn, consider that time is ripe for price stability also in emerging market economies, although, of course, the latter “have had a relatively worse performance”. Yet, as Angeriz and Arestis (2006:265) argue in reference to Mishkin (1999), it ‘was premature’ to derive such conclusions. For, as they and Rochon and Rossi (2006:622-630) compellingly demonstrate, Taylor rules were adopted around the world when inflation rates were already at historically low levels: “in nearly all countries, the rate of inflation was already on a downward trend before inflation targeting was adopted” (Rochon and Rossi, 2006:226; also Rochon, 2006:553). Rochon and Rossi (2006:628), on the basis of robust empirical evidence for ten advanced and thirteen developing economies, reach the conclusion that the new monetary policy regime “cannot be held responsible for the measured reduction in the rates of inflation with no further misgivings”. Angeriz an Arestis (2006:566), in turn, look into “new” empirical evidence and using intervention analysis find that “[i]n most cases, inflation had already entered a downward trend well before inflation targeting was introduced”. Ball and Sheridan (2004:2) are also distrustful of the relative merits of the IT regime with respect to overall macroeconomic performance: “[o]n average, there is no evidence that inflation targeting improves performance as measured by the behaviour of inflation, output or interest rates”[15]; their analysis concludes that disinflation must be attributed to factors other than the

[15] Angeriz and Arestis (2006:568-571) provide data for Australia, Canada, Finland, South Korea, New Zealand, Norway,

new monetary policy. All these objections to the IT regime are supported by the fact that inflation rates of non-targeting countries did decline "dramatically in the 1990s and beyond" (Rochon and Rossi, 2006:624). Therefore, it remains unclear why central banks abandoned the late monetary rules and embraced the new IT framework, as much as it is utterly unclear why neither output growth-targeting nor employment-rate targeting would make the central bank "accountable, "transparent" and "credible" (Truman, 2002; Lavoie, 2004; Rochon and Rossi, 2006). Most likely, the "reason" why those features exclusively incarnate in IT regimes was given, in a different context, by a leading mainstream economist: "the neutrality of money (...) is very much a matter of faith, based on theoretical considerations rather than on empirical evidence" (Blanchard, 1990:828).

In fact, Bernanke et al. (1999:288) acknowledged, inattentively, that IT regimes did not reduce inflation and revealed that their main "advantage" is rather unpretentious: IT regimes may contribute to "*lock in earlier* disinflationary gains" (emphasis added). Thus, one may ask: If the new monetary policy framework does not appear to have contributed to "low and stable inflation" significantly, then what are the driving forces behind actual disinflation? Contrary to proponents of the IT model, better hypotheses appear to be: rising trade liberalisation, declining wages and exchange rate appreciation, which jointly have been working as nominal anchors of the economy (Mántey, 2002, 2005a, b). Furthermore, as experience has often shown in developing countries, such nominal anchors fail sooner than later because monetary policy overlooks the structural sources of balance of payments disequilibria, hence of inflation (Mántey, 2005a). On the other hand, Rochon and Rossi (2006:226) argue that owing to generalized technological progress inflation has also been falling "across industrialized economies"

Spain, Sweden, Switzerland and United Kingdom confirming that inflation rates had declined prior to adoption of inflation targeting regimes. Similarly, Rochon and Rossi (2006:628) stress that "In the case of Canada, however, measured inflation rates have been gradually decreasing since 1981 –that is, ten years before this country adopted inflation targeting".

As for the impact on output, it has been claimed that inflation targeting encourages economic growth. Since the new theory of monetary policy assumes long-run neutrality of money, real effects of price stabilization through inflation targeting are assumed away (Bernanke et al., 1999, Taylor, 1999; Svensson, 1999). Nonetheless, this assumption is subject to criticism; as interest rates must rise under IT regimes, investment must decline, driving the system onto weaker long-run growth paths. If money is not neutral, as Post Keynesian theory has it (Keynes, 1936; Davidson, 1972; Kaldor, 1982; Arestis, 1992; Lavoie, 2004), inflation targeting must be costly so long as it will impair long-run equilibrium growth and impose a output loss ratio of real output and employment[16]. Several studies, to the disappointment of NCM authors, have asserted and found high unemployment and output costs of disinflation in advanced economies (Blanchard, 1990; Ball, 1994; Bernanke et al., 1999; Ball and Sheridan, 2004; Rochon and Rossi, 2006; Atesoglu and Smithin, 2006).

A further effect is on income distribution. As Rochon and Rossi (2006) show, if the central bank fights inflation with restrictive monetary policies, then real interest rates and hence profits will rise to the detriment of wage earners. Actually Rochon and Rossi (2006:634-635) provide convincing empirical evidence showing that labourers' wage share has deteriorated in various economies since the inception of the IT regime: "income distribution worsens and sacrifice ratios increase". Mántey (2005) finds that in Mexico the minimum real wage "has fallen steadily" since the early 1980s, suggesting that, apart from the exchange rate, lower real wages help to explain the "success" of inflation-targeting. The decline in the wage share happens to be quite consistent with the real cost involved in the achievement of price stability, albeit in the neoclassical theory of income distribution there is no room for this result; marginalist theory would have wages adjusting to marginal

[16] Cukierman (2002:1) defined the output loss ratio as "the cumulative increase in the yearly rate of unemployment that is due to the disinflation effort divided by the total decrease in the rate of inflation" (quoted in Rochon and Rossi, 2006).

productivity of labour at the optimum monetary policy rule. Yet, the rate of interest is a key variable for income distribution (Sraffa, 1960:33); hence restrictive monetary policy affects wage and profit rates.

Finally, a fourth issue refers to the relationship between inflation targeting, exchange rates and structural inflation. This is a topic of the first importance in developing economies, where structural disequilibrium of balance of payments becomes a source of structural inflation. Post Keynesian theory models inflation as cost-push driven (Kalecki, 1971; Mántey, 2005; Rochon and Rossi, 2006). From this perspective, price stability through the IT regime cannot be achieved without imposing economic stagnation and flimsy balance of payments equilibrium on the system. A sequence of events goes as follows: interest rate adjustments induce lower investment and higher unemployment rates. As a result, income will be redistributed against real wages, contracting effective demand. Exchange rate appreciation will help the central bank attain its inflation target but at a lower rate of economic activity. Clearly, the IT regime is fatally flawed and cannot be a sensible approach to fight inflation, particularly so in countries subject to structural inflation which often must cope with exchange rate instability and higher pass-through effects from exchange rate fluctuations to inflation compared to more advanced economies.

I.4. Endogenous Money and Inflation Targeting

The new theory of monetary policy drops the neoclassical assumption of exogenous money supply entertained by Friedman (1956, 1968, 1969, 1970 and 1977) and others (cf. Brunner and Metzler, 1993; Laidler, 1993). Hence endogenous money supply is widespread in economic theory thereon. The monetary base is no longer the control variable for the objective of price stability because in the ISLM model “endogenous money flattens the LM” (Palley, 2001:1).

Today the futility of conducting monetary policy using monetary aggregate targets is widespread among central bankers so long as those practitioners have come to admit that such approach is subject to Goodhart's law. That law states that trying to apply any monetary aggregate to target nominal GDP will break the causal link with inflation, making monetary aggregate targets useless[17] (Goodhart, 1989). Yet, the consensus around endogeneity of money has not meant outright acceptance of the assumption of non-neutrality of money as one would logically expect. The IT model continues to presume that monetary policy is neutral in the long-term. Therefore, central banks are envisaged to engage into price stabilization policies through adjustment of interest rates with disinflation being costless in the long-run.

Indeed, recognition of the existence of Goodhart's law implies the failure of Friedman's rule because the presumed linear relationship between money and prices simply does not exist; hence endogeneity of money. The fact that endogeneity of money is widespread makes it necessary to clearly identify the "distinguishing hallmark" of Post Keynesian theory of endogenous money (Palley, 2001). It has been said, in the debate, that the new monetary consensus lacks a theory of endogenous money (Rochon, 1999 and 2006). This needs not be entirely accurate. For there is a long catalogue of neoclassical endogenous money constructs which yet assume long-run neutrality of money. Thus, it is not enough to have endogenous money in order to derive the long-run non-neutrality of monetary policy result[18] and lay the groundwork for full-employment growth policies. On the other hand, some other authors have claimed that the "new" historical stage of liability

[17] Goodhart's law predicts the impossibility of any stable relationship between the money supply and economic activity if the central bank undertakes control of monetary aggregates (Goodhart, 1989; cf. also Lavoie, 1992; Moore 1988:81). Palley (2001:2) calls Goodhart's law "the cynic's version of the Post Keynesian claim that it is impossible to control the money supply". Interestingly enough, a neoclassical study that recommends the U.S. Fed should "control quarterly M2 growth completely" warns "we cannot be certain that a shift of Fed policy to control M2 in this way would not change the basic reduced-form parameters linking M2 and nominal GDP" (Feldstein and Stock, 1994:55). Perhaps because Feldstein and Stock know that "the ability to control nominal GDP is far from perfect" (p. 7).

[18] Palley (2001) records ten "sources of endogenous money" -from evolutionary, general equilibrium to neoclassical quantitative to open economy endogeneity-, Post Keynesian endogenous credit and money being one of them.

management by the commercial banking system has made the supply of money and credit endogenous (Coghlan, 1978; Chick, 1986). This is untenable because it is quite the reverse: since credit drives money supply, liability management by banks has always been with us, it is "a permanent phenomenon" (Lavoie, 1992:212).

The Post Keynesian critical originality lay neither "in the distinction between exogenous and endogenous money" (Palley, 2001:1), nor in liability management by private banks, but in its more transcendental theory of endogenous money "*in terms of bank lending*" (Ibid, italics added), in its establishing "a causal link from bank lending to money supply" (ibid.). Likewise, the non-neutrality of money and credit is nested in the strong link between financial intermediary activities, the production process and endogenous money and credit. This leads Post Keynesians to reject both the monetarist hypothesis that portrays inflation as a monetary phenomenon, stemming from biased central banks, and the new monetary consensus proposition that inflation is the outcome of the unemployment rate falling below the "natural rate" because of excessive credit supply. This reasoning also leads Post Keynesian theory to challenge and refute money supply targets and inflation targeting as allegedly efficient and sensible cures to price and exchange rate instability. For:

> "(...) the function of any central bank, as controller of the banking system, is to encourage bankers to make credit (liquidity) available as cheaply as possible to investors as long as the economy has significant idle resources that could be usefully employed. In Keynes's world of nonergodic uncertainty where money is never neutral, the central bank has the primary function of providing sufficient liquidity to facilitate economic expansion and growth and not the targeting of a rate of inflation before full employment is achieved" (Davidson, 2007:161).

Since credit is endogenous (demand creates its own supply), deposits create loans, the central bank does not control the supply of credit, the banking sector's asset and liability management becomes relevant and debt plays a "critical role". Therefore, there is no way for price and wage reductions to stimulate effective demand and produce output growth at full employment equilibrium

(Lavoie, 1992:212-214 and 2005:689; Palley, 2001: 12, passim). Actually, inflation targeting is likely to trigger real output loss ratios (i.e., output contractions and higher unemployment) because "endogenous money inevitably leads to the 'Fisher debt'" effect (Palley, 2001:23). Post Keynesian theory extends Fisher's debt analysis to endogenous monetary policy where credit is not neutral in the long-run. Since interest rate adjustments reduce investment and production, increase the debt burden/income ratio and risks of bankruptcy, such adjustments redistribute income against sectors with lower propensity to save and induce credit rationing (Palley, 2001; Stiglitz and Weiss, 1981).

It is worthwhile to remark that Wicksell´s pure credit economy and the Post Keynesian theory appear to share a remarkable similarity, namely the endogeneity of credit. This could give rise to the confusion that the proponents of the neo-wicksellian new monetary theory –as Woodford (2003) has it- and the Post Keynesian approach of endogenous money belong to the same paradigm (apart from perhaps some slight discrepancies), confirming "convergence" and consensus in monetary analysis. On closer inspection, the neo-wicksellian approach is at variance with the Post Keynesian theory of endogenous money and credit in several ways. First, the latter posits the full endogeneity of high-powered money, since the control of monetary aggregates "contain no useful information for monetary policy" (Lavoie, 2005.704), and emphasize that, in asset-based financial systems, open market operations are not effective but "defensive". Second, open market operations and interest rate adjustments do not control the exchange rate owing to the interest rate parity condition does not hold. Third, Post Keynesians have the interest rate determined through a complex mechanism involving structural and institutional factors such as "central banks and behavioural conventions", "state of the real economy" (Palley, 2001) and the position of the balance sheet of the financial sector, whereas neo-wicksellian theory relies on Wicksell's natural rate of interest. Fourth, Wicksell's credit pure economy and neo-wicksellians' cash-less economy (Woodford, 2003) are supply-side models, while in Post Keynesian theory of endogenous money and credit the equilibrium growth rate of output is demand-driven (Keynes, 1936; Davidson, 1978; Lavoie, 1992; Palley, 2001). And fifth, since money and credit are non-neutral in Post Keynesian theory, monetary policy does affect output growth, unemployment and income distribution, whereas the new monetary consensus theory asserts money is long-run neutral. For these reasons, the inflation targeting regime is not an optimal policy framework, "because it biases decisions toward low inflation by obscuring the fact that policy also affects unemployment, real wages, and growth" (Palley (2007: 1).

We should like to close by emphasizing that, as opposed to the predominant new monetary consensus, the Post Keynesian theory of endogenous money and credit provides the basis for a more sensible policy because it addresses the roots of structural inflation in developing economies. Post Keynesian theory also addresses the causes of balance of payments problems and of the so-called magnified pass-through effect from exchange rate fluctuations to the price level (Mántey, 2005). As Palley (2001:26) highlights, the alternative Post Keynesian frame "recommends interest rate policy and regulatory controls - such as asset based reserve requirements - that automatically restrict the ability of the financial sector to expand lending".

I.5. Conclusion

We have examined the analytical core of the new approach to monetary policy. Basically, this theory claims that fine-tuning and curbing aggregate demand through Taylor rules will enable central banks to target inflation and, in so doing, attain permanent costless price stability and short-run output stabilization.

The main policy implication of this new orthodoxy is that long-run output and labour market stabilization must be forsaken, since the capitalist system is seen to be capable of achieving full employment levels of economic activity automatically, provided wages and prices are flexible. In this connection, we have contended that such conclusion by the proponents of the IT regime rests upon the inveterate neoclassical principle of long-term neutrality of monetary policy, despite their assuming endogenous money. We have challenged the neutral money axiom entertained by the new monetary orthodoxy, which claims that unregulated perfectly competitive markets will ensure full employment growth. As opposed to the new monetary consensus, we stress that the inherent "failure [of a free market economy] to provide for full employment and its arbitrary and inequitable distribution of wealth and incomes" (Keynes, 1936:372) cannot be amended by the inflation-targeting regime.

Akin to Wicksell's norm, the IT regime postulates "optimizing" interest rate policy rules despite full information of natural rates of interest is not available. Therefore, Taylor rules cannot explain inertia in output gap dynamics (Tamborini, 2007) nor can they be held responsible for observed price stability, since inflation had been on a downward trend in the world economy well before the IT regime was adopted. Interestingly enough, Bernanke et al. (1999:253) state that "[...] while the reduction of inflation in these [four inflation-targeting] countries represents a genuine achievement, it is not clear whether it was the result of forces that were already in place before inflation targeting was adopted or whether the adoption of targeting contributed to the process".

Further, we argued that inflation targeting countries incur output loss ratios, worsening of income distribution inequality, lower output growth, higher unemployment rates, exchange rate volatility and tighter balance of payments constraints. Since credit is *endogenous and non-neutral*, debt plays a critical role, strengthened by the fact that the interest rate is a key variable for income distribution.

