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# Change in the productive structure of Mexico and Brazil

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## Introduction

The purpose of this thesis is to analyze the effects that the 1) growth of different sectors, 2) the sectorial composition of exports and 3) the sectorial composition of the domestic market has on the skill content of employment (which refers to the percentage of high-skilled, medium-skilled, and low-skilled workers each sector employs). Furthermore, this thesis also analyzes how the sectorial composition of exports affects the growth of domestic value added (DVA). These two metrics can measure the state of the productive structure of an economy. This thesis studies the growth strategies that the Mexican and Brazilian economies have used to grow and how this growth strategies have affected these two variables, these variables being skills in the labor force and DVA generation. By doing this, the thesis contributes to the debate of how different sectors impact the productive structure of the overall economy of these two developing countries.

There is a need for further discussion on this topic, specifically on how the development of different sectorial classifications with different technological content in different final demands (exports and the final domestic demand), affect the productive structure of an economy. As this research can complement the understanding of why Brazil's and Mexico's productive structures does not behave as conventional economic theory would suggest it should behave. Conventional economic theory argues that prioritizing the growth of sectors with high technological content and exporting these high technological goods benefits the productive structure of an economy. This paper finds that due to the globalization stage in which these countries were at the moment they were incorporated into the global market, these growth strategies have not yield high growth DVA or improved the skill composition of the overall labor force expected.

This work will be composed of 4 chapters, Chapter 1 reviews different theoretical frameworks that discuss the impact of different growth strategy on the productive structure,

changes that are reflected on the generation of DVA and the absorption of skill workers. These strategies are mainly focused on the export-led growth strategy and the domestic-led growth strategy. After reviewing the theoretical frameworks, the thesis proceeds to Chapter 2, which describes the growth strategy that was implemented on Mexico and Brazil and the composition of goods that the economies export and sell in their respective final domestic demand. Then the work describes the impact that the growth strategies have had on the overall skill employment and their DVA generation as a result of exporting their goods. Following this chapter, Chapter 3 describes the methodology used to analyze the change in skill and how the technological sectors have contributed to the growth of DVA of the economy, in the same chapter the thesis presents the exercise made and the analysis to measure changes in the induction of labor from different skill and the generation of DVA per sectorial classification. The thesis ends presenting the conclusions.

## Chapter 1. Theoretical Frameworks

This chapter reviews literature on different growth strategies and the theoretical impact that these strategies should have on the productive structure of an economy, specifically on the composition of skill level of the labor force and the generation of DVA. Subsection **1.1** analyses developmentalist literature which argues that focusing on exports and manufacturing exports benefits the productive structure, this subsection also states some disadvantages that the specialization of exporting primary goods can have on the productive structure of an economy. Subsection **1.2** studies the fallacy composition literature, which points out some of the cons that the export growth strategy has when it is implemented by a large number of developing countries simultaneously, as well as other issues that this growth strategy might have when is implemented during the current context. The last subsection, **1.3**, highlights some benefits that implementing

the domestic-led growth strategy could result and how this strategy can complement an export-led growth strategy.

### 1.1 Export manufacturing good model

This section reviews the literature that states the benefits on the productive structure of an economy that implements an export-led growth strategy and focus mainly on exporting manufacturing goods. These benefits mainly are an increase in DVA in exports and a higher absorption of high skill labor for the overall economy. These ideas are mainly influenced by the economic success of the East Asian tigers (Hong Kong, Korea, Singapore, and Taiwan), that occurred during the early 1980s. As a result of the economic growth of these countries, developmentalist economists have discussed the benefits of exporting manufactures goods (Cline, 2008). On this note, Berg, Ostry and Zettelmeyer (2012, p.50) argue that the "manufacturing share in exports, and more generally, export product sophistication tend to predict prolonged growth". Additionally, a high composition of complexes goods in the export matrix has been positively correlated to countries' income (Felipe et al., 2012). There is also evidence pointing that the exports of sophisticated goods increase the amount of productive knowledge (Hausmann, Hidalgo et al., 2011), which is essential to converge the productivity levels of a developing country with those of the advanced economies (Rodrik, 2013). Therefore, to promote growth, according to these authors, there should be a proactive effort to increase the share of manufactured and complex goods of the export basket.

The growth achieved using this strategy, which is focused on exporting goods from sectors with high technological level, would increase the Schumpeterian efficiency of an economy. The concept of "Schumpeterian efficiency" refers to an increase in the "technological externalities,

which have higher technological opportunities and exhibit higher rates of innovation" (Cimoli et al., 2009, p. 390). The increase in the Schumpeterian efficiency, will increase technological externalities and lead to an expansion in the domestic demand as technologic externalities would generate domestic producers that are able to supply inputs to the domestic exporters in the sectors with high technological content, and so, the growth of exports of goods with high technological content would increase the domestic final demand and benefit the overall economy (CEPAL, 2012). The increase in demand should result in an increase of people employed in firms that supply inputs to sectors with high technologic content, and thus, the firms that supply inputs to sectors with high technologic content would be able to move the workforce from sectors with low levels of productivity and the informal market, to sectors with higher levels of productivity which need a higher skill of human capital and increase the DVA added in exports as there will be an increase in the number of domestic inputs in the manufactured exports, and thus improve the overall content skill of the labor force and the DVA content of exports. Furthermore, according to Cimole, Porcile and Rovira (2009), only the sectors that Lall (2000) classifies as high technology, can increase the Schumpeterian efficiency of the economy. Table 1.1 details what sectors are considered as high technologic sectors by Lall (2000).

Table 1.1. Technological classification of exports

| Classification | Examples |
|---|---|
| Primary Products | Fresh fruit, meal, rice, cocoa, tea, coffee, wood, coal, crude, petroleum, gas |
| Manufactured Products | |
| *Resource-based manufactures* | |
| Agro/forest-based products | Prepared meats/fruits, beverages, wood products, vegetable oils |
| Other resource-based products | Ore concentrates, petroleum/rubber products, cement, cut gem, glass |
| *Low-technology manufactures* | |
| Textile/fashion cluster | Textile fabrics, clothing, headgear, footwear, leather manufactures, travel goods |
| Other low technology | Pottery, simple metal parts/structures, furniture, jewelry, toys, plastic products |
| *Medium technology manufactures* | |
| Automotive products | passenger vehicles and parts, commercial vehicles, motorcycle, and motorcycle parts |
| Medium technology process industries | Synthetic fibers, chemical and paints, fertilizer, plastics, iron, pipes/tubes |
| Medium technology engineering industries | Engines, motors, industrial machinery pumps, switchgear, ships, watches |
| *High-technology manufactures* | |
| Electronics and electrical products | Office/data processing/telecommunications equip, TVs, transistors, turbines, power-generating equipment |
| Other high technology | Pharmaceuticals, aerospace, optical/measuring instruments, cameras |
| Other transactions: | Electricity, cinema film, printed matter, "special" transactions, gold, art, coins |

Source: (Lall, 2000, p. 341)

This literature also argues that the specialization on exporting goods from the primary sector increases the technological gap that exists between developing and developed countries and promotes a self-reinforcing mechanism that leads to a productivity divergence pattern (Cherif,

2013). This is due to the volatility of prices of good belonging to this sector in international markets. This volatility disincentives the growth of investment in an economy, which in the context of the current global economy, widens the technology gap between the developed and developing countries (CEPAL, 2012). Lastly, focusing on the exporting primary goods can lead to currency appreciation, which decreases the diversity of the productive structure of an economy (CEPAL, 2012). Because of these reasons, focusing on the primary sector can be detrimental to the productive structure according to the literature reviewed, and therefore the composition of skill in the labor and the ability of domestic suppliers to generate inputs for manufacturing goods decreases the DVA generated.

### 1.2 The fallacy of composition and other issues with the export-led growth strategy

Due to the success of the Asian tigers, developing countries have implemented the export-led growth strategy focusing on exporting manufactured goods as way to develop their economies. Nonetheless, according to Cline (2008), the literature that argues in favor of this strategy has not considered the negative effects that can occur from using this growth strategy. The fallacy composition, which is the concept of "adding-up constraint on the efforts of numerous developing countries to simultaneously export similar types of manufactured goods to the same industrialized country markets" (Blecker & Ramzi, 2009 p. 2), addresses the issues that arise from using this strategy. The issues pointed by the fallacy composition are three main ones which are: negative effects on prices of manufactured exports on the global market, the crowding-out or displacement of exports from developing countries by exports of other developing countries, and an increased international competition that limits export growth for other developing countries (Blecker & Ramzi, 2009).

The implementation of this growth strategy by a large number of countries results on the commoditization of manufactured goods, as the terms of trade for manufacture goods worsens when the volume increases (Sarkar & Singer,1991). The commoditization has also occurred for manufactured goods that are classified as high-tech goods (Blecker & Ramzi, 2009; Kaplinsky, 1993; Kaplinsky, 1999). The fall of prices results from weak demand that is not able to absorb the increase in supply of manufactured exports, as domestic consumers in developing countries and consumers in developed countries are unable to absorb the increase of exports (Blecker & Ramzi, 2009; Palley, 2012; Muscatelli et al., 1994; Sarkar and Singer, 1991). This is reflected on the decline in the relative price of US's imports of manufactured goods from developing countries that has occurred (Blecker & Ramzi, 2009).

Another negative aspect that the fallacy composition considers, is the decrease in prices of manufacture goods resulting from global competition, as "exports from different developing countries are strong substitutes for each other... [this] enables the developing countries with relatively lower-priced exports to succeed at the expense of others" (Blecker and Razmi, 2009, p.20). In this sense, developing countries goods are crowding out goods from other developing countries, which results in price competition. This price competition is more intensive for countries who Razmi & Blecker (2009) considers low technology, which is the case for Mexico. The measures taken to lower prices, which is the suppression of real wage and the devaluation of currencies, limits the gains from exports, and only allows for labor of low skill to be used (Kaplinsky, 1993). As countries try to become more competitive by lowering costs, the benefits will be "offset to the extent that its real exchange rate also depreciates relative to the industrialized countries at the same time" (Blecker and Razmi, 2009, p.19).

Furthermore, according to Palley 2012, there have been four stages of the export-led growth strategy. Stage I consisted of the development of "indigenous industrial base and export growth was driven by an under-valued exchange rate" (Palley, 2012, p. 147). Stage II relied on using undervalued currency and acquiring foreign technology. Stage III, which is the stage in which most of Latin America economies implemented the export-led growth strategy, is based on countries becoming trade platforms for foreign multi-nationals, instead of developing their own indigenous industrial capacity. The export-led growth strategy in stage III was based on a) integrating the country into the global economy; b) having an undervalued exchange rate and c) suppressing wages and social standards to reduce the cost of production (Palley, 2012). In this stage, economic growth stopped being a priority, and the goal was to create partnership between developing countries, multi-national corporations, and developed countries (Palley, 2012). The export-led growth strategy from stage III was focused on creating production zones in which corporations could establish export production platforms that would export back to developed markets, the developing markets would use its cheap labor to reduce the cost of production. With this structure, it is very difficult to absorb the benefits resulting from trade, which is the creation jobs and the transfer of technology.

According to Palley (2012), the export-led growth strategy has been exhausted, for various structural issues. The first issue is the growing debt of U.S. consumers, as this model depends on the consumption from developed economies, the increase of consumption of these countries, which does not occur, would justify using Foreign Direct Investment (FDI) in developing countries to increase supply of exports. Another structural issue that arises of implementing this growth strategy is the inability of developed economies to absorb all the excess of exports which creates an environment of deflation (Palley, 2002). This is a consequence of the rapid growth of exports

from emerging economies. For the export-led growth strategy to function in the actual context, there is the need for increases in income and demand to absorb the increase of exports (Palley, 2002). The final issue is the entrance of China to the global market, as this country is siphoning the Foreign Direct Investment (FDI) and demand from other emerging economies, this is especially true for Mexico (Chiquiar & Tobal, 2019; Palley, 2012).

### 1.2 Arguments in favor of domestic-led growth

The domestic-led growth strategy is based on using the domestic demand as the main engine of growth of the economy (Sağlam & Egeli, 2018). To implement this type of growth strategy it is necessary to solve the problems of income distribution, as the rising wages would expand the market, this would raise wages even higher, which would benefit the productive structure of an economy (Palley, 2002). Some benefits from implementing a domestic-led growth would be an increase of investment, which goal would be to produce and sell in the domestic country (Palley, 2002). The domestic-led growth also reduces the vulnerability against global demand shock, that could occur due to the increasing volatility and unpredictability of international markets when it cannot absorb all exports from developing countries, therefore, the domestic-led growth strategy would generate a stable and sustainable growth for the economy that implements it (Leng, 2017).

The domestic-led growth can also complement the growth of exports as Linder (1961) argues, as the domestic-led growth would shift economies away from the world market and would improve the capacity of absorption of manufactured goods of developed nations, improving the terms of trade for manufacturing goods, as the excess of manufacturing goods in the global market would decline (Palley, 2002). Furthermore, a domestic-led growth would also allow countries to

absorb a larger amount of the benefits that result from trade, as the race of bottom would also diminish (Palley, 2002). The increase in absorption would result in higher wages, which is a necessary component to have a successful domestic-led growth and improve the productive structure of an economy.

### 1.3 Final thoughts on the literature review

This chapter started by presenting literature review on the export-led strategy, this subsection focused especially on the benefits that arise from exporting manufacturing good. The evidence of the benefits is mainly based on the economic success lived by the East Asian tigers. Furthermore, this argument is supported from a theoretical perspective supporting that this growth strategy should increase the Schumpeterian efficiency in an economy, which is the main mechanism of transmission from where the benefits of implementing the export-led growth strategy are transmitted to the productive structure of an economy. The discussion on this chapter was enriched by presenting literature review on the fallacy composition, which presents some of the issues that arise when a large number of countries implement an export growth strategy during contemporary times. Some of the issues that arise from implementing an export-led growth strategy are the "comodization" of manufacturing goods from developing countries, the lack of innovation which is the result of the installation of intensive labor process in developing countries and others. Lastly, it is possible that the implementation a domestic-led growth strategy, can solve some of the issues of the export-led growth strategy presented by the fallacy composition, showing that a mixture of both strategies can result in a more effective growth strategy.

