Real wage convergence or non-convergence after the North American free trade agreement (NAFTA)

Case study of the manufacturing sector in Mexico and the United States

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"The promises of NAFTA were lost and it broke my heart"

(Anonymous)

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Acronyms

BEA	Bureau of Economic Analysis
ECE	Evaluation Committee of Experts
FPE	Factor Price Equalization
GATT	General Agreement on Trade and Tariffs
NAALC	North American Agreement on Labor Cooperation
NAFTA	North American Free Trade Agreement
NAICS	North American Industry Classification System
PROPICE	Industrial Policy and Foreign Trade
UNIDO	United Nations Industrial Development Organization

Abstract

The principle objective of the present research paper is the study of the impact of the North American Free Trade Agreement (NAFTA) on real wages in Mexico and United States. Our conclusions are that NAFTA did result in a significant divergence and not convergence –as expected- of real wages in the two countries; for both labor and capital intensive industries. In other words, convergence implies that real wages should fall in one country (United States) and rise in another (Mexico) relatively. For the purpose of our analysis, we present two different cases in the manufacturing sector. Firstly, we present real wages' movements per employee from the same sub-manufacturing sectors from Mexico and United States in labor-intensive industries. Secondly, we present real wages' movements per employee from different sub-manufacturing sectors from Mexico and United States, the former from labor-intensive industries and the latter from capital-intensive industries. The two samples introduced are part of our empirical research. The study period selected is from 1993 to 2010 (last data available) as to analyze real wage per employee movements during the NAFTA period. The database is provided by the United States Bureau of Labor Statistics and the Mexican National Institute of Statistics and Geography. As a corollary of our major objective on real wage movements, we made an assessment on Mexico's specialization patterns and export structure. This assessment is presented with regard to Mexico's NAFTA most important trading partner: United States, previously and after NAFTA period. The analysis is based on the theoretical framework of the doctrine of comparative advantage and factor price equalization theorem as to link trade and wages. In the particular case of Mexico this topic is of relevance because trade liberalization was materialized through the signature of NAFTA that came with expectations and promises of resulting in the increase of Mexican wages and raising the living standards of Mexican workers. On our personal point of view, we feel this is an important topic because it brings one essential aspect of the discussion in the academic area. Moreover, it gives an understanding of the impact of free trade agreements on real wages. Evaluating the promises and expectations that come from trade liberalization as a path to improve living conditions for the majority is mandatory in the development economics area. Mexico embarked on significant political and economic reforms at the beginning of the 1990s and is an essential trading partner of the United States, so the examination of the effects of NAFTA and its benefits to Mexican workers in the manufacturing sector should receive a deep assessment. Finally, this paper intends to contribute in a reflection of Neo-classical economics' ideologies and its underlying effects for developed and developing countries' trade relationships. If we only had more reflections thirty or twenty years ago about the effects of trade integration on wages recognizing the implications of skills differentials between developed and developing countries things might be rather different.

Keywords Real wages, convergence, manufacturing sector, trade liberalization, factor price equalization and labor studies.

Chapter 1

Introduction

The North American Free Trade Agreement (NAFTA) has its 20th anniversary in the year of 2014. The agreement created a common market for services, investment capital and goods between United States and Canada -as two major developed economies- and Mexico -as a developing economy. The agreement was signed up during a period of optimism. "The cold war period no longer existed and western fundamentals –including the ten economic policy prescriptions of the Washington Consensus- were adopted by most of the developing economies" (Oropeza 2005:68) including Mexico whom signed the agreement in November 1993, coming finally into force in 1st January 1994. As a consequence, "Mexico opened to trade reducing its commercial barriers and is now closely tied to the North America economy (United States and Canada) as at any point in its history" (Hanson 2003:1).

During the first years of the 1990s -previous to the agreement signature- supporters of NAFTA argued that this international agreement will bring benefits to Canada, United States and Mexico. Trade balance among the three countries will improve and growth and development will come as a result of NAFTA, according to some economic studies previous to NAFTA such as the Peat Marwick and Ciemex-Wharton economic studies. In addition, supporters of NAFTA claimed that real income will increase and labor will benefit with somewhat higher real wages -such as the case of the manufacturing sector in Mexico- and as a result incentives for illegal migration to the United States would diminish. Economic mainstream views throughout the 1990s also reflected a fundamental confidence about the conceptual origins and economic gains of the agreement. Two of the most important assumptions of supporters of NAFTA was that this agreement will create specialization and economies of scale in export goods and that Canada, Mexico and United States will all benefit from it by specializing and expanding its exporting sectors. As a consequence, this should provide higher wages and increase benefits to all workers. "Specialization will result in better resource allocation and enhanced investment and as in the specific case of Mexico; specialization, better resource allocation and increase in investment should increase Mexican wages and raise the standards of living of Mexican workers" (Malvido 1993). This idea is assumed in the theory of comparative advantage which indicates that specialization makes economies more competitive and the allocation of resources more efficient.

Twenty years since NAFTA went into effect the performance of the Mexican economy with the rest of the Latin American region cannot be more than disappointing, according to a working paper by the Center for Economic and Policy Research published in February 2014. The paper states that among 20 Latin American countries Mexico ranks 18th in terms of growth of real GDP per person. In addition, the report states that over the past 20 years, Mexico's per capita GDP growth of just 18.6

percent is about half of the rate of growth achieved by the rest of Latin America. In terms of inequality, by the year 2012 poverty rate in Mexico was of 52.3 percent –a figure almost identical to the poverty rate of 1994-. The report by the CEPR concludes that there are 14.3 million more Mexicans living below the poverty line than in 1994 the year when the NAFTA came into force.

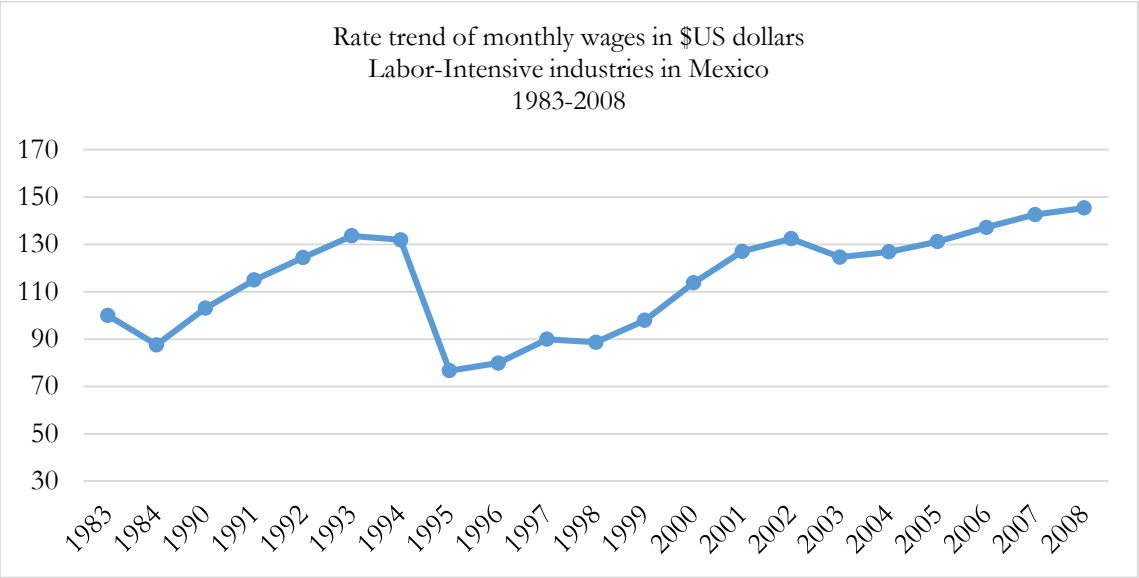
In August 2014, the official government report from the Mexican Federal government was presented. In this report the public organization Consejo Nacional de Evaluacion de la Politica de Desarrollo Social (National Council for the Evaluation of Social Development Policy, hereafter referred as the "public organization") which is responsible to generate objective information on the social political situation and poverty measurement in Mexico reported that income inequality has increased. The report indicates that 20% of the total population in Mexico has a sufficient income to acquire goods of the basic food basket, and shockingly, 51.6% does not have the sufficient income to have access to the most basic needs such as: health care, education, shelter and food.

To clearly outline the different faces of trends in wages in Mexico, we present two graphics as follows with the last data available by the World Bank as to show trend of wages in Mexico before and after NAFTA.

Figure 1. - Wage and salaried workers; total, female, and male in Mexico, 1990 - 2011

Source: World Bank Indicators (2014)

Figure 2. – Rate trend of monthly wages in $US dollars of Labor-intensive industries in Mexico, 1983-2008



Source: WDR2013 Occupational Wages around the World, World Bank Group

According to a report in 2003 by the Carnegie Endowment for International Peace about an assessment of jobs, real wages and household income in Mexico after trade liberalization policies took place through NAFTA[1] real wages are lower today than before NAFTA. The report explored the evolution of real wages in Mexico before and after NAFTA and it recognizes the decline on real wages cannot be solely accounted to NAFTA but other factors. As an example they make the observations for two periods of harsh decline in wages. The first one took place during the debt crisis of the early 80s and the second occurred as a result of the peso crisis in 1994. The two periods were characterized by a high increase in the cost of imported goods and inflation and Mexican government's monetary policies along with wage-setting policies, according to the authors, set up constraints to wages.

From this perspective, we must reference the recent work by Mexican economist Velasquez Zarate (2014), about Mexico's economic performance since NAFTA. The report indicates that between 1982 and 2012, the welfare of Mexican workers has been more than precarious and disappointing after the signature of NAFTA. The post NAFTA period has been characterized by low rate of formal jobs; wages and purchasing power severely diminished, and, an increasing socio-economic inequality and poverty.

[1] Audley, J., D. Papademitriou, S. Polaski and S. Vaugham (2003) 'NAFTA's Promise and Reality: Lessons from Mexico for the Hemisphere'.

Research Problem and findings

The main research problem of the present paper is to study the effect on real wages in Mexico after its integration to NAFTA. Firstly, as part of this research problem we test the theorem of factor price equalization as to know whether or not real wages in Mexico have converged to real wages in United States for the same sub-manufacturing industries (labor-intensive industries) and for different sub-manufacturing industries (labor and capital-intensive industries). Secondly, we study the export structure of Mexico previous and during post-NAFTA period; as to understand if Mexico has specialized in labor-intensive industries or if Mexico's export structure has passed through a significant shift from labor-intensive industries to capital-intensive industries after it joined NAFTA. Our findings and conclusions support the thesis that NAFTA has not resulted in a convergence of real wages in the two countries as expected by the Neo-classical trade theories. In other words, if had convergence taken place, real wages should have fallen in the United States and have raised in Mexico relatively. In addition, our findings demonstrate that Mexico did specialize mostly in labor-intensive industries, during the pre and post-NAFTA period.