Taylor rules overlook the causes of structural inflation. For that reason inflation targeting can hardly be an optimal monetary policy framework for less developed economies. Furthermore, if structural unemployment is high -like in Mexico and most developing economies- the IT regime will stabilize the economy at a high unemployment rate trap and more inequitable distribution of income, unless explicit employment and output growth rate targets are undertaken by monetary authorities.

There is no empirical evidence supporting the dogma that money is neutral in modern economies whose output depends on accumulation of fixed capital. Hence the claim that the Post Keynesian novelty lay in a theory which links endogenous money to both banking credit activities and the rejection of the neutral money axiom. Thus, the theory of non-neutral endogenous money provides a sensible skeleton for framing and conducting monetary policy in order to cope with the causes of structural inflation (Arestis and Milberg, 1994; Mántey, 2005)[19].

[19] "Once the neutrality of money is rejected as a necessary axiomatic building block, then an organizing principle for studying the level of employment and output in a market economy involves: (1) comprehending the role of money as a means of settling contractual obligations and (2) understanding the essential role that liquidity plays in determining the flow of production and employment in the economic system in which we live" (Davidson, 2007:29).

CHAPTER II: THE NEW MONETARY POLICY AND THE OUTPUT-INFLATION TRADE-OFF IN MEXICO

The available evidence does not suggest that more independent central banks are rewarded with more favorable short-run tradeoffs. Nor does the recent experience of OECD countries suggest that central banks that posted inflation targets were able to disinflate at lower cost than central banks without such targets.

Alan S. Blinder (1998:63)

II.1. Introduction

Over the past two decades the Mexican monetary authorities have been actively disinflating the economy, first (1983-1987) with the IMF canonical model of macroeconomic stabilization (cf. IMF, 1987; also Fitzgerald, 2005), then (1988-1994) through a heterodox price stabilization program including price and wage "freezes" and nominal exchange rate anchoring (Mántey, 2005a; see also Aspe, 1993:22-60) and, finally (1996-present), adopting inflation targeting as the framework for monetary policy.

According to the Bank of Mexico and other proponents of the new monetary policy framework, continuous strive for long-term price stability is the unique duty of any central bank. By and large, they claim that disinflation through Taylor rules can be *inexpensive* in the long-run. This view is based on the hypothesis that inflation hinders economic growth. Hence monetary policy must focus on targeting low levels of inflation. Since inflation and capital investment are inversely related, the argument continues, low inflation targets will enhance accumulation of capital, employment and production. On the other hand, economists of Post Keynesian persuasion maintain that disinflation *is costly* and that investment and inflation are positively related. Therefore, a low inflation-targeting policy will hamper investment and economic growth (Atesoglu, 2005). These opposite visions of disinflation derive from divergent hypotheses about the axiom of neutral money. Certainly, the settlement of the matter depends on empirical testing.

In the IT model, the measurement of the variables involved (potential output, y_n, and the derived output gap, Γ_y), takes priority in the calculation of the central bank's reaction function and, consequentially, concerning the macroeconomic effects of monetary policy. Γ_y represents the amount of resources wasted owing to idle capacity; it implies inefficient allocation of resources and failure of the policy regime to attain optimal outcomes. Several methods have been proposed in the literature to estimate potential output and, in consequence, the output gap[20]. Yet, statistical observations of potential output are not available. Therefore, it is hard to determine conjectural inflationary pressures stemming from the labour market on the basis of those methods. Furthermore, the analysis of the adjustment process towards long-run full employment equilibrium based on the aggregate production function has been shown to be fatally flawed (cf. Felipe and McCombie, 2005; Garegnani, 1970; Kurz and Salvadori, 1995; Mas-Collel, 1989; Pasinetti, 1969; Robinson, 1953). Thus, the corresponding empirical estimations of y_n and Γ_y used to calculate the equilibrium rate of inflation, π_E, and the inflation target may be misleading. For this reason our empirical analysis of disinflation in Mexico follows the alternative approach of *normal economic capacity* (NEC), which does not assume automatic full utilization of resources (cf. Shaikh and Moudud, 2004; also Marris et al., 1964). The NEC approach obtains a benchmark 'normal' position or state of economic affairs useful to assess the effects of policy.

The contribution of this essay to the literature is twofold. First, it is intended to show empirically that Mexico has incurred a significant real cost, measured as forgone output and economic capacity, in its attempt to deflate the economy during 1983-2006. Second, the essay also

[20] For example, the Hodrick-Prescott filter (1997), Okun's methods (Okun, 1962) and the aggregate production function (Lucas, 1970). Woodford (2003:170) proposes "a simple gross-output production function".

shows empirically that the output-inflation trade-off did not improve with the adoption of the new monetary policy framework; hence inflation-targeting does not appear to be a "wise policy" to eliminate or at least minimize the costs of disinflation in Mexico. Presumably, disinflation has contributed to lower the country's economic capacity and long-run output growth performance. The rest of the essay is in four parts. Section II.2 very briefly surveys the literature on the real costs of disinflation, section II.3 presents the model of normal economic capacity, section II.4 contains the empirical analysis and the last one summarizes and concludes.

II.2. On Some Debates on Disinflation and the Output loss Ratio

The output loss ratio (σ henceforth) is defined as the reduction in real output and employment a country must incur in order to lower inflation to a target as established by the central bank (Ball, 1994; Bernanke et al., 1999: 254). Thus, σ measures the cumulative output losses incurred during disinflation episodes owing to stabilization policies undertaken by the central bank. Cukierman (2002) ascertains σ in terms of the ratio between the cumulative increases in unemployment rates owing to disinflation divided by the cumulative reduction in inflation rates.

As shown above, the new monetary policy paradigm claims that the NAIRU- vertical Phillips Curve describes the dynamics of the economy adequately (Cecchetti and Kim, 2004:177; also see Svensson, 1999). This assumption straightforwardly neglects the existence of significant positive real costs of disinflation in the long-term. Actually the IT model only admits short-run temporary output losses of disinflation, which tend to vanish as the economy returns to trend of potential output in the long-run (Ball, 1994; Schelde-Andersen, 1992). For example, Taylor (1999b: 29-30) argues that:

> "There is substantial evidence demonstrating that there is no long-run trade-off between the level of inflation and the level of unused resources in the economy – whether *measured by the unemployment rate, the capacity utilization rate, or the*

> *deviation of real GDP from potential GDP*. Monetary policy is thus neutral in the long run" (emphasis added).

Some other neoclassical authors acknowledge that disinflation may not be inexpensive and focus attention on the "optimal" speed of disinflation, the least expensive method to disinflate, the initial conditions -such as the economic environment and the level of inflation at the beginning of the deflation policy-, the institutional setting, the accompanying policies and/or the openness of the economy. For instance: Sargent (1983) claims that gradualism tends to increase σ, hence favours fast disinflation owing to speedy rational expectations adjustments. Ball (1994) studies disinflation in a number of OECD moderate-inflation countries; Ball (1994) finds that, in general terms, quick disinflation is less expensive and that greater labour market flexibility lowers σ, since recessions associated with disinflation "are [thus] dampened" (ibid.:181). He draws one straight policy implication: governments should induce greater wage flexibility! Gordon (1982), Taylor (1983) and Ball (1994) focus attention on staggered wage settings and conclude that those wage institutional features explain why σ varies across countries and across disinflation episodes; wage rigidity, they say, also makes quick methods of disinflation cheaper than gradualism. Ball (1994:176) even asserts that "wage rigidity is an important determinant of the output loss ratio", albeit his empirical results ("not very robust", he warns) also find that incomes policies diminish σ by 0.6. Similarly, New Keynesian models show that an initial higher inflation rate weakens nominal wage rigidity: in consequence, it reduces σ (Ball, Mankiw and Romer, 1988; Bernanke et al., 1999: 257-259). Finally, Romer (1991) claims that openness, measured by the imports/GNP ratio, reduces σ owing to a stronger disinflating effect of exchange rate appreciation –induced by tighter monetary policies.

It is worth pointing out that the aforementioned papers assess disinflation experiences in industrialized capitalist economies not subject to structural inflation phenomena. Inflation-targeting –

it is claimed and taken for granted- is a sensible monetary policy strategy causing no long-run losses in output and employment. Despite the debate, the aforesaid authors share the core belief that the output-inflation trade-off is a short-run phenomenon and that a successful inflation-targeting policy is a *conditio sine qua non* for achieving sustainable long-run growth. So $\sigma > 0$ is also envisaged as a short-run phenomenon, since real interest rate adjustments are held to be neutral with respect to real output, employment, investment and cost of borrowing. Yet, this vision has been disputed by Post Keynesian economists and even by some major advocates of the very new monetary policy paradigm (cf. Atesoglu, 2005; Atesoglu and Smithin, 2006; Bernanke et al., 1999; Lavoie, 2004; Rochon and Rossi, 2006). For example, Atesoglu (2005:16) has shown empirically that "there is a positive cointegration relation between inflation and investment spending" in the United States; Atesoglu and Smithin (2006) find that pursuing more stringent inflation goals through (higher) equilibrium real interest rates triggers deleterious effects on employment, short and long-run real output growth paths and income distribution. Bernanke et al. (1999:257), in turn, find that σ increased after the adoption of the IT regime in Canada, New Zealand, and the United Kingdom, though they adamantly add: "[...] unfortunately, [...] the only way to achieve disinflation is the hard way: by accepting possibly significant short-run losses in output (and employment) in exchange for the longer-run economic benefits of price stability. The use of inflation targeting [...] does not change that basic fact" (ibid: 259).

Be that as it may, empirical evidence attests that disinflations have been "a major cause in recessions in modern economies –perhaps the dominant cause" (Ball, 1994:155). Particularly so in peripheral economies that have adopted Taylor rules in the hope of improving the output-inflation trade-off, seeking a far-fetched lower σ.

II.3.Data and Methodology

The most widespread conventional approach of measuring the output loss ratio associated with disinflation monetary policies is deriving it from an estimated Phillips curve and computed trend inflation rates (Gordon and King, 1982). Other mainstream calculations have been made assuming an ad hoc natural rate of unemployment (Mankiw, 1991) and computing changes in inflation rates and output losses. The trouble with the above estimates is that the former treats output-inflation trade-offs symmetrically irrespective of differences between disinflation and inflationary periods, while the latter rely on awkward potential output computations, de-trending procedures and the unrealistic NAIRU hypothesis[21]. Since the validity of the NAIRU is contentious and subject to criticism, we do not consider it in our estimates. As Thirlwall (2007:26) puts it:

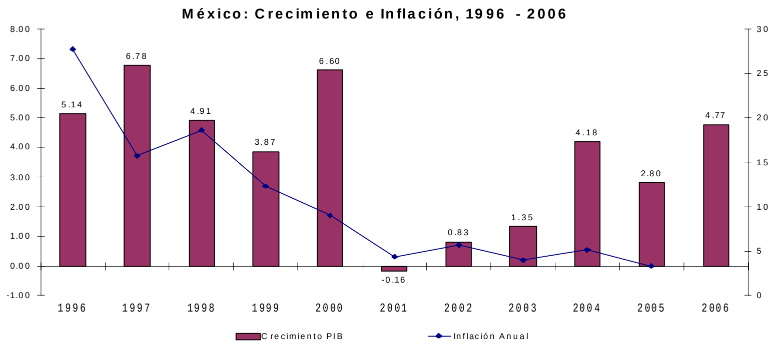
> "Those who estimate expectations-augmented Phillips curves and derive the so-called natural rate from them are estimating a number which adds little to an understanding of the nature of unemployment, or whether demand management can reduce the rate below whatever level is estimated without ever-accelerating inflation. In the concept of the natural rate of unemployment, we have a prime example of a theoretical construct which, apart from being based on shaky labour market assumptions, has no empirical counterpart (*unless* the economy *is* in general equilibrium)." (Italics in the original).

The first step of our method is to spot and classify disinflation episodes. We identify and examine several disinflation events in Mexico throughout the last twenty five years. A disinflation event is a marked falloff in trend inflation (henceforth Π) defined as a five quarters decline in the average of actual inflation. The estimation of the output loss ratio (σ) is based on a time series of Π, helpful to identify disinflation occurrence. Trend inflation in a particular quarter, Π_t, is the average of cumulative inflation in five quarters. Identification of disinflation periods requires spotting Max (Λ)

[21] Myatt (1986) provides a Kaleckian critique and demonstrates that there is no such thing as a NAIRU; Bellod (1999), in turn, applies Granger and Sims causality tests showing empirically that the alleged link between the NAIRU and the acceleration of inflation does no exist in Spain 1976-1997.

and Min (τ) points in trend inflation. According to Bernanke et al. (1995), a Max (Min) is a quarter in which Π is higher (lower) than the inflation rate of the two quarters prior to and than that of the two quarters after such yardstick. A disinflation period is any period that starts at an inflation Max and ends at a Min with an annual inflation rate at least two percentage points lower than the Max[22]. The identified disinflation periods in Mexico are represented as drastic falloffs in the inflation rate, as can be shown in graph II.1.

Graph II.1. Trend Inflation and Output Growth



To compute the real cost ratio, σ is measured as the ratio of cumulative output loss to the fall in trend inflation, using data from Banco de México. Whilst Ball's (1994) results rely on "measuring full-employment output during disinflation", alternatives methods rather establish a "normal" or desired rate of utilization of economic capacity based on the experienced or observed maximum

[22] A number of criteria have been used in the literature which refer to various methods of computing disinflation events, depending on the initial level of inflation, the behaviour of trend inflation and, last but not least, the reaction function of the monetary authority. On the other hand, Mexico's inflationary experience has been discontinuous through time with some drastic instability features in 1987 and 1994-1995.

growth rate attained by the economy during the period under study[23]. The estimation of economic capacity is built on Shaikh and Moudud (2004). This figure, then, will be used to compute an alternative output gap variable which should allow an estimation of the cumulative output loss incurred during each disinflation episode. Calculations of σ were carried out for each of the four sub-periods with identified disinflation occurrence, albeit our main interest is to compare the impact of disinflation policies before and after the adoption of inflation targeting.