## Chapter 2. Mexico's and Brazil's growth strategies

This chapter will analyze the different development strategies that Mexico and Brazil have respectively implemented and the impact these strategies have had in their productive structure, mainly in the skill composition of the labor force and the DVA generated. The strategies used by each country are very different, so studying them serves to highlight the contrasting nature of the strategies (an export-led growth strategy for Mexico *vs* a domestic-led growth strategy which is complemented by the exporting sector for Brazil), and thus it will shed light on how these strategies impact the growth of DVA as well as the skill composition of the labor force in the different sectors of their respective economies.

Subsection **2.1** introduces the characteristics of the Mexico's export-led growth strategy, as well as the impact that this strategy has had on the economic growth during 1994-2011. Then the chapter proceeds to analyze how this strategy affected the channels of transmission that have been constraining the growth of DVA and the labor force skill composition of the overall economy. The two main channels explored are the imported inputs involved in production processes which lowers the DVA generated by exports and the high demand of low skill labor that the production processes of the exporting sector have. Furthermore, it will be explored how the negative impacts of these channels are intensified by the international competition faced by Mexico.

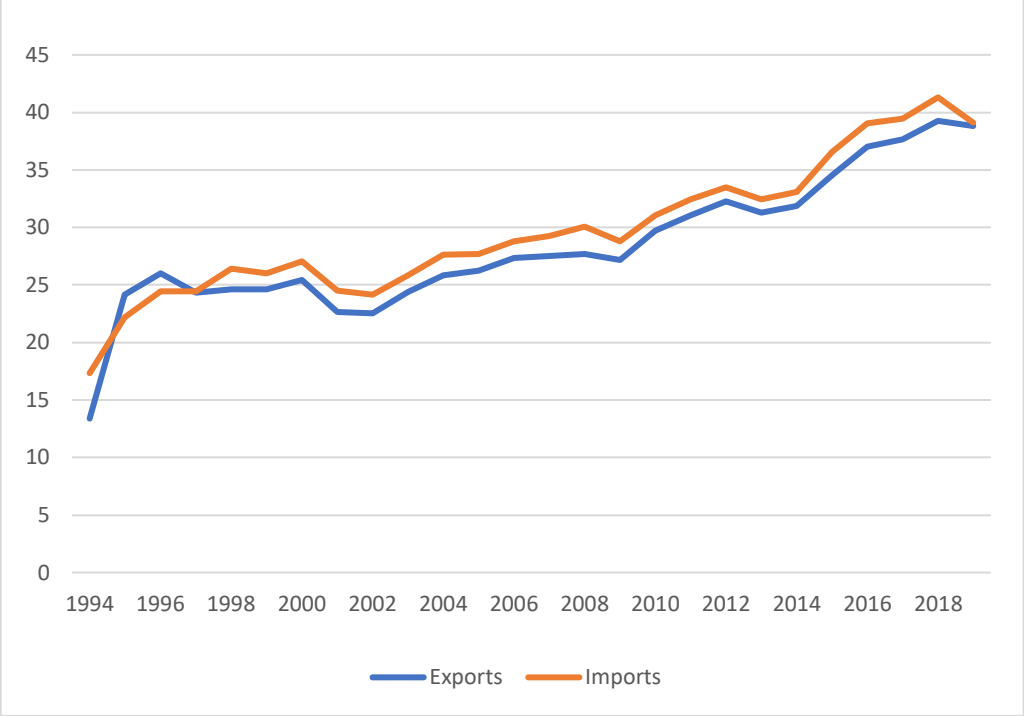
The subsection **2.2** reviews how much of the Brazilian economy depends on the exporting sector, its composition, and its effect on the growth of DVA and high skill absorption. Then the subsection will analyze the characteristics of domestic-led growth strategy and the impact of this strategy that has had on the growth of DVA and the skill demand.

## 2.1 The effect of Mexico's export-led growth strategy on DVA growth and labor force skill demand

Studying the changes in the productive structure of Mexico, reflected on the labor composition and the changes in the DVA content in exports of its economy during 1994-2011, serves to explore the impact that the export-led growth strategy has had on the Mexican economy during the implementation of the export-led growth strategy during stage III of globalization (Palley, 2012, p.148). Recall that stage III is characterized by turning countries into production platforms for foreign multinationals companies (MNCs) to produce exports, instead of developing industrial capacity within the country.

Figure 2.1 details the major growth that Mexican exports and imports, as percentage of GDP, have had since entering NAFTA. Exports went from representing 13% of GDP in 1994 to 39% in 2019, meanwhile imports shifted from representing 17% of GDP in 1994 to 39% in 2019 according to data from the World Bank. Even though this strategy was implemented successfully, as the policies used to complement the growth strategy resulted in a strong growth rate for exports, it has not helped the economy to develop, as Mexico's GDP growth did not reached the levels needed to create better jobs, increase the real wage and, ultimately, improve the living standard, as the economy needed to grow at a rate of 6% per year, according to Blecker (2006), to achieve these improvements. Other benefits that a higher growth could achieve would be increases in the level of sophistication of domestic inputs, a higher demand for workers with high skills and increase the levels of DVA.

Figure 2.1 Mexico's exports and imports of goods and services
(% of GDP)




Source: World Bank (worldbank.org)

Mexico's implementation of the export-led growth strategy has been highly focused on exporting manufactured goods, as these goods "accounted for more than 50 percent of the country's total exports by 1988, and in 2004 their share exceeded 85 percent" (Lorde, 2011, p. 35). The export matrix has been highly focused on producing manufacturing goods with high technology, as of all the manufacturing goods exported in 2009, 31% of them were classified as high technologic goods (Fujii & Cervantes, 2013). Nonetheless, the implementation of the export-led growth strategy and the changes in the composition of the export matrix have not yield the results that the conventional economic theory predicted in the productive structure of country. Mexico's economic outcome can be better described using the fallacy composition theory and not conventional economic theory.

The lack of economic growth, after the successful implementation of the export-led growth strategy is the result of the disconnection between the exporting sector and the rest of the economy. Even though the exporting sector has grown at a rate of 14% during the period of 1994-2008 (Fujii & Cervantes, 2013), the growth in the export sector has not spillover to the rest of the economy which is due to the high quantity of imported inputs used in exports. Mexico's production of manufactured goods depends on the use of imported inputs as 70% of manufactured exports "are produced through assembly processes involving imported inputs that enter the country under preferential tax schemes" (Moreno-Brid, Rivas & Santamaría, 2005, p. 22).

One of the reasons that could explain the increase of the share of import in the composition of the Mexican GDP can be the dependance that exports have on imported inputs. The dependance of exports on imported inputs can also explain why the growth in the exporting sector has not spillover to the overall economy. The growth of the exporting sector does not benefit the domestic market, as the imported inputs used in the exporting sector eliminates the benefits that could result from this growth such as increases in employment and increases in real wages as well as the DVA in exports (Ruiz-Nápoles, 2004; Cervantes, 2008). This results in backward linkages that "are weak to non-existent, resulting in small employment gains from apparently large volumes of exports" (Blecker, 2006, p. 3).

The implementation of Mexico's growth strategy contrasts strongly with the one used by the Asian tigers, as the high dependance that the production of manufactured exports has on imported inputs has resulted in a stagnant growth of DVA (Blecker, 2006). The stagnation of DVA has occurred on a period in which the value of manufacture exports has been growing, which did not occur during the development of the Asian tigers (Blecker, 2006). Considering that this strategy attempts to replicate the successful development of the Asian tigers, the stagnation of

value added should be a major concern for Mexico. The lack of growth of value added in the exporting sector is due to the use of imported inputs which offsets the value generated by manufacture exports, for example, in the maquiladora sector, three-quarters of the value generated is erased by the importation of inputs (Blecker, 2006). Mexico's export-led growth strategy has generated weak linkages with the domestic market which have constrained economic growth as well as the generation of DVA in the exporting sector.

Another negative aspect of Mexico's export-led growth strategy is the lack of growth of the Schumpeterian efficiency, as sophisticated inputs were not developed in Mexico but imported. Between 1993 and 2017 the number of production stages processes that the imported manufacturing goods have been subject to have been higher than the number of production stages that exported manufacturing goods are subject to in Mexico (Chiquiar & Tobal, 2019). This means that imported inputs by Mexico are more processed than the manufactured goods being exported by Mexico, and that the sophisticated imported inputs haven not been substituted by domestic inputs, as the difference in the number of processes between imported and exported manufactured goods has remained stable throughout 1993-2017 (Chiquiar & Tobal, 2019).

The Mexican export-led growth strategy has also limited the growth of high skill workers in the labor force. The employment created in Mexico during the time that the export-led growth strategy has been implemented has been in non-traded sectors, the informal market, and in sectors that only require low skill workers, like the maquiladora sector (Polaski 2003; Salas & Zepeda, 2003; Ruiz-Nápoles, 2004). The export-led growth strategy has had a negative impact on the productive structure of the economy by generating a high demand of low skill labor, as Mexico's type of insertion into the Global Value Chain (GVC), is highly focused on production processes that uses low skill labor. This is shown by fact that the "Mexican manufacturing exports were

persistently less human capital intensive than Mexican manufacturing imports" (Chiquiar & Tobal, 2019, p. 29) during 1994-2017. The imports of sophisticated goods impact the generation of high skills working by constraining the demand for this type of worker, as the goods that need high skill labor are produced outside the country and the production processes that take place in Mexico use mostly low skill labor. To improve its competitiveness, Mexico's export-led growth strategy has been reducing the incentives for the overall labor force to improve their skills, as there has been a negative relation between wages and skills since Mexico entered NAFTA. The "skill premia decreased after the Mexican crisis of 1995, and this can be attributed both to NAFTA and to supply shocks" (Montes-Rojas, 2006, p. 923). This is because "NAFTA is especially pro-unskilled… trade openness with the USA may have caused a demand shift towards low-skilled workers" (Montes-Rojas, 2006, p. 923). The negative relation between the export-led growth strategy and the skill absorption of sectors is due to the low levels of skills required to achieve the tasks which "does not necessarily increase returns to education or the overall demand for education" (Brun, Helper & Levine, 2011, p. 31).

Moreover, Mexico's specialization in low skill labor in the exporting sector impacts the skill attainment of younger generations. As the new jobs opening in the exporting sector hire unskilled workers and pays them higher wages than the average wage of the region, these new jobs incentive students to drop out of school to take these new jobs, which not required high levels of education. This is especially true for the maquiladora sector, which mainly use unskilled workers, as 80 percent of employees that worker in this sector during the year 2000 had less than a high school degree (Atkins, 2012). Because of these, the expansion of the maquiladora sector incentivized students to drop out of school. In this sense the creation of jobs in the exporting sector has had an overall negative impact on the education attainment of the Mexican population, as "for

every twenty new jobs that arrived, one student dropped out of school at grade 9 rather than continuing on through grade 12" (Atkin, 2012, p.2). The relation between the exporting jobs and the decrease of education attainment also holds for older cohorts, as the "Net new job arrivals in export industries reduced schooling by an average of 0.012 years for the cohorts aged 16-28 in the year 2000 … This reduction in schooling would be the result of 58,169 students forgoing exactly three-year education" (Atkin, 2012, p.21).

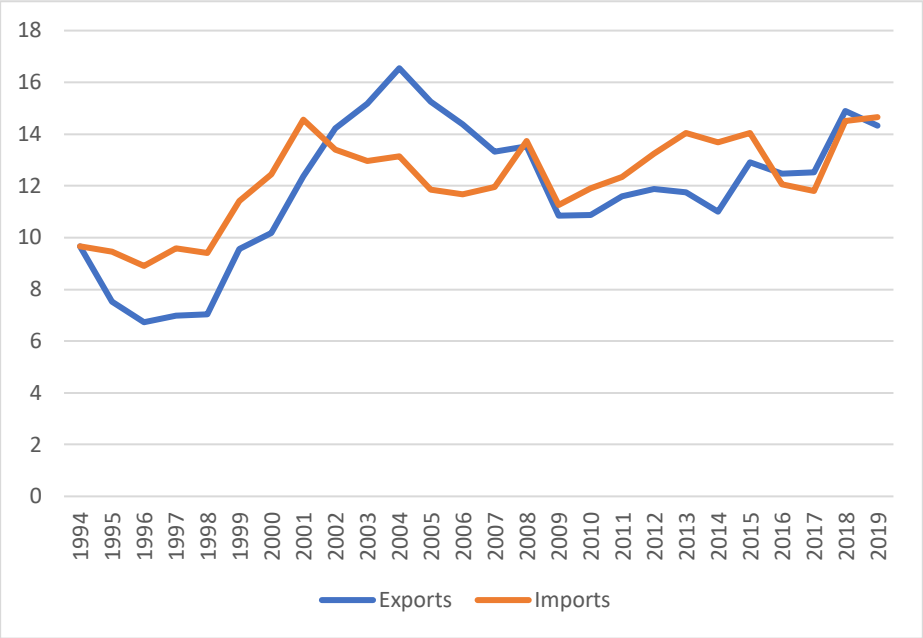
Finally, the international competition has decreased the opportunities to improve the skill absorption of the exporting sector. There has been a decrease in the human capital intensity in the goods that Mexico exports after China entered de World Trade Organization (Chiquiar & Tobal, 2019, p. 29). This might suggest that China has been able to absorb the labor-intensive jobs that use low skill labor better than Mexico, as China has been able to develop its productive structure enough to absorb high skills jobs from other countries. Therefore, Mexico does not only face competition from developing countries with low wages for labor intensive processes but also faces higher competition from economies that are able to improve their skill absorption in their productivity structure.

### 2.2 The impact of Brazil's growth strategy on DVA growth and high skill absorption

Brazil's growth strategy is focused on the expansion of the domestic market as the growth that occurred between 1994-2019 was mainly driven by the domestic market. During this period the range of imports was between 9-14% of GDP, and exports only composed between 6%-16% of the GDP (see figure 2.2). Brazil's exports are mainly composed by minerals (25.2%), foodstuffs (13.8%), vegetables (12.3%) and 51.3% of Brazil exports are considered commodities, this trend has become stronger due to the boom in prices of commodities (Jenkins, 2012; Canuto, Cavallari

& Reis, 2013). Even with this economic structure, Brazil has been able to absorb the benefits from the growth of its exporting sector, as Brazil's exports have "a very high share of domestic value added" (Canuto, Fleischhaker & Schellekens, 2015, p. 9). Brazil's DVA is the highest among the so-called BRICS (Brazil, Russia, India, China and South Africa) countries (Ferraz, Gutierre & Cabral, 2015), and "the economies covered by the OECD-WTO Trade in Value Added database" (Canuto, Fleischhaker & Schellekens, 2015, p. 9). The high DVA is a result of the export matrix composition, as commodities usually are located at the beginning of the GVC production processes, the export of these goods do not allow the use of imported inputs, which would reduce the DVA (Callegari, Melo & Carvalho, 2018). Furthermore, the low dependance of imported inputs also applies to Brazil's manufacture exports, as 93% of the value generated by manufacture exports stayed within the country during 2015 (Callegari, Melo & Carvalho, 2018). Due to the reduced need of imported inputs, the structure of the Brazilian economy has improved its productive structure, especially on the creation of DVA and the composition of the skilled labor.