Approach and Methodology

As for the methodology of the present research paper, we are presenting a first analysis with a sample of five sub-manufacturing sectors form the labor-intensive industries respectively from Mexico and United States. These five sub-manufacturing sectors are: (I) food manufacturing, (II) beverage and tobacco product manufacturing, (III) paper manufacturing, (IV) plastics and rubber product manufacturing and (V) machinery manufacturing. As to complement the same objective, a second analysis will be carried out using a sample of ten sub-manufacturing sectors. Five sectors belonged to the labor-intensive industries in Mexico and five sectors from capital-intensive industries in United States. For the labor-intensive industries in Mexico, we use the same sample as from the first analysis. For Unites States and capital-intensive industries we use the following sub-manufacturing sectors: (I) computer and electronic product manufacturing, (II) petroleum and coal products manufacturing, (III) chemical manufacturing, (IV) transportation equipment manufacturing and (V) miscellaneous manufacturing (medical equipment and others). The classification of these business establishments is in accordance to Sistema de Clasificacion Industrial de America del Norte's structure or "North America Industry Classification System" (NAICS) which was developed in cooperation by the U.S. Economic Classification Policy Committee (ECPC), Statistics Canada and Mexico's Instituto Nacional de Estadistica y Geografia, to provide an accurate and high level of comparability in

business statistics among the North American countries[2]. Using the methodology proposed the analysis on real wages for the same sub-manufacturing sectors in both countries and different sub-manufacturing sectors will approach the objective of determinate whether or not real wage convergence has taken place for the same and different industries based on our theoretical framework of comparative advantage and factor price equalization theorem.

Scope and limitations of the research paper

The presented research paper have several limitations. Firstly, since the scope of the methodology proposed is limited to only ten sub-manufacturing sectors from both countries this leaves space to further studies to present a broader sample (e.g. fifteen sub-manufacturing sectors instead of ten) or present a sample with different selection criteria (e.g. study of real wages in capital-intensive industries only). Therefore, the methodology proposed provide a response to whether or not real convergence has taken place in our sample, however, as mentioned these conclusions can possibly differ in another study which includes a broader sample. Secondly, since the research questions of our study are narrowed; the findings of our case study cannot shed light in other relevant questions such as why real wages in Mexico have not increased or in which aspects has NAFTA failed to provide better wages or higher incomes to Mexican workers (with particular focus in the manufacturing sector). Thirdly, our study is not focusing to explain why patterns of specialization take place and wage differentials. The focus of this paper is to test an existing theory as to provide evidence in the pattern of wage movements. In addition, the discussion of our findings are limited in regard to other aspects such as the legal protection for private corporations within NAFTA against the lack of legal protection and right to local workers in Mexico (e.g. right of workers to bargain collectively wages). In conclusion, our study can contribute to a very specific aspect of trade liberalization and real wages with a potential for broader discussion and development of further studies.

Relevance to Economics of Development Studies

This research topic is relevant to many dimensions of the area of Economics of Development studies. The topic of the present research paper intends to contribute to the debate about how neoliberalization policies are able to lead to economic growth without increases in aggregate social welfare and how these trends are exacerbated by free trade agreements. Economic growth is relevant as a determinant of wages and consumption levels and for most developing countries growth constitutes the principal avenue via which poverty and inequality can be reduced, as growth provides greater opportunities. In the case of Mexico, reduction in trade barriers and capital investment liberalization through the signature of regional free trade agreements such as NAFTA; have had an

[2] United States Census Bureau 'North American Industry Classification System'. Accessed 09/17 2014 <http://www.census.gov/eos/www/naics/>.

important impact in trends in real wages. Moreover, current low level of wages or incomes in developing countries such as Mexico is one of the major problems and of interest in the specific area of development economics as for policy makers. It is of my own academic interest to identify why problems of inequality and poverty still characterize countries like Mexico despite following the prescriptions of think tanks, the World Bank, and the IMF. I feel the topic of real wages in Mexico after its integration to NAFTA is an important academic topic because it is a debate that has been overlooked by policy makers in Mexico. It is a topic that brings different academic opinions and contributes to the debate of free market, neoliberalization policies, international integration, labor studies and low wages.

Chapter 2

Background

2.1 The economic structure of Mexico from 1960s to 2010s

The Mexican Miracle (1930s – 1960s)

From 1932 through 1962, Mexico was characterized by a significant economic improvement. Mexico's per capita gross domestic product (GDP) grew at a rate of 3.4% per year and Mexico's economy grew with rates averaging over 6% (Moreno-Brid and Ros 2009). During this period, "there was a commitment of industrial protection and a high level direct involvement of the government in many areas of the economy, such as: the promotion of the local industry, low levels of taxation and protectionist policies" (Baab 2004:78). Although, rapid industrialization was taking place due to the protectionist policies and a dynamic domestic market; problems in relation to competitiveness and access to a foreign market were consistent.

As a result, at the beginning of the 1960s, the Mexican economy began to show weak aspects. According to the Mexican economist Sanchez (2010), the most evident and crucial factor during the 1960s was that the economy was no longer capable of self-sufficiency. Savings from both public and private sector were not enough to finance the investment required in the country. In addition, the Mexican economy with its protectionist policies was not capable of generating foreign exchange required purchasing goods and services overseas turning out in a growing imbalance in the balance of payments. "The limitation in the Mexican economy at the end of 1960s was more than evident and it served as a catalyst for a change in the development model" (Sanchez 2010:187).

The new development model (1970s – 1980s)

"The real limitations that the Mexican economy at the end of 1960s became more evident in the decade of 1970s. Growth was leaner and the fiscal deficit went from 3.6% in 1972 to 8.9% in 1975 in GDP terms" (Sanchez 2010:190). These limitations played a catalyst role to create a change of Mexico's development model. As a new measure of development, the Federal government established the Instituto Mexicano al Comercio Exterior *(Mexican Institute for Foreign Trade)* in order to promote exports. However, the required exports target was not achieved, whereas imports maintained a strong momentum (Sanchez 2010:191). In 1976, the Bank of Mexico abandoned the foreign exchange market and the Mexican peso devalued for the first time after 22 years of maintaining its stable value. "The political crisis and the devaluation of the Mexican peso occasioned negative political and economic imbalances" (Merrill and Miró 1997). The strategy of growth implemented based on public expenditure and government intervention did not lead to positive results whatsoever.

After the discomfort and the mistrust that the devaluation of the Mexican peso caused. The government under Lopez Portillo's presidency launched a program with the aim to stabilize,

consolidate and generate growth. This government program was called Alianza para la produccion (*Alliance for production*, hereafter referred as the "program"). This program took place when one of the major oil reserves in Mexico and the world was discovered. The revenues generated by the sale of oil helped to remove the external restriction that the Mexican economy was facing. In addition, la Secretaria de Patrimonio y Fomento Industrial *(Minister of Heritage and Industrial Development)* launched the National Plan for Industrial Development. With this program, it was intended to follow the industrialization policies previously implemented in Japan and the policies that South Korea was following at that time. The objective was to expand the heavy industry through public investment as to ensure a new level of development. The high revenues resulted from the oil boom were intended to be used as a means to finance this new process of industrialization in Mexico.

As a result, the Mexican economy was again in the path of economic growth, both public and private investment flourished, but this time imports grew at a faster rate. In order to increase exports rather than imports, the Mexican government implemented new trade policies with the aim to allow the inflow and outflow of goods with fewer restrictions. The trade policy created the opposite effect and a result an increase in imports took place. The protectionist scheme that was implemented since the 1930s was weak and the imports of consumption goods increased rapidly. The program launched by the Minister of Heritage and Industrial Development with the aim to follow the industrialization policies of East Asian countries failed and revenues from oil to finance a new industrialization process in Mexico lost its objective. "The productive structure was not getting stronger but the boom in oil exports and an increase in public expenditure resulted in a growth rate of 7.8% in 1979 to 8.8% in 1980" (Sanchez 2010:194). Unfortunately, the speed in which the *"National Plan for Industrial Development"* program took place resulted in a tragic waste of economic resources and the fiscal deficit continued growing during the presidential period of Lopez Portillo (1976-1982).

At the end of 1982, the oil boom was no longer present and finances in the public sector were in trouble. This, along with Mexico's decreasing in international reserves forced the government to devaluate the peso during 1982. The devaluation further drove inflation and discouraged short-term recovery. "Cut off from additional credit, the government declared an involuntary moratorium on debt payments in 1982 and the following month it announced the nationalization of Mexico's private banking" (Merrill and Miró 1997).

The process of structural changes (1980s)

Amidst of the economic recession and the end of the Mexican Miracle period, the government was forced to initiate profound structural changes in the economy. The president Miguel de la Madrid (1982) had to reduce public expenditure, foster economic growth and stimulate exports to balance the national accounts. From 1985, the majority of the requirements of import permits and tariffs were either canceled or reduced and the protectionist scheme was eliminated. With this, "the government made a fundamental change in development strategy by reorienting economic policy towards trade liberalization" (Merrill and Miró 1997). From 1982 to 1985, most of the protectionist apparatus was removed and Mexico became a member of the General Agreement on Tariffs and

Trade (GATT). The institutionalization of structural changes toward an open economy was taking place. By 1982, 100% of imports were subject to protection measures such as import permits whereas in 1988 only 21% of imports were subject to import permits.

However, economic recession was so profound that imports were relative small in volumes. During 1983 to 1988, Mexico's GDP grew at an average rate of just 0.1 percent. Public consumption grew at an average of less than 2 percent. Total investment fell at an average annual rate of 4 percent and public investment at 11 percent. After 50 years of continuous economic growth from 1930s to 1980s, the economy in Mexico stopped growing.

"In 1989, the new president Carlos Salinas announced the national government development plan called Pacto para la estabilidad y el crecimiento *(Pact for Economic Stability and Growth)* with the hope to end Mexico's net capital outflows" (Merrill and Miró 1997). The program planned to achieve sustained growth by boosting private investment through the privatization of state enterprises and deregulation of the economy. Mexico's foreign debt was reduced from 95% to 29% of GDP by establishing a new agreement with its international creditors. "These announcements were soon followed by increased levels of capital repatriation and foreign investment" (Sanchez 2010:212). Overall, domestic borrowing costs were lowered, the banking system was privatized and the idea of a Free Trade Agreement with the United States was broached.

The signature of the North America Free Trade Agreement (1990s)

The institutionalization of structural changes towards an open economy that begun during the 1980s was finally consolidated under Carlos Salinas' presidency. "The signature of a Free Trade Agreement with the United States along with economic reforms brought the confidence back to the private investment sector" (Cardenas 2010:217). Privatization of some specific sectors (e.g. banks and telecommunications) and deregulation of sectors such as steel and cement were amongst these economic reforms.

An increasing optimism from the private sector gave support to the idea of a closer trade relationship with the United States through the signature of a Free Trade Agreement. Leaving behind a protectionist economic structure with import-substitution model as the economic development project, Mexico embraced a new path to trade, finance and capital mobilization. By 1991, negotiations formally started and free trade was the main core of the agreement between Mexico, the United States and, Canada. Elimination of trade barriers and investment, and the strengthening of intellectual property were part of the agreement. By 1993, both public and private sector supported the negotiations of what become the most important free trade agreement for Mexico (Cameron and Tomlin 2002).

Trade liberalization was carried out and it was the leading point of the new economic strategy of Mexico. As a retrospective, during the protectionist model (1958-1970), 57.2% of total imports were subjected to import licenses, this percentage changed to 74.1% during the period of 1971-1980; whereas in 1989 only 14.1% of total imports were subjected to import licenses and by 1993 (one

previous year when NAFTA came into place) this percentage was reduced to 10.7% (Cardenas 2010:218).