II.3.1. Output and Economic Capacity

Following heterodox authors (Arestis, 1992; Kurz and Salvadori, 1995, Marris, Maclean and Bernau, 1964), we distinguish between installed capacity and economic capacity, the difference being that, albeit existing capacity can be utilised fully, this can be harmful to the profit rate. A normal rate of utilisation of productive capacity is assumed and compared to the effective level of economic activity. Capital accumulation, effective demand fluctuations and technical progress combine, yielding a dynamic model of economic growth where supply and demand interact so as to bring about a less than full employment equilibrium growth rate of output. According to Shaikh and Moudud (2004), economic capacity is estimated as follows:

$$\mathrm{X}_t \equiv \frac{X_t}{\chi_t^*} \cdot \frac{\chi_t^*}{\kappa_t} \cdot \kappa_t \qquad \text{(II.1)}$$

Where X_t denotes output, χ_t^* economic capacity and κ_t is capital stock. In terms of natural logarithms we have:

---

[23] See Arthur Okun (1978), Laurence Ball (1994), Ben Bernanke et al. (1999), Thomas Sargent (1982). Interestingly, Sargent analyses "the ends of four big inflations". In this study, we assume that σ is equivalent to the cumulative deviation of actual GDP from the constant growth rate of potential GDP. Unlike Ball (994) and Sargent (1982), our findings reveal that disinflation is costly regardless of the particular strategy followed by the government to achieve price stability.

$$\ln(X_t) = \ln\left(\frac{X_t}{\chi_t^*}\right) + \ln\left(\frac{\chi_t^*}{\kappa_t}\right) + \ln(\kappa_t) \qquad \text{(II.2)}$$

Now, capacity utilization is μ_t and the capacity–capital ratio is given by $\xi_t = \frac{\chi_t^*}{\chi_t}$

. Capacity utilization is assumed to fluctuate around a normal or desired rate of utilization of capacity ($\mu^* = 1$). Then the natural logarithm of μ_t is:

$$\ln(\mu_t) = \varepsilon\, e_t^{\mu} \qquad \text{(II.3)}$$

Where e_t^{μ} is a random error term. On the other hand, the capacity–capital ratio depends on autonomous technical change and embodied technical change, which in turn depend on the rate of capital accumulation:

$$\gamma_t^{\xi} = \alpha_1 + \alpha_2 \gamma_t^{\kappa} \qquad \text{(II.4)}$$

Where γ_t^{ξ} stands for the growth rate of the capacity–capital ratio, γ_t^{κ} denotes the growth rate of capital and α_1 and α_2 represent the effects of autonomous technical change and embodied technical change respectively. Variations in the capacity-capital ratio respond to autonomous technological progress, on the one hand, and to changes in capital accumulation, on the other. So, in terms of natural logarithms we have:

$$\ln\left(\frac{\chi_t^*}{\kappa_t}\right) = \alpha_0 + \alpha_1 t + \alpha_2 \ln\kappa_t + e_t^{\xi} \qquad \text{(II.5)}$$

Where e_t^{ξ} is a random error term. Substituting equations (II.3) and (II.5) into (II.2) obtains:

$$\ln(X_t) = \alpha_0 + \alpha_1 t + \alpha_2 \ln\kappa_t + \ln\kappa_t + e_t^{\mu} + e_t^{\xi} \qquad \text{(II.6)}$$

Equation (II.6) states that there is a long-period relationship between $\ln(X_t)$ and $\ln(\kappa_t)$. Cointegration analysis gives a coefficient of long-term elasticity between the economic capacity–

capital ratio and autonomous technical change[24]. Moreover, the long-period value of current output is the economic capacity variable, from which the value of μ_t and ξ_t can be readily derived. The choice of technique and the normal level of capacity utilisation of plant and equipment will in general fall short of fully utilised productive capacity. There is no presumption of full employment of capital and labour, since the supply side of the economy is highly elastic.

II.4. Empirical Analysis

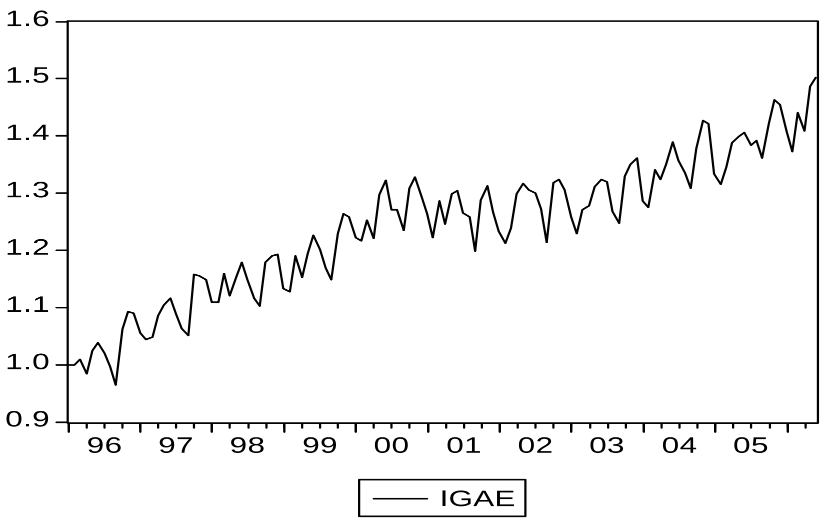
We want to address two questions: first, whether lower inflation can be linked to higher economic activity or if, instead, disinflation policies have had deleterious effects on the real economy in Mexico. The focus will be not only on the effects of disinflation on actual economic activity, but also on the growth rate of economic productivity, i.e., on the potential ability of the system to attain ever higher sustainable growth rates of output and employment. We seek to address the inflation-targeting issue in particular. Second, whether inflation-targeting has reduced the real cost ratio *vis-à-vis* other policy regimes undertaken in the past.

As argued below, there is a strong long-run relationship between output and capital accumulation and, therefore, between the latter and economic activity. Visual inspection of the time-series data from 1996 to 2006, presented in graph II.2 exhibits the evolution of the global index of economic activity. Remarkably, the growth rate of economic capacity tends to outpace that of output because investment expands during periods of exchange rate stability and, in consequence, inflation declines. Indeed, economic capacity building accelerates not so much owing to disinflation, but the

[24] The long-period relationship between $\ln(X_t)$ and $\ln(\kappa_t)$ is computed on the basis of the rate of capital accumulation as a parameter, which can be taken to represent a proxy of the marginal rate of capital formation (see Kurz and Salvadori, 1995). This procedure is consistent with that used by several authors who disregard the production function in their analysis on the grounds that both measurement and aggregation problems remain unresolved by its proponents. See Shaikh's "Laws of production and laws of algebra: Humbug II" paper (1974). In a more recent paper, Shaikh and Moudud assume an exogenous given rate of technological change and introduce, in their cointegration procedure, a serial trend whose estimated parameter becomes "the rate of technological progress".

other way around: exchange rate stability and rising productivity in this case cause the inflation rate to decline.[25]

Graph II.2. Global Index of Economic Activity, 1996-2006.

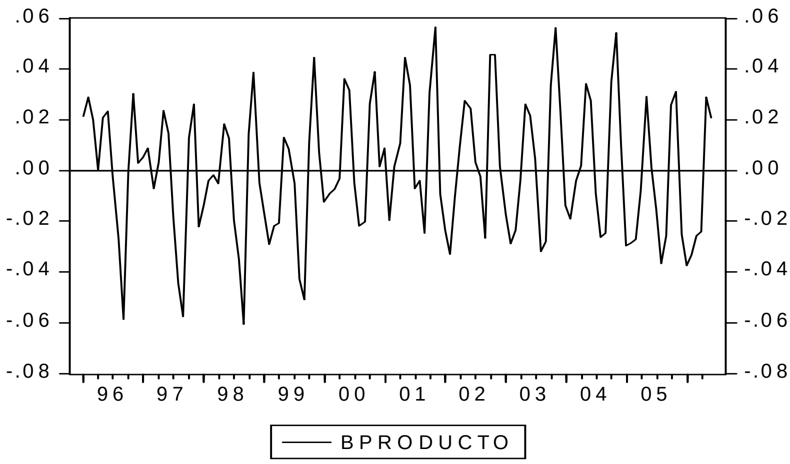


On the one hand, policy-induced contractions undertaken in order to control and reduce inflation hamper economic capacity. The output gap defined in terms of the economic capacity variable moves accordingly (see graph III.3). Clearly, disinflation in Mexico has slackened economic activity: average utilised productive capacity in 1995-2006 (i.e., mostly during the inflation-targeting epoch) has fallen below the benchmark level of late-1995. Actually, σ increased after the adoption of inflation-targeting (see *infra*), contradicting the widely held presumption that interest adjustments do

[25] Interestingly, Mántey (2005b:88) explains that this behavioural relationship between investment, the exchange rate, economic activity and inflation is typical of countries characterized by high pass-through effects from exchange rate variations to price levels, such as Mexico.

not hamper output growth and economic capacity. Advocates of the inflation-targeting policy strategy maintain that economic growth gets back to potential output after the disinflation event. However, it can be seen that, normally, economic activity does not return to previous trend but, instead, it tends to remain on lower growth paths at permanent positive output loss levels.

Graph II.3. Output Gap, 1995-2006



II.4.1. The Output Loss Ratio

To compute the σ associated to each disinflation episode experienced by the Mexican economy in 1996-2006, we use equation (II.7) based on Ball and Mankiw (1988) methodology[26].

[26] The numerator in equation (II.7) is the sum of output losses during the period of disinflation plus four quarters in order to allow for lag effects of disinflation on economic activity (Ball and Mankiw, 1988). Such spans of time will also help to see whether a positive σ has been a short-run or a long-run phenomenon.

$$\sigma = \frac{\sum_{\Lambda}^{\tau} \Theta_{\tau+4}}{\Delta \Pi} \tag{II.7}$$

The main queries at issue are: Does disinflation entail an output loss ratio in a peripheral economy such as Mexico? Does the output loss ratio fade away in the long-run? Does inflation-targeting reduce σ? Is gradualism or fast-track disinflation more costly? Speed of disinflation is measured as the ratio between the change in inflation ($\Delta\Pi_t$) and the length of the disinflation event. As mentioned, σ is measured in terms of cumulative output loss, not in terms of cumulative unemployment, because we are concerned with the magnitude of σ associated to aggregate demand contractions across time and across policy regimes of disinflation. Table II.1reports the results.

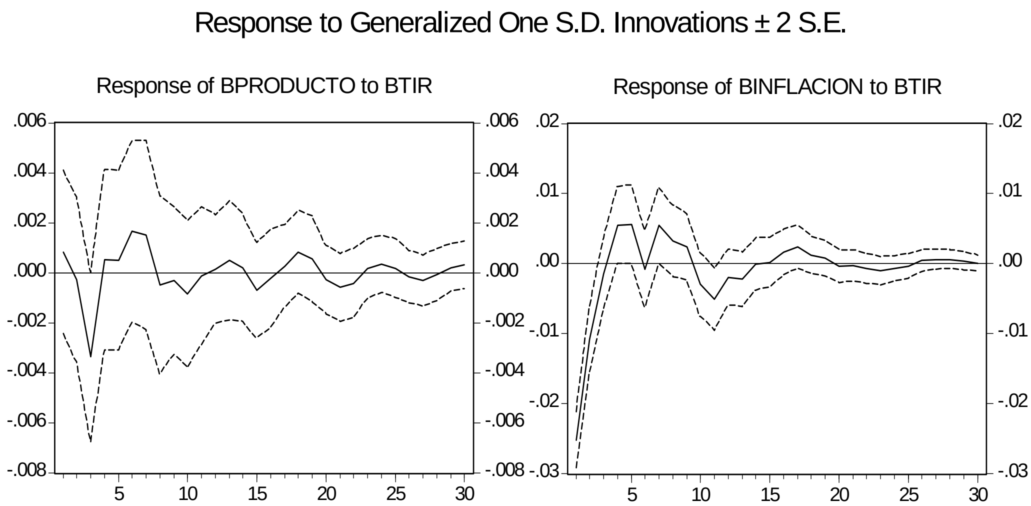
Table II.1

Episode	Length in Quarters	Initial Inflation	Final Inflation	Change in Inflation	σ
Before Inflation Targeting					
IMF Canonical Disinflation	8	100	58	42	1.01
Exchange Rate Targeting I	8	147	20	127	0.43
Exchange Rate Targeting II	16	27	7	20	9.03
Disinflation During Inflation Targeting					
1996- 2006	42	42	4	38	9.01

The answer to the first question, according to empirical evidence, is on the affirmative: disinflation is always costly regardless of the speed chosen by the monetary authority. As for the second query, the output loss ratio is normally a long-run stylized fact, not a short-run phenomenon, in Mexico: only on one occasion (the third episode) the output gap appears to return to the trend exhibited before the beginning of the disinflation event; the cumulative output loss is not offset four or even more quarters after the end of disinflation in the other three episodes, contrary to Ball's (1994) finding in his analysis of disinflation in a sample of most developed OECD countries. Furthermore, it is hard to claim that, in the case of the third disinflation episode, the catch up in the output gap confirms the hypothesis that the output loss ratio is just a short-run fact supposedly owing to lower inflation accelerates domestic capital accumulation, improves labour markets and output growth. Actually it was the reverse, the investment coefficient declined from 17% in 1990 to 14.6% in 1995 (Moreno-Brid and Ros, 2004:48). Hence definitely disinflation affected economic activity. So, one may hint that the output gap improved not so much because disinflation spurred output growth, but rather owing to it decimated economic capacity. Moreover, some positive ephemeral shocks originated at the time in the international capital markets account for at least part of the effect in the aftermath of the third disinflation episode.

Obviously, gradualism tends to be more costly than fast disinflation irrespective of the exchange rate regime. The question of the relationship between the new monetary policy framework and the output loss ratio surfaces a number of interesting issues. First and foremost, inflation-targeting does not appear to reduce σ, as is commonly claimed by proponents of the new paradigm of monetary policy. Second, the value of σ is almost the same whether Banco de Mexico's monetary policy pursues a nominal exchange rate anchor or an inflation-targeting framework. Third, inflation-targeting implies a trade off between price stability and higher potential growth owing to it imparts negative effects not only on actual output growth but, most importantly, on economic capacity. Put differently, cumulative output loss means cumulative idle productive capacity and, therefore, cumulative forgone savings and productivity. This finding is relevant owing to the fact that economic capacity refers to potential long-run economic growth. Since the output loss ratio is about the same for the exchange rate targeting period (1988-1994) than for the inflation-targeting era, it can be also argued that disinflation policies in general tend to be detrimental to economic capacity. In both cases the role of the appreciation of the exchange rate matters: it biases consumption toward tradable goods and production toward non-tradable goods. The difference being that, if it is true that inflation targeting "locks in the gains" of past disinflations, to use Bernanke's terms, then the new monetary policy framework secures long-run lower rates of economic capacity. Graph II.4 shows the dynamics of the output gap across disinflation episodes[27]. The impulse-response function shows that both output and inflation gaps are sensitive to real interest changes. By and large, the economic trends associated with disinflation experiments lay below the productivity trend that the Mexican economy exhibited prior to such experiments, confirming the existence of long-run costs of disinflation in terms of less dynamic economic capacity trends. Likewise, visual inspection of the time-series data reveals that the inflation-targeting period has not triggered a more dynamic economic capacity trend, as promised by the central bank.

Graph II.4. Impulse-Response Functions of Output, Inflation and Real Interest Rate Gaps



[27] The time-series of economic capacity trends show in this impulse-response functions that the output gap is sensitive to interest rate changes as the Banco de Mexico follows an inflation targeting approach to price stability.

II.5. Conclusion

The above empirical analysis shows that price stability has imposed a high levy on the Mexican economy, measured as output loss and weaker paths of economic capacity, during 1983-2006. The magnitude of the output loss ratio is inversely related to the speed of disinflation. Sánchez, Seade and Werner (2001) arrived at a similar result.

Another finding is that inflation-targeting failed to reduce such burden; instead, the output-inflation trade-off worsened since the adoption of the new monetary policy. Compared to previous disinflation experiments, the IT regime does not appear to perform any better. Bernanke et al. (1999) reach an analogous outcome in their analysis of the lessons of inflation-targeting “from the international experience”, though they report significant negative effects only in the short-run.

The fact that the output loss ratio remains significant even in the long run is best manifested in the declining trend of economic capacity computed for each disinflation episode. This is a stylized fact of disinflation experience in Mexico, signalling that the orthodox approach to price stability imparts negative impacts not only on current output, but above all on the conditions for sustainable higher long-run growth rates of output. Our finding is consistent with Atesoglu’s (2005) analysis of the effect of inflation targeting on investment in the US economy.

A cursory comparison of output loss ratios across disinflation episodes and policy regimes in Mexico, before and after the policy change, reveals that the new monetary policy framework did not improve the output-inflation trade off nor gave rise to a faster growing economy, as promised by Banco de Mexico. In that sense, it is hard to admit that purely targeting low rates of inflation makes the central bank more accountable and credible. Moreover, it appears that the output loss ratio associated with disinflation happens to be higher in peripheral economies than in industrialized countries. According to empirical evidence (Bernanke et al., 1999), disinflation represented output loss ratios of: 3.04 in Canada (1990:3-1993:4), 2.05 in New Zealand (1986:3-1992:4), 0.53 in Sweden (1990:4-1993:1), and 2.19 in the UK (19990:1-1993:4), while Mexico incurred much higher costs as shown above. Presumably, disinflation has also meant lower economic capacity and more fragile long-run output growth paths.