Figure 2.2 Brazil's Exports and Imports of goods and services
(% of GDP)




Source: World Bank (worldbank.org)

Without being highly focused in exports, relative to the size of the Brazilian economy, and having an export matrix with a low content of manufacturing goods, the country's economy has been able to generate high levels of value added (Canuto, Fleischhaker & Schellekens, 2015, p. 9). This allows Brazil to absorb the benefits generated by Brazilian firms and the growth of its economy. Moreover, even with a relative closed economy, the Brazilian firms that engage in international trade are "able to compete via innovation, product differentiation and emerging brands. These firms have a strong presence on foreign markets and receive premium prices for their products" (Araujo, Bogliacino & Vivarelli, 2009, p.8) which stimulate the demand of high skill labors, as they compete by increasing the sophistication of their final goods. This is because "most of the rise in skilled employment occurred within firms" (Giovannetti, Menezes-Filho, Tovar & Manzano, 2006, p.15), which suggests that the improvement of skill in Brazil is more

linked to the way a firm competes in the international market and is not linked to technologic content of a certain sector. Because of this, the growth of exports has been helping the productive structure of the economy by promoting the growth of DVA, and at the same time stimulates the skill of the overall labor force. Therefore, the exporting sector has been complementing the main engine of economic growth which has been the domestic market. This analysis is useful, as it shows that it is possible to have an exporting sector with high DVA content and stimulate the high skill of the labor force, without focusing on manufactured goods.

Furthermore, the increase in imported inputs has a positive effect on the high skills absorption of the Brazilian economy, this serves as evidence that that imports can have a positive impact on the productive structure of the economy. Araujo, Bogliacino & Vivarelli, (2011) have found that the reduction of tariffs has increased the amount of high skill labor demanded. This is because the Brazilian economy absorbs the transfers of technology from richer countries when they import inputs (Araujo, Bogliacino & Vivarelli, 2011). The industries that import within industry inputs increase the demand for higher skill, which suggest that the inputs are not used in intensive labor processes. It is because of this, that in the case of the Brazilian economy the "imported capital goods clearly act as a skill-enhancing component of trade." (Araujo, Bogliacino & Vivarelli, 2011, p.168).

Nonetheless, Brazil has used the domestic market as its main engine of economic growth, which is especially true for the period between 2004-2010, as the annual household consumption grew on average 5.3% per year (Serrano & Summa, 2015). During this period, the domestic growth was aided by policies that increased the purchasing power of the Brazilian population, implemented by the federal government. Some of the benefits that resulted from the growth in the domestic consumption are similar to those benefits that supporters of the export-led growth

strategy argue that would occur. This increased employment, as the unemployment went from 12% in 2002 to 5% in 2014 (Serrano & Summa, 2015). There was dislocation of workers that occurred when younger workers entered the sectors of "manufacturing and retail, while older workers are more likely to enter the agriculture and construction sectors" (Silva, Almeida & Strokova, 2015, p.31), this movement was impulse by the increments in real wages, especially the real minimum wage (Serrano & Summa, 2015). Also, the increase in employment was accompanied by an increase in the skills of the labor force as "The average educational level of the labor force rose by more than 50 percent between 1995 and 2010, driven by the rapid expansion of secondary education" (Silva, Almeida & Strokova, 2015p. 33). This might be because the manufacturing jobs install in Brazil demand a higher level of education, which incentivized young generations to stay in school to obtain these jobs. In this sense the domestic-led growth was able to replicate some of the benefits that the export-led growth strategy desired to achieve without being expose to international competition and lowering wages to attract FDI from MNCs to install labor intensive production processes.

### 2.3 Conclusions of Mexico's and Brazil's growth strategy implementation

Mexico has implemented the export-led growth strategy, which has been mainly focused on exporting manufacturing goods. The implementation of the strategy has resulted in an increase of imports, as the Mexican economy is not able to domestically produce the inputs used in their manufacturing exports. Also, the inability to generate the inputs for exports has lowers the DVA generated by the Mexican exports, as the exporting industries does not have strong connections to the domestic market. Furthermore, in order to implement this strategy, there was the need to lower working conditions which made even more difficult for the economy to absorb the gains from exporting goods, as the workers involve in these industries had less income to spend in the

domestic market. Another negative impact that this strategy has had on Mexico's productive structure is the impact that this strategy has had on the skill development of the labor market of the economy, as the production process that are installed for producing exports are labor intensive and absorb low skill labor, which ends up promoting the generation of low skill labor.

On the other hand, Brazil has engaged in more balanced growth strategy, this strategy has been highly focused on growing from a domestic perspective. The benefits of implementing this growth strategy, has provided some of the benefits that the supporters of the export-led growth strategy claim would bring the economy if the export-led growth strategy would bring if implemented. At the same time the Brazilian economy implemented an exporting industry which has been mainly focused on exporting commodities which has resulted in generating high levels of DVA and has been able to increase the technology from inputs that are imported with higher technological content in inputs that within industry, this has increased the high skill labor demand. In this sense it seems that the Brazilian economy has benefited from implementing a more balance growth strategy than in the case of Mexico.

## Chapter 3. Methodology and results

As mentioned, this thesis analyzes the impact that exports and the domestic final demand have on the productive structure of the overall employment, which can be measured as the generation of employment for the different type of skills (low, middle, and high skills), as well as the overall employment in the economy of Mexico and Brazil. Furthermore, this thesis also analyzes how the value of exports are constructed, measuring how much of the value generated of exports in the different sectorial classifications is DVA. The measurement of DVA can show the levels of productivity that a country has and how the country competes in the international market with its insertion in the GVC. To accomplish these goals, in this chapter we use two different methodologies which are based on the Leontief's input-output matrix methodology.

Leontief's (1936) input-output matrix methodology consists of a system of linear equations which describes the industry production that takes place in the economic system. It is assumed that there are $s$ sectors in the economy, these $s$ sectors, have a total output of production which is denoted by $x_i$, where $i$ refers to the production of sector $i$. The total output of production of the different sectors in the economy is equal to the sum of the final demand of each of the sectors in the economy, denoted by $f_i$, and the intermediate inputs involved in producing final goods, denoted by $z_{ij}$, where $i$ refers to the sales of sector $i$ to sector $j$. This linear system of equation can be represented using the following equation (1):

$$\boldsymbol{x} = \boldsymbol{Z_i} + \boldsymbol{f} \qquad (1)$$

And

$$\boldsymbol{x} = \begin{bmatrix} x_1 \\ \vdots \\ x_s \end{bmatrix}, \qquad \boldsymbol{Z} = \begin{bmatrix} z_{11} & \cdots & z_{1s} \\ \vdots & \ddots & \vdots \\ z_{s1} & \cdots & z_{ss} \end{bmatrix}, \qquad \boldsymbol{f} = \begin{bmatrix} f_1 \\ \vdots \\ f_s \end{bmatrix}$$

In this equation, $\boldsymbol{x}$ is a column vector which contains the total production for the $s$ sectors of the economy, the matrix $\boldsymbol{Z}$ captures the intermediate sales between sectors and the column vector $\boldsymbol{f}$ represents the vector of final demand of each of the sectors in the economy.

Part **3.1** of this section shows the methodology required to measure the impact of the domestic final demand and exports on the generation of jobs and sections **3.2, 3.3**, **3.4, 3.5,** analyze the results from the exercises made to measure the impact that the domestic final demand and exports have had on the overall employment and the different type of skill in the different sectors in the Mexican and Brazilian economies. Meanwhile, section **3.6** shows the methodology required to measure the DVA generated by each sector of the economy and subsections **3.7,** and **3.8** analyze the results from implementing the methodology described in the exercises for the different exporting sector applied to the Mexican and Brazilian economies.

### 3.1 Methodology to analyze the impact of final demand on the generation of employment

To measure the impact that the final demand has had on the growth of employment and its composition, categorized by skills, in the different sectorial classifications defined by Lall's (2000), we use the methodology developed by Los, et. al, (2014). This methodology extends the approach adopted by Johnson & Noguera (2012), as well as the World Input-Output Database (WOID) matrix. The sectorial classification of the different sectors from the WOID have been decided by the authors to be classified by technology content and the classification of Lall, 2000, and it is shown in table 3.1.

Table 3.1 Sectorial classification by technological content

| Primary Products |
|---|
| Agriculture, Hunting, Forestry and Fishing |
| Mining and Quarrying |
| Other Non-Metallic Mineral |
| Resource-based manufactures |
| Food, Beverages and Tobacco |
| Wood and of Wood and Cork |
| Pulp, Paper, Printing and Publishing |
| Coke, Refined Petroleum and Nuclear Fuel |
| Basic Metals and Fabricated Metal |
| Low-technology manufactures |
| Textiles and Textile |
| Leather, Leather and Footwear |
| Construction |
| Medium-technology manufactures |
| Chemicals and Chemical |
| Rubber and Plastics |
| Machinery |
| Transport Equipment |
| Manufacturing; Recycling |
| Other Inland Transport |
| Other Water Transport |
| High-technology manufactures |
| Electrical and Optical Equipment |
| Other Air Transport |
| Post and Telecommunications |
| Financial Intermediation |
| Services |
| Electricity, Gas and Water Supply |
| Sale, Maintenance and Repair of Motor Vehicles and Motorcycles; Retail Sale of Fuel |
| Wholesale Trade and Commission Trade, Except of Motor Vehicles and Motorcycles |
| Retail Trade, Except of Motor Vehicles and Motorcycles; Repair of Household Goods |
| Hotels and Restaurants |
| Other Supporting and Auxiliary Transport Activities; Activities of Travel Agencies |
| Real Estate Activities |
| Renting of Machinery & Equipment and Other Business Activities |
| Public Administration and Defense; Compulsory Social Security |

| |
|---|
| Education |
| Health and Social Work |
| Other Community, Social and Personal Services |
| Private Households with Employed Persons |

Source: Own elaboration based on Lall's (2000) classification

The methodology developed by Los *et. al*, (2014) uses an input-output model which assumes that to produce final goods, sectors need to use labor, capital, and intermediate inputs. The creation of intermediate inputs also needs the use of labor, capital, and other intermediate inputs. Therefore, this approach considers all the intermediate inputs used to reproduce the economic system. The Leontief's mathematical model allows to trace all the factors that go into the production of a final good and provides an ex-post accounting of the value for the final demand, domestic and exports, of an economy.

The model starts by assuming that there are $N$ countries and $S$ industries in each country. The production factors, as well as intermediate inputs, can be produced either in the domestic country or be imported. The final goods can be used to satisfy the final demand or used as intermediate inputs. The current input-out tables can track the shipment within and across countries, therefore, these matrices can define the source and destination of countries and industries, which serves to measure the impact that exports and the domestic final demand have in the contribution and composition of employment in a country. Also, the model assumes that each product has only one price, because of this, revenue for the producer equals the value of use across the global value chain. Using these assumptions allows the market clearing condition to be described by the following equation (2):

$$x_i(s) = \sum_j f_{ij}(s) + \sum_j \sum_t z_{ij}(s,t) \qquad (2)$$

Where $x_i(s)$ is the value of output in industry $s$ of country $i$, $f_{ij}(s)$ is the value of product sold by industry $i$ for final consumption in country $j$, and $z_{ij}\ (s,t)$ is the value of products sold by industry $i$ for intermediate use by industry $t$ in country $j$. When the products are used in the domestic market, then $i = j$, when the goods are used in the international market, then $i \neq j$. It is important to note that even though the exercise uses annual data, the time subscripts are ignored to ease the exposition.

The condition when the markets clear for each of the $SN$ products can be combined into a global input-output system. Where $\boldsymbol{x}$ is the output vector of dimension ($SN$ x 1), and the individual elements of this vector represents the output levels of every country-industry. The global input-output matrix of coefficients, denoted as matrix **A**, has a dimension of $SN * SN$, and the elements of this matrix are calculated using the following equation, where $a_{ij}$ the induvial elements of matrix **A**:

$$a_{ij}(s,t) = \frac{z_{ij}(s,t)}{x_j(t)} \qquad (3)$$

The input coefficients give a cost share of output from industry $s$ in country $i$ used by industry $t$ in country $j$. The matrix **A** can described as:

$$A \equiv \begin{pmatrix} a_{11} & \cdots & a_{1N} \\ \vdots & \ddots & \vdots \\ a_{S1} & \cdots & a_{SN} \end{pmatrix}$$

The sub-matrices found in the diagonal contain the $\boldsymbol{A}$ matrices for domestic produced intermediate inputs of each country, meanwhile, the off-diagonal sub-matrices contain the cost shares of foreign intermediate inputs. The matrix $\boldsymbol{A}$ thus summarize the input requirement that are

necessary to produce all the goods of all industries and countries. Because of this it is possible to write the economic system using the equation (4):

$$\begin{bmatrix} \boldsymbol{x_1} \\ \vdots \\ \boldsymbol{x_N} \end{bmatrix} \equiv \begin{bmatrix} \boldsymbol{A_{11}} & \cdots & \boldsymbol{A_{1N}} \\ \vdots & \ddots & \vdots \\ \boldsymbol{A_{N1}} & \cdots & \boldsymbol{A_{NN}} \end{bmatrix} \begin{bmatrix} \boldsymbol{x_1} \\ \vdots \\ \boldsymbol{x_N} \end{bmatrix} + \begin{bmatrix} \sum_j f_{1j} \\ \vdots \\ \sum_j f_{Nj} \end{bmatrix} \qquad (4)$$

In the equation (4), $\boldsymbol{x}_i$ shows the production levels of country $i$, and $\boldsymbol{f}_{ij}$ shows the final demand in country $j$ for products of country $i$. The equation in a compacted manner can be described by equation (5):

$$\boldsymbol{x} = \boldsymbol{A}\boldsymbol{x} + \boldsymbol{f} \qquad (5)$$

This equation can be arranged to get the Leontief equation:

$$\boldsymbol{x} = (\boldsymbol{I} - \boldsymbol{A})^{-1}\boldsymbol{f} \qquad (6)$$

where $\boldsymbol{I}$ is an $(SN\ x\ SN)$ identity matrix with ones in the diagonal and zeros on the non-diagonals. The $(\boldsymbol{I} - \boldsymbol{A})^{-1}$ is the Leontief inverse, which will be denotated as $\boldsymbol{B}$, and equation (6) represents the gross output values in all the stages of production generated in the production process of one unit of final output.