2.2 North American Free Trade Agreement: Trade integration and Labor cooperation

Trade Integration

NAFTA removed barriers to trade and investment in both goods and services between Mexico, Canada and the United States. Since 1994, all tariffs between the three NAFTA countries were gradually eliminated. "Half of the 9,000 NAFTA categories were eliminated immediately after the agreement came into force and other categories were eliminated from a period between two years as long as fifteen years" (Glick 2010:3). In the case of Mexico and its trade with NAFTA members, United States has more importance than Canada in terms of international trade. To understand trade between Mexico, United States and Canada it is important to observe the elimination and reduction of tariffs and trade restriction. Under NAFTA, Mexican manufactured goods received lower tariffs, with the largest cuts in apparel and textile industry. Most of these items were already duty-free under the Generalized System of Preferences which was terminated when NAFTA came into force on January 1, 1994. In the case of United States, tariffs were cut dramatically in agricultural and manufactured goods exports to Mexico.

Under NAFTA, the eligibility of goods for duty-free are determinate by different rules of origin and a tariff rate quota can increase the duty when certain levels of imports are reached. "The rules of origin were placed to ensure that assembly plants in Mexico are not used by other countries, as a platform from which to bypass barriers to the United States and Canadian markets" (UNIDO 1993:39). The elimination and reduction of tariffs were important to increase international trade between NAFTA members and specifically the case of Mexico and the United States the patterns of trade had increased substantially, as the case of the manufacturing sector.

Labor Cooperation

Labor issues are addressed in the labor side accord of NAFTA with a commitment of fair and open competition based on innovation and productivity with an adherence to labor law. The accord is known formally as the North American Agreement on Labor Cooperation (NAALC). "The intention of the parties in the Agreement on Labor Cooperation is to pursue a set of general objectives that aim to complement NAFTA by promoting the improvement of working conditions and living standard in all three countries" (Glick 2010).

According to NAALC's classification, these labor principles are aimed to address issues and goals related to labor matters. Therefore, each NAFTA member is committed to promoting specifically the following labor principles;

1. Freedom of association;
2. The right to bargain collectively;
3. The right to strike;

4. Prohibition against forced labor;
5. Restrictions on labor by children and young people;
6. Minimum employment standards;
7. Elimination of employment discrimination;
8. Equal pay for men and women;
9. Prevention of occupational accidents and diseases; and
10. Protection of migrant workers.

These principles are enforced by the Commission for Labor Cooperation which is a tri-national commission created to facilitate the objectives of the Accord in a cooperative and consultative manner (Glick 2010), as well as for independent evaluations and dispute settlement related to the enforcement of labor laws (Devlin et al. 2003).

The NAALC remains the most challenging link between labor rights to trade agreements. Its purpose is to ensure access to "fair, equitable, and transparent" mechanisms for enforcing their labor law and to obligate the parties to enforce their own law. However, "the labor accord failed to harmonize labor standards in the three NAFTA's member countries, and by ruling out the establishment of multinational judicial processes or appeal procedures" (Glick 2010:8).

Within the structure of NAALC, the National Administrative Offices (NAOs) were created in each signatory country to address instances of non-compliance. In addition, the labor accord sets out no standards regarding how labor ministries in the three signatory states (Canada, Mexico and United States) should design programs to address cases of non-compliance with NAALC obligations. The accord permits the establishment of an outside panel of experts known as an Evaluation Committee of Experts (ECE) and an arbitral panel to address non-compliance with the obligation to enforce certain NAALC labor principles. However, three fundamental labor rights –the right to bargain collectively, freedom of association and the right to organize- cannot be brought before an ECE.

As a result, the governments of the three NAFTA's members can ignore or failed to include issues in government-to-government talks, or included them in bilateral discussions but established no mechanism for remedying the problems identified.

2.3 Understanding promises of NAFTA

"Not only is factor-price equalization possible and probable, but in a wide variety of circumstances it is inevitable. Specifically: So long as there is partial specialization, with each country producing something of both goods, factor prices will be equalized, absolutely and relatively, by free international trade"(Samuelson 1948)

"In the specific case of Mexico; specialization, better resource allocation and increase in investment should increase Mexican wages and raise the standards of living of Mexican workers" (Malvido, P.L.B. 1993)

The theorem of factor price equalization by Samuelson (1948) comes from the theory of comparative advantage and the Heckscher-Ohlin model. In a very straightforward fashion, the propositions of factor price equalization had been widely accepted in part of the economic literature as the most

appropriate model of trade to explain the link between trade and wages. As a result, the underlying propositions of this theory have been subsequently conveyed to political economic practices. In the case of the Heckscher-Ohlin model of comparative advantage this theory assumes that unskilled labor is abundant in developing countries and skilled labor is abundant in developed countries and as a result it provides an accurate description of patterns of trade between the North (developed region) and the South (developing region).

Hence, the theory of comparative advantage and factor price equalization assumes that trade integration among developed and developing countries should take place and lead to a narrow in the gap between the skilled (developed region) and unskilled (developing region) wages. There is of course a broad literature against the propositions of the Heckscher-Ohlin model and Samuelson's theorem as the work of Wood (1997) that critics the flaws of the wisdom associated to the conventional international trade theories that predicts that trade integration with developed countries will lead to gradual elimination of wage inequality in the developing countries. When all these theoretical assumptions and expectations are translated in the political economic arena their consequences can be measured by empirical evidence of changes in factors of production such as the factor of production of labor: real wages. Therefore, it is important to understand first how the doctrine of comparative advantage and factor price equalization guided policy makers at the time of the agreement by Mexico to sign NAFTA. And secondly how the economic ideologies were translated to the political context and how under these assumptions NAFTA was consolidated. Therefore, the political context and the economic arguments that support the opening of trade of Mexico through NAFTA can be understood by the assumptions of the Neo-classical theoretical framework that lead to lock Mexico's most important free trade agreement.

As discussed in the background section of our paper, liberalization measures in trade were a substantial part of the Mexican government at the end of the 1980s when Mexico was trying to manage the impact of the economic crisis during the period of 1982-1987. During Mexico's period of liberalization policies; public and private sector along with officials unions between Canada, Mexico and United States began a series of economic paths that led to the signature of NAFTA. "Mexican policy makers numerous links with United States' academics institutions and government officials, favored the adoption of a liberalization strategy negotiated jointly by the government, union officials and the private sector", according to the view of the Mexican economist Dussel Peters. However, the author states "only government-friendly unions were deemed to negotiate with private sector firms and the government whereas other unions were marginalized" (Dussel 2003:244).

The structural changes that were taking place in Mexico reconfirmed the commitment of the government to limit its participation in the market and reducing its direct intervention in economic productive areas. One of the main economic and political objectives of NAFTA was to create sustained economic growth in Mexico such as workers could see an increase in their wages and number of employments. The opening of trade and the opening of Mexico's domestic market to international competition were part of this new commitment. Economic liberalization and the

opening of the borders were the main channels to reach that goal. "Globalization makes necessary to interrelate the global economy to achieve full utilization of the comparative advantages of our country, with the aim to ensure the profitability of investments, employment creation and a sustained raise of living standards… the opening of trade favors employment and income redistribution… NAFTA is a powerful instrument to attract investment, generate productive employment and to improve the welfare of the Mexicans" (Salinas. 1992).

Carlos Salinas served as the 53rd President of Mexico. During his presidency, the negotiations of NAFTA were strengthened and structural changes will be completed under his presidency where the government supported substantially the establishment of the free trade agreement. Long-term benefits from NAFTA were under doubt. For NAFTA's promoters the treaty was a magic formula that would place Mexico in the club of the richest countries, whereas for its detractors it was a Trojan horse that would bring the economic catastrophe (El Universal 2003). In 1994, the United Nations Industrial Development Organization (UNIDO) presented a report about NAFTA's effects in structural changes in the export sector in Mexico. In this report the international organization stated that the Mexican industry, with its comparative advantage in cheap labor, will surely stand to gain from NAFTA especially in the early years of the arrangement. One of the reasons for this argument by UNIDO were the immediate removal of quota restrictions between Mexico and United States especially for labor-intensive industries such as the textile and apparel industry. Mexico's proximity to United States 'market, low wages based, and the entry of new job seekers into the labor market (abundance of unskilled labor) were clearly Mexico's comparative advantage as a player in labor-intensive industries.

However, supporters of NAFTA, such as Carlos Salinas' presidency argued that trade liberalization will help Mexico to catch-up with its Northern neighbors and to provide higher real wages and improve Mexican worker's living conditions. The expectations from the Mexican government in relation to NAFTA were clear; Mexico would improve investment, boost export growth, diversification in trade, create jobs in higher-skills industries, increase wages and reduce poverty rates. As noted in Villarreal's book (2010) a report delivered to the Congress of United States stated that NAFTA was expected to narrow the income differentials between Mexico, United States and Canada. "NAFTA was seen by its supporters as a magic formula which will solve Mexico's economic problems where the consequences of international trade would lead to favor unskilled intensive goods; increasing the demand for labor in labor-intensive industries thus causing the wages to increase" (Moreno-Brid 2009:195).

NAFTA was seen by Mexican policy makers as part of the globalization process and part of a new development path for Mexico. Policy makers in Mexico put their stakes in the ideology that complementing developed and developing economies into a free trade agreement will provide further specialization for each of the countries involved resulting in their stimulation of production and exports. Therefore, if Mexico was able to increase its exports through specialization and resource

allocation, we should see as a result an increase in wages in export industries in Mexico whose production requires intensively Mexico's abundant factors of production. The complementarity of economies with different characteristics such as wages and factors of production should lead to the benefit of all the countries involved when having trade integration.

By 1996, the idea of what is Mexico's comparative advantage was clear. Mexico should open itself to trade, it should specialize as to enhance exports and be able to reduce wage discrepancy between United States and Mexico's wages. The government program for Industrial Policy and Foreign Trade (PROPICE) was launched with the aim to improve private entities' perform that were seen as a priority by the Mexican government. Export industries such as textiles, footwear, electronics, appliances and canned foodstuffs were part of this program which are oriented towards labor-intensive industries or Mexico's comparative advantage. One of the examples by NAFTA's supporters and the benefits of a higher integration of Mexico with the United States' economy were the expectation to "cause a process of convergence in incomes similar to that which took place in countries such as Spain, Ireland and Greece after their entry into the European common market" (Moreno-Brid 2009:198).

The support for the globalization process taking place at the end of the 1980s along with the takeoff of NAFTA concurs ideologically with the theory of comparative advantage that each country should specialize and produce products in those activities where certain factors of production are abundant in comparison to other countries. In an economic analysis released in February 1991 by the Mexico-United States Business Committee concluded that a free trade agreement will be a substantial "win-win" proposition for both Mexico and United States. With the assumptions of a win-win relationship and gains from trade; Mexico and United States reinforced their international relationships through the signature of NAFTA.

"The prospects from the three members of the international treaty were to fortify the competitiveness of their companies, encourage innovation and to improve the working conditions as well as Mexican employees' living standards" (Akaki 2009:117). Therefore, gains from trade are expected to take place through trade liberalization and by exploiting the comparative advantage of each country as a channel -where according to the Heckscher-Ohlin model- countries should specialize and as the factor price equalization theorem states factors of production including real wages are expected to converge.

2.4 Remarks of Mexican economic history

The last decades of economic history in Mexico witnessed profound economic transformations and a break in the trend of economic growth. Since 1930s, Mexico achieved having a rapid growth in economic activities that were reflected through poverty's reduction. Although, in the 1980s, the economy fell into a severe crisis but at the end of that decade the recovery of the crisis was stronger and gave birth to a long transition process characterized by structural reforms at the politic and economic level. This transformation led to the creation of a new development model and the

protectionist policies that resulted in sustained economic growth no longer persisted. Carlos Salinas' presidency setup a new period of reforms in accordance to the tendencies of liberalization and opening up of economies following the Washington Consensus' orders. The institutionalization of trade liberalization through NAFTA modified the economic panorama of Mexico.