Undoubtedly, the high output loss ratio experienced in the last decade is associated with the inflation-targeting regime, which has proved not to be a suitable guide for monetary policy. The true solution to macroeconomic instability lay at the opposite pole of Taylor rule policies. The output-inflation trade-off can best be improved through a lower interest rate policy combined with Keynesian fiscal and financial courses of action aimed at improving the structural constraints of the balance of payments and income distribution (cf. Atesoglu and Smithin, 2006; Mántey, 2005). Experience shows that low inflation attained through high interest rates does not cause actual output to return automatically to higher potential output paths, particularly so when the exchange rate becomes a source of inflation via “magnified” exchange rate pass-through effects, as seen in most peripheral economies (see infra).

CHAPTER III. INFLATION TARGETING, EXCHANGE RATE PASS-THROUGH AND THE MONETARY POLICY TRANSMISSION MECHANISM

As years go on it seems to become ever clearer that there ought to be an international currency; & that the –in itself foolish- superstition that gold is the 'natural' representative of value has done excellent service (...) And I am soon to go away: but, I have opportunity, I shall ask new-comers to the celestial regions whether you have succeeded in finding a remedy for currency-maladies.

Alfred Marshall, Letter 130 (to Keynes), 1923.

III.1. Introduction

After the financial crisis of 1994-95, the Banco de Mexico's approach to monetary policy changed from exchange rate targeting to inflation targeting. The accompanying transition to a floating exchange rate regime at the beginning of 1995 implied that monetary policy became the nominal anchor of the economy, while abatement of inflation was established as the main goal of policy (Baqueiro et al., 2003; Ortiz, 2006; Torres García, 2002). Further, Banco de Mexico (henceforth BM) was granted autonomy in 1993.

A formal full-fledged inflation-targeting framework was adopted in 2001 with a 3±1% target, though in fact the basic characteristics of the IT regime have been with us since 1996. Announcement of an explicit multi-annual inflation target just began in 1999. Now, current inflation is almost on target. According to Ortiz (2006:323), inflation targeting "contributed to the significant reduction of inflation" as BM tightens its policy stance when inflation pressures come from the demand side of the economy. It has been claimed that in the new policy regime the central bank needs not engage in foreign exchange interventions[28]. The logic behind is that a run on international reserves can readily be averted because BM can always let the exchange rate go.

The operational instruments used in implementing monetary policy in Mexico have been the setting of minimum levels for the interest rate (domestic monetary conditions) and the "corto"[29]. The latter was introduced in the 1990s because, owing to exchange rate volatility, "a high pass-through of the exchange rate to inflation was observed" (Ortiz, ibid.). It used to reflect BM's goal for the private banking system's daily balances at the central bank. BM can always modify domestic monetary conditions in order to hit the inflation target. Ortiz (2006) argues that the role of the corto diminished since April 2004 as the economy converged to an environment of low inflation. Thus, recently the corto was dispensed with and replaced by the funding interest rate.

Empirical research on Taylor rules in developing economies has found that central banks do react to exchange rates (Mohanty and Klau, 2004). In this connection, Taylor (2006:233) admits two important facts. First, the possibility for the exchange rate to have a "larger and more significant" weight in the policy rules of small developing open economies compared to developed ones. Second, sterilized exchange market intervention in small open inflation-targeting economies is significant. Yet Taylor (2000 and 2006:234) establishes a causal link between a lower pass-through and monetary policy; he believes that the pass-through effect from exchange rate fluctuations to core inflation "has declined significantly since the adoption of inflation targeting". Several studies have also found a dramatic decline in exchange rate pass-through in developed countries between the 1970s-80s and the 1990s. Laflèche (1996-1997) reports lower pass-through in Canada. Parsley and

[28] "I see no reason why a transparent inflation-targeter should undertake foreign-exchange interventions" (Svensson, 2001: 48; also quoted in Hüfner, 2004: 1). Hüfner (2004: 1) points out that this "statement (...) exemplifies that up to now foreign exchange interventions are not recognised as an instrument for central banks that pursue inflation targeting. This contrasts with the observation that intervention operations *are actually undertaken in reality, also by inflation targeting countries*, as is evident from news reports" (emphasis added).

[29] The corto is "a flexible monetary policy instrument (...) that allows interest rates to be determined freely in the money market without limiting changes in short-term interest rates, in order to stabilize the exchange rate and inflation expectations" (Ortiz, 2005:328).

Popper (1998) found lower pass-through effects at a microeconomic level in the US industry. Gagnon and Ihrig (2004) examine 20 developed economies between 1971 and 2003 and find that anti-inflationary monetary policy reduced the pass-through effect into domestic inflation in those countries because the central bank tightened its policy stance, making firms "less keen to pass-through fluctuations in their input prices to output prices" (p. 316). Taylor (2000) and Cunningham and Haldane (1999) report low pass-through coefficients of sterling pound fluctuations. On the other hand, Goldfajn and Werlang (2000), Norambuena (1991) and Taylor (2000) document this result for several developing economies. Santaella (2002), Schmidt-Hebbel and Werner (2002), Torres García (2002) and Baqueiro et al. (2003) and Ortiz (2006) document reductions in pass-through in Mexico owing to adoption of an inflation targeting regime. Summing up, all these studies optimistically conclude that the new monetary policy framework of inflation targeting has caused smaller and incomplete pass-through effects from exchange rate fluctuations to domestic inflation in both industrialised and developing countries.

The remainder of this final essay proceeds as follows. Aims and motivation of the essay are in the next section. Following Arestis and Milberg (1993-94) and Mántey (2005a), section III.3 presents the theoretical underpinning of the research as well as some stylised facts, highlighting the relationship between complete pass-through, monetary policy and structural inflation. Section III.4 provides evidence for complete pass-through and the heavy role of the exchange rate in BM's monetary policy rule. Concluding comments are in section II.5.

III.2. Motivation and Objectives

There is a widely held belief that the good performance of inflation since the 1990s proves the IT framework empirically correct. Nonetheless, it appears that the relationship between inflation and economic activity in Mexico and other countries with substantial output loss ratios of disinflation behaves opposite to what orthodox theory claims. This "puzzle" has prompted a literature on "special factors" –like increasing competition from globalization, exchange rates and import prices- to explain the conundrum. Now, if the influence of exchange rate appreciation on price deflation belongs to such conspicuous "special factors", then Bernanke's claim that inflation-targeting helps "lock in" the gains of disinflation would be a weak argument, because "the gains" would not be robust. For a major exchange rate devaluation would cause the inflation-targeting regime to fall apart, uncovering the fragility of the acclaimed gains.

This final essay contributes to the ongoing debate on the role of the exchange rate in the inflation-targeting monetary policy framework as follows. First, we are concerned with the long-run pass-through effect from exchange rate variations to domestic inflation. We argue that, contrary to what Banco de Mexico (Ortiz, 2005:333) claims, the exchange rate long-run pass-through effect remains strong. Therefore, in spite of price stability achieved through inflation targeting, current pass-through is almost as complete as in the past. Unlike most developed economies, the decrease in the pass-through effect in Mexico was not as large after the adoption of the new monetary policy framework, particularly when it comes to the long-run. Second, this fact determines that the exchange rate boasts a "large and significant" weight in Banco de Mexico's reaction function. Indeed, given the sizable inflationary influence of the exchange rate, the monetary authority allows currency appreciation and eschews monetary depreciation, playing an asymmetric game with the exchange rate. Thus exchange rate stability sets the limit to inflation-targeting. And the central bank is forced to assign the exchange rate to the price stability goal, like in the exchange rate targeting model of 1988-1994[30]. As it is well known, this strategy is bound to fail. Third, owing to the "magnified" exchange rate pass-through effect, the assumption of the uncovered interest rate parity

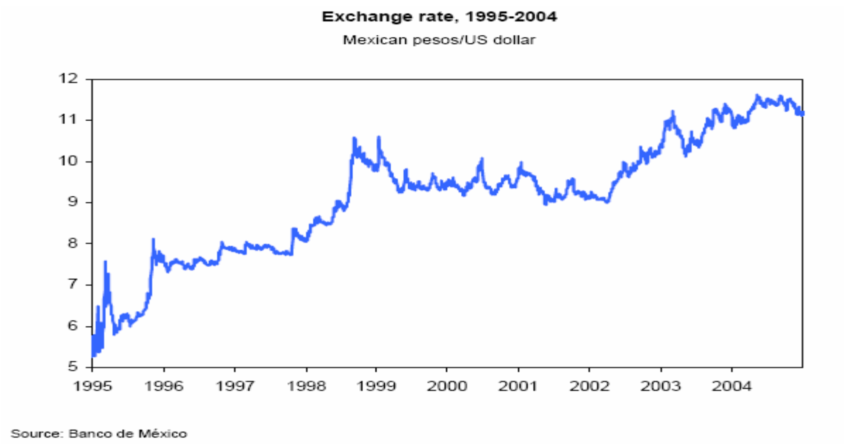
[30] Toporowski (2005:227) explains that only reserve-currency central banks can pursue multiple goals "such as low inflation, economic growth and financial stability, etc." (My translation).

does not hold. The reason behind is that the interest rate does not control the exchange rate. Thus, when the central bank tightens policy and adjusts the interest rate to offset inflationary impetus the exchange market does not adjust automatically. Contrary to that, higher interest rates and an appreciated exchange rate hamper real economic activity. Hence positive output loss ratios appear to be linked to the magnified exchange rate pass-through phenomenon.

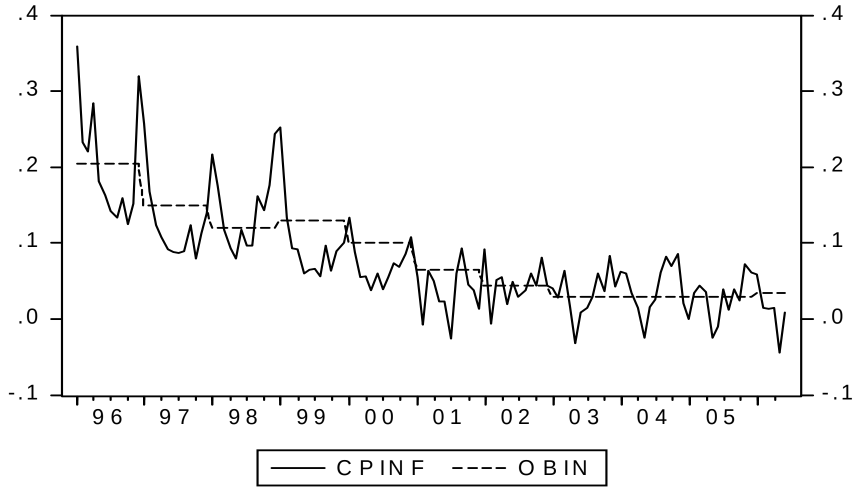
III.3. Some Stylised Facts and Theoretical Background

Visual inspection of empirical evidence reveals a high correlation between exchange rate fluctuations and inflation, showing the importance of exchange rate dynamics in both the monetary policy regime and the convergence to inflation target (see graphs III.1 and III.2).

Graph III.1. Exchange Rate Depreciation

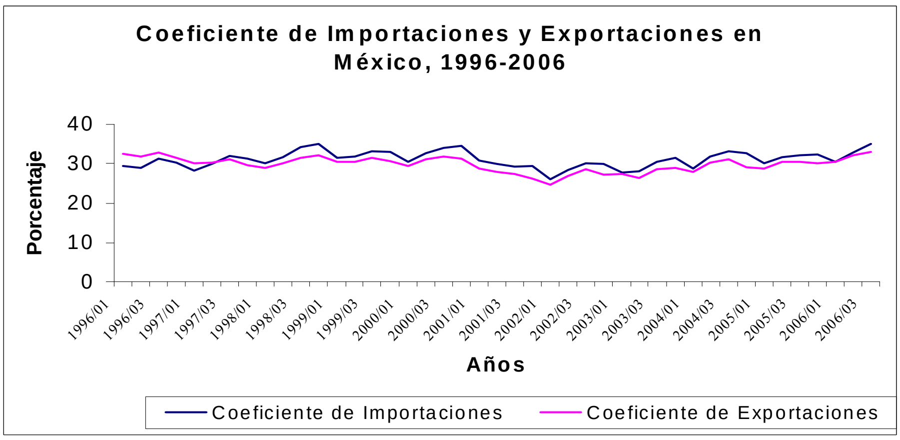


Graph III.2. Convergence of Actual (CPINF) to Inflation Target (OBIN)



A second stylised fact worth noting is the increasing degree of economic openness, a trend which speeded up since the inception of the North American Free Trade Agreement in 1994 (see graph III.3).

Graph III.3. Trade Openness.



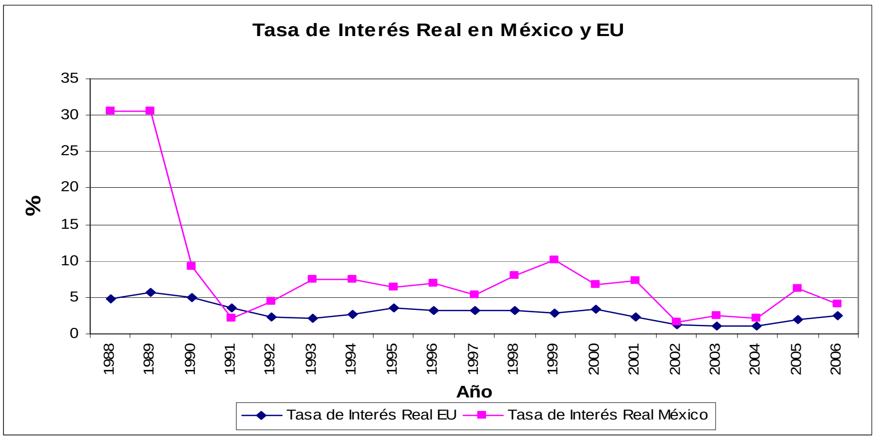
Third, statistical evidence does not appear to support the idea that interest rate arbitrage works and provides the economy with a hedging mechanism against risk and uncertainty originating in external adverse financial and supply shocks that can "contaminate" the inflation-targeting process. The "risk management framework" adopted by BM in 2004-05 to face increasing financial volatility confirms that inflation-targeting does not necessarily lead to exchange rate stability and, thereby, negligible exchange rate pass-through effects. In consequence, the assumption that the exchange rate is determined by the uncovered interest rate parity condition does not follow. Contrary to that, positive real interest rate differentials between Mexico and the U.S. economy becomes an empirical regularity, signalling faster adjustment in the capital market vis-à-vis the goods market and positive and persistent risk-premium (see graph III.4)[31],

The new monetary policy framework is ill-equipped to treat these stylised facts properly, particularly in peripheral economies subject to complete exchange rate pass-through and structural inflation. Indeed, inflation-targeting authors have low and stable inflation, trade liberalization and the interest rate arbitrage mechanism causing exchange rate stability, balance of payments equilibrium, full-employment economic activity and minimum-to-zero exchange rate pass-through coefficients. Yet, Granger causality analysis reveals that exchange rate fluctuations precede inflation hikes, hence monetary policy must react to exchange rate instability. Thus, convergence to low and stable inflation target has implied higher interest rates, currency appreciation and positive output loss ratios. Therefore, if complete or magnified exchange rate pass-through in peripheral open economies, such as Mexico, is explained by technological dependence, oligopolist competition and the reluctance of firms to reduce markup pricing owing to inelastic demand, then it appears most appropriate to rely on a theory that explains why inflation rises whenever the exchange rate fluctuates (Arestis and

[31] Author's calculation based on the US federal funds and the Cetes 28 days interest rates.