To link the final demand to the overall employment creation, and the creation of employment with different skills, this model needs to be modified. Let the quantity of output in an

industry be a function of the quantities of labor, capital and intermediate inputs used. Then the value of output of any industry is equal to the value of all inputs used, which is expressed in monetary terms (dollars). It is also necessary to introduce the term $l_i(s)$ which denotes the number of workers industry $i$ in country $s$, as well as the variable $p_i(s)$, which is the number of workers required per dollar output in industry $s$ in country $i$. To calculate $p_i(s)$ the equation (7) is used:

$$\boldsymbol{p_i(s) = l_i(s)/x_i(s)} \qquad (\mathbf{7})$$

Equation (7) creates a column vector $\boldsymbol{p}$ of dimension of SN x 1. The coefficients in the vector $\boldsymbol{p}$ indicates the labor per dollar of output needed in the production stage, which are country-industry specific. With $\boldsymbol{p}$, it is possible to define the $\boldsymbol{k}$ vector, which indicates labor needed to replicate the linear system of equation of an economy. To derive this vector, which shows the labor inducement from the total final demand, of dimension SN, the equation (8) is used:

$$\boldsymbol{k = \hat{p}Bf} \qquad (8)$$

where $\hat{\boldsymbol{p}}$ is diagonal matrix with the elements of the vector $\boldsymbol{p}$ on the main diagonal of the square matrix. The vector $\boldsymbol{k}$ shows the labor (directly and indirectly) needed to produce the specific final demand vector that is analyzed. For example, if the final demand for the products sold by the Mexican or Brazilian textile industries are analyzed then, $\boldsymbol{k}$ represents the labor required in each country-industry in the world to meet this demand. This includes the labor used in the country textile industry itself that is being analyzed, and upstream industries which produce intermediate goods and services required to create textiles.

To be able to analyze how exports and the domestic final demand affects employment, it is necessary to divide final demand into exports ($\boldsymbol{f}_i^{FOR}$) and domestic final demand ($\boldsymbol{f}_i^{DOM}$) into vectors with dimensions of $SN$, as equation (9) shows:

$$\begin{bmatrix} \sum_{j \neq i} \boldsymbol{f}_{1j} \\ \vdots \\ \sum_{j \neq i} \boldsymbol{f}_{Nj} \end{bmatrix} = \boldsymbol{f}_i^{FOR} \quad \begin{bmatrix} \boldsymbol{f}_{1i} \\ \vdots \\ \boldsymbol{f}_{Ni} \end{bmatrix} = \boldsymbol{f}_i^{DOM} \qquad (9)$$

This implies that $\boldsymbol{f}_i^{DOM} + \boldsymbol{f}_i^{FOR} = \boldsymbol{f}$. If equation (9) is substituted into equation (8), then it is possible to decompose the impact that the different types of final demand have on the generation of employment as equation (10) shows:

$$\boldsymbol{k} = (\widehat{\boldsymbol{p}})(\boldsymbol{I} - \boldsymbol{A})^{-1}\boldsymbol{f}_i^{DOM} + (\widehat{\boldsymbol{p}})(\boldsymbol{I} - \boldsymbol{A})^{-1}\boldsymbol{f}_i^{FOR} = \boldsymbol{k}^{FOR} + \boldsymbol{k}^{DOM} \qquad (\mathbf{10})$$

Equation (10) decomposes the labor used in each country industry that is induced by the final demand of the domestic market of the countries analyzed $\boldsymbol{k}^{DOM}$ and induced by the demand from the international market $\boldsymbol{k}^{FOM}$.

To measure changes in skills, this thesis splits the labor force in each industry or sector, into low-educated, medium-educated, and high-educated, ratios for each year analyzed provided by the WIOD database. The changes in these ratios will show what sectors and what type of final demand are the ones that contribute the most to increase the absorption of high, middle, and low skill labor.

### 3.2 Mexico's final domestic demand impact on the inducement for general labor market and its different skills

This subsection analyzes Mexico's changes in employment induced by the domestic final demand and exports during 1995-2009. Using the methodology developed by Los, et. al, (2014), and using the data of WOID an exercise was conducted to measure the labor and type of skill labor that the domestic final demand and exports have induced on the employment of different sectorial classifications. This thesis uses the word induction, referring as how the fluctuation in the final demand can impact the number of jobs as the methodology allows to calculate how many workers are necessary to produce a specific amount of dollars in a given economy. Using this methodology, it is possible to see that in Mexico the domestic final demand has been the main engine for the induction of jobs for the overall labor market, as 91% of the overall jobs were induced by the final domestic demand, and for all the type of skill labor. The domestic final demand also is a stable tool to generate jobs constantly, as the change between the jobs generated from the previous the year has been positive, in this sense the final demand has been able to increase the jobs number between years for all the years analyzed for the overall labor force and the labor force of all the type of skills, with the exception of 2008, and jobs that employ low skill labor. The final domestic demand has done most of the labor induction using 5 individual sectors, which have induced 56% of all total jobs induced during this period. These 5 sectors are the 1) construction sector, 2) the renting of machinery & equipment sector, 3) the retail trade sector, 4) the private households with employed persons sector, 5) and the education sector. Most of these individual sectors are classified in the sectorial service classification, which would also help to explain why the service sectorial classification is the main engine for the generation of employment of the Mexican economy.

Table 3.2.1

| Change in number of jobs generated as a result of changes of the final domestic demand (millions) in Mexico | | | | | | | |
|---|---|---|---|---|---|---|---|
| | P | Pm | LT | MT | HT | S | Total |
| 1995 | 54 | 40 | 318 | 162 | 76 | 278 | 928 |
| 1996 | -399 | 15 | 305 | 179 | 84 | 501 | 686 |
| 1997 | 87 | 36 | 95 | 120 | 46 | 624 | 1009 |
| 1998 | 7 | 56 | 124 | 109 | 42 | 832 | 1169 |
| 1999 | -135 | 31 | 184 | 148 | 56 | 786 | 1070 |
| 2000 | 256 | 2 | -97 | -8 | -70 | 811 | 893 |
| 2001 | 144 | 18 | 82 | -4 | -47 | 776 | 970 |
| 2002 | 180 | 1 | 82 | -27 | -41 | 414 | 609 |
| 2003 | 133 | 99 | -23 | 106 | 165 | 1010 | 1490 |
| 2004 | -373 | -60 | 819 | -9 | 36 | 450 | 863 |
| 2005 | -90 | 38 | 433 | 111 | 77 | 828 | 1397 |
| 2006 | -229 | 13 | 234 | -48 | 34 | 814 | 818 |
| 2007 | 708 | 185 | 622 | 131 | 42 | 1819 | 3508 |
| 2008 | -162 | -32 | -388 | -361 | -13 | 16 | -941 |
| 1995-09 | 180 | 441 | 2791 | 608 | 487 | 9960 | 14468 |
| Percentages total change 1995-2009 | 1.10% | 2.80% | 17.50% | 3.80% | 3.10% | 62.50% | 90.80% |

Sources: Own elaboration using WOID's data
Note: "P" stands for primary sectors, "PM" stands for Resource-based manufactures, "LT" stands for Low-technology manufactures, "MT" stands for Medium-technology manufactures, "HT" stands for High-technology manufactures and "S" stands for Services

The induction of high skill jobs via the domestic final demand in Mexico is done mostly by the following sectors: 1) the education sector, 2) the renting of machinery & equipment and other business activities sector, 3) the health and social work sector, 4) the retail trade sector, and 5) the inland transport sector. The aggregate of these 5 sectors induced 81% of all these jobs during the period analyzed. In this sense, the generation of high skill jobs in Mexico is very concentrated and in order to stimulate the induction of this type of skill it is necessary to target the expansion of the domestic final demand of these individual sectors. In the case that a specific sectorial classification had to be chosen to induce high skill jobs, then it would have to be services as it induced 91% of all high skill jobs during this period, and by stimulating this sectorial classification as a whole it would also stimulate the 4 top individual sectors that generate high skill jobs. On the

other hand, the final domestic demand of sectors that are classified as manufactures with high technology, which in theory could create better jobs and improve the production of high skill jobs, have only generated 6% of all high skill jobs during this period, suggesting that the production processes in Mexico of these sectors do not use high skill labor, and therefore the technologic content of the final good is not related to the type of skill they use. In fact, this is the same for manufactures that has a medium technological content, as it only induced 7% of all high skill jobs during this period. Finally, the other sectorial classifications had either negative numbers or only 1% of positive job creation.

Table 3.2.2

| Change in number of high skill jobs generated as a result of changes of the final domestic demand (millions) in Mexico | | | | | | | |
|---|---|---|---|---|---|---|---|
| | P | Pm | LT | MT | HT | S | Total |
| 1995 | -11 | 14 | 67 | 42 | 17 | 10 | 139 |
| 1996 | -15 | -4 | 91 | 27 | 18 | 72 | 189 |
| 1997 | 12 | 9 | 68 | 16 | 14 | 120 | 237 |
| 1998 | -1 | 8 | 33 | 27 | 10 | 165 | 242 |
| 1999 | -7 | 1 | 20 | 37 | 11 | 128 | 189 |
| 2000 | 15 | -10 | -26 | 1 | -13 | 149 | 116 |
| 2001 | 4 | 0 | 29 | 0 | -5 | 131 | 159 |
| 2002 | 1 | -1 | 30 | -10 | -14 | 70 | 76 |
| 2003 | 19 | 11 | -9 | 3 | 22 | 234 | 280 |
| 2004 | -9 | -18 | 197 | 1 | 9 | -180 | 0 |
| 2005 | -29 | 9 | -774 | 39 | 24 | 235 | -496 |
| 2006 | 4 | -4 | 34 | -23 | 5 | 159 | 174 |
| 2007 | 21 | 28 | 45 | 22 | 16 | 370 | 502 |
| 2008 | -23 | -27 | -39 | -53 | 7 | 91 | -44 |
| 1995-09 | -22 | 15 | -235 | 129 | 121 | 1755 | 1763 |
| Percentages total change 1995-2009 | -1% | 1% | -12% | 7% | 6% | 91% | 91% |

Sources: Own elaboration using WOID's data
Note: "P" stands for primary sectors, "PM" stands for Resource-based manufactures, "LT" stands for Low-technology manufactures, "MT" stands for Medium-technology manufactures, "HT" stands for High-technology manufactures and "S" stands for Services

The domestic final demand induced 91% of all middle skill jobs during this period. The most important sectorial classifications for the inducement of these jobs via the final domestic demand were the low-tech sector, which induced 24% of middle skill jobs, and services, inducing

49% of this type jobs during the period analyzed suggesting that for the generation of middle skill of jobs in Mexico. For this type of skill, the technological content is not a good proxy to know what type of skill a sectorial classification use, as for Mexico, the main sectors for the induction of middle skill jobs are heterogenous technologic content wise, suggesting that the production processes of this sectorial classification are more advance than the ones consider in the global market, and services. The most important individual sectors for the induction of middle skill jobs via the final domestic demand were the 1) the construction sector, 2) the retail trade sector, 3) the renting of machinery & equipment and other business activities sector, 4) the agriculture, hunting, forestry, and fishing sector, and the 5) hotels and restaurants sector. The final domestic demand of these 5 sectors induced 56% of all middle skill jobs created during this period, and their sectorial classification are services, low technological content, and primary sectors, suggesting that the production processes of these sectors are more advance than the sectorial technologic content would suggest in Mexico, the inducement of middle skill jobs are better distributed than high skill jobs induction via the final domestic demand, and in the majority of the sectorial classification there is an individual sector.

Table 3.2.3

| Change in number of middle skill jobs generated as a result of changes of the final domestic demand (millions) in Mexico | | | | | | | |
|---|---|---|---|---|---|---|---|
| | P | Pm | LT | MT | HT | S | Total |
| 1995 | 116 | -8 | 196 | 53 | 51 | 339 | 748 |
| 1996 | 150 | 42 | 133 | 143 | 67 | 420 | 956 |
| 1997 | -32 | 47 | -91 | 125 | 25 | 344 | 418 |
| 1998 | 9 | 31 | 49 | 56 | 26 | 422 | 593 |
| 1999 | -91 | -20 | 133 | 73 | 27 | 450 | 572 |
| 2000 | 206 | 71 | 14 | 35 | -26 | 684 | 984 |
| 2001 | 86 | 24 | 66 | -3 | -32 | 493 | 634 |
| 2002 | 165 | -15 | 89 | 7 | -24 | 363 | 585 |
| 2003 | 169 | 119 | 12 | 136 | 134 | 722 | 1292 |
| 2004 | -47 | -9 | 566 | -12 | 23 | 510 | 1031 |
| 2005 | 69 | 33 | 1752 | 60 | 65 | 296 | 2275 |
| 2006 | -47 | 41 | 68 | 7 | 27 | 558 | 654 |
| 2007 | 333 | 119 | 566 | 106 | 27 | 1128 | 2279 |
| 2008 | -79 | -13 | -275 | -262 | -17 | -101 | -747 |
| 1995-09 | 1007 | 461 | 3278 | 524 | 373 | 6630 | 12273 |
| Percentages total change 1995-2009 | 7% | 3% | 24% | 4% | 3% | 49% | 91% |

Sources: Own elaboration using WOID's data
Note: "P" stands for primary sectors, "PM" stands for Resource-based manufactures, "LT" stands for Low-technology manufactures, "MT" stands for Medium-technology manufactures, "HT" stands for High-technology manufactures and "S" stands for Services

Furthermore, the domestic final demand contributed with 90% of the low skill jobs induced during this period. The most important sectorial classifications for the inducement of low skill jobs via the domestic final demand were services, which in fact was the only sectorial classification with positive number of low skill jobs induced via the final domestic demand. In the case of the induction of low skill labor the final domestic, the individual sectors that induced the most low skill jobs were the 1) private households with employed persons, 2) the renting of machinery & equipment and other business activities sector, 3) the public admin and defense; compulsory social security sector, 4) the hotels and restaurants sector, and 5) the sale, maintenance and repair of motor vehicles and motorcycles; retail sale of fuel sector.