Chapter 3

Literature review

According to the neo-classical theory of international trade, when there is no intervention in the economy by the government and trade liberalization takes place, the productive sources should be originated from each country's comparative advantage. Based on this understanding and in the specific case of developing countries which are abundant in low-skilled labor, their comparative advantage relies in labor-intensive industries. Therefore, when the reduction of trade tariffs takes place through the establishment of free trade agreements, developing countries should boost their exports from labor-intensive industries which as a result it should lead in a higher demand of unskilled labor and hence an increase in real wages.

3.1 Theory of Comparative advantage and factor price equalization theorem

The role of trade and specialization in the process of economic development is essential for both developed and developing economies. According to the neo-classical theory, it is argued that trade liberalization policies can enhance economic growth in developing economies "with trade liberalization or the opening of trade, competitive producers can respond to opportunities of trade in each country" (Evans and Evans 1989). To understand international trade, one of the most important principles is the theory of comparative advantage. In principle, this theory indicates that patterns of trade and an equilibrium in terms of trade is determined by relative labor inputs and technical conditions in each country. "In the case of two countries producing two goods under free conditions the theory of comparative advantage states that trade equilibrium means a more market-oriented approach where there is no control of production and interference in prices" (UNIDO 1986:1).

Following this premise, the two countries producing two goods have differences in relative autarkic prices (a situation in which a country does not engage in trade) and factor endowments ratio (a country's stock of factors of production) which can constitute a country's comparative advantage. Based on this theory, the opening of trade will lead to the country with a comparative advantage in labor-intensive industries to export manufactured goods, whereas the country with resource intensive industries will export manufactured goods with the use of higher technologies. Thus, when there are two commodities, a country will export the commodity which intensively utilizes or embodies the abundant factor. Based on these assumptions, the theory of comparative advantage should expect developed countries specializing in capital-intensive industries where the use of capital is higher than the use of labor and should expect developing countries to specialize in labor-intensive industries where the use of labor is higher than use of capital. Originally, this theory is known as the Ricardian model of trade.

In addition, the Heckscher-Ohlin model -which is also part of the theory of comparative advantage- can be distinguished from the Ricardian Model in several important aspects. In the Heckscher-Ohlin model, the production function is identical in all countries (technologies are universally available), real marginal productivity of the production functions (labor and capital) depend on the ratio in which they are combined and there is an absence of economies of scale (factors that cause the average cost of producing a good to decrease as the volume of its output increases). Under the assumptions of the Heckscher-Ohlin model, the principle of comparative advantage depends only on the relative endowments of different countries. Whereas, in the Ricardian model, trade occurs because countries use their technological comparative advantage in order to specialize in the production of specific goods.

In general terms, the theory of comparative advantage states that trade occurs because countries have different resources. As a result, a country endowed with labor in relation to capital will have an advantage in labor-intensive goods, whereas a country where labor is scarce in relation to capital, will have an advantage in capital-intensive goods (Hirsch 1978:67). Therefore, the theory of comparative advantage assumes that the economy will be more competitive and the allocation of resources will be more efficient (Lopez 2014:4). International trade and the specialization in production of goods must benefit all trading countries.

The Ricardian model is named after the English economist David Ricardo, one of the great classical economist in the period of the 19th-century and the Heckscher-Ohlin model is named after the Swedish economists Eli Heckscher and Bertil Ohlin who further developed the ideas of international trade in 1920s.

As previously mentioned, the theory of comparative advantage is one of the most important theories in international trade and is interconnected with diverse areas of economic analysis, ranging from patterns of international trade to industrialization strategies. According to the view of Industrial Development Organization in the United Nations (1986) "the relaxation of restrictions on world trade should lead to a reallocation of resources, bringing production and trade structures better into accord with underlying patterns of comparative advantage". The signature of NAFTA is a significant example of trade liberalization policies and reduction of trade tariffs among developed and developing countries. This agreement enabled international integration and trade amongst its trade members (United States, Canada and Mexico), and as a result, trade flows have significantly increased at unprecedented rates since mid-1990s. Balance of payments have drastically changed and reallocation of resources have taken place in response to the multiple possibilities of trade liberalization and international exchange of goods. The theory of comparative advantage paved the way and served as a guidance for policy makers with regard to NAFTA's benefits such as the aspect of specialization in productive areas where factors of production are more abundant.

3.2 Factor price equalization theorem

Following the theory of comparative advantage, Mexico's structure of production and trade should be in labor-intensive industries because Mexico's more abundant factor of production is labor rather than capital. Whereas in the case of United States -Mexico's major trading partner- should specialize in capital-intensive industries since the former is more abundant in capital rather than labor. Under these assumptions and within the context of NAFTA, Mexico should have more growth opportunities based on the improvement of its comparative advantage by specializing in labor-intensive industries and in the case of United States should have more growth opportunities in capital-intensive industries since it is more abundant in capital than labor.

Following the assumption of this theory, Mexico's reduction of trade barriers -through NAFTA- and its specialization in labor-intensive industries should have as a result higher labor demand and therefore an increase in real wages. Subsequently, United States' labor-intensive industries should see a reduction in its production and demand of labor since Mexico is exporting more low-skilled products to United States. As a result, low-skilled labor is less required in United States producing wages to fall in labor-intensive industries.

But what are the factors that determine price (wages) differences according to the theory of comparative advantage? The Heckscher-Ohlin theory of international trade tries to provide an answer to this question. One of the theorems that arise from this model is the factor price equalization theorem. Following the dictionary of Economics Oxford (Black 2002:170) categorization, factor price equalization theorem refers to a tendency in international trade to reduce international differences in relative factor prices. Factor prices refers to prices of the services of factor of production. As for example, for labor the factor price is the *appropriate wage rate*; for land, *the rent paid*; and for capital, *the interest rate*. Its central proposition is that factors of production (e.g. wages, rent and interest rate) should converge when countries with different factors of endowment (e.g. capital, labor, technology) engage in international trade.

Factor price equalization considers different panoramas. It states that when there are no transport costs and no restrictions in international trade between countries, complete factor price equalization can take place. In the opposite case where there are transport costs and restrictions to international trade, trade can only result in reducing international factor price differences but not in a complete factor price equalization. In case of perfect mobility, factor price equalization theorem suggest that "growth in sectors such as manufacturing, which is mostly labor-intensive industries in mainly developing countries such as the case of Mexico, would achieve a greater reduction of poverty than, for example growth in high-tech manufacturing or utilities, which are less labor-intensive" (Gutierrez 2007). Considering that factor of labor; wages should increase as a result of Mexico's specialization in labor-intensive industries.

As a result, the theory of comparative advantage and factor price equalization theorem serves in prescription and provision of guidelines on resource allocations' policies and trade ((United Nations Industrial Development Organization 1986)UNIDO 1986). Based on the principle that international comparative advantage is an important determinant of production and trade, issues relating to specialization and factor prices can diverge between developed and developing countries. In most developing countries trade balances reflect comparative advantage in labor-intensive industries such as the manufacturing sector. Although, their relationships with their trade partners can sometimes reflect changes of international trade patterns over time. Thus, successive stages of comparative advantage in the course of economic development of developing countries can also take place according to the view of UNIDO (1986:37).

Generally, the Heckscher-Ohlin model indicates that countries should specialize in the production and export of goods whose production requires large inputs of their more plentiful factors of production, and import part or all of their requirements of goods of their scarcer factors. According to this model, import of goods intensively in scarce factors lower the demand for them, and therefore their factor prices (wages). On the other hand, exports have the opposite effect by raising the demand for, and thus raising the price (wages) of, abundant factors. As a result and according to the Heckscher-Ohlin model and factor price equalization theorem, international trade should result in convergence of relative factor prices (e.g. wages, rent and interest rate) between developed and developing countries.

3.3 Critics to comparative advantage and factor price equalization theorem

As a conceptual framework, the theory of comparative advantage assume either constant unit cost (in Ricardo model) or increasing unit cost (in Heckscher-Ohlin model). Both models present factor endowments as "God-given natural phenomena" (Singer 1990) such as natural resources and weather conditions that are said to determinate a country's comparative advantage. In the Ricardo model, different countries have different production functions, but the same factor endowment with a single factor; labor. In the Heckscher-Ohlin model, production functions are the same everywhere but factor endowments vary between countries. However, the general view of those against the theory of comparative advantage have indicated that (Young 1928, Singer 1990) with the growing importance of science and technology, the capacity to form human capital and the increasingly relation between expenditure on research and development, comparative advantage has become something created and manipulated. It is not a "God-given natural phenomena" (Singer 1990) anymore.

Research and development expenditure and human capital formation are cases of activities that the role of the government is crucial to influence, shape international competitiveness or increase comparative advantage of certain industries. Economies of scale and increasing returns play an important role in this process and both concepts are not considered in the doctrine of comparative advantage. This view is also supported by Allyn A. Young (1928) who stated that economic progress does not depend in comparative advantage, but from the formation of specialized human capital, where there is an interdependence between specialization and market. Complementing this critique,

Singer (1990) stated that "the line of specialization are determined by those who are first in the field, those who have the new technology, and those who can capture a larger market". Therefore, those countries whose factors of production do not give them a certain comparative advantage, it can be improved by better technology and innovation, giving them an opportunity to move forward and be capable to shift significantly from labor-intensive industries to capital-intensive industries. As for example, skilled manufactured goods produced in one developed country can eventually be produced and also improved by technology and innovation in countries with less abundant skilled labor. Differences in comparative advantage have little to do with who produces what. If proper and correct designs and applications of trade policies are made to enhance countries' to move from low-skilled specialization to high-skilled specialization, then comparative advantage is not natural given but manipulated.

Following (Singer 1990, Young 1928), the economic concept "learning by doing" is another argument and critic to the theory of comparative advantage. Both authors stated that comparative advantage can also be reduced or improved by reducing production costs. As for example, the concept of leaning by doing explains how expenditure on research and development can change the comparative advantage of countries by improving productivity due to the experience of operating a process. As an example of this critique, there is the case of labor-intensive industries such as the textile sector which utilizes labor intensively. However, this sector can be shifted to automated textile plants reducing the use of labor and intensifying the use of capital.

Therefore, and as contradiction of the theory of comparative advantage, countries' with comparative advantage in certain industries cannot be solely determined by its relative factor endowments, but on a number of other factors (e.g. capital, research and development). In other words "a country can developed comparative advantage in an industry of its choice" (Shafaeddin 2000). Therefore, when the principle of comparative advantage is dominant in the theory of international trade, alternative hypothesis such as technical progress, learning by doing and economies of scale seems to gain further importance as they present a close interpretation of real trade activities between developed and developing countries. As the contributions of Hesse (1978), the author stated that economies of scale may be more appropriate to explain the structure of imports and exports (trade specialization) and that countries with a larger home market and with the opportunity to produce on a large scale have comparatively higher productivity and cost advantages.