Milberg, 1993-94; Mántey, 2005a). Such alternative coherent theory belongs to the Post Keynesian paradigm.

Graph III.4. Real Interest Rate Differential between Mexico and the U.S.



The Post Keynesian theory of (incomplete) exchange rate pass-through is based on the theory of oligopolist competition and markup pricing behaviour of firms put forth by Kałecki and Eichner (Arestis and Milberg, 1993-94). Exchange rate variations are viewed as affecting prime costs and firms' markup. The size of the pass-through depends on internal costs of future investment, the elasticity of demand and on the degree of monopoly. Incomplete or limited pass-through of exchange rates is the result of falling markup of oligopoly firms keen to preserve market share owing to sensitivity of their financial needs to exchange rate fluctuations and elasticity of demand[32].

[32] "The greater the sensitivity of funds generation to the exchange rate change, the smaller will be the markup change and the more limited will be the degree of exchange rate pass-through" (Arestis and Milberg, 1993-94:178).

The working of the Post Keynesian theory of exchange rate pass-through in developing economies is different compared to developed economies. In the former, due to technological dependence, the effect of currency fluctuations on imported inputs and on the internal price level "are more important" (Mántey, 2005a). This rationale "may explain why in developing economies that exhibit structural inflation, the exchange rate elasticity of prices is near unity, even though import of goods and services are less than one third of GDP" (ibid., p. 11). Mántey (2005a) explains the significant role of the interest rate policy in the phenomenon of "magnified exchange rate pass-through". Therefore, paradoxically, it can be said that Taylor rules in peripheral economies "magnify" the exchange rate pass-through while momentarily abating inflation. Structural inflation is the direct outcome of complete pass-through and balance of payments disequilibrium arising from technological dependence, oligopolist competition, inelastic import-substitution of capital and intermediate goods and asymmetric access to capital markets.

III.4. Evidence

The exchange rate pass-through (henceforth Φ) to domestic inflation has been examined by Baqueiro et al. (2003) and Santaella (2002) and others, who find that it has diminished due to the inflation-targeting framework. Baqueiro et al. consider a "high inflation" (1996-1999) and a "low inflation" (1999-2002) scenario assuming that past inflation determines the exchange rate pass-through[33]. We, instead, divide between an exchange rate targeting regime (1988-1994) and an inflation targeting *cum* managed floating exchange rate regime (1996-2006). Galindo and Ros (2006) confirm a lower

[33] This claim is based on the inflation-forecast targeting model put forth by Mishkin (2000), Svensson (1997) and Woodford (2000), who have the central bank defining current interest rates according to inflation forecasts; future inflation plays the role of "intermediate target" in this kind of models. Hence the exchange rate plays no role in monetary policy: "(...) the relationship that during the sample period existed between the exchange rate and nominal interest rates could be explained by the effect that variations in the exchange rate could have on inflation expectations. Therefore, a monetary policy rule which includes both the expected inflation deviation from its target and the exchange rate does not seem to be an appropriate representation of the process through which interest rates are determined in Mexico" (Torres García, 2003:95-96). See Appendix B, Table B.1 for a summary of some recent calculations.

Φ, but also find that it is still significant. Mántey (2005a), in turn, calculates a magnified Φ and asserts that the current monetary policy framework triggers systemic risks.

III.4.1. Complete Pass-Through and Structural Inflation

The present essay computes Φ coefficients for different sample periods, namely Φ_1 = exchange rate targeting, Φ_2 = inflation targeting, and compares their size before and after the advent of inflation-targeting. We are concerned with the long-run exchange rate pass-through, since proponents of the new paradigm claim that Φ tends to zero as the economy converges to inflation target in the long-run. Like Mántey, we also ascertain a complete exchange rate pass-through despite a low and stable inflation environment. This proves that a high pass-through effect implies a significant and persistent threat to the inflation target[34], since there is a trade-off between the inflation target and exchange rate stability. Table B1 in Appendix B reports calculations that have been made by official economists from BM, among others. The model takes the form of equation (III.1):

$$\Delta \log P_t = \alpha_0 + \alpha_1 \Delta \log y_t + \alpha_2 \Delta \log p^* + \alpha_3 \Delta \log e_t + \Sigma \alpha_{4i} m + \alpha_5 \Delta \log P_{t-1} + u_t \qquad \text{(III.1)}$$

Where $logP_t$ denotes the natural log of prices, $logy_t$ the natural log of output, $logp^*$ the natural log of the international price level, $loge_t$ the natural log of the exchange rate, m other control variables expected to capture changes in the markup, α_i >0 are the elasticity of prices with respect to output, external inflation and the exchange rate pass-through parameter and u_t is an error term. Table III.1 below presents the results of equation III.1 based on cointegration test (see Appendix B for the diagnosis and statistical properties of the test).

[34] Minella et al. (2003) and Fraga et al. (2003) make a similar point for other emerging countries.

Table III.1. Normalized Parameters of Cointegration Test

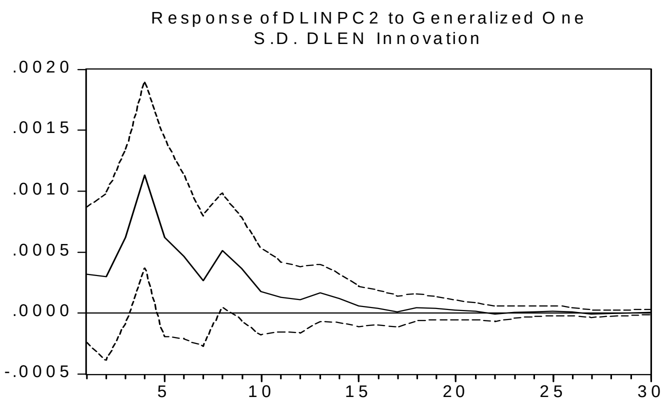
Period	Exchange Rate Targeting Φ_1	Inflation Targeting Φ_2
α_2	0.20	0. 11
α_3	1.13	0.78

It is crystal-clear that empirical evidence appears to support the presence of a long- run "magnified" exchange rate pass-through even after inflation-targeting (0.78). This result is consistent with Mántey (2005a:18), who argues that "inflation targeting (...) is an inadequate strategy for monetary control in emerging economies subject to structural inflation". It is true that $\Phi_1 > \Phi_2$, but the potential impact of exchange rate depreciations on inflation is still strong.

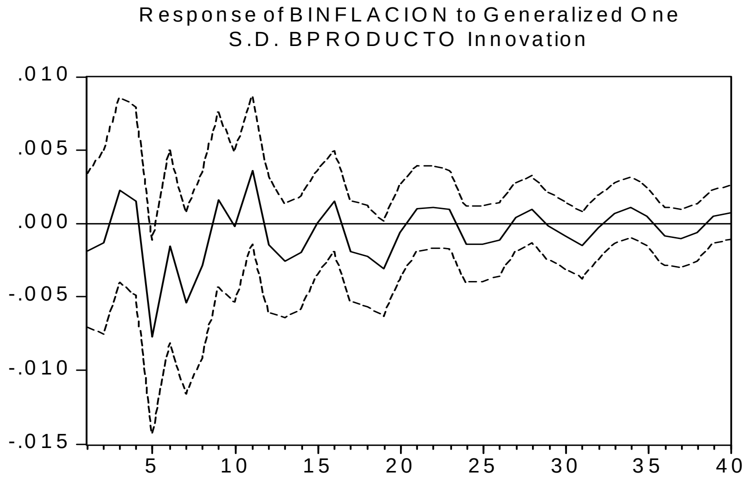
As mentioned, BM assumes that $\Phi = \Phi(\pi)$, i.e. the exchange rate pass-through depends on the inflation level. Yet, inflation is already on target, so it is hard to believe that inflation will still decline any further, say to zero. But even if it does, Φ would not decline much though. So, inflation-targeting has caused the economy to plunge into an exchange rate pass-through trap. Obviously the conventional model overlooks the structural cause of inflation. Targeting inflation cannot remove technological dependence and high markup pricing behaviour of oligopolist firms, nor can address the gap between income elasticities of imports and exports.

On the other hand impulse-response functions derived from an error correction model show that annual inflation is extremely sensible to exchange rate fluctuations through time. Interestingly, variance decomposition analysis reveals that economic activity is not all that important to explain inflation dynamics, while the bulk of price instability is due to exchange rate variations. For the sake of comparison, we only report impulse-response functions and variance decomposition evidence for the sub-periods corresponding to exchange rate targeting and inflation-targeting. It ought to be mentioned that the influence of exchange rate fluctuations on inflation remains the same in the last decades. Likewise, economic activity is not a major cause of inflation in all three samples (see graphs III.5-III.8).

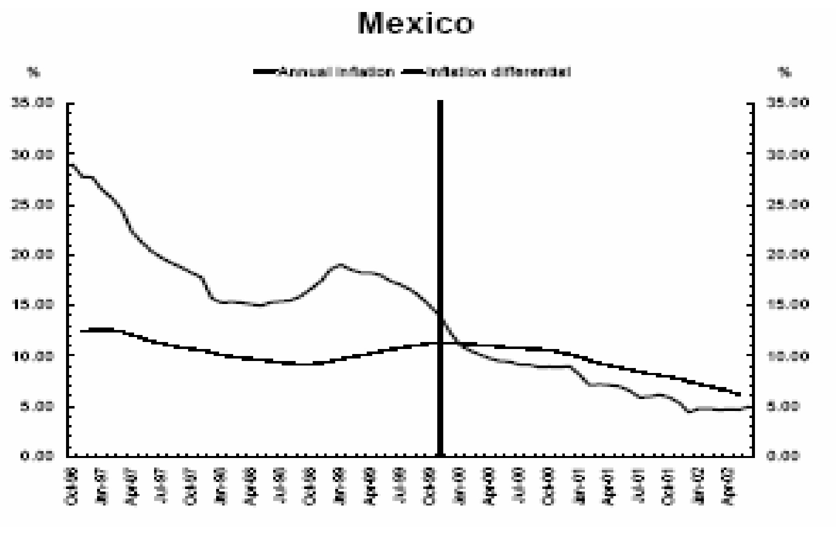
Graph III.5.



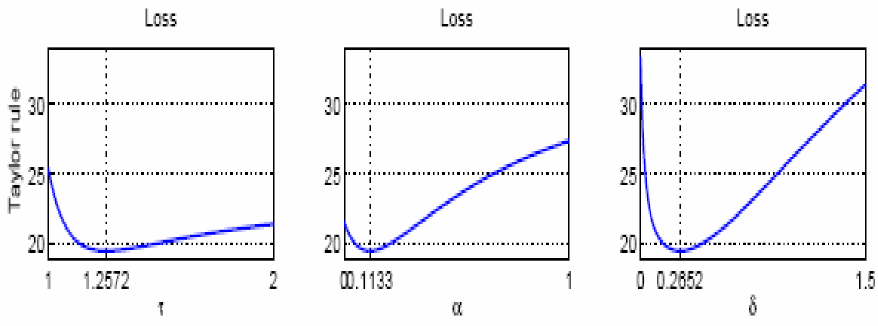
Graph. III.6



Graph III.7.

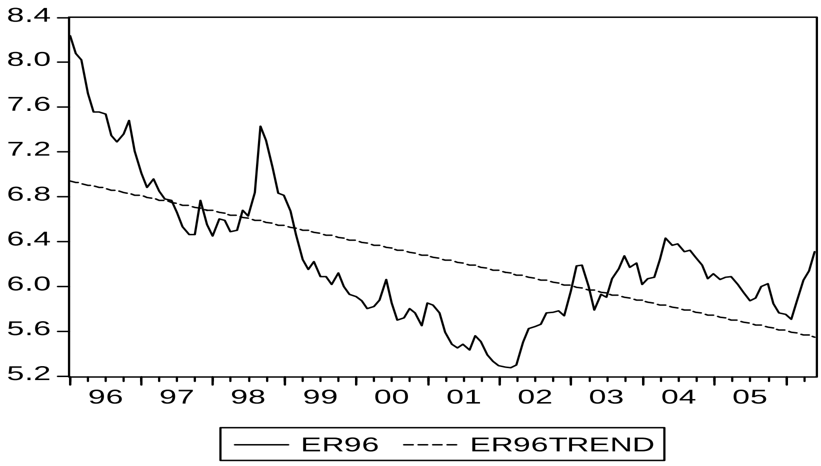


Graph III. 8. Variance Decomposition of Prices (%), 1996:1-2007:2



It is noteworthy that the exchange rate explains a great deal of price performance within the first three years following a shock during the inflation-targeting *cum* managed floating exchange rate regime (see graph 8). Apart from high correlation between inflation and currency depreciation noticeable in graph III.1, Granger causality tests show that currency depreciations cause inflation, not the reverse as BM's model appears to assume. Therefore, it can be established that monetary policy in Mexico must deal with a systematic significant exchange rate pass-through which makes inflation targeting costly and likely to fail. The sizable impact of a "magnified" pass-through on domestic prices explains why the performance of the real exchange rate exhibits an appreciation trend (see graph 9). It appears that the exchange rate has significantly contributed to a "successful" convergence to inflation target. Moreover, the "corto" introduced an appreciating bias in exchange rate dynamics owing to its asymmetric nature.

Graph III.9. Trend of Real Exchange Rate (base=1996), 1996-2006



Now we turn to examine the consequence of a magnified exchange rate pass-through for the BM's monetary policy rule empirically.

III.4.2. Monetary Policy in Practice

Ball (1998: 1) has famously said "[i]n open economies, inflation targets and Taylor rules *are suboptimal unless they are modified in important ways*" (emphasis added). And he adds "[d]ifferent rules are required because monetary policy affects the economy through exchange-rate as well as interest-rate channels" (ibid.). Yet, at the end of analysis, Ball maintains that in the long-run the uncovered interest rate parity hypothesis holds, hence Taylor rule is optimal, the exchange rate channel fades away. We first look at some data in order to gain some intuition, then we shall estimate BM's monetary policy rule, all with a view to confirm whether in fact the exchange rate channel vanishes.

Exchange rate appreciation appears to be one of the most serious monetary phenomena of the Mexican economy; irrespective of the specific monetary policy regime, be it exchange rate targeting or inflation-targeting. Clearly, the lower the inflation rate the greater the instability of the exchange rate. The intuition, then, is that a great deal of the disinflation "success" hinges upon significant currency appreciation.

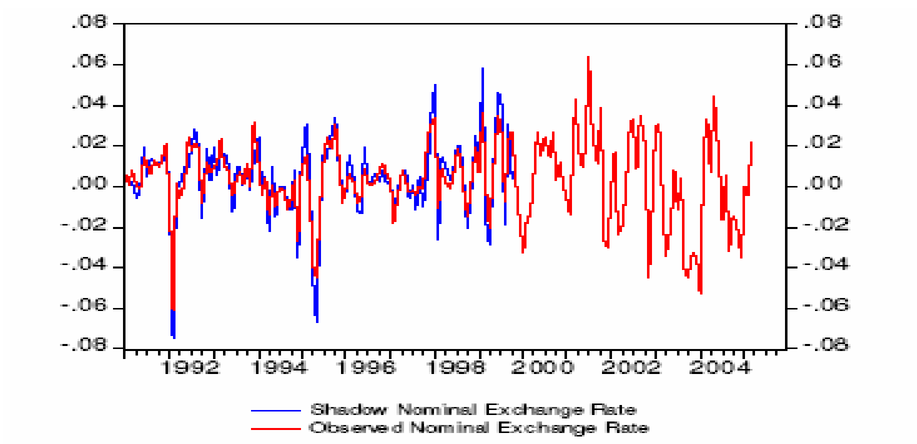
Therefore, it appears that due to the effect that a magnified exchange rate pass-through imparts on inflation, the rate of interest reacts to exchange rate fluctuations. Contrary to conventional uncovered interest rate parity condition, interest rate and exchange rate variations are positively related. Furthermore, the inflation-targeting policy regime has seemingly strengthened the positive link between the aforementioned variables, a fact that will puzzle inflation-targeting advocates, who would not expect that the control variable (the interest rate) should be influenced by exchange rate volatility (see table III.3 and graph III.10). Most importantly, Granger causality tests assert that nominal exchange rate depreciations determine nominal interest rate variations (see Appendix B, table B6).