Table 3.2.4

| Change in number of low skill jobs generated as a result of changes of the final domestic demand (millions) in Mexico | | | | | | | |
|---|---|---|---|---|---|---|---|
| | P | Pm | LT | MT | HT | S | Total |
| 1995 | -51 | 33 | 55 | 67 | 9 | -71 | 40 |
| 1996 | -534 | -23 | 81 | 9 | -1 | 9 | -459 |
| 1997 | 107 | -19 | 118 | -21 | 8 | 160 | 353 |
| 1998 | -1 | 17 | 42 | 26 | 5 | 245 | 335 |
| 1999 | -37 | 50 | 32 | 39 | 18 | 207 | 308 |
| 2000 | 35 | -59 | -85 | -44 | -31 | -23 | -207 |
| 2001 | 55 | -6 | -13 | -1 | -10 | 153 | 177 |
| 2002 | 14 | 17 | -36 | -25 | -2 | -19 | -52 |
| 2003 | -55 | -31 | -25 | -33 | 9 | 54 | -82 |
| 2004 | -317 | -34 | 56 | 2 | 4 | 120 | -168 |
| 2005 | -129 | -4 | -545 | 11 | -12 | 297 | -382 |
| 2006 | -186 | -24 | 133 | -32 | 2 | 97 | -10 |
| 2007 | 355 | 38 | 12 | 3 | -1 | 321 | 727 |
| 2008 | -59 | 8 | -74 | -46 | -3 | 26 | -150 |
| 1995-09 | -805 | -36 | -252 | -46 | -6 | 1576 | 432 |
| Percentages total change 1995-2009 | -168% | -7% | -53% | -10% | -1% | 329% | 90% |

Sources: Own elaboration using WOID's data
Note: "P" stands for primary sectors, "PM" stands for Resource-based manufactures, "LT" stands for Low-technology manufactures, "MT" stands for Medium-technology manufactures, "HT" stands for High-technology manufactures and "S" stands for Services

In summary, most of the jobs are induced by the final domestic demand for jobs in general and for every type of skill. Also, it seems that services are the engine for all the types of skill job induction, and that for Mexico the technologic content is not related to the type of labor a sectorial classification uses. Because of this, to improve the skill composition, according to these exercises, it is important to focus on developing individual sectors and not sectors that might be classified in the global market as high-technology manufactures.

### 3.3 Mexico's exports impact on the inducement for general labor market and its different skills

The induction of jobs via exports shows in Mexico serves to complement the induction of jobs produced by the domestic final demand, in a smaller quantity, this is a result of the size that exports have *vs* the domestic final demand. Exports are not as consistent for the induction of jobs, as this final demand has induced negative numbers of jobs for the overall labor force and most of the different type of skill labor during 2001, 2003, 2004. Nonetheless is an important complement for the induction of jobs, as it performs better after the rebound of global crisis and it can surpass the generation of jobs via the final domestic demand in these situations, as it was the case of the case for the year of 2008. The year 2008, was the only year in which the exports induced a higher number than the final domestic demand in all type of skill and overall. From a general perspective, exports induced 9% of the jobs created during this period. The individual sectors that induced most jobs via exports were 1) the transport equipment sector, 2) the textiles and textile sector, 3) the retail trade sector, 4) the recycling sector, and 5) the renting of machinery & equipment sector. The sectorial classification of the biggest inducers of employment via export is a heterogenous group, there are two sectors classified as services, two sectors classified as medium tech manufacture and one sector classified as low-tech manufacture. This shows that the sectorial classification for the overall employment it is not very connected for the overall labor force.

Table 3.3.1

| Change in number of jobs generated as a result of changes of exports (millions) in Mexico | | | | | | | |
|---|---|---|---|---|---|---|---|
| | P | Pm | LT | MT | HT | S | Total |
| 1995 | -32 | 6 | 101 | 62 | 48 | 66 | 251 |
| 1996 | -10 | 7 | 107 | 31 | 76 | -14 | 197 |
| 1997 | 16 | 16 | 142 | 61 | 73 | 49 | 357 |
| 1998 | 12 | 7 | 70 | 45 | 53 | 58 | 245 |
| 1999 | -20 | 2 | 2 | 54 | 88 | 59 | 186 |
| 2000 | 0 | 8 | -49 | 39 | -5 | -8 | -15 |
| 2001 | 8 | -5 | -56 | -3 | -84 | 25 | -115 |
| 2002 | 49 | 5 | -17 | 16 | -9 | 44 | 88 |
| 2003 | 0 | -2 | 7 | -9 | -121 | 10 | -113 |
| 2004 | -37 | -6 | -69 | -38 | -40 | -4 | -193 |
| 2005 | 27 | 21 | -54 | 82 | 24 | 70 | 170 |
| 2006 | -23 | 5 | -54 | 14 | 9 | 43 | -7 |
| 2007 | 23 | 21 | -4 | 38 | -5 | 34 | 107 |
| 2008 | 121 | 26 | 42 | 115 | 16 | -18 | 302 |
| 1995-09 | 135 | 111 | 169 | 507 | 124 | 414 | 1460 |
| Percentages total change 1995-2009 | 1% | 1% | 1% | 3% | 1% | 3% | 9% |

Sources: Own elaboration using WOID's data
Note: "P" stands for primary sectors, "PM" stands for Resource-based manufactures, "LT" stands for Low-technology manufactures, "MT" stands for Medium-technology manufactures, "HT" stands for High-technology manufactures and "S" stands for Services

Even though some theories expects that exports would be able to generate a higher quantity of high skill jobs, in the case of Mexico this is not true. Exports only induced 9% of all high skill jobs and the 5 biggest inducers of high skill jobs via export were the 1) renting of machinery & equipment and other business activities sector, 2) the recycling sector, 3) the transport equipment sector, 4) the retail trade sector and 5) the machinery sector. None of these 5 sectors are classified high technology manufacture, instead, two sectors are classified as services, while the other 3 sectors are considered sectors with medium technological content, which shows that for exports the technological content are not related with the type of skill that the production process that use in the Mexican economy. Instead, it seems that services and these medium technological content sectorial classifications have processes that demand higher skills that what its technologic content

would suggest. On the other hand, the sum of the percentages of all the sectors classified with high technologic content contribute with less than 1% of all high skill jobs generated during this period, showing that this sectorial classification is not a good tool to generate high skill jobs.

Table 3.3.2

| Change in number of high skill jobs generated as a result of changes of exports (millions) in Mexico | | | | | | | |
|---|---|---|---|---|---|---|---|
| | P | Pm | LT | MT | HT | S | Total |
| 1995 | -2 | 1 | 7 | 10 | 10 | 10 | 36 |
| 1996 | -1 | 0 | 6 | 2 | 10 | -4 | 14 |
| 1997 | 2 | 5 | 10 | 9 | 11 | 10 | 46 |
| 1998 | 1 | 2 | 6 | 7 | 8 | 11 | 35 |
| 1999 | -1 | 0 | 0 | 9 | 14 | 11 | 33 |
| 2000 | 1 | 2 | -4 | 3 | -5 | -4 | -6 |
| 2001 | 0 | -2 | -5 | 0 | -13 | 4 | -16 |
| 2002 | 1 | 1 | -2 | 1 | -3 | 7 | 6 |
| 2003 | 0 | -2 | -1 | -5 | -19 | 0 | -27 |
| 2004 | -1 | -2 | -5 | -4 | -5 | 0 | -16 |
| 2005 | -1 | 4 | -6 | 11 | 3 | 19 | 30 |
| 2006 | 0 | 0 | -3 | 1 | -1 | 7 | 4 |
| 2007 | 1 | 4 | -1 | 3 | -1 | 3 | 9 |
| 2008 | 2 | 3 | 3 | 17 | 3 | -1 | 26 |
| 1995-09 | 2 | 16 | 7 | 63 | 11 | 74 | 173 |
| Percentages total change 1995-2009 | 0% | 1% | 0% | 3% | 1% | 4% | 9% |

Sources: Own elaboration using WOID's data
Note: "P" stands for primary sectors, "PM" stands for Resource-based manufactures, "LT" stands for Low-technology manufactures, "MT" stands for Medium-technology manufactures, "HT" stands for High-technology manufactures and "S" stands for Services

Exports also contributed with 9% of the middle skill jobs induced during 1995-2009. The most important sectorial classification to generate middle jobs from the export side were the medium tech sectors, which contributed with 3% of all jobs induced during this period, followed by services which contributed 2% of all middle skill jobs created. In terms of individual sectors, the most important sectors for the induction of jobs via exports were the following: 1) the transport equipment sector, 2) the textiles and textile, 3) the retail trade sector, 4) the electrical and optical equipment sector and 5) the agriculture, hunting, forestry, and fishing. The inducement of middle

skill jobs via exports seems very concentrated, as the 5 sectors are responsible for 5% of all middle skill employment generated, which is more than half of the 9% of contribution that the export contribute to the middle skill jobs generated during this period. This group is also very heterogenous in terms of sectorial classification as there are sectors classified as high, middle, and low technology content, services, and primary industry individual sectors.

Table 3.3.3

| Change in number of middle skill jobs generated as a result of changes of exports (millions) in Mexico | | | | | | | |
|---|---|---|---|---|---|---|---|
| | P | Pm | LT | MT | HT | S | Total |
| 1995 | -2 | 2 | 58 | 35 | 32 | 65 | 190 |
| 1996 | 13 | 7 | 82 | 30 | 60 | 3 | 195 |
| 1997 | 1 | 9 | 86 | 52 | 51 | 29 | 228 |
| 1998 | 4 | 4 | 40 | 30 | 35 | 34 | 148 |
| 1999 | -9 | 1 | -1 | 29 | 48 | 37 | 105 |
| 2000 | 8 | 9 | -17 | 39 | 20 | 12 | 72 |
| 2001 | 5 | -1 | -28 | -1 | -55 | 22 | -59 |
| 2002 | 22 | 1 | -10 | 19 | -8 | 34 | 58 |
| 2003 | 8 | 4 | 21 | 8 | -68 | 12 | -15 |
| 2004 | -8 | -1 | -24 | -28 | -31 | 5 | -86 |
| 2005 | 16 | 13 | -38 | 65 | 33 | 25 | 115 |
| 2006 | -6 | 6 | -35 | 17 | 10 | 38 | 30 |
| 2007 | 13 | 13 | 0 | 40 | -2 | 28 | 93 |
| 2008 | 44 | 16 | 28 | 78 | 12 | -13 | 166 |
| 1995-09 | 112 | 84 | 161 | 414 | 138 | 330 | 1239 |
| Percentages total change 1995-2009 | 1% | 1% | 1% | 3% | 1% | 2% | 9% |

Sources: Own elaboration using WOID's data
Note: "P" stands for primary sectors, "PM" stands for Resource-based manufactures, "LT" stands for Low-technology manufactures, "MT" stands for Medium-technology manufactures, "HT" stands for High-technology manufactures and "S" stands for Services

The exports on the other hand, stand out for generating low skill jobs, as all sectorial classifications, with the exception of services, have generated higher percentages of jobs via exports than via the final domestic demand and in general, exports contributed 10% of all low skill jobs induced. The most important sectorial classifications for the inducement of low skill jobs skills exports were the medium tech as it induced 6% of all the low skill jobs induced, followed

by the primary resource sector which contributed with 4% of all the low skill jobs induced. From the individualistic sector point of view, the most important sectors for the induction of low skill jobs via export are the following sectors: 1) the manufacturing; recycling sector, 2) the agriculture, hunting, forestry, and fishing, 3) renting of machinery & equipment and other business activities, 4) the food, beverages, and tobacco, and 5) the sector of sale, maintenance and repair of motor vehicles and motorcycles; retail sale of fuel. The contribution of these 5 sectors represents 19% of all the low skill jobs generated (there were sectors that generated negative percentages and because of this the 19% of induced is higher than the 10% of jobs of exports), exports have the biggest potential to increase jobs is in the low skill sector and serve to compensate for the fall of the sector which induced negative numbers via the domestic final demand. The sectorial classification of these 5 sectors is of medium tech, primary sources, services and based primary resources manufactured goods, these might support the idea that multinationals companies in Mexico install their lowest technologic production process regardless of the technological classification that the goods the sector produces.

Table 3.3.4

| Change in number of low skill jobs generated as a result of changes of exports (millions) in Mexico | | | | | | | |
|---|---|---|---|---|---|---|---|
| | P | Pm | LT | MT | HT | S | Total |
| 1995 | -28 | 2 | 36 | 18 | 6 | -9 | 25 |
| 1996 | -22 | 0 | 19 | -1 | 6 | -12 | -11 |
| 1997 | 13 | 2 | 46 | 1 | 12 | 10 | 83 |
| 1998 | 8 | 2 | 23 | 8 | 10 | 13 | 63 |
| 1999 | -10 | 2 | 4 | 16 | 25 | 12 | 48 |
| 2000 | -9 | -3 | -28 | -4 | -20 | -16 | -81 |
| 2001 | 3 | -1 | -23 | -2 | -17 | 0 | -40 |
| 2002 | 26 | 3 | -5 | -4 | 2 | 3 | 24 |
| 2003 | -8 | -4 | -12 | -12 | -34 | -2 | -72 |
| 2004 | -28 | -2 | -41 | -6 | -4 | -10 | -91 |
| 2005 | 12 | 4 | -11 | 6 | -12 | 25 | 25 |
| 2006 | -18 | -1 | -16 | -3 | 0 | -2 | -41 |
| 2007 | 8 | 3 | -3 | -5 | -1 | 3 | 5 |
| 2008 | 75 | 7 | 11 | 20 | 1 | -4 | 110 |
| 1995-09 | 20 | 11 | 1 | 30 | -26 | 10 | 48 |
| Percentages total change 1995-2009 | 4% | 2% | 0% | 6% | -5% | 2% | 10% |

Sources: Own elaboration using WOID's data
Note: "P" stands for primary sectors, "PM" stands for Resource-based manufactures, "LT" stands for Low-technology manufactures, "MT" stands for Medium-technology manufactures, "HT" stands for High-technology manufactures and "S" stands for Services

Mexico's growth and development strategy has been highly focused on expanding the export of manufactured goods sectors, nonetheless, it seems that there is little contribution of exports to the productive structure of Mexico in term of quality jobs. One explanation could be that the production process installed in Mexico of companies that exports goods use low skill labor, regardless of the technology content of the final good, as exports stand out inducing this type of job. Still, exports are an important tool to compensate for the loss of jobs of low skill jobs, generated by the domestic final demand, and in cases of booms of growth in the global economy, take advantage of the global recovery. It is important to note that using economic policies to increase in exports will not improve the skill composition of the labor force or have big effects in employment, instead is important to use policies to benefit key sector and in general make the final

domestic demand grow as the induction of jobs via this final demand improves the productive structure of the economy by increase the generation of high and medium skill jobs, and maintain the high level of low skill job creation.