3.4 Skills Differentials

As previously mentioned, human capital can be a decisive factor to determinate a country's comparative advantage irrespective of its factor endowments. However, the theory of comparative advantage does not predict how economies will react in practice when there are differences in skills between two countries who are engaged in trade such as the case of Mexico and United States through NAFTA. The Heckscher-Ohlin model assumes that labor is the same in developed and developing countries. However in practice, developed and developing countries differ in their skills. Therefore, one of the flaws of the doctrine of comparative advantage theory is that it presumes that all labor is

homogeneous. Based on this assumption, skills in both Mexico and United States is homogeneous. This aspect is of high relevance because one of the central propositions of the theory of comparative advantage and factor price equalization theorem is that international trade should lead factors of production to converge. Hence, after reduction of trade tariffs factor of labor: wages, should relatively fall in capital-intensive industries and should relatively rise in labor-intensive industries as to finally converge. However, the theory of comparative advantage does not specify the differences on wages for skilled labor and wages for unskilled labor. Skilled labor should have relative higher wages than unskilled labor.

The doctrine of comparative advantage states that countries should specialize in the production and export of the goods where its relative cost are lowest and factor of production are more abundant. Following this assumption, we should not only see a rise in the demand of unskilled labor and wages in labor-intensive industries but also a rise in the demand of labor and wages in capital-intensive industries. Based on this, it could be expected that the United States with abundant skilled labor tend to export high manufactured goods from capital-intensive industries increasing the employment of labor and wages in that sector. While at the same time it can be expected that United States imports low-skilled manufactured goods from Mexico, a country where the unskilled labor is abundant, and therefore more labor is required for labor-intensive industries in that country resulting in an increase in wages. Under these circumstances where wages from capital and labor-intensive industries are rising, we cannot expect wages to converge but on the contrary; we should expect to see wage differentials between the two countries to rise relatively to one to another.

This is a contradiction to the Neo-classical trade of theory because the argument is that wage differentials should converge. Trade liberalization should lead countries with abundant unskilled labor to further specialize in labor-intensive industries where they have comparative advantage, increase their exports, have a higher demand on labor and raise wages. In the specific case of Mexico and United States, the meaning of this trade theory is that trade integration through NAFTA is supposed to bring real wages' convergence. However, when taking into consideration the differences in skills between the two countries, real wages' convergence cannot be expected since the demand for labor in capital-intensive industries in United States should rise along with labor-intensive industries in Mexico after the strength of exports. This as a result brings a wider gap of wage differentials between the two countries. Why then the doctrine of comparative advantage assumes that there will be a relative decrease in wages in capital-intensive industries in United States when the same doctrine assumes that developed countries are abundant in capital and skilled labor? We should not expect to see a relative decrease in wages for skilled labor in capital-intensive industries after trade liberalization leads an increase in production in high manufactured goods, such as the case of the United States. Skills between developed and developing countries constitutes a practical aspect as to understand trade of patters and wage differentials. Labor is not homogeneous between Mexico and the United States and the recognition of skills differences are of high relevance as to understand that there cannot be a factor price equalization area without the condition of having the same type of

labor. Unfortunately, the factor price equalization theorem assumes that labor has the same quality both in Mexico and the United States. The aspect of wage differentials is not discussed and explicitly explained by one of the most important Neo-classical theories of trade.

Overall, empirical analyses of patterns of international trade (Evans and Evans 1989, Singer 1990, United Nations Industrial Development Organization 1986) argue that the theoretical model of comparative advantage poses severe restrictions and limitations to explain empirical evidence. This for the reason that with time it is expected that countries will increase its comparative advantage in relation to more capital intensive, more skilled intensive and the production of more sophisticated goods. As observed in the literature, there is no consensus amongst economists regarding the underlying role of the principle of comparative advantage and some questions remained to be answered. Although the critics, the doctrine of comparative advantage has a significant importance for trade guidance and specialization patterns which are part of trade policies and economic development.

3.5 Comparative advantage and factor price equalization in developing countries

The law of comparative advantage states that the gaining in a given industry by one country or a group of countries is usually accompanied by the loss of competitiveness by that industry in one country or a group of countries. "In other words, patterns of industrial growth and international division of labor can be applied to the decline of certain industries in developed countries and the rise of these industries in developing countries" (UNIDO 1986:62). In the case of developing countries, labor-intensive industries are modest in their requirements of sophistication and technology inputs. And from the point of view of comparative advantage, industrial countries have an advantage in capital-intensive goods whereas developing countries have an advantage in labor-intensive goods. The manufacturing sectors related to labor-intensive industries can range from textile, chemicals, woodworking, and thread, among others. These industries are usually known as early-stage type industries and its competitive position according to UNIDO (1986) became stronger during the decade of 1960s and 1970s in developing countries.

In the 1970s, more than half of the population in developing countries were drawing their income from the application of labor-intensive industries (Ritter 1978:48). In 1973, in a paper named "Appropriate Technology" the Secretary General of the United Nations stated that: "The developed countries will assist developing countries in identifying technologies which are appropriate for their circumstances and in avoiding the utilization of scarce resources. The development of these new technologies are appropriate for the particular conditions of developing countries; raw material resources, labor supplies, climatic conditions, and the level of social and economic development" (Scheper 1974:438). The reports presents empirical findings about international comparative advantage in manufacturing in both developed and developing countries.

However, developing countries are characterized by relative scarcity of capital and relative abundance of labor. The developing countries offer mainly labor-intensive goods which mostly relies on the differences between the developing and the developed countries' wage levels. This widely accepted fact, that the supply of unskilled labor relative to skilled labor is much larger in the developing countries than in the developed countries fits with the law of comparative advantage. And according to the factor price equalization, trade between developed and developing countries should have as an outcome the convergence of wages between labor-intensive industries in the developing countries and capital-intensive industries in the developed countries. So the greater absolute advantage of the differences in wage levels is, the more labor-intensive exports prevail.

From the point of view of comparative advantage law, sources of supply (e.g. natural resources) are often located in developing countries. As argued by Lemper (1978) local demand in natural resources in developing countries has been small and its availability can be directed and used in foreign markets. In this way, the Ricardian model in the law of comparative advantage distinguishes developing countries as suppliers of minerals and other natural resources as contrasted to developed countries where natural resources are scarce. As a result, labor-intensive industries which requires abundant natural resources and labor will be located in developing countries.

In this sense, "the direction of trade will be from the developing countries to the developed countries through some specific goods while also some goods will be traded in the opposite direction" (Lemper 1974:67). Overall, it can be argued that the law of comparative advantage can be related to several examples in patterns of trade and specialization of developing countries in different sectors such as: textiles, construction materials, metal products, and electrical appliances, plastic and synthetic materials, amongst others. The conclusions of the law of comparative advantage have pessimistic implications for developing countries. "The Heckscher-Ohlin model divides the patterns of international trade of manufactured goods between labor and capital intensive goods, and it implies that developing countries can expect to develop a comparative advantage in labor-intensive goods" (Hirsch 1974:78).

From this point of view, the model designates developing countries to have an advantage in their labor-intensive industries from which they endowed abundant factors of production. This view is supported by Lorenz (1974) who makes very clear this idea in which he argues that comparative advantage law suggest that within the process of industrialization, the developing countries are equipped mainly with labor intensive goods and its gross structure of exports depends on the differences in the wage levels between the developing and the developed countries.

The greater the absolute advantage of the differences in wage levels is, the more labor-intensive exports prevail. These conclusions are important as a way to reflect in the impact of comparative advantage law in the process of policy making in developing countries and its consequences in the long term. As (Chenery and Hughes 1972) made this point perfectly clear: "the long run implications for developing countries is to repeat the twentieth century pattern of international division of labor, with a surplus of labor-intensive products competing for limited markets, and declining income terms

of trade". At this respect, Lorenz (1974) suggest that labor-intensive industries are the platform as to enter the international market, although income from these activities should be invested in changing the structure of developing countries' exports.

Undoubtedly, the long term consequences should be of higher importance to policy makers, especially in the case of developing countries such as Mexico, where its comparative advantage through the signature of NAFTA should result in rapid growth of labor demand and an increase in wages, according to the neo-classical theory of international trade.

3.6 Theory of comparative advantage and factor price equalization: Mexico and United States after NAFTA

According to the Heckscher-Ohlin theory of international trade each country exports the product which makes intensive use of whatever production factor it has relative abundance of and imports the other. According to this theory, Mexico with a more abundant unskilled labor should specialize in labor-intensive industries, whereas the United States with more abundant skilled labor should specialize in capital-intensive industries. In addition, one of the theorems of the Heckscher-Ohlin theory of international trade is the theorem of factor price equalization which indicates that international differences in relative factor prices between two countries should be reduced as a consequence of removing most restrictions to international trade under the assumption of having different transportation costs.

Following the theorem of factor price equalization, the result of removing barriers to trade in both goods and services through the signature of NAFTA in the year of 1994 between Canada, Mexico and United States would have as a result Mexico and United States' international differences in relative factor prices would be reduced. Since the supply of unskilled labor is abundant in Mexico, exports to the United States should come mainly from the labor-intensive industries and exports from United States to Mexico should come mainly from capital-intensive industries where supply of skilled labor is abundant. This, according to the theorem of factor price equalization, should have as a result a convergence in factor prices differences.

More specifically, the theorem of factor price equalization indicates that it should be expected that the factor price of labor -which is the appropriate real wage - should be reduced in the labor-intensive industries in the United States and the factor price of labor –real wage - should be increased in the labor-intensive industries in Mexico. As a result, the convergence of real wages in labor-intensive industries, respectively Mexico and United States, should take place after the removal of trade barriers through the signature of NAFTA.

Overall, the theoretical framework of comparative advantage (the Heckscher-Ohlin model) and the theorem of factor price equalization suggest that both Mexico and United States must specialize in their more plentiful factors of production, and import part of their requirement of goods of their scarcer factors. And with non-restrictions in international trade and with transportation costs, trade should result in reducing international factor prices differences such as the case of the factor price of

labor: wages. In such a way the Heckscher-Ohlin model serves as one of the most important theories of international trade as well as to understand the links between trade and wages.

3.7 Case studies of factor price equalization between Mexico and United States

Since Mexico, United States and Canada joined NAFTA several working papers and articles from different academic journals such as Journal of International Economics and *Revista de Economia Politica* have been published in order to provide an assessment on the impact of international integration through NAFTA to wages. Some of these studies examine the link between trade and wages based on the Neo-classical Heckscher–Ohlin framework and factor price equalization theorem that "suggests that changes in trade policy affect relative wages (w) through changes in relative goods prices (p)" (Robertson 2004) which is part of the Stolper-Samuelson theorem (FPE). Although, their general objective is to test with empirical evidence the factor price equalization theorem which states that factor price convergence should follow after international trade integration not so much discussion is provided in relation to whether developed and developing countries did or did not specialize in capital-intensive and labor-intensive industries respectively. In addition, each of these working papers and articles present different methodologies and approaches thus providing different conclusions. The theorem of factor price equalization states that wages should fall in one county and rise in another relative to one another after trade integration has taken place. To address an analysis on previous empirical studies we are focusing on how specialization and convergence of wages (nominal, relative) has been shown on previous empirical analysis and what their merits and demerits are. In our specific case of study, the export structure of Mexico and United States before and after NAFTA is analyzed as to gain evidence from which manufacturing sectors did both countries specialize. In addition, the theorem of factor price equalization tested since Mexico and United States' joined NAFTA as to present empirical evidence of real wage movements between the two NAFTA members. The analysis of wage convergence comes after the analysis of countries' specialization as the case of Mexico and United States after joining NAFTA.