Table III.3. Exchange Rate Volatility, Interest Rate and Expectations

Variance Decomposition (percent of total variance)						
Forecast Horizon: 1 year						
Regimen 2						
		Shock in:				
	Forecast Standard Error	Real Exchange Rate	Output Gap	Inflation	Expectations	Nominal Interest Rate
Real Exchange Rate	3.36	76	13	4	4	2
Output Gap	1.24	30	63	4	2	1
Inflation	2.21	58	13	23	4	2
Inflation Expectations	1.21	67	27	3	3	1
Nominal Interest Rate	2.55	61	21	4	7	7
Regimen 1						
		Shock in:				
	Forecast Standard Error	Real Exchange Rate	Output Gap	Inflation	Expectations	Nominal Interest Rate
Real Exchange Rate	3.12	50	3	13	2	32
Output Gap	0.70	5	70	8	8	9
Inflation	1.00	4	12	67	6	10
Inflation Expectations	0.39	12	11	60	13	3
Nominal Interest Rate	1.36	12	29	27	4	29

Source: Calculations based on data from Banco de Mexico.

Graph III.10. Exchange Rate Volatility: Variations in Observed and Shadow Nominal Exchange Rate



The fact that the exchange rate appears to bear such significant influence indicates that the inflation-targeting strategy relies on a monetary conditions index (i.e., interest rate plus exchange rate) rather than on pure interest rate adjustments. Taylor's rule, then, can be stated in a way that captures the monetary conditions index (henceforth MCI) as follows:

$$\eta i + (1-\eta) q = \theta + \gamma_1 \Gamma_y + \gamma_2 \Gamma_\pi \qquad \text{(III.2)}$$

Where $(\Gamma_\pi = \pi - \pi^T)$ is the inflation gap, $(\Gamma_y = y - y_n)$ is the output gap, θ denotes the equilibrium long-run interest rate and q is the real exchange rate. According to Ball (1998) and Svensson (1999), perfect arbitrage of interest rates is assumed to preside over the foreign exchange market. If their hypothesis holds, then η must be close to one or at least greater than 0.5. On the contrary, η ought to be close to zero or at least smaller than 0.5 if the exchange rate plays an active and permanent role in the price stability strategy and, thereby, in the monetary policy transmission mechanism[35]. Yet, as discussed, the exchange rate pass-through remains significant over the long-run and does not

[35] Cf. Ball (1998).

disappear, contrary to what proponents of the inflation-targeting regime claim. Therefore, the fact that η should tend to zero appears to confirm the magnified exchange pass-through effect.

In this case, we speak of a Taylor rule including a permanent role of the exchange rate in the sense that the persistence of a "magnified" exchange rate pass-through leads the central bank to undertake interventions in the exchange market in order to prevent currency depreciations. This, of course, causes the role of the exchange rate to increase over time according to equation (III.2). Moreover, it seems that the relative weight of the interest rate tends to overshoot in stages of international financial turbulence and exogenous shocks. The high volatility of the exchange rate due to volatility stemming from international financial markets reduces the role of the exchange rate in the mix of monetary policy. However, under normal circumstances its relative importance tends to climb, contrary to what commentators and proponents of Taylor's rule predict.

Following Ball (1998), it is clear that only when $\eta = 1$, BM is exclusively using the interest rate to attain price stability. Otherwise there will be an exchange rate channel and most likely the pass-through will also be persistent and significant.

Given the behaviour of the real exchange rate, BM faces a difficult dilemma. On the one hand, the real appreciation of the exchange rate contributes to attain inflation target, but stimulates imports and, consequently, deteriorates the balance of payments. On the other hand, given the high imported-input-content of domestic exports and the magnified pass-through coefficient, currency devaluation will not suffice to adjust the trade balance deficit; instead, it may impart stagflation. Thus, the more the real exchange appreciates, the more actual output deviates from economic capacity and the more BM is induced –by its own inflation model- to adjust the interest rate accordingly in order to eschew deviations of actual inflation from target. However, the more the interest rate is adjusted upwards the more gross capital formation gets hurt and, thereby, the less the economy is able to achieve higher growth rates of output consistent with balance of payments equilibrium (see Thirlwall, 2000 and 2003).

The above reasoning appears to lead to the conclusion that the so-called Thirlwall's Law sets the limit to Taylor's rule in developing emerging economies. Thirlwall (1979, 2002) argues that the ratio between the income elasticity of exports and the income elasticity of imports determines the maximum economic growth rate consistent with balance of payments equilibrium.

Summing up, the BM's strategy to disinflate is based on Ball's alternative monetary conditions index that includes an important role of the exchange rate to attain inflation target. Although Ball himself does not acknowledge the permanent role of the exchange rate in the new monetary policy framework –he only accepts a temporary role for the exchange rate-, this confirms the presence of the phenomenon of structural inflation not addressed by current monetary policy. Thus, using Ball's rule to enforce convergence to low inflation target hampers output growth and "stabilizes" the economy at a high unemployment rate trap, worsening the output-inflation trade off.

III.5. Conclusion

We have dealt with the problem of long-run magnified exchange rate pass-through -also known as structural inflation- in Mexico, put forth by Mántey (2005,a b). We have shown that Granger causality runs from nominal exchange rate depreciations to nominal interest rate variations. This fact means that, in practice, the inflation-targeting monetary policy framework in Mexico relies on Ball's rule where the role of the exchange rate is paramount, despite BM says otherwise. For this reason, convergence to low inflation has led to higher interest rates, currency appreciation and positive output loss ratios: Higher interest rates and an appreciated exchange rate hamper real economic activity. Hence real costs associated to disinflation are related to the magnified exchange rate pass-through phenomenon.

The fact that inflation is structural in nature makes inflation-targeting policy irrelevant to cope with the problem of magnified exchange rate pass-through in a peripheral economy.

This finding proves that the uncovered interest rate parity hypothesis, a fundamental assumption of the theory of inflation-targeting, does not hold: The interest rate does not control the behaviour of the exchange rate.

Following Arestis and Milberg (1993-94) and Mántey (2005a, b), we found that structural inflation is the direct outcome of complete exchange rate pass-through owing to structural constraints on balance of payments derived from technological dependence, oligopolist competition and inelastic import-substitution of capital goods. We have argued that, since there is a trade-off between inflation target and exchange rate stability, complete pass-through effects entail persistent threats to the inflation target regime. Therefore, the new monetary policy framework has led the economy to low output growth, exchange rate pass-through traps, costly convergence to low inflation targets and deterioration of the output-inflation trade off.

These results are empirically grounded and entail a number of important economic policy consequences for output growth, balance of payments equilibrium, employment and economic development. Our main conclusion is that there is an exchange rate channel in the practice of monetary policy in Mexico, which hampers the macroeconomy. Such problem must be dealt with through alternative macroeconomic policies addressing the structural cause of inflation.

FINAL REMARKS

The supreme goal of all theory is to make the irreducible basic elements as simple and as few as possible without having to surrender the adequate representation of a single datum of experience.

Albert Einstein, 1933, pp. 10-11

The above discussion dealt with the experience of inflation targeting in Mexico since the mid-1990s onwards. Next, the cumulative output loss corresponding to each event was measured in order to derive a output loss ratio indicator associated to each disinflation effort. Then, the various output loss ratios were compared to one another with a view to assess the twofold new monetary consensus hypothesis, namely: (i) that inflation-targeting minimizes the real cost of disinflation, representing, allegedly, the least costly method to disinflate a capitalist economy and (ii) that output growth returns to its secular path after price stability has been conquered. Hence there is no real cost of price stability in the long-run. Proponents of the new monetary policy framework claim that inflation-targeting is the optimal way of improving the output-inflation trade-off.

The analysis has also contended with the problem of long-run magnified exchange rate pass-through, typical of the structural inflation phenomenon seen in developing economies. We have evaluated empirically whether the uncovered interest rate parity hypothesis holds, in which case the interest rate would govern exchange rate behaviour and control inflation efficiently with no other real macroeconomic consequence.

The present study confronts the above hypotheses with statistical evidence and theoretical reasoning. We considered critically the theoretical foundations of the new monetary policy paradigm, confronting it with the Post Keynesian theory of endogenous money and exchange rate pass-through.

The discussion leads to conclusions empirically grounded, suggesting a number of sensible policy implications for balance of payments equilibrium, output growth and economic development:

1. Due to the causes behind structural inflation, the Mexican economy exhibits a long-run magnified exchange rate pass-through. This stylised fact is further supported by Granger causality tests confirming that nominal exchange rate depreciations precede nominal interest rate variations. This is the reason why inflation targeting resembles a soft peg.
2. The above stylised fact reveals that the uncovered interest rate parity condition does not rule exchange rate dynamics. Thus, in practice the inflation-targeting regime relies on Ball's rule where the appreciation of the exchange rate plays a significant role in the BM's goal of price stability. Thus, inflation-targeting has not delivered observed price stability in its own right.
3. Convergence to low inflation hampers real economic activity: Inflation-targeting requires higher interest rates, currency appreciation and sizable output loss. Therefore, inflation-targeting involves substantial real costs owing to magnified exchange rate pass-through, higher costs of borrowing and lower investment rates. As discussed above, the output loss ratio associated to inflation-targeting is as large as that of the exchange rate targeting regime.
4. The trade-off between inflation targeting and exchange rate stability, implies that complete pass-through effects entail continuous threats to price stability. For this reason, under "normal" circumstances, the relative weight of the exchange rate in Ball's rule outweighs the relative share of the interest rate.
5. Inflation-targeting has not improved the output-inflation trade off. In fact, the latter has deteriorated, given that long-run economic productivity declined as a result of protracted disinflation efforts, imposing more fragile long-run output growth paths. The output loss ratio of disinflation is a long-run phenomenon.
6. Since inflation-targeting does not address the cause of structural inflation in Mexico, orthodox disinflation policies have led the domestic macroeconomy to high unemployment rate traps owing to contractionary effects of higher interest rates, curbed aggregate demand and exchange rate appreciation.
7. As opposed to the new monetary consensus, we conclude that a capitalist free market economy is unable to provide full employment economic activity automatically. Inflation-targeting policies cannot amend this fundamental failure of the system. Hence, the new monetary orthodoxy cannot produce less inequitable distribution of income either.

8. Inflation targeting can hardly be an optimal monetary policy framework for less developed economies; it relies on the axiom of neutral money, which is at variance with empirical evidence. As argued, there is no evidence supporting the dogma that money is neutral in modern economies whose economic activity depends on accumulation of fixed capital. The theoretical analysis shows that credit is *endogenous and non-neutral*, debt plays a critical role and the interest rate is a key variable for income distribution.
9. The Post Keynesian theory of endogenous credit represents a more sensible paradigm for framing and conducting monetary policy addressing structural inflation and complete exchange rate pass-through phenomena.
10. Our main conclusion asserts that the exchange rate channel of monetary policy hampers the macroeconomy. The solution to macroeconomic instability calls for a policy addressing the structural cause of inflation. Such policy runs counter to Taylor rules in that it implies lower – not higher- interest rates along with Keynesian fiscal and financial measures aimed at improving the structural constraints of balance of payments and income distribution.

Finally, the above discussion opens a host of research lines worth pursuing in their own right. Yet, here we cannot pursue them further as they lay beyond the confines of this project.

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APPENDICES

Appendix A. Inflation Target around the World: Timing and Background

Country	Date of adoption	Previous anchor	Main reason for inflation target adoption
New Zealand	March 1990	None	Part of extensive reforms, dissatisfaction with earlier outcomes; provide a new nominal anchor
Chile	September 1990	Exchange rate	Provide a new monetary anchor; gradual disinflation
Canada	February 1991	None	Provide a new monetary anchor and bring down inflation
Israel	January 1992	Exchange rate	Lock in disinflation and define the slope of the exchange rate crawling peg
UK	October 1992	Exchange rate	Forced off a fixed exchange rate regime; search for a new anchor to rebuild credibility
Sweden	January 1993	Exchange rate	Forced off a fixed exchange rate regime; search for a new anchor to secure price stability
Australia	April 1993	None	Provide a new monetary anchor and lock in disinflation
Czech Republic	January 1998	Exchange rate and money supply	Forced off a fixed exchange rate regime, bring down inflation with future EU membership in mind
Korea	April 1998	Money supply	Part of extensive reforms following the Asian crisis; price stability set as the sole monetary policy objective
Poland	October 1998	Exchange rate	Considered the most effective way to bring down inflation as a precondition for subsequent EU membership
Mexico	January 1999	Money supply	Problems with earlier fixed exchange rate and monetary target; provide a new nominal anchor
Brazil	June 1999	Exchange rate	Forced off a fixed exchange rate regime, search for a new anchor within IMF programme
Columbia	September 1999	Exchange rate	Dissatisfaction with earlier framework, search for a new anchor within IMF programme
Switzerland	January 2000	Money supply	Dissatisfaction with earlier regime; however, the central bank does not consider itself on a formal inflation target
South Africa	February 2000	Money supply	Formalisation of earlier policy; greater transparency of policy
Thailand	May 2000	Money supply	Inflation targeting considered more appropriate with floating exchange rate than money supply targeting
Norway	March 2001	Exchange rate	Final phase in gradual movement towards flexible exchange rate and stronger emphasis on price stability
Iceland	March 2001	Exchange rate	Dissatisfaction and problems with fixed exchange rate regime, considered the only realistic option as long as EU/EMU membership is ruled out
Hungary	June 2001	Exchange rate	Increasing incompatibility of fixed exchange rate regime and disinflation; bring down inflation with future EU membership in mind
Peru	January 2002	Money supply	Formalisation of earlier regime; greater transparency of policy
Philippines	January 2002	Exchange rate and money supply	Formalisation and simplification of earlier regime; greater transparency and focus on price stability

Based on data at the end of 2003.

Sources: IMF, Carare and Stone (2003), Fracasso et al. (2003), Hoffmaister (2001), Jonas and Mishkin (2003), Mishkin and Savastano (2001), Mishkin and Schmidt-Hebbel (2001), Rich (2000), Schaechter et al. (2000), Truman (2003) and central bank websites.

Inflation-Targeting in Selected Countries: Structure and Size.

Country	*Population (million)*	*GDP (US$ billion)*	*GDP per capita in US$ thousand*	*Open-nes**	*Stock market turnover***	*Treasury Debt***
New Zealand	3.8	50	13.1	69.1	16.7	31.0
Chile	15.4	66	4.3	67.3	6.4	15.6
Canada	31.1	694	22.3	82.5	66.5	58.5
UK	58.8	1,424	24.2	56.4	131.4	49.5
Sweden	8.9	210	23.6	87.0	143.7	45.9
Mexico	100.4	624	6.3	57.0	6.4	23.2
Brazil	172.4	509	3.0	27.4	12.8	99.7

* Imports and exports as a percentage of GDP.
** % of GDP.

Data are from 2001, except for treasury debt which uses the most recent available data (over the period 1997-2001).

Sources: EcoWin, International Monetary Fund (IFS) and World Bank: World Development Indicators.