### 3.4 Brazil's domestic final demand impact on the inducement for general labor market and its different skills

This subsection analyzes the same components as part **3.2,** with the only difference is that is focused on Brazil's changes in employment induced by domestic final demand and exports. According the WOID database, Brazil's composition of final demand was heavily reliant on the domestic final demand during 1995-2009. The final domestic demand was the main engine for the generation of employment as it generated 90% of all jobs during this period. The most import sectorial classification for the overall job creation was services as it induced 78% of these new jobs. The most important individual sectors for the overall jobs inducement via domestic final demand were 1) retail trade, 2) social and personal services, 3) rent of machinery & equipment and other business activities, 4) construction and 5) education. Most of these sectors are classified as services, showing that services are the main engine for employment in Brazil. The creation of jobs in Brazil is somewhat concentrated, as these 5 sectors contributed 66% of all induced by the final domestic demand.

Table 3.4.1

| Change in number of jobs generated as a result of changes of the final domestic demand (millions) in Brazil | | | | | | | |
|---|---|---|---|---|---|---|---|
| | P | Pm | LT | MT | HT | S | Total |
| 1995 | -1159 | -66 | 2 | -36 | -62 | 136 | -1185 |
| 1996 | 61 | -34 | 40 | 75 | -6 | 827 | 964 |
| 1997 | -588 | -153 | 111 | -83 | -67 | 300 | -479 |
| 1998 | 796 | 17 | 424 | 0 | 45 | 1541 | 2824 |
| 1999 | -741 | 131 | 194 | 266 | 97 | 2243 | 2190 |
| 2000 | -1122 | -90 | -61 | -27 | -10 | 1002 | -308 |
| 2001 | -62 | -30 | 295 | 151 | 39 | 1477 | 1870 |
| 2002 | 419 | 130 | -188 | 71 | 28 | 807 | 1267 |
| 2003 | 934 | 305 | 328 | 153 | 59 | 1721 | 3501 |
| 2004 | 171 | 275 | 604 | 315 | 48 | 1358 | 2772 |
| 2005 | -440 | 5 | 78 | 137 | 57 | 2814 | 2651 |
| 2006 | -678 | 159 | 393 | 306 | 86 | 1453 | 1718 |
| 2007 | -116 | 226 | 785 | 291 | 59 | 794 | 2039 |
| 2008 | -257 | 3 | -71 | -196 | -4 | 1539 | 1013 |
| 1995-09 | -2783 | 879 | 2933 | 1423 | 372 | 18014 | 20838 |
| Percentages total change 1995-2009 | -12% | 4% | 13% | 6% | 2% | 78% | 90% |

Sources: Own elaboration using WOID's data
Note: "P" stands for primary sectors, "PM" stands for Resource-based manufactures, "LT" stands for Low-technology manufactures, "MT" stands for Medium-technology manufactures, "HT" stands for High-technology manufactures and "S" stands for Services

Analyzing the domestic final demand and its induction of high skill jobs, it is possible to see that this final demand induced 95% of all high skill, from which the majority was induced by the sectorial classification of services with 82% of all the high skill jobs. The most important individual sectors for the inducement of high skill jobs via the domestic final demand were the: 1) rent of machinery & equipment and other business activities sector, 2) the education sector, 3) the public administration sector, 4) the retail trade sector and 5) other community, social and personal services sector. These 5 individual sectors contributed 68% of all high skills jobs generated, which makes the generation of jobs concentrated but not as concentrated as it was in Mexico, as there are other important sectors for the inducement of high skill jobs via the domestic final demand that do not appear in the top 5 sectors. All these sectors are classified as services, making the technological

classification of no use to understand what the key sectors are to generate high skill jobs in Brazil. During the period analyzed the domestic market has not induced negative high skill jobs making the domestic final demand a reliable tool for the generation of high skill jobs.

Table 3.4.2

| Change in number of high skill jobs generated as a result of changes of the final domestic demand (millions) in Brazil | | | | | | | |
|---|---|---|---|---|---|---|---|
| | P | Pm | LT | MT | HT | S | Total |
| 1995 | -71 | -2 | 21 | -2 | -17 | 207 | 135 |
| 1996 | 37 | 4 | 26 | 17 | 16 | 379 | 479 |
| 1997 | -25 | -30 | 38 | -27 | -21 | 212 | 147 |
| 1998 | 90 | 17 | 107 | 9 | 28 | 719 | 970 |
| 1999 | -25 | 50 | 66 | 72 | 47 | 888 | 1098 |
| 2000 | -75 | -13 | 14 | -4 | 19 | 547 | 489 |
| 2001 | 27 | 11 | 83 | 41 | 40 | 607 | 809 |
| 2002 | 189 | 3 | -95 | 47 | 37 | 427 | 607 |
| 2003 | 265 | 54 | -4 | 68 | 27 | 906 | 1316 |
| 2004 | 188 | 40 | 35 | 110 | 35 | 572 | 981 |
| 2005 | -164 | -3 | -17 | 66 | 39 | 1416 | 1336 |
| 2006 | -176 | 45 | 32 | 122 | 62 | 1169 | 1255 |
| 2007 | -108 | 55 | 87 | 113 | 24 | 858 | 1030 |
| 2008 | -130 | -10 | -49 | -9 | 29 | 1016 | 847 |
| 1995-09 | 22 | 222 | 344 | 622 | 364 | 9924 | 11499 |
| Percentages total change 1995-2009 | 0% | 2% | 3% | 5% | 3% | 82% | 95% |

Sources: Own elaboration using WOID's data
Note: "P" stands for primary sectors, "PM" stands for Resource-based manufactures, "LT" stands for Low-technology manufactures, "MT" stands for Medium-technology manufactures, "HT" stands for High-technology manufactures and "S" stands for Services

The domestic final demand induced 92% of the middle skill jobs. In terms of sectorial classification, the low-tech manufacturing sectors, contributed 14% of medium skill jobs induced and services, which induced 57% of medium skill jobs during the period analyzed, were the most important sectorial classification for the inducement of medium skill jobs. From the individual sector perspective, the most important sectors for the generation of middle skill jobs of the domestic market were the 1) retail trade sector, 2) the social and personal services sector, 3) the construction sector, 4) the agriculture, hunting, forestry, and fishing sector and 5) the hotels and

restaurants sector. In term of sectorial classification this group is very heterogenous, as there are sectors belonging to primary resources, services, and low technologic manufactured goods that almost every sectorial classification in Brazil can use middle skill labor force. These 5 individual sectors contribute 57% of all middle skill jobs generated.

Table 3.4.3

| Change in number of middle skill jobs generated as a result of changes of the final domestic demand (millions) in Brazil | | | | | | | |
|---|---|---|---|---|---|---|---|
| | P | Pm | LT | MT | HT | S | Total |
| 1995 | -91 | -4 | 15 | 24 | -34 | 164 | 75 |
| 1996 | 92 | 6 | 13 | 61 | -12 | 425 | 585 |
| 1997 | -16 | -34 | 28 | 8 | -33 | 254 | 207 |
| 1998 | 202 | 22 | 168 | 36 | 6 | 640 | 1074 |
| 1999 | -35 | 62 | 108 | 133 | 24 | 937 | 1228 |
| 2000 | -116 | -15 | 22 | 28 | -15 | 514 | 417 |
| 2001 | 66 | 6 | 118 | 96 | 2 | 713 | 1000 |
| 2002 | 12 | 93 | 71 | 68 | 3 | 488 | 734 |
| 2003 | 104 | 165 | 201 | 102 | 25 | 695 | 1293 |
| 2004 | -28 | 162 | 313 | 177 | 16 | 736 | 1376 |
| 2005 | 236 | 46 | 153 | 98 | 20 | 1109 | 1662 |
| 2006 | 179 | 111 | 256 | 176 | 27 | 583 | 1332 |
| 2007 | 276 | 144 | 378 | 171 | 32 | 294 | 1296 |
| 2008 | 227 | 51 | 119 | -37 | -8 | 684 | 1036 |
| 1995-09 | 1109 | 813 | 1962 | 1140 | 53 | 8236 | 13313 |
| Percentages total change 1995-2009 | 8% | 6% | 14% | 8% | 0% | 57% | 92% |

Sources: Own elaboration using WOID's data
Note: "P" stands for primary sectors, "PM" stands for Resource-based manufactures, "LT" stands for Low-technology manufactures, "MT" stands for Medium-technology manufactures, "HT" stands for High-technology manufactures and "S" stands for Services

Finally, the inducement of low skill jobs via the domestic market induced -117% of the all the low skill jobs created during this period, the domestic final demand was responsible for losing more jobs that it generated, in this sense, during this period there was a loss of low skill jobs during this period. The low technology manufactures sectorial classification being the only sectorial classification with positive numbers of low skill jobs inducement as a whole. The most important

sectors for the inducement of low skill jobs thru the domestic demand were the following sectors: 1) construction, 2) other community, social and personal services, 3) renting of machinery & equipment, 4) food, beverages, and tobacco and 5) leather and footwear. These five sectors contribute 48% of the low skill jobs generated, in terms of low skill jobs inducement via final domestic demand is very concentrated as these were the only few sectors generating positive numbers of low skill jobs. The sectorial classification of these sectors is very heterogenous, as it is composed by sectors with low skill technological content, services, and primary based manufactured goods, showing that sectorial classification of medium and high technological content is a barrier for these type of skill workers.

Table 3.4.4

| Change in number of low skill jobs generated as a result of changes of the final domestic demand (millions) in Brazil | | | | | | | |
|---|---|---|---|---|---|---|---|
| | P | Pm | LT | MT | HT | S | Total |
| 1995 | -997 | -60 | -35 | -58 | -11 | -235 | -1395 |
| 1996 | -68 | -44 | 1 | -3 | -9 | 24 | -100 |
| 1997 | -548 | -89 | 46 | -63 | -13 | -166 | -833 |
| 1998 | 504 | -22 | 149 | -45 | 12 | 182 | 779 |
| 1999 | -681 | 20 | 20 | 61 | 25 | 418 | -136 |
| 2000 | -932 | -62 | -97 | -51 | -14 | -59 | -1214 |
| 2001 | -155 | -46 | 94 | 14 | -2 | 157 | 61 |
| 2002 | 218 | 34 | -163 | -43 | -12 | -108 | -74 |
| 2003 | 565 | 86 | 131 | -17 | 8 | 120 | 892 |
| 2004 | 12 | 73 | 255 | 28 | -2 | 50 | 416 |
| 2005 | -512 | -38 | -58 | -26 | -2 | 289 | -347 |
| 2006 | -682 | 3 | 105 | 9 | -2 | -300 | -868 |
| 2007 | -284 | 27 | 320 | 7 | 3 | -358 | -286 |
| 2008 | -354 | -38 | -142 | -151 | -25 | -160 | -870 |
| 1995-09 | -3915 | -155 | 626 | -339 | -45 | -146 | -3974 |
| Percentages total change 1995-2009 | 116% | 5% | -19% | 10% | 1% | 4% | 117% |

Sources: Own elaboration using WOID's data
Note: "P" stands for primary sectors, "PM" stands for Resource-based manufactures, "LT" stands for Low-technology manufactures, "MT" stands for Medium-technology manufactures, "HT" stands for High-technology manufactures and "S" stands for Services

As it was the case in Mexico, in Brazil, the main engine of the inducement of jobs in general and for every type of skill is the domestic final demand. Furthermore, the sectorial classification of services is the main engine for the overall inducement and of the type of skills. In Brazil, the growth of the domestic final demand is essential to the inducement of jobs, and the economy should grow key sectors to stimulate the induction of jobs for the skill desire, focusing on the real impact on the induction of jobs as for Brazil there is no relation between the technological content of the sectorial classification and the production process install in the country.

### 3.5 Brazil's exports impact on the inducement for general labor market and its different skills

The inducement of jobs via exports contributed with 10% of all jobs generated, the same percentage that Mexico's exporting sector, but without following an export-led growth strategy. This percentage was achieved using the domestic-led growth strategy, which might suggest that it is not necessary to change policies to attract multinational production processes to generate employment via exports. The most important sectorial classification for the inducement of jobs via exports are services generating 4% of all the Brazilian jobs and the primary sectors with 3% of all jobs. The five most important individual sectors for the inducement of jobs via exports are the 1) agriculture, hunting and fishing sector, 2) the social and personal services sector, 3) the retail trade sector, 4) the rent of machinery & equipment and other business activities sector, 5) the food, beverages, and tobacco sector. The classification of these sectors are primary, primary manufacture, services and medium technology manufacture sectorial classification, which is a very varied classification, showing that almost each sectorial classification has an individual sector that stands out from others in the job generation. The job creation resulting from exports also is highly

concentrated, as 7% of the jobs created are induced by these sectors. In this sense, the induction of jobs from export can benefit from the growth of certain individual sectors and sectorial sectors.