Most of the empirical studies analyzed for our research study (G. Davide et al. 2014, Hanson 2003, López and Gallardo 2006, Polaski 2003, Revenga and Montenegro 1995, Robertson 2004) present different methodologies and approaches and thus the conclusions reached by these empirical studies differ as well. In relevance to our research study it is important to analyze whether or not previous empirical studies purport to show that specialization did take place as predicted by the Neo-classical doctrine of comparative advantage and those studies purporting the opposite view to this assumption.

In the empirical case study by Revenga and Montenegro (1995) the authors firstly present the evolution of trade between Mexico and United States. They show Mexico's characteristics in importing and exporting industries as to discuss changes in trade patterns and their impact in relative wages, employment and trade protection. The authors present the theory of comparative advantage and factor price equalization theorem as the theoretical framework for their empirical analysis. As the

authors present indications of trade patterns between Mexico and United States –previous to NAFTA- they agree that trade patterns are in accordance to the predictions of the Neo-classical theory of comparative advantage in which the empirical evidence shows that Mexico is a net exporter of labor-intensive goods and United States is a net exporter of capital-intensive goods. However, the authors present also the observation that most trade between Mexico and United States is intra-industry. Transport equipment and electrical machinery sectors are examples of these intra-industries, according to the authors, and "they accounted for a large fraction of both Mexican exports and imports from the United States" (Revenga and Montenegro 1995). This observation is a fundamental criticism to the Neo-classical theory because intra-industry trade reflects economies of scale which in the theory of comparative advantage is not assume industries in scale in which for the same industry both imports and exports are high. However, Revenga and Montenegro (1995) state that previous studies have tended to use alternative approaches such as industry trade dependence ratio as to assess export orientation of Mexico and United States. On the contrary, comparative advantage theory states that two countries with different factor endowments and factors of productions lead to countries to specialize in its most abundant factors. Unfortunately, different conclusions can be reached in relation to Mexico's export structure depending on the methodology used to assess whether Mexico has specialized or not in labor-intensive industries as in the study of Revenga and Montenegro (1995). "The contrast between two different sets of results highlights the complex trade patterns of countries through any model" (Revenga and Montenegro 1995).

As a result, the study provides two different models as to assess Mexico's specialization previous to NAFTA; one that relies on net exports as a measure of comparative advantage and the second one that relies on trade dependence ratios. The authors decided to use the HOS Model as their criteria is that this model provides an accurate description of North and South trade patterns. The authors proceed with an econometric strategy and they conclude that removal of trade protection did have a negative impact on the relative wages of Mexican workers relative to their counterpart in the United States as opposite to what the theory states. According to our view, the authors failed to test properly the factor price equalization theorem since they present an analysis based on real wage movements within the same industries for both countries. Factor price equalization theorem states that real wage convergence should be tested within different industries such as labor-intensive and capital-intensive industries.

The importance of this study is that acknowledges the complexity of assessing trade patterns of countries with the aim to use the theory of comparative advantage model. Revenga and Montegro's (1995) conclusions remains the same as other empirical studies that focus on post-NAFTA period such as Polaski (2003) that demonstrates the impact of NAFTA on real wages in United States has been significantly less than real wages in Mexico. Their explanation for this is that productivity has been concentrated more in skill-intensive sectors, raising the demand of skilled labor and increasing

its relative wage which contradicts the assumptions of the Neo-classical theory that states that demand for unskilled labor and its wages should rise.

Using a different methodology the case study by (Robertson 2004) includes more variables than Revenga and Montenegro (1995) as to understand movements in relative wages. The variables used by this author are foreign direct investment, real exchange rates, relative factor supplies, and skill-biased technological change as alternative explanations for wage changes (Robertson 2004:388). In addition, the author presents different approaches following previous price studies as to understand wage movements. As to evaluate the link between tariff change and wages, the approach used are the consistency checks and the mandated wage equation proposed in previous articles. The author presents empirical evidence from capital-intensive industries (both from Mexico and United States) and its objective is to test the Neoclassical Heckscher-Ohlin framework that suggests that changes in trade policy affect relative wages (w) through changes in relative good prices (p) (Robertson 2004: 389). Therefore and according to the Heckscher–Ohlin framework "if broader integration measures under NAFTA, such as non-tariff barriers, helped to reduce the relative price of skill-intensive goods this is also consistent with the theory" (Robertson 2004:395).

The author present the link between trade and wage movements before and after Mexico joined NAFTA. The author conclusion is that relative wages from capital-intensive industries rose before Mexico joined NAFTA and fell after Mexico opened to trade with relatively skilled abundant Canada and the United States. The authors argue that their conclusions are consistent with Heckscher-Ohlin model's assumptions that increase in the relative wage of skilled labor should be preceded by an increase in the relative price of skill-intensive goods. However, the theorem of factor price equalization has been tasted under the criteria of using same industries (capital-intensive industries) for both Mexico and United States.

The authors portrays the FPE differently from other authors since it does not provide empirical evidence from unskilled labor industries in Mexico but it rather focus only in capital-intensive industries where according to the Heckscher-Ohlin model Mexico does not have a comparative advantage. Mexico is abundant in unskilled labor rather than skilled labor. We then find no test in the convergence or non-convergence of wages between different industries that should follow after trade integration. It neither explain the export structure of Mexico before and after NAFTA as to assess if Mexico did specialize in labor-intensive industries in these two periods. Finally, if Canada and United States' abundant factor is skilled labor relative to Mexico, the authors should had presented trade patterns of specialization before and after NAFTA as to assess changes in patterns of trade.

In the case of Hanson (2003) the author presents an analysis of wage convergence using the factor price equalization theorem. As Robertson's study (2004), Hanson also reflects on the idea that convergence in goods' prices between countries creates pressure for convergence in factor prices. As in the case of Mexico this according to the author should have a consequence in wages for both capital and labor-intensive industries. The empirical evidence presented in this paper shows data not between labor-intensive and capital-intensive industries but using the location as the explanatory variable. The author justifies his criteria by explaining that "differences in wage structure are based on the region; border or interior states' differences in Mexico are largely due to access to foreign trade and investment and higher rates of migration" (Hanson 2003:1). The author's findings is that regional differences have played a major role because the states in Mexico and United States border have seen an increase in wages relative than those in the interior regions. Therefore, the author makes a comparison between Border States and interior states both from Mexico and United States with the aim to test the factor price equalization theorem focusing in wage structures. The author focus in location as an explanatory variable rather than focusing in labor-intensive industries and their wage movements in Mexico because low-skilled activities had a higher tariff rate than capital-intensive industries at the moment Mexico joined NAFTA.

The study's conclusions are similar from Robertson's (2004) conclusions. The evidence presented by Hanson (2003) states that wages for skilled workers have increased, especially in the border areas because Mexico's abundance of low-wage labor has a comparative advantage in assembly type activities. Most manufacturing industries are located in the border area because of its proximity to the United States. In relation to specialization the author concludes that one of the reasons that labor-intensive industries had not gained from trade integration as expected by the Neo-classical trade theory is that Mexico has not strongly specialized in low-skilled activities. This is a substantial critique to the Neo-classical theory given Mexico's comparative advantage in labor-intensive industries. "While Mexico may have such a comparative advantage relative to the United States, it probably does not relative to China or South Asia" (Hanson 2003:12).

Our last case study analyzed is by Polaski (2003) which her conclusions agree with those of (Revenga and Montenegro 1995 and Hanson 2003) that Mexican wages are diverging rather than converging to United States' wages. These conclusions are a clear evidence against the Neo-classical theory of trade of comparative advantage that suggest that opening of trade should lead countries with abundant unskilled labor -such as the case of Mexico- an increase in the demand of labor and hence an increase in wages. The author accomplishes to present a deep analysis in the aspect of trade specialization and wage convergence in Mexico after its integration to NAFTA. In regard to specialization, the author mentions that evaluating trade patterns in Mexico and their impact on wage comes with a lot of difficulties. As a result, the author excludes an analysis in Mexico's export structure before and after NAFTA.

Although, Polaski (2003) mentions that "Mexico enjoyed the advantage of being the first low-wage country to sign a free trade agreement with the United States". Although, in opposition to this statement the author highlights the flaws of the manufacturing model in Mexico (which part of its components are imported and only assembled) and that some manufacturing industries has been displaced by imports. This argument is also presented by Hanson (2003); the author reflects in the role of Mexico as a subcontractor for United States rather than a producer of simple consumer goods as the case of China. In the case of factor price equalization theorem the author makes a review of the impact of NAFTA on jobs, wages and household incomes in each North American country and makes an emphasis in the case of Mexico which according to her study is the most affected country from NAFTA. The variables presented by Polaski construct an understanding of why real wage convergence has not taken place after Mexico and United States joined NAFTA. Polaski's conclusions contradict and challenges to what the Neo-classical theory predicts that wages should converge after trade integration. "Real wages for most Mexicans today are lower than when NAFTA took effect. During the NAFTA period, productivity growth has not translated into wage growth, as it did in earlier periods in Mexico. Mexican wages are also diverging from, rather than converging with, United States wages" (Polaski 2003:12).

In general, most empirical case studies presenting the theory of comparative advantage and factor price equalization focusing in the case of Mexico and United States' trade relationship analyze changes of tariff rates between the two countries after joining NAFTA with special attention in the manufacturing sector. Most of case studies portrays explanations and analyses on changes in prices for the adjustment on reduction of trade barriers and the impact of price changes in real wages or wage structure. As a final note, most studies do not focus in Canada and Mexico's trade relationship since is a very small part of Mexico's total trade (Polaski 2003:14).