Formulation of Inflation Targets. Selected Countries.

Country	**Price index**	***Numerical target***[3]	***Formal provision for review of the target***	***Time frame of target***	**Escape clause**
New Zealand	CPI[1]	1-3%	Regularly	Open	Yes[6]
Chile	CPI	2-4%	None since 1999	Open	No
Canada	CPI	1-3% (2% midpoint)	Next in 2006	Several years ahead	Yes[6]
UK	CPI[2]	2%[4,5]	Once a year	Open	No
Sweden	CPI	2% (±1%)	None	Open	No[7]
Mexico	CPI	3% (±1%)	Once a year	Open	No
Brazil	CPI	3¾% (±2½%)	Once a year	One year ahead	No

1. The reserve banks of Australia and New Zealand ceased using a core index as a reference price index after mortgage interest costs were removed from the headline CPI.
2. The EU's harmonized index of consumer prices (HICP). Previously based on the retail price index, excludes mortgage interest costs.
3. The table shows only the current inflation target or official long-term target if this differs from the policy target at the end of 2003 (Brazil (currently 3¼% (±2%)), the Czech Republic (currently 2½-4½%), Colombia (currently 5½% (±½%)), Korea (currently 3% (±1%)), Philippines (currently 4½-5½%) and Poland (currently 3% (±1%)).
4. The target allows for a ±1% range, with the Bank of England obliged to write an open letter explaining the deviations. The Bank, however, does not want to define the range as tolerance limits for the inflation target.
5. Previously 2½%, the target was lowered when a new reference price index was introduced to accommodate differences between CPI and RPIX inflation (see note 2).
6. Deviations are allowed if caused by major terms of trade shocks (e.g. large-scale changes in oil prices), natural catastrophes and government measures to exert a direct influence on the general price level. New Zealand and Switzerland also specify that such escape clauses only apply if they do not exacerbate inflationary pressures.
7. Although Norway and Sweden do not have define escape clauses, they do specify that deviations should be ignored if they are the result of mortgage interest costs, changes in indirect taxation and subsidies, and major supply shocks. Monetary policy implementation is therefore based on an index excluding these items, even though the formal target is the headline CPI. These provisions may thus be interpreted as escape clauses. The Bank of Canada also has specially defined escape clauses.

Sources: IMF, Mishkin and Schmidt-Hebbel (2001), Schaechter et al. (2000), Schmidt-Hebbel and Tapia (2002), Truman (2003) and central bank websites.

Appendix B. Cointegration Tests

The different cointegration tests used in this research can be described as follows:

Firstly, it implies running a static OLS regression such as:

$$y_t = \alpha + \beta' x + \varepsilon_t \qquad \text{(B.1)}$$

The next step is to use an ADF test in order to test the resulting residual for the presence of a unit root:

$$\Delta\hat{\varepsilon} = \rho\hat{\varepsilon}_{t-1} + \sum_{i=1}^{f} \gamma_i \Delta\hat{\varepsilon}_{t-i} + \omega_t \qquad \text{(B.2)}$$

A cointegration relationship will be found if the null hypothesis of a unit root is not accepted owing to the t-statistic on ρ is insignificant.

Regression (B1) represents the first step of the KKPS and its residuals are tested for stationarity using the test statistic in the following test:

$$KPPS = T^{-2} \sum_{t=1}^{T} S_t / \hat{\sigma}^2 \qquad \text{(B3)}$$

where

$$S_t = \sum_{j}^{t} \hat{\varepsilon}_j \qquad \text{(B4)}$$

Lastly, the Johansen tests (1988) are developed. A VAR of order ρ as follows is considered:

$$y_t = \mu + A_1 y_{t-1} + .. + A_\rho y_{t-\rho} + \varepsilon_t \qquad \text{(B5)}$$

With y_t denoting a nx1vector of non-stationarity I(1) variables and ε_t a nx1 vector of new information. Now, the VAR can be re-written as follows:

$$\Delta y_t = \mu + \Pi y_{t-1} + \sum_{i=1}^{\rho-1} \Gamma_i \Delta y_{t-i} + \varepsilon_t \qquad \text{(B6)}$$

According to Johansen (1988), two different likelihood ratio tests to assess the significance of the canonical relationships are considered. The same applies for the reduced rank of the Π matrix (the trace test J_{trace}, which tests the null hypothesis of the number of Cointegrating vectors being less than or equal to r against the alternative hypothesis of r+1, and the maximum eigenvalue test, J_{max}, which tests the same null and alternative hypotheses). The J_{trace} and the J_{max} are given by the next equations:

$$J_{trace} = -T \sum_{i=1+r}^{n} \ln(1-\hat{\lambda}_i)$$
$$J_{\max} = -T \ln(1-\hat{\lambda}_{1+r})$$

Table A1. Time Series I

Period	π	π^*	r	GIEA	e	q	P*
1996:01	0.205	0.359493995	-0.0204655	1	7.5048	8.24	0.98696176
1996:02	0.205	0.233396491	0.108675442	1	7.5042	8.08	0.990182245
1996:03	0.205	0.220138261	0.157593009	1.008946322	7.5736	8.02	0.99530787
1996:04	0.205	0.284274052	0.010230796	0.984095427	7.4713	7.72	0.999103029
1996:05	0.205	0.18227573	0.067048601	1.024850895	7.4345	7.56	1.001060565
1996:06	0.205	0.162835894	0.084402089	1.038767396	7.5425	7.56	1.001694095
1996:07	0.205	0.14215364	0.149407813	1.020874751	7.6229	7.54	1.003622685
1996:08	0.205	0.132913358	0.109269501	0.997017893	7.5141	7.35	1.005534812
1996:09	0.205	0.159888567	0.046923483	0.965208748	7.5447	7.29	1.008693498
1996:10	0.205	0.12481804	0.112297136	1.062624254	7.6851	7.36	1.011932265
1996:11	0.205	0.151511191	0.117997609	1.092445328	7.9189	7.48	1.013839333
1996:12	0.205	0.320181696	-0.103377506	1.090457256	7.8767	7.21	1.013823994
1997:01	0.15	0.257151126	-0.06880203	1.054671968	7.8299	7.01	1.017035258
1997:02	0.15	0.168044333	-0.003931081	1.043737575	7.7926	6.88	1.020202102
1997:03	0.15	0.124452737	0.068554732	1.047713718	7.9628	6.96	1.022764134
1997:04	0.15	0.10803607	0.086557074	1.085487078	7.9037	6.85	1.024071523
1997:05	0.15	0.091265276	0.076687458	1.103379722	7.9057	6.78	1.023441675
1997:06	0.15	0.088725596	0.098279625	1.116302187	7.9465	6.77	1.024696481
1997:07	0.15	0.087118653	0.085770073	1.088469185	7.8857	6.66	1.025960982
1997:08	0.15	0.088915801	0.085194683	1.06361829	7.7843	6.53	1.027892746
1997:09	0.15	0.1245493	0.030789481	1.051689861	7.7792	6.46	1.030449751
1997:10	0.15	0.079916562	0.086016105	1.15805169	7.8114	6.46	1.033020438
1997:11	0.15	0.111871661	0.068679191	1.155069583	8.2837	6.77	1.032381091
1997:12	0.15	0.140107224	0.019957658	1.149105368	8.136	6.55	1.031075798
1998:01	0.12	0.217563802	-0.076743959	1.109343936	8.1798	6.45	1.033015662
1998:02	0.12	0.175072068	-0.0221679	1.109343936	8.4932	6.6	1.034924728
1998:03	0.12	0.117140024	0.05899718	1.160039761	8.5689	6.59	1.036859494
1998:04	0.12	0.093561786	0.079678553	1.12027833	8.4996	6.49	1.038743362
1998:05	0.12	0.079655543	0.08612785	1.154075547	8.5612	6.5	1.040665403
1998:06	0.12	0.118196546	0.053980602	1.178926441	8.8948	6.68	1.041956508
1998:07	0.12	0.096423835	0.087663664	1.148111332	8.904	6.63	1.043239137
1998:08	0.12	0.096134123	0.115541741	1.116302187	9.2596	6.84	1.044505373
1998:09	0.12	0.162188351	0.231460813	1.102385686	10.2154	7.43	1.045788054
1998:10	0.12	0.143297652	0.188581559	1.178926441	10.1523	7.3	1.048333186
1998:11	0.12	0.177093797	0.112285682	1.190854871	9.9874	7.06	1.04834134
1998:12	0.12	0.243996916	0.043657301	1.192842942	9.9117	6.83	1.047706196
1999:01	0.13	0.252510563	0.018202288	1.133200795	10.1104	6.81	1.050281947
1999:02	0.13	0.134405265	0.13200902	1.127236581	10.015	6.67	1.051560292
1999:03	0.13	0.092905908	0.128910214	1.189860835	9.7694	6.46	1.054738137
1999:04	0.13	0.091773337	0.095767563	1.152087475	9.4461	6.24	1.062398077
1999:05	0.13	0.060156317	0.133534355	1.194831014	9.3623	6.15	1.062401815
1999:06	0.13	0.065704549	0.139450618	1.226640159	9.5418	6.22	1.062416327
1999:07	0.13	0.066089907	0.124186473	1.200795229	9.3671	6.09	1.065605342
1999:08	0.13	0.056286189	0.146035192	1.169980119	9.3981	6.09	1.068162324
1999:09	0.13	0.096625644	0.083530762	1.148111332	9.3403	6.02	1.073286964
1999:10	0.13	0.063335889	0.106873842	1.229622266	9.5403	6.12	1.075197574
1999:11	0.13	0.088930231	0.063974606	1.264413519	9.4205	6	1.075822773
1999:12	0.13	0.10017819	0.04490329	1.258449304	9.4151	5.93	1.075836878
2000:01	0.1	0.13427468	0.00068424	1.22166998	9.4793	5.91	1.079026218
2000:02	0.1	0.088703057	0.052702	1.216699801	9.4456	5.87	1.085442702

2000:03	0.1	0.055438761	0.071591248	1.252485089	9.2959	5.8	1.094361081
2000:04	0.1	0.056896362	0.06267603	1.220675944	9.3748	5.82	1.095024407
2000:05	0.1	0.037382359	0.100724597	1.2972167	9.5081	5.88	1.096282351
2000:06	0.1	0.059233427	0.08826156	1.32306163	9.7978	6.06	1.102032101
2000:07	0.1	0.039008357	0.094282337	1.271371769	9.4688	5.85	1.104616381
2000:08	0.1	0.054949298	0.089311131	1.270377734	9.2846	5.7	1.104612932
2000:09	0.1	0.073049654	0.06422638	1.234592445	9.3319	5.72	1.110129176
2000:10	0.1	0.068860358	0.078246961	1.309145129	9.5182	5.8	1.112270283
2000:11	0.1	0.085501926	0.074945709	1.328031809	9.5179	5.76	1.112919603
2000:12	0.1	0.108261185	0.040713177	1.293240557	9.4439	5.65	1.112263803
2001:01	0.065	0.055437379	0.11790001	1.263419483	9.7701	5.85	1.119315271
2001:02	0.065	-0.006618173	0.197171506	1.222664016	9.7027	5.83	1.12377669
2001:03	0.065	0.063357754	0.084680659	1.286282306	9.6186	5.76	1.126343603
2001:04	0.065	0.050443474	0.092195352	1.246520875	9.3513	5.59	1.13080836
2001:05	0.065	0.022946641	0.095904044	1.298210736	9.1467	5.48	1.135938827
2001:06	0.065	0.023652382	0.067668256	1.30417495	9.0957	5.45	1.13785985
2001:07	0.065	-0.025982415	0.132869727	1.265407555	9.156	5.48	1.134653719
2001:08	0.065	0.059247202	0.003947137	1.258449304	9.1272	5.43	1.134656991
2001:09	0.065	0.093088808	-0.018114866	1.198807157	9.3841	5.56	1.139770877
2001:10	0.065	0.045195695	0.02938025	1.288270378	9.3685	5.51	1.135912644
2001:11	0.065	0.037670008	0.029622107	1.313121272	9.2223	5.39	1.134017632
2001:12	0.065	0.013848837	0.047065963	1.267395626	9.1672	5.33	1.129530063
2002:01	0.045	0.09231172	-0.039817182	1.23359841	9.1614	5.29	1.132099835
2002:02	0.045	-0.006428656	0.090487741	1.212723658	9.1062	5.28	1.136580956
2002:03	0.045	0.051151977	0.010677271	1.238568588	9.0809	5.27	1.1429509
2002:04	0.045	0.054625021	-0.007678253	1.298210736	9.1317	5.3	1.149362548
2002:05	0.045	0.020268404	0.042394679	1.317097416	9.4899	5.5	1.14934972
2002:06	0.045	0.048757518	0.014482607	1.305168986	9.7378	5.62	1.149988973
2002:07	0.045	0.028707062	0.039956423	1.300198807	9.7978	5.64	1.151267827
2002:08	0.045	0.038022434	0.021297995	1.272365805	9.8258	5.66	1.155103255
2002:09	0.045	0.060148133	0.001215609	1.213717694	10.0425	5.76	1.15702097
2002:10	0.045	0.044075502	0.023862428	1.318091451	10.0961	5.77	1.158938684
2002:11	0.045	0.080876855	-0.023600068	1.324055666	10.2032	5.78	1.158938684
2002:12	0.045	0.043530032	0.016617407	1.305168986	10.1982	5.74	1.156381732
2003:01	0.03	0.040426028	0.034587597	1.258449304	10.5762	5.96	1.161495637
2003:02	0.03	0.027777778	0.058416657	1.228628231	10.9216	6.18	1.17044497
2003:03	0.03	0.063123148	0.015967842	1.270377734	10.94274	6.19	1.177476589
2003:04	0.03	0.017072539	0.059602666	1.27833002	10.632425	6	1.174908387
2003:05	0.03	-0.032267639	0.095454411	1.311133201	10.2506	5.79	1.172990691
2003:06	0.03	0.008261129	0.042880568	1.324055666	10.4953	5.93	1.174269155
2003:07	0.03	0.014493032	0.028638567	1.320079523	10.4434	5.9	1.175547619
2003:08	0.03	0.029998371	0.008509525	1.268389662	10.7327	6.07	1.180022243
2003:09	0.03	0.059530635	-0.023677357	1.247514911	10.9255	6.16	1.183863257
2003:10	0.03	0.036665875	0.007099017	1.330019881	11.1704	6.27	1.182584788
2003:11	0.03	0.083001297	-0.048193898	1.349900596	11.1145	6.17	1.179388612
2003:12	0.03	0.042989356	0.009011199	1.36083499	11.2486	6.21	1.178110143
2004:01	0.03	0.062151856	-0.024644469	1.286282306	10.9151	6.02	1.183863257
2004:02	0.03	0.05981739	-0.015868649	1.275347913	11.0142	6.07	1.190255608
2004:03	0.03	0.033885786	0.022286762	1.339960239	11.0094	6.08	1.197926428
2004:04	0.03	0.015091284	0.04243112	1.324055666	11.2751	6.24	1.201761838
2004:05	0.03	-0.025083612	0.10060261	1.349900596	11.5124	6.43	1.208793424
2004:06	0.03	0.01602756	0.047391854	1.389662028	11.3894	6.37	1.212628833
2004:07	0.03	0.02621003	0.037170781	1.357852883	11.4636	6.38	1.210711129
2004:08	0.03	0.06173066	-0.001962895	1.33499006	11.3942	6.31	1.211350363