Table 3.5.1

| Change in number of jobs generated as a result of changes of exports (millions) in Brazil | | | | | | | |
|---|---|---|---|---|---|---|---|
| | P | Pm | LT | MT | HT | S | Total |
| 1995 | -276 | -31 | -18 | -5 | -1 | -43 | -374 |
| 1996 | 148 | 10 | -15 | 17 | 3 | 15 | 178 |
| 1997 | -41 | 12 | -4 | 36 | 5 | 88 | 96 |
| 1998 | 485 | 84 | 88 | 96 | 24 | 295 | 1072 |
| 1999 | -192 | 4 | 70 | 41 | 16 | 202 | 142 |
| 2000 | 400 | 66 | 52 | 52 | 20 | 289 | 880 |
| 2001 | 545 | 117 | 60 | 78 | 16 | 399 | 1215 |
| 2002 | -115 | 16 | 70 | 32 | 3 | 133 | 139 |
| 2003 | 335 | 68 | 44 | 82 | -14 | 201 | 717 |
| 2004 | -34 | 34 | -50 | -16 | 8 | -61 | -119 |
| 2005 | -133 | -16 | -70 | -42 | 0 | -48 | -310 |
| 2006 | -74 | 12 | -48 | -31 | -3 | -107 | -251 |
| 2007 | -326 | -43 | -53 | -23 | 0 | -77 | -521 |
| 2008 | -102 | -55 | -64 | -109 | -17 | -252 | -599 |
| 1995-09 | 621 | 279 | 61 | 208 | 60 | 1036 | 2264 |
| Percentages total change 1995-2009 | 3% | 1% | 0% | 1% | 0% | 4% | 10% |

Sources: Own elaboration using WOID's data
Note: "P" stands for primary sectors, "PM" stands for Resource-based manufactures, "LT" stands for Low-technology manufactures, "MT" stands for Medium-technology manufactures, "HT" stands for High-technology manufactures and "S" stands for Services

In the case of inducement of high skill jobs via exports, the most important sectorial classification are services, which represented 3% of all high skills jobs created, of the 5% of high skill induced by exports. Nonetheless, the individual sectors that have contributed the most to the induction of this type of jobs via exports are the same sectors that contributed the most to overall jobs, which are 1) the rent of machinery & equipment and other business activities sector, 2) the retail trade sector, 3) the agriculture, hunting, forestry and fishing sector, 4) other community, social and personal services sector and 5) the food, beverages and tobacco sector. In terms of contribution, the inducement of high skill jobs is very concentrated, as the top 5 inducers of high skill jobs via exports are responsible of inducing 3%, which is more than the entire sectorial

classification of services that are exported generates. The sectorial classification of these 5 sectors is very varied, but none of these is considered as a manufactured sector with high technologic content, showing that these sectors do not use production process that use high skill labor. Brazil serves as an example of an exporting sector which can induce high skill jobs with sectorial classification that are thought to use production process of low technologic content. The technologic content of a sector depends to the production processes that are use within a country and not to the technology that the most developed countries use in such sectors.

Table 3.5.2

| Change in number of high skill jobs generated as a result of changes of exports (millions) in Brazil | | | | | | | |
|---|---|---|---|---|---|---|---|
| | P | Pm | LT | MT | HT | S | Total |
| 1995 | -21 | -6 | -3 | -1 | 0 | -8 | -38 |
| 1996 | 13 | 3 | -2 | 5 | 1 | 8 | 28 |
| 1997 | -1 | 4 | 0 | 10 | 2 | 25 | 40 |
| 1998 | 44 | 22 | 18 | 27 | 9 | 79 | 199 |
| 1999 | -13 | 4 | 15 | 11 | 6 | 55 | 78 |
| 2000 | 39 | 16 | 13 | 14 | 7 | 78 | 165 |
| 2001 | 53 | 30 | 14 | 21 | 6 | 105 | 230 |
| 2002 | 11 | 0 | 7 | 11 | 4 | 38 | 71 |
| 2003 | 59 | 11 | 0 | 27 | -4 | 61 | 154 |
| 2004 | 20 | 1 | -17 | -3 | 3 | -5 | -1 |
| 2005 | -32 | -5 | -10 | -11 | 1 | 3 | -55 |
| 2006 | -23 | 2 | -7 | -8 | 1 | -11 | -46 |
| 2007 | -47 | -8 | -8 | -5 | 2 | -5 | -73 |
| 2008 | -25 | -16 | -10 | -30 | -7 | -70 | -158 |
| 1995-09 | 78 | 60 | 7 | 66 | 30 | 352 | 593 |
| Percentages total change 1995-2009 | 1% | 0% | 0% | 1% | 0% | 3% | 5% |

Sources: Own elaboration using WOID's data
Note: "P" stands for primary sectors, "PM" stands for Resource-based manufactures, "LT" stands for Low-technology manufactures, "MT" stands for Medium-technology manufactures, "HT" stands for High-technology manufactures and "S" stands for Services

Conversely, exports contributed 8% of the middle skill jobs induced during 1995-2009. The most important sectorial classification for the inducement of middle skill jobs are services, which contributed with 3% of all middle skill jobs. In terms of individual sectors, the most

important sectors for the inducement of jobs via exports are the 1) agriculture, hunting, forestry, and fishing sector, 2) the retail trade sector the other community, social and personal services sector, 3) the food, beverages, and tobacco sector, and 5) the renting of machinery & equipment and other business activities sector. These 5 sectors are the same main 5 sector for the inducement of the other jobs via exports contributed with 5% of all middle skill jobs created. For the induction of middle skill jobs, there is a decline in its induction after 2004, exports induced negative jobs. The decline in the inducement of middle skill workers might suggest that the sectors that focus on exports tend to specialize on installing production processes which induce either low skill jobs or high skill jobs.

Table 3.5.3

| Change in number of middle skill jobs generated as a result of changes of exports (millions) in Brazil | | | | | | | |
|---|---|---|---|---|---|---|---|
| | P | Pm | LT | MT | HT | S | Total |
| 1995 | -35 | -10 | -6 | 0 | 0 | -12 | -64 |
| 1996 | 27 | 4 | -5 | 7 | 1 | 7 | 41 |
| 1997 | -1 | 5 | -1 | 14 | 2 | 35 | 53 |
| 1998 | 84 | 30 | 29 | 36 | 8 | 111 | 299 |
| 1999 | -24 | 3 | 23 | 18 | 6 | 80 | 106 |
| 2000 | 75 | 25 | 22 | 22 | 8 | 118 | 269 |
| 2001 | 104 | 44 | 21 | 34 | 6 | 166 | 375 |
| 2002 | -29 | 13 | 33 | 19 | 2 | 67 | 104 |
| 2003 | 48 | 34 | 26 | 40 | -5 | 90 | 234 |
| 2004 | -16 | 22 | -11 | 0 | 4 | -17 | -18 |
| 2005 | 21 | 0 | -22 | -14 | 0 | -14 | -28 |
| 2006 | 29 | 12 | -15 | -10 | -1 | -36 | -22 |
| 2007 | -29 | -12 | -19 | -7 | 0 | -26 | -94 |
| 2008 | 9 | -18 | -24 | -45 | -6 | -91 | -174 |
| 1995-09 | 262 | 153 | 51 | 115 | 23 | 477 | 1081 |
| Percentages total change 1995-2009 | 2% | 1% | 0% | 1% | 0% | 4% | 8% |

Sources: Own elaboration using WOID's data
Note: "P" stands for primary sectors, "PM" stands for Resource-based manufactures, "LT" stands for Low-technology manufactures, "MT" stands for Medium-technology manufactures, "HT" stands for High-technology manufactures and "S" stands for Services

For the inducement of jobs via export of all the low skill, this final demand induced 17% of all low skill jobs, the most import sectorial classifications are the primary which produced most of low skill jobs (8%), followed by services (6%). The top sectors which induced the highest quantity of low skill jobs via exports were again the main sectors that induce the other type of employment, which were the 1) agriculture, hunting, forestry and fishing, other community, social and personal services sector, 2) the food, beverages and tobacco sector, 3) the retail trade, except of motor vehicles and motorcycles; the 4) repair of household goods sector and the 5) renting of machinery & equipment and other business activities sector. These 5 sectors induced 16% of all low skill jobs induced during this period.

Table 3.5.4

| Change in number of low skill jobs generated as a result of changes of exports (millions) in Brazil | | | | | | | |
|---|---|---|---|---|---|---|---|
| | P | Pm | LT | MT | HT | S | Total |
| 1995 | -218 | -17 | -10 | -4 | 0 | -23 | -272 |
| 1996 | 108 | 3 | -8 | 5 | 1 | 0 | 109 |
| 1997 | -39 | 3 | -3 | 12 | 1 | 29 | 3 |
| 1998 | 357 | 32 | 40 | 33 | 6 | 106 | 574 |
| 1999 | -155 | -2 | 32 | 12 | 4 | 66 | -42 |
| 2000 | 287 | 25 | 18 | 16 | 6 | 94 | 445 |
| 2001 | 388 | 43 | 24 | 24 | 4 | 127 | 610 |
| 2002 | -97 | 2 | 30 | 2 | -2 | 29 | -36 |
| 2003 | 228 | 23 | 18 | 15 | -5 | 49 | 329 |
| 2004 | -38 | 10 | -22 | -13 | 1 | -38 | -100 |
| 2005 | -122 | -12 | -38 | -17 | -1 | -37 | -227 |
| 2006 | -79 | -2 | -26 | -14 | -2 | -59 | -183 |
| 2007 | -249 | -22 | -25 | -11 | -2 | -45 | -354 |
| 2008 | -86 | -22 | -30 | -33 | -4 | -91 | -266 |
| 1995-09 | 283 | 64 | 2 | 26 | 6 | 207 | 590 |
| Percentages total change 1995-2009 | -8% | -2% | 0% | -1% | 0% | -6% | -17% |

Sources: Own elaboration using WOID's data
Note: "P" stands for primary sectors, "PM" stands for Resource-based manufactures, "LT" stands for Low-technology manufactures, "MT" stands for Medium-technology manufactures, "HT" stands for High-technology manufactures and "S" stands for Services

Exports are not useful to generate stable jobs high skill and middle skill jobs, in the case of Brazil it yields similar results as Mexico but without been so reliant in exports. Also, it was seen that exports in general are the most useful at generating low skill labor and can be a complement for this type of job, nonetheless exports have not work to improve the labor absorption of the productive structure of a country for higher skill. Also, there are individual sectors that stand out, because of this, to improve the productive structure of the economy there should be efforts to increase specific individual sectors, instead of focusing on improving sectorial classification with high technologic content.

### 3.6 Methodology used to calculate DVA

This thesis also analyze the composition of the value of exports. To achieve this, the work uses Koopman's et.al (2014) methodology using the MATLAB code developed by Aslam et.al, (2017). To calculate the DVA that each sectorial classification generates by countries, Koopman's et.al (2014) methodology allows to measure it by using the rows in the $\boldsymbol{Z}$ matrix as well as of the rows of $\boldsymbol{f}$ vector, which gives information about the intermediates goods used to produced final goods by industry.

To calculate the DVA, there is need to calculate the matrix of value-added shares $\hat{V}$, which can also be called as the value-added coefficient matrix. To calculate $\hat{V}$ there is the need to sum across rows of the Matrix A, and these elements are put in diagonal of a square matrix which then is subtracted from an identity matrix which size is SN x SN as equation (11) shows

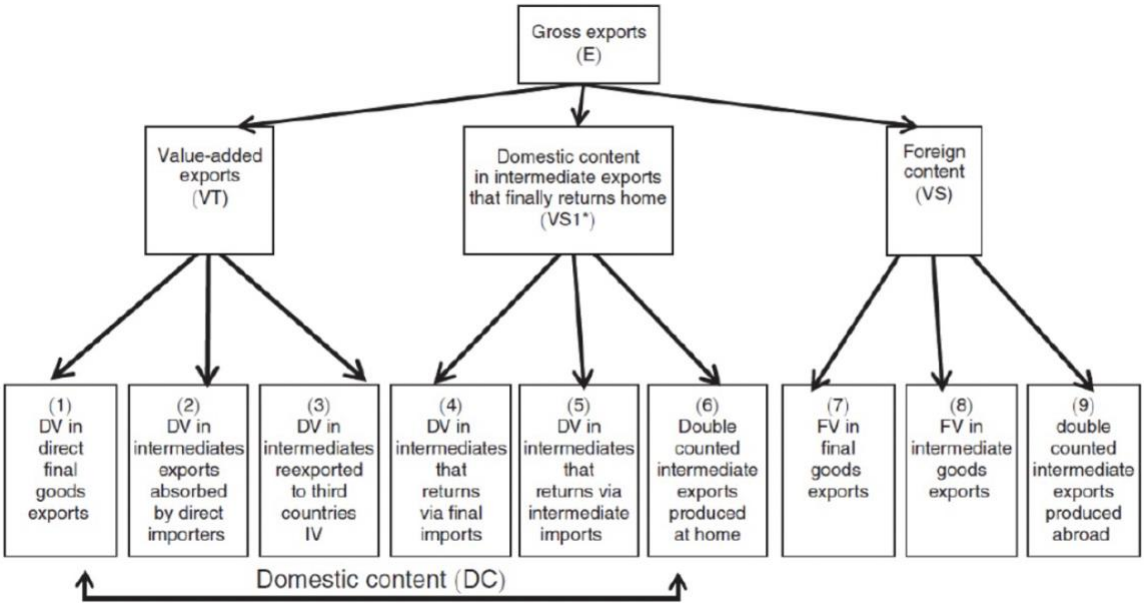
$$\widehat{\boldsymbol{V}} = \boldsymbol{I_{SNxSN}} - \boldsymbol{diag}\left(\sum_{\boldsymbol{s}}^{\boldsymbol{SN}} \boldsymbol{A_{s1}}_{\ldots} \sum_{\boldsymbol{s}}^{\boldsymbol{SN}} \boldsymbol{A_{SN}}\right) \qquad (\mathbf{11})$$

By multiplying $\hat{V}$matrix with $\boldsymbol{B}$ from Leontief, which is equal to, $(I - A_1)^{-1}$ , and the matrix of gross exports, which is obtained by adding all exports and diagonalizing the vector, the value-added trade *(Tv)* is obtained, this matrix shows the value added embodied in gross trade flows.

$$T_v = \begin{bmatrix} \hat{v}_{11} & \cdots & 0 \\ \vdots & \ddots & \vdots \\ 0 & \cdots & \hat{v}_{SN} \end{bmatrix} \begin{bmatrix} B_{11} & \cdots & 0 \\ \vdots & \ddots & \vdots \\ 0 & \cdots & B_{SN} \end{bmatrix} \begin{bmatrix} e_1 & \ldots & 0 \\ \vdots & \ddots & \vdots \\ 0 & \vdots & e_{SN} \end{bmatrix} \qquad (12)$$

After obtaining the $T_v$ it is possible to calculate the DVA. To calculate the DVA for each country in the different sectors it is necessary to see the diagonal elements of the $T_v$ matrix. This methodology can calculate DVA at the country-sector level, by summing over only over the corresponding rows or columns of the country block matrix. The code developed by Aslam et.al, (2017) allows MATLAB code calculates DVA at both, the country and country-sector level, as the Figure 3.6.1 shows

Figure 3.6.1




Source: Koopman et al (2014)

It is important to point out that this analysis will use EORIO's data base, and the different sector were categorized according to the following:

Table 3.6.1

| Sectorial classification by technological content |
|---|
| Primary Products |
| Agriculture |
| Fishing |
| Mining and Quarrying |
| Resource-based manufactures |
| Food & Beverages |
| Wood and Paper |
| Petroleum, Chemical and Non-Metallic Mineral Products |
| Metal Products |
| Electricity, Gas and Water |
| Low-technology manufactures |
| Textiles and Wearing Apparel |
| Construction |
| Medium-technology manufactures |
| Electrical and Machinery |
| Transport Equipment |
| Other Manufacturing |
| Recycling |
| Transport |
| High-technology manufactures |
| Post and Telecommunications |
| Financial Intermediation and Business Activities |
| Services |
| Maintenance and Repair |
| Wholesale Trade |
| Retail Trade |
| Hotels and Restaurants |
| Public Administration |
| Education, Health, and Other Services |
| Private Households |
| Others |
| Re-export & Re-import |

Source: Own elaboration based on Lall's (2000) classification

Lastly, in these sections, services are ignored due to the low level of contribution to exports, as thru the period analyzed the biggest contributor has been the sector education, which contributed with less than 1%.