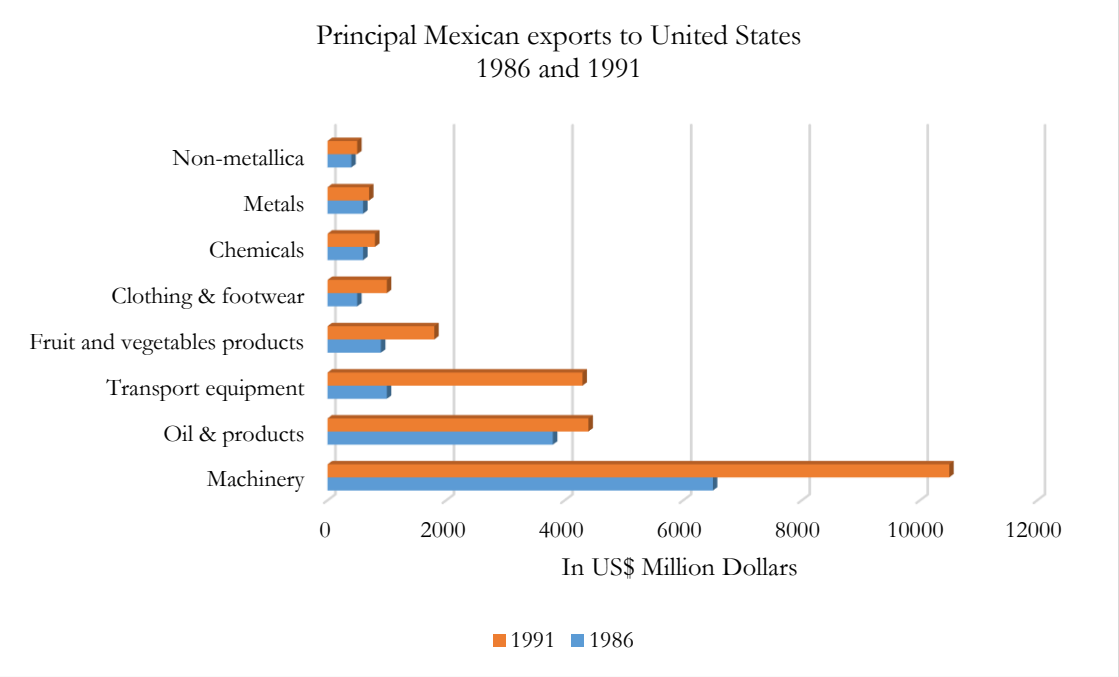
Chapter 4

Analysis I

4.1 Trends in trade between Mexico and United States previous to NAFTA, 1986-1991

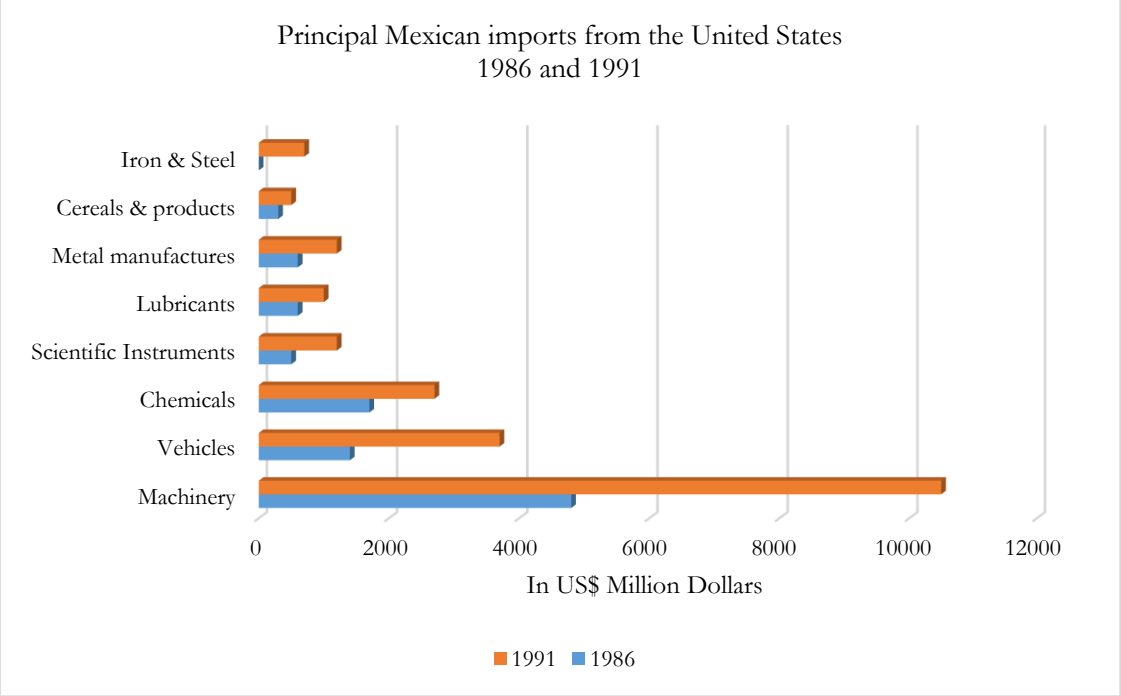
Traditionally, the United States has been Mexico's most important trading partner. According to a report by UNIDO at the end of the last century United States absorbed 70 per cent of Mexico's exports and accounted for 50 per cent of its imports. As for example, in 1982 Mexico's non-maquiladora exports to the United States amounted to 51 per cent of the total, but rose by an annual average of 7 per cent between 1982 and 1990, with the share of manufacturing rising to about 70 per cent. Previous to the signature of NAFTA (1982-1991), the heading list of Mexican goods exported to United States was machinery, followed by oil and products and transport equipment and the principal goods imported from the United States were machinery (33 per cent of the 1991 total), transport equipment (13 per cent), chemicals (8 per cent) and scientific instruments (4 per cent). The strongest increase in both export and import between Mexico and United States during this period was machinery, oil products, transport equipment, vehicles and chemicals.

Figure 3. - Principal Mexican exports to United States, 1986 and 1991



Source: United Nations Industrial Development Organization (1993)

Figure 4. - Principal Mexican imports from the United States, 1986 and 1991



Source: United Nations Industrial Development Organization (1993)

The previous figures demonstrates that from 1986 to 1991, Mexico's exports to United States were mainly low (machinery) and middle (transportation equipment) capital intensity, according to a classification by the United Nations Commodity Trade Statistics Database (UN Comtrade) database based on capital/labor ratios (capital intensity) presented in the work of (Revenga and Montenegro 1995). In the case of United States' exports to Mexico were mainly middle (machinery) and high (vehicles and chemicals) capital intensity. These observations suggest that the general trade pattern between Mexico and United States previous to NAFTA is in accordance with the expectations of the comparative advantage theory that suggest that Mexico and United States should specialize in their more abundant factors of production. Therefore, countries like Mexico with an abundant low skilled labor should specialize in labor-intensive industries (e.g. machinery, fruit and vegetables products, clothing and footwear) whereas United States with an abundant skilled labor should specialize in capital-intensive industries (e.g. vehicles, chemicals and scientific instruments).

4.2 Changes in trade between Mexico and United States after NAFTA

After 20 years of NAFTA, Mexico is now the third largest trading partner of the United States with $507 billion for the total trade balance during 2013. Goods produced in United States exported to Mexico had increased 444% since 1993. As a result in 2013, United States exports to Mexico accounted for 14.3% of overall United States exports according to United States Trade Representative in Mexico.

In the case of Mexico and its exports to United States these have increased 603% from 1993 to 2013. As an example, in 2013 export trade from Mexico to United States accounted for $280.5 billion and for 12.4% overall of exports in United States. Changes in trade between Mexico and United States has undoubtedly intensified since NAFTA. By 1993, Mexico exports to United States accounted for 10% of overall exports and by 2013 increased to 12.4%. By 1993, United States' exports to Mexico accounted closely 7% of overall United States exports and by 2013 these increased to 14.3%[3].

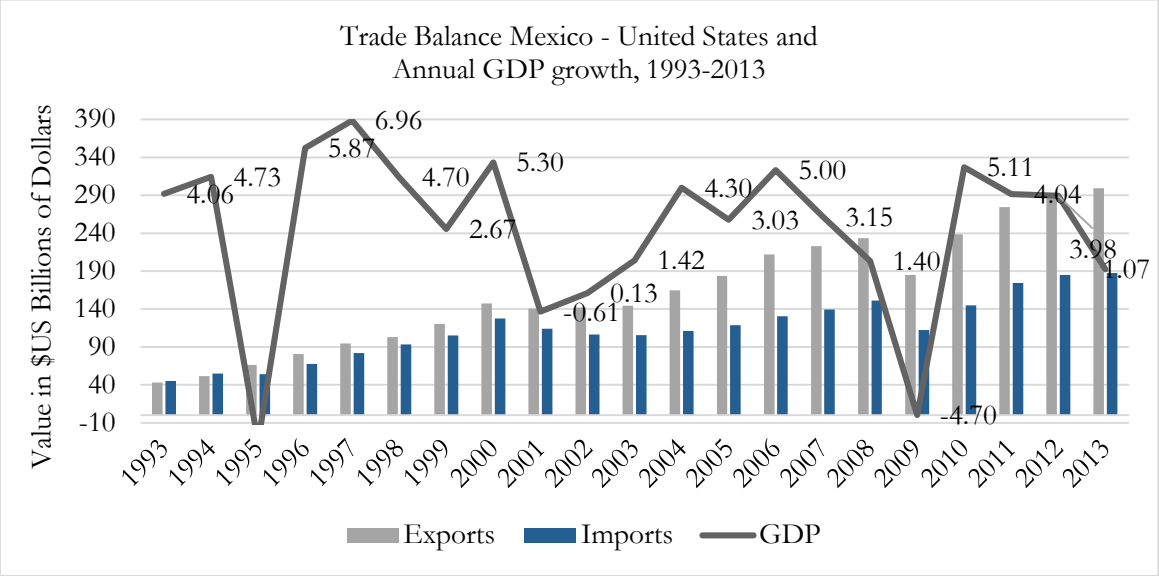
Overall, goods produced in the United States have increased its presence in the Mexican market more rapidly than exports from Mexico to the United States since NAFTA's signature in 1994. The details of the trade balance between Mexico and United States for the period of 1993 to 2013 are shown in figure 5 and figure 7 in order to understand the increase in trade flows -both import and exports- between the two NAFTA members. In addition, the figure 6 shows trade balance between Mexico and United States using percentages of annual growth rate of Gross Domestic Product (GDP).

Figure 5. – Total value of imports and exports between Mexico-United States, 1993-2013

Source: The Ministry of Economy and Bank of Mexico (2014)

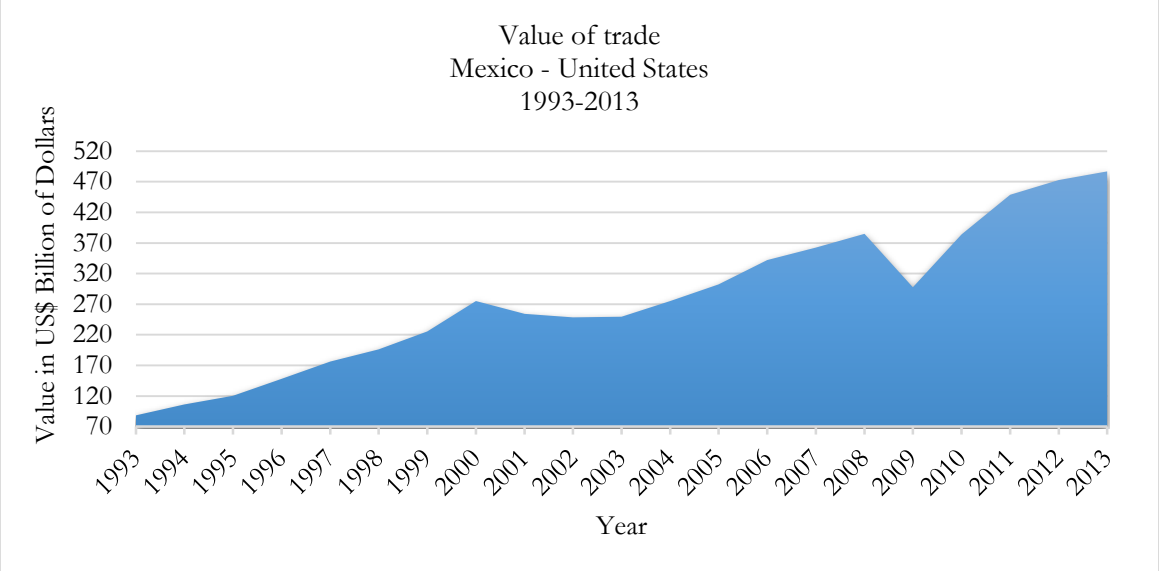
[3] United States Trade Representative's Office of the Western Hemisphere (Last updated 2014) 'U.S.-Mexico Trade Facts'. Accessed 15/09 2014 <http://www.ustr.gov/countries-regions/americas/mexico>.