2004:09	0.03	0.082683805	-0.0251166	1.308151093	11.4864	6.32	1.213907303
2004:10	0.03	0.069257337	-0.005457217	1.378727634	11.3983	6.26	1.220299654
2004:11	0.03	0.08530278	-0.020005291	1.427435388	11.3681	6.19	1.220938889
2004:12	0.03	0.020655638	0.088390906	1.421471173	11.2041	6.07	1.216464244
2005:01	0.03	0.000355398	0.089007606	1.333001988	11.2607	6.113078711	1.219021184
2005:02	0.03	0.033317341	0.052573971	1.31610338	11.1367	6.060444539	1.226052769
2005:03	0.03	0.045072568	0.040568723	1.345924453	11.1427	6.083710942	1.235641295
2005:04	0.03	0.035614168	0.054698107	1.387673956	11.1163	6.088431409	1.243951349
2005:05	0.03	-0.025122538	0.135747491	1.399602386	10.9733	6.01903194	1.242668247
2005:06	0.03	-0.009598788	0.113423751	1.406560636	10.8228	5.945262884	1.243312115
2005:07	0.03	0.039137218	0.050056785	1.383697813	10.6781	5.869944254	1.24906523
2005:08	0.03	0.011941242	0.084639302	1.392644135	10.6882	5.898521909	1.25545758
2005:09	0.03	0.040078227	0.045266208	1.36083499	10.7775	5.996477156	1.270804274
2005:10	0.03	0.024544915	0.061124627	1.421471173	10.8324	6.024362823	1.273361198
2005:11	0.03	0.071973163	0.00067754	1.463220676	10.6685	5.843449168	1.263123018
2005:12	0.03	0.061423467	0.008472723	1.45526839	10.6251	5.760743495	1.258011701
2006:01	0.035	0.05864094	0.008413995	1.407554672	10.547	5.748624225	1.272077142
2006:02	0.035	0.015301369	0.059171781	1.372763419	10.4833	5.70803287	1.27271437
2006:03	0.035	0.01254673	0.060168612	1.440357853	10.7434	5.862883497	1.277193121
2006:04	0.035	0.014662132	0.055384308	1.408548708	11.0421	6.053211002	1.284864976
2006:05	0.035	-0.044517837	0.131462763	1.486083499	11.0923	6.135247975	1.29061339
2006:06	0.035	0.008635579	0.061451424	1.501988072	11.3913	6.307653327	1.293168318

Table A1. Time Series II

Period	Real interest gap	$\Gamma\pi$	Γy	Δe	CPI MEX
1996:01	-0.0795316446899	0.154493995	0.0214032346683		0.8984419476
1996:02	0.0493536992804	0.028396491	0.0288759808142	-0.0006	0.9194112674
1996:03	0.0980211912814	0.015138261	0.0198975486493	0.0694	0.9396510271
1996:04	-0.0495834779959	0.079274052	0.00026898805728	-0.1023	0.9663628676
1996:05	0.00699477811172	-0.02272427	0.0208492904399	-0.0368	0.9839773174
1996:06	0.0241103565649	-0.042164106	0.0232707840374	0.108	1
1996:07	0.0888780565758	-0.06284636	-0.0019375327698	0.0804	1.014215364
1996:08	0.0484981780262	-0.072086642	-0.0270018031242	-0.1088	1.027695641
1996:09	-0.0141025492896	-0.045111433	-0.0587324112403	0.0306	1.044127319
1996:10	0.0509902834941	-0.08018196	-0.000459824120643	0.1404	1.057159912
1996:11	0.0563718365863	-0.053488809	0.0304042489774	0.2338	1.073177067
1996:12	-0.165375827796	0.115181696	0.00309721355051	-0.0422	1.107538233
1997:01	-0.131245975145	0.107151126	0.00532596953132	-0.0468	1.136018703
1997:02	-0.0669016835237	0.018044333	0.00893704405873	-0.0373	1.155108854
1997:03	0.00497759231159	-0.025547263	-0.00694049124906	0.1702	1.1694845
1997:04	0.0222993175537	-0.04196393	0.00326349415703	-0.0591	1.18211915
1997:05	0.0116804597294	-0.058734724	0.0234850864934	0.002	1.192907794
1997:06	0.0324586658018	-0.061274404	0.0146249490427	0.0408	1.203491939
1997:07	0.019073528591	-0.062881347	-0.018273313312	-0.0608	1.213976599
1997:08	0.017561769843	-0.061084199	-0.0443316206664	-0.1014	1.224770769
1997:09	-0.0378410682467	-0.0254507	-0.0574674620208	-0.0051	1.240025203
1997:10	0.01632494895	-0.070083438	0.01296632148	0.0322	1.249935058
1997:11	-0.00213461808694	-0.038128339	0.0261371188408	0.4723	1.263918289
1997:12	-0.0520410595543	-0.009892776	-0.0221848887062	-0.1477	1.281626698
1998:01	-0.149989901412	0.097563802	-0.0136446819627	0.0438	1.309510255
1998:02	-0.0967198306565	0.055072068	-0.00392152436435	0.3134	1.332436122
1998:03	-0.0169055333201	-0.002859976	-0.00169175164962	0.0757	1.348044282
1998:04	0.00240094822058	-0.026438214	-0.00504657550215	-0.0693	1.360656825
1998:05	0.00747310458403	-0.040344457	0.0182200963095	0.0616	1.371495211
1998:06	-0.0260318403437	-0.001803454	0.0126082293585	0.3336	1.387705811
1998:07	0.00633414235782	-0.023576165	-0.0197357793055	0.0092	1.401086602
1998:08	0.0329587393757	-0.023865877	-0.0350705326351	0.3556	1.414555825
1998:09	0.147710472526	0.042188351	-0.0604820410377	0.9558	1.437498273
1998:10	0.103770273824	0.023297652	0.0145298142984	-0.0631	1.458097286
1998:11	0.0265298416118	0.057093797	0.0387533006588	-0.1649	1.483919284
1998:12	-0.0429239160358	0.123996916	-0.0048312942694	-0.0757	1.520126457
1999:01	-0.069084180395	0.122510563	-0.0168147771451	0.1987	1.558511256
1999:02	0.0441413530857	0.004405265	-0.0291302010235	-0.0954	1.579458468
1999:03	0.0405941264701	-0.037094092	-0.0217232333807	-0.2456	1.59413257
1999:04	0.00714149245048	-0.038226663	-0.0208395747808	-0.3233	1.608762456
1999:05	0.0447395796826	-0.069843683	0.0129808555787	-0.0838	1.618440179
1999:06	0.0506307608851	-0.064295451	0.00854046748451	0.1795	1.629074067
1999:07	0.0354843948615	-0.063910093	-0.00500940615507	-0.1747	1.639840602
1999:08	0.0575894753901	-0.073713811	-0.0428187009382	0.031	1.64907064
1999:09	-0.00452675294471	-0.033374356	-0.0507849950299	-0.0578	1.665004891
1999:10	0.0193256271721	-0.066664111	0.0111937479719	0.2	1.675550348
1999:11	-0.0229536375863	-0.041069769	0.0444561013079	-0.1198	1.690451056
1999:12	-0.0413060806045	-0.02982181	0.00706466371371	-0.0054	1.707385689
2000:01	-0.0847175312642	0.03427468	-0.0122758066873	0.0642	1.730311555
2000:02	-0.0318107524694	-0.011296943	-0.00913026492222	-0.0337	1.745659948

2000:03	-0.0119524899623	-0.044561239	-0.00734409856397	-0.1497	1.75533767
2000:04	-0.0198179124049	-0.043103638	-0.00306812372606	0.0789	1.765324903
2000:05	0.0193628465748	-0.062617641	0.036258637251	0.1333	1.771924104
2000:06	0.00811738959254	-0.040766573	0.0316408065855	0.2897	1.782419818
2000:07	0.0154427816222	-0.060991643	-0.00486061226795	-0.329	1.789372744
2000:08	0.0118643089298	-0.045050702	-0.0218504775754	-0.1842	1.799205222
2000:09	-0.0117395796338	-0.026950346	-0.0202646972138	0.0473	1.812348354
2000:10	0.00384917987169	-0.031139642	0.0263971245973	0.1863	1.824828249
2000:11	0.00220342463534	-0.014498074	0.0389325947188	-0.00030	1.840430882
2000:12	-0.0302865574581	0.008261185	0.00164798112614	-0.074	1.860355605
2001:01	0.0487294604608	-0.009562621	0.00887648889276	0.3262	1.870668929
2001:02	0.129918461494	-0.071618173	-0.0195839217468	-0.0674	1.869430888
2001:03	0.0194317407542	-0.001642246	0.00167657570618	-0.0841	1.881275182
2001:04	0.0290264602376	-0.014556526	0.0108597580688	-0.2673	1.890764988
2001:05	0.0348790085147	-0.042053359	0.0446248649039	-0.2046	1.895103658
2001:06	0.00883682042915	-0.041347618	0.0336287866677	-0.051	1.89958603
2001:07	0.0762651266716	-0.090982415	-0.00698899530581	0.0603	1.894650447
2001:08	-0.0504145147356	-0.005752798	-0.00390260168334	-0.0288	1.905875721
2001:09	-0.0702398739594	0.028088808	-0.0245662427738	0.2569	1.923617291
2001:10	-0.0205333361589	-0.019804305	0.0305763692749	-0.0156	1.932311213
2001:11	-0.0181193187238	-0.027329992	0.0564702623729	-0.1462	1.93959023
2001:12	0.00144482288176	-0.051151163	-0.00943054924443	-0.0551	1.942276337
2002:01	-0.0833812665199	0.04731172	-0.0235385001929	-0.0058	1.960205824
2002:02	0.0489060265586	-0.051428656	-0.0330826580467	-0.0552	1.958945676
2002:03	-0.02900242403	0.006151977	-0.0100525769489	-0.0253	1.96896607
2002:04	-0.0455453406844	0.009625021	0.00948218995653	0.0508	1.979721551
2002:05	0.00624373925374	-0.024731596	0.0274829449117	0.3582	1.983734131
2002:06	-0.0200525286863	0.003757518	0.0243132102959	0.2479	1.993406326
2002:07	0.00693242943164	-0.016292938	0.00334720098842	0.06	1.99912881
2002:08	-0.0103224439194	-0.006977566	-0.00222463691257	0.028	2.006729984
2002:09	-0.0291122696852	0.015148133	-0.0267165522176	0.2167	2.018800091
2002:10	-0.00528657497511	-0.000924498	0.0455870072836	0.0536	2.027698053
2002:11	-0.0516845482131	0.035876855	0.0455214997147	0.1071	2.044097437
2002:12	-0.0105172046999	-0.001469968	0.00163734388282	-0.005	2.0529954
2003:01	0.00829148746849	0.010426028	-0.01735588947	0.378	2.061294845
2003:02	0.0328517015576	-0.002222222	-0.0287736466568	0.3454	2.067020664
2003:03	-0.00896986496488	0.033123148	-0.0235951640606	0.02114	2.080068349
2003:04	0.0351894630006	-0.012927461	-0.00366930900973	-0.310315	2.083619554
2003:05	0.0714647514609	-0.062267639	0.025997535493	-0.381825	2.076896206
2003:06	0.0192128317102	-0.021738871	0.0216382209472	0.2447	2.078611956
2003:07	0.00518551121265	-0.015506968	0.00455963371136	-0.0519	2.081624495
2003:08	-0.014843049792	-1.629e-06	-0.0319417848566	0.2893	2.087869029
2003:09	-0.047050967169	0.029530635	-0.027983473281	0.1928	2.100298246
2003:10	-0.0164234310161	0.006665875	0.0337033564824	0.2449	2.107999174
2003:11	-0.0719960050029	0.053001297	0.0562345071284	-0.0559	2.12549584
2003:12	-0.0152032662829	0.012989356	0.0222392098193	0.1341	2.13463321
2004:01	-0.0494008702871	0.032151856	-0.0136564555807	-0.3335	2.147900351
2004:02	-0.0412923866641	0.02981739	-0.0190470265777	0.0991	2.160748531
2004:03	-0.00392210444646	0.003885786	-0.00386521479168	-0.0048	2.168070397
2004:04	0.0153298078601	-0.014908716	0.00184840140271	0.2657	2.171342293
2004:05	0.0725122831183	-0.055083612	0.0342016153344	0.2373	2.165895783
2004:06	0.0182256266206	-0.01397244	0.0274259194775	-0.123	2.169367185
2004:07	0.0068464150846	-0.00378997	-0.00912699885307	0.0742	2.175053103
2004:08	-0.0335242554409	0.03173066	-0.02644599985	-0.0694	2.188479849

2004:09	-0.0579909043524	0.052683805	-0.0245940559887	0.0922	2.206575033
2004:10	-0.0397151799733	0.039257337	0.0351304522279	-0.0881	2.221857185
2004:11	-0.0557083654807	0.05530278	0.0543399074911	-0.0302	2.240810244
2004:12	0.0511932869469	-0.009344362	0.0098757482299	-0.164	2.245438781
2005:01	0.0502818977675	-0.029644602	-0.029648823122	0.0566	2.245518583
2005:02	0.0122989623495	0.003317341	-0.0284656029038	-0.124	2.253000054
2005:03	-0.00126795573684	0.015072568	-0.0271783664265	0.006	2.263154904
2005:04	0.011295375984	0.005614168	-0.00785444078178	-0.0264	2.271214941
2005:05	0.0907824010399	-0.055122538	0.0292285393888	-0.143	2.265509073
2005:06	0.0669072865578	-0.039598788	0.000901718508809	-0.1505	2.263334459
2005:07	0.00200091733127	0.009137218	-0.0154528205595	-0.1447	2.27219252
2005:08	0.0350523428144	-0.018058758	-0.0366477719154	0.0101	2.2749058
2005:09	-0.00584732949138	0.010078227	-0.0256205630056	0.0893	2.28402322
2005:10	0.00848279172514	-0.005455085	0.0257710240443	0.0549	2.289629335
2005:11	-0.0535001391605	0.041973163	0.0312709939501	-0.1639	2.306108521
2005:12	-0.0472547618554	0.031423467	-0.0251473440497	-0.0434	2.32027344
2006:01	-0.0488799577792	0.02364094	-0.0374189171164	-0.0781	2.333879741
2006:02	0.000295279228963	-0.019698631	-0.0332316642069	-0.0637	2.337450897
2006:03	-0.000302544228349	-0.02245327	-0.0256768267786	0.2601	2.340383633
2006:04	-0.00668965305415	-0.020337868	-0.0239727507027	0.2987	2.343815134
2006:05	0.0677818228586	-0.079517837	0.028886051775	0.0502	2.333380976
2006:06	-0.00383622882391	-0.026364421	0.0207576108718	0.299	2.335395986

Source: INEGI), Banco de México and Fed.

Notes: π= actual inflation; π^* = inflation target; r = real interest rate (1996); GIEA = General Index of Economic Activity (1996); P* = international price level (USA Consumer Price index); Γ_{π} = inflation gap; Γ_y = output gap; Δe = changes in the nominal exchange rate; CPI MEX = Mexico's consumer price index.

Appendix B

Table B.1. Some Previous Estimates of Exchange Rate Pass-Through in Mexico

Author	Period	Pass-through coefficient
R. Hausmann (2000)	1990-1998	0.58
J. Santaella (2002)	1969-2003	0.1018
	1996-2003	0.0254
A. Baqueiro (2003)	1996:X-1999:XI	1.35
	1999:XII-2002:VI	-0.48

Source: referred authors' papers.

Table B2. Granger Causality Tests§

Ho null	No. Observations	F Statistic	Probability
	Period 1987:4–1994		
e does not Granger cause *P*	25	13.04	0.00
P does not Granger cause *e*	25	0.51	0.83
Period	Period 1996–2006		
e does not Granger cause *P*	44	4.06	0.02
P does not Granger cause *e*	44	0.19	0.97

Notes: §: quarterly data. No. of lags determined according to Akaike and Schwarz criteria.