### 3.7 Mexico's DVA generation

The composition of DVA in the value of exports in the different sectorial classifications can serve as a proxy to know how interconnected the sectorial classification is to the overall economy and how much the sectorial classification has improved in its Schumpeterian efficiency, which also serves to measure improvement of the productive structure of an economy.

The share of value composed by DVA in Mexican exports have decreased strongly after 1994. This could be the result of NAFTA and the installation of production processes that do not generate a lot of value added, which according to the literature review could be low skill labor intensive processes. Also, it can be argued that there has not been an increase in the Schumpeterian efficiency in the Mexican economy during this period analyzes, as the value portion of exports that DVA represents has grown, one of the possible reasons for the lack of DVA growth could be a lack of Mexican input suppliers for the Mexican exports, which would have occur if there was an increase of Schumpeterian efficiency not been meaning that there has not been an increase in the value of Mexican inputs that could increase the DVA share for the Mexican exports.

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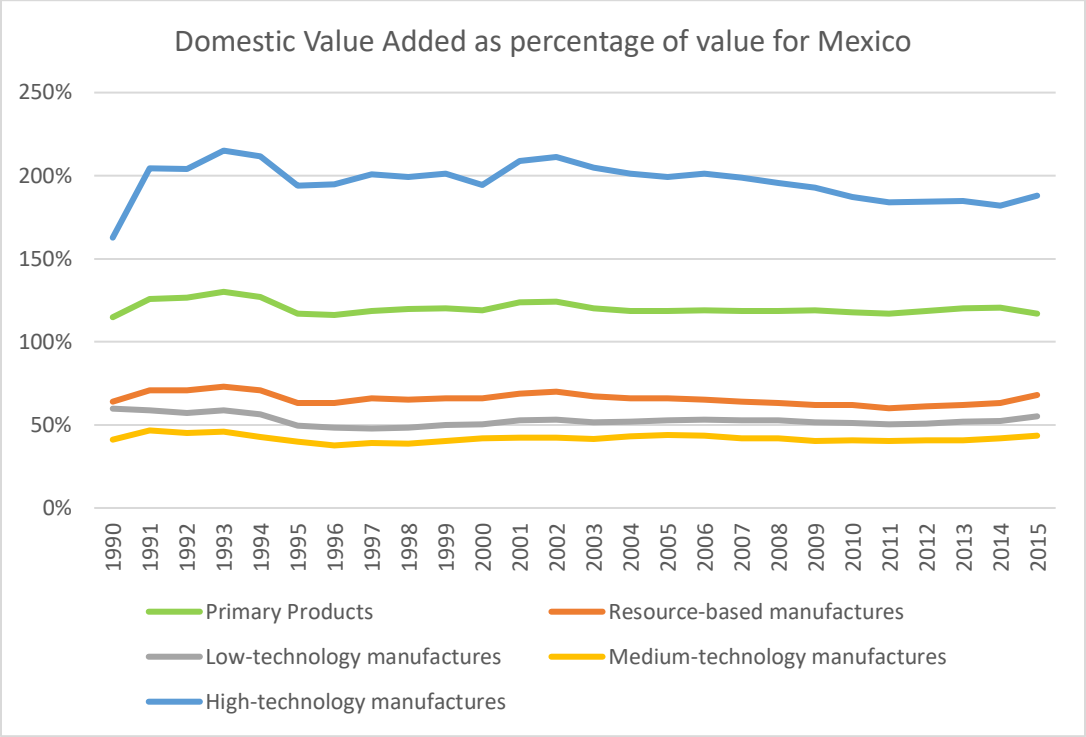
Figure 3.7.1




Calculations made by the author using EORIO's database.

Analyzing the main sectorial classification for exports, which according to the EORIO database has been the medium technology manufactured sectorial classification, which was responsible for generating more than 60% period thru the years analyzed, its value is only composed by a little more than 42% in average of DVA. In this sense, Mexico benefits with a little more of 4 dollars by every 10 dollars that the country exports, as other countries absorb 6 dollars of these 10 dollars exported. This sectorial classification has the lowest DVA composition of all the sectorial classification measured, because of this, the export-led growth strategy has not been beneficial for the Mexican productive structure. The country has a very concentrated export structure and the main sectorial classification in exports, which is the medium technology manufactured sectorial classification, is the sectorial classification that generates the DVA in its exports. Furthermore the two sectorial classifications which have the highest level of DVA

generated, the high technology manufactures and the primary sectorial classifications, have a low share in the export matrix, both of these sectors are composed more than 100% of DVA and both of this sectorial classification are able to have percentages higher than 100% because they have negative percentage contribution of intermediate components, this is due to the negative double counting terms that are negative.

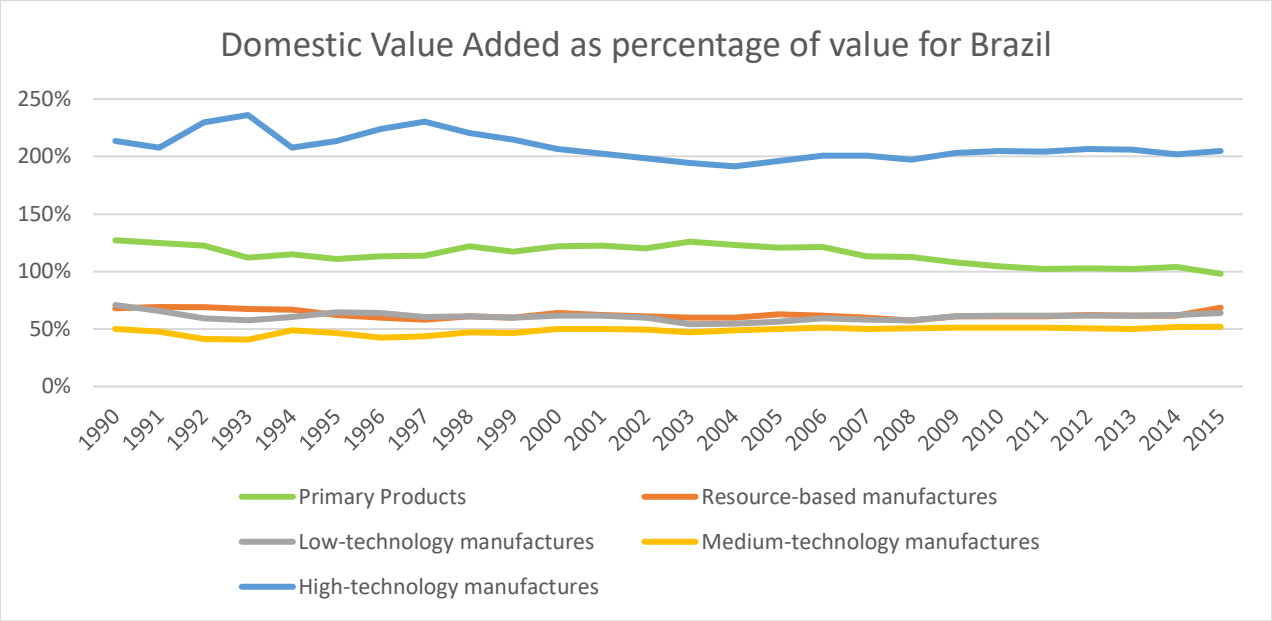
Instead of focusing on growing or maintaining the current export structure of the Mexican economy in which the medium technologic sectorial classification has the biggest share, there should be policies to target the growth of sectorial classifications which have a higher composition of DVA. Analyzing the generation of each of the sectorial classification to explore possible sectorial classification that can grow and improve the DVA share in exports, it can be seen that one of these sectorial classifications that can improve the DVA that Mexico generate is the primary goods, which in average has only contributed with 7% of the value of exports, it is important to note that this is not suggesting that the Mexico should solely focus on expanding this sectorial classification only. Furthermore, within the primary sectorial classifications there are induvial sectors inside the sectorial classification that generate high levels of DVA such as the mining and quarrying sector, which has 135% of its value comes from DV, and the agriculture sector, which has 96% of it is value. The value of the sector that this sector contributes to the economy is higher than other sectors, even though it has low technologic content. Another sectorial classification than can be expanded and would benefit the export composition of DVA is the sectorial classification resources-based manufactures, which is the second biggest contributor to exports and has a high generation of DVA as during 1990-1994, 70% of the value exported was DVA, which is higher than the percentage of medium technology manufactures sectorial classification.

Also, it is important to emphasize that within the sectorial classification of medium technology manufactures there are key sectors for generating DVA in their exports, for example the Transports sectors, which in average during the period studied was composed by 128% of DVA. Nonetheless, this individual sector contributes only 6% of exports of the value Mexico's export, this number is small if it is compared to the Electrical and Machinery individual sector, which its value is composed by 35% of DVA but contributes 13% of the export value. The high-technology manufactures sectorial classification is the exception of the group of Manufactures (high, medium and low technology manufactures) of the levels of DVA generation, but unfortunately this sector does not have a strong presence in contribution to exports, and its contribution to exports has been decreasing during the period analyzed, has been decreasing thru the period analyzed, in 1990 the sector contributed with 9% and in 2015 the contribution went to 6%, making it the second lowest sectorial classification in terms of contribution of exports.

### 3.8 Brazil's DVA generation

Brazil seems to have a more balanced export basket, as none of the sectorial classification surpassed 50% of contribution to exports according to EORIO data during the period studied. In general, there has not been a significant increase of DVA in all the sectorial classification analyzed, but it is important to note that there is also not a sectorial classification with less of 50% of value being composed by this DVA. In this sense, in average all exports good should benefit Brazil with more than half of the value staying inside the country.

Figure 3.8.1




Calculations made by the author using EORIO's database.

Nonetheless, according to the EORIO's data the sectorial classification with the biggest share of exports is the medium technology manufactures, which has become even bigger than the share represented by the resource-based manufacture sectorial classification which at the beginning of the period analyzed was bigger. Unfortunately, the medium technology manufactures sectorial classification generates the lowest amount of DVA and has maintained a stable level during the period analyze with no improvement. Meanwhile the resource-based manufacture sectorial classification seems like a useful tool to generate value from exports, as even though the sectorial classification has been losing its presence in exports, it has a higher content of DVA, that the low and medium manufactures sectorial classification. In this sense, focusing in this type of sectors is better for the productive structure of Brazil that any type of manufacture, with the exception of high technology manufactures. Another key sector would be to focus on developing the primary sector as it has the second highest DVA percentage of all the 5 sectorial classifications measured. The contribution of the sectorial classification Primary products sector of DV, has been

high compared to other sectors being higher than 100% for most years. The most important sectors for the sectorial classification are the Agriculture sector, which has contributed with 4% of the total value of exports, and of its total value, 174% is DVA, and the Mining and Quarrying sector, which is the sector that contributes the highest percentage of value to exports with 7% of the total value of exports, and is composed by 88% of DVA. Showing that these two sectors could be key to increase benefits producers obtain from exports for Brazil. These sectors play an important role in the composition of exports and growth, contributing with more than a tenth of the value of exports and improves the productive structure of the Brazilian economy.

## Conclusions

In this section there is analysis of what are the main findings achieved with these two different exercises.

For the case of Mexico, it was found that exports have not achieved the generation of jobs that demand high skill labor force, instead exports are able to generate low skill labor and can serve to complement the induction of general jobs in times when the domestic economy is not growing. But it is clear that in Mexico the expansion of the exporting sector has not resulted in increases of the Schumpeterian efficiency or improvements in the productive structure of the economy. It was also shown that for Mexico, the technological content of a sector is not related to the type of skill that such sector demands. Because of this, if the goal of policy makers is to improve the productive structure, in terms of increasing the overall demand for high skill labor then there should be an analyze of the usage of individual sectors of this type of skill for each type of final demand, as the production process of exports and final domestic demand use different type of skills.

It is also important to note that Mexico has focused on mainly exporting goods produced in the sectorial classification with the lowest content of DVA, in this sense Mexico has little benefit at exporting, and keeps less than half of the value of the final good. Because of this, it should be suggested to focus more on exporting goods from other sectorial classifications which higher DVA, which are any other than the whole Medium-technology manufactures. Another suggestion would be to expand individual sectors within each sectorial classification that stand out as generators of DVA. Using this approach there are possibilities that the DVA composition would benefit even from expanding individual sectors from the Medium-technology manufactures, but it

is incorrect to assume that the exports of any type manufactures will improve the productive structure of a country.

For the case of Brazil, it seems that to increase the labor demand for high skill exports are not very useful, but they are useful to compensate the demand low labor skill, which have been lowering thru the years, especially on sectors that have low technologic content. Furthermore, the manufactures also do not stimulate the demand of high skill labor, specially does manufactures that are exports. Again, if the goal of the policy makers is to induce high skill jobs, then it is important to focus on individual sectors, or focus on expanding domestic services in general, as this sectorial classification is responsible for the majority of the creation of this type of job. On the other hand, it is important to maintain exports that are good to generate low skill jobs which are not used in the domestic market.

If we analyze the generation of value by sector for the Brazilian economy, it is possible to observe that the Medium-technology manufactures is the sectorial classification which have the highest share in exports, in terms of value. Nonetheless, this sectorial classification has the lowest share of DVA in their value of exports from all the sectorial classifications analyzed. Considering Brazil's export structure, it could be possible to increase the resource-based manufacture exports to play a more important role, sectorial classification which DVA has a higher contribution of value than the medium tech manufactures exports.

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