Figure 6. - Trade Balance between Mexico-United States with annual percentage growth rate of GDP, 1993-2013



Source: The Ministry of Economy and Bank of Mexico (2014) and the World Bank Data Indicators (2014)
Note: annual percentage growth rate of GDP at market prices based on constant local currency. Aggregates are based on constant 2005 U.S. dollars

Figure 7. - Total value of trade Mexico-United States, 1993-2013



Source: The Ministry of Economy and Bank of Mexico (2014)

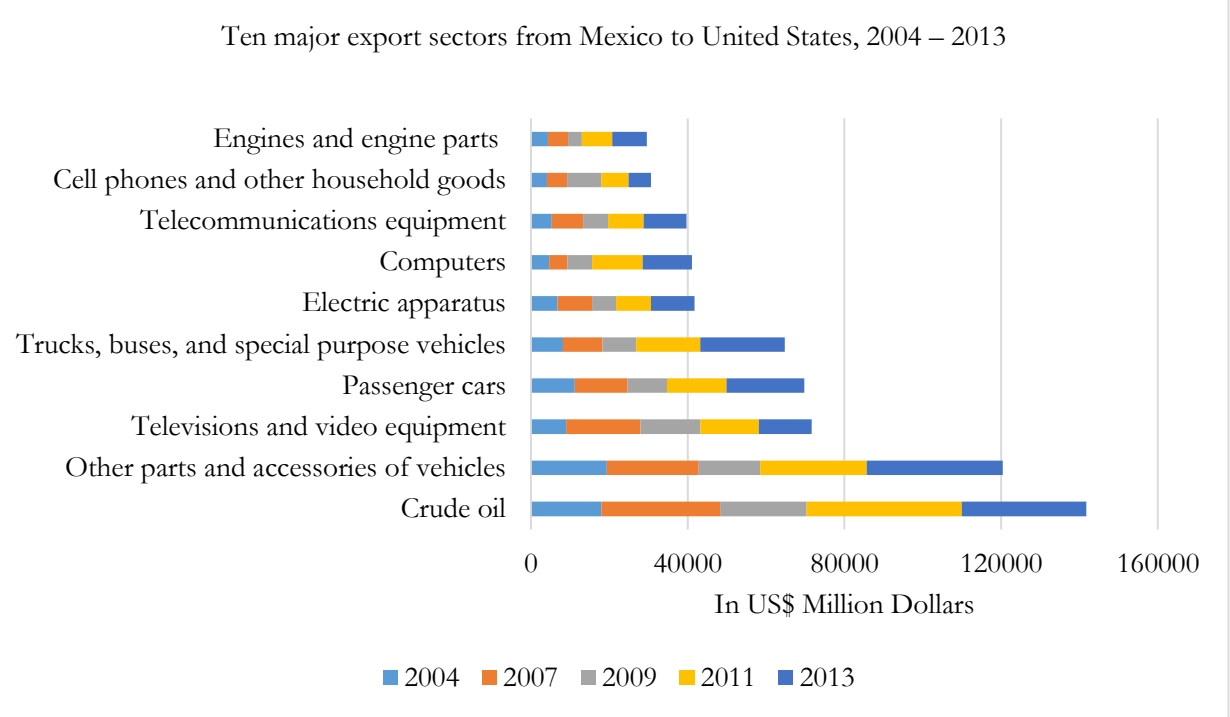
4.3 Most relevant export industries between Mexico and United States after NAFTA

As referred in the theoretical framework, the Heckscher-Ohlin theory of comparative advantage indicates that each country exports the product which makes intensive use of whatever production factor it has a relative abundance of and imports the other. As a consequence, Mexico with a more abundant unskilled labor should specialize in labor-intensive industries, whereas the United States with more abundant skilled labor should specialize in capital-intensive industries. The database provided by the United States Census Bureau presents different commodity classifications such as:

the Standard International Trade Classification (SITC) and the End-use classification. Although, for the purpose of the present case study and according to the United States Census Bureau's database the 5-digit End-use code presents available data as to show the most relevant export industries between Mexico and United States between 2004 and 2013 (NAFTA post-period). The 5-digit End-use code was developed by the Bureau of Economic Analysis (BEA) which is a source of United States economic statistics.

In the case of Mexico and its exports to the United States, the data available shows that between 2004 and 2013 (post-NAFTA period) the ten most important export sectors (see figure 8) are: crude oil, other parts and accessories of vehicles, television and video equipment, passenger cars, trucks, buses and special purpose vehicles, electric apparatus, computers, telecommunications equipment, cell phones and other household goods, engines and engine parts. This figure is a clear indication that Mexico has maintained its specialization in the oil and product and transport equipment sectors since 1986 (see figure 3). These two sectors belonging to the labor-intensive industries.

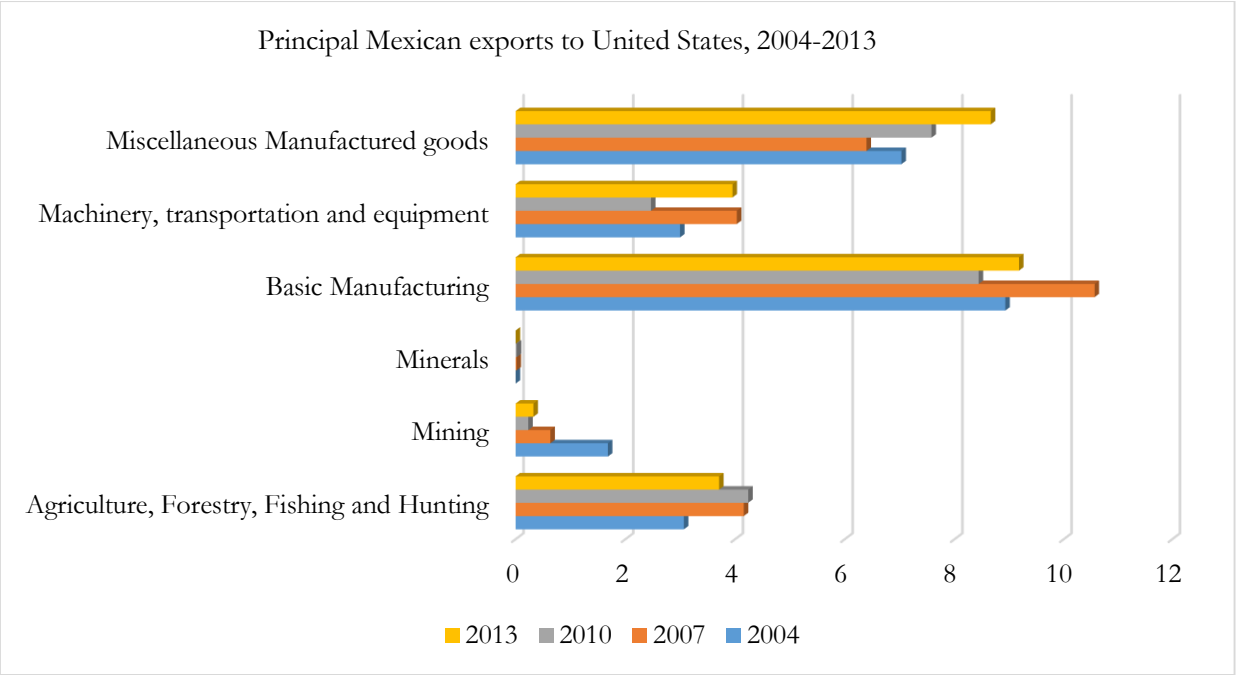
Figure 8.- Ten major export sectors from Mexico to United States using 5-digit End-Use code, 2004-2013 (post-NAFTA period)



Source: United States Census Bureau (2014)

Figure 9 shows that with regard of Mexico's exports to its NAFTA trading partner United States, Mexico is a net exporter of basic manufacturing, miscellaneous manufacturing industries, agriculture, forestry, fishing and hunting industry. Although it is important to note that after Mexico joined NAFTA, it has gained in terms of exports volume in middle-capital intensive industries such as electric apparatus, computers and telecommunication equipment.

Figure 9. - Principal Mexican exports to United States, 2004-2013

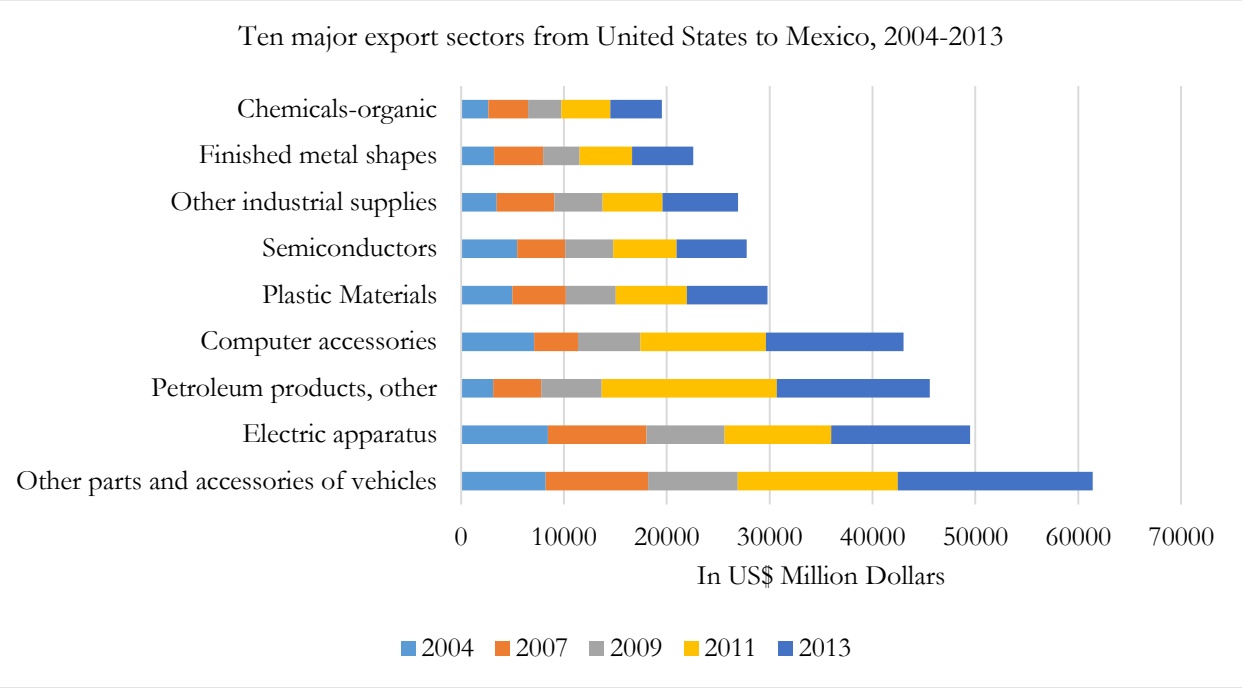


Source: United States Census Bureau (2014)

It is clearly indicated in figure 8 that the principal Mexican exports sectors to United States after its integration to NAFTA are basic manufacturing (e.g. lumber, stone and cement, iron and still mill products) as well as miscellaneous manufactured goods (e.g. jewelry, artwork antiques, television, video equipment and toys).

In the case of United States and its exports to Mexico, the data available shows that between 2004 and 2013 (NAFTA post-period) the ten most important export sectors (see figure 10) are: part and accessories of vehicles, electric apparatus, petroleum products, computer accessories, plastic materials, semiconductors, other industrial supplies, telecommunications equipment, finished metal shapes and industrial machines.

Figure 10. - Ten major export sectors from United States to Mexico using 5-digit End-Use code, 2004-2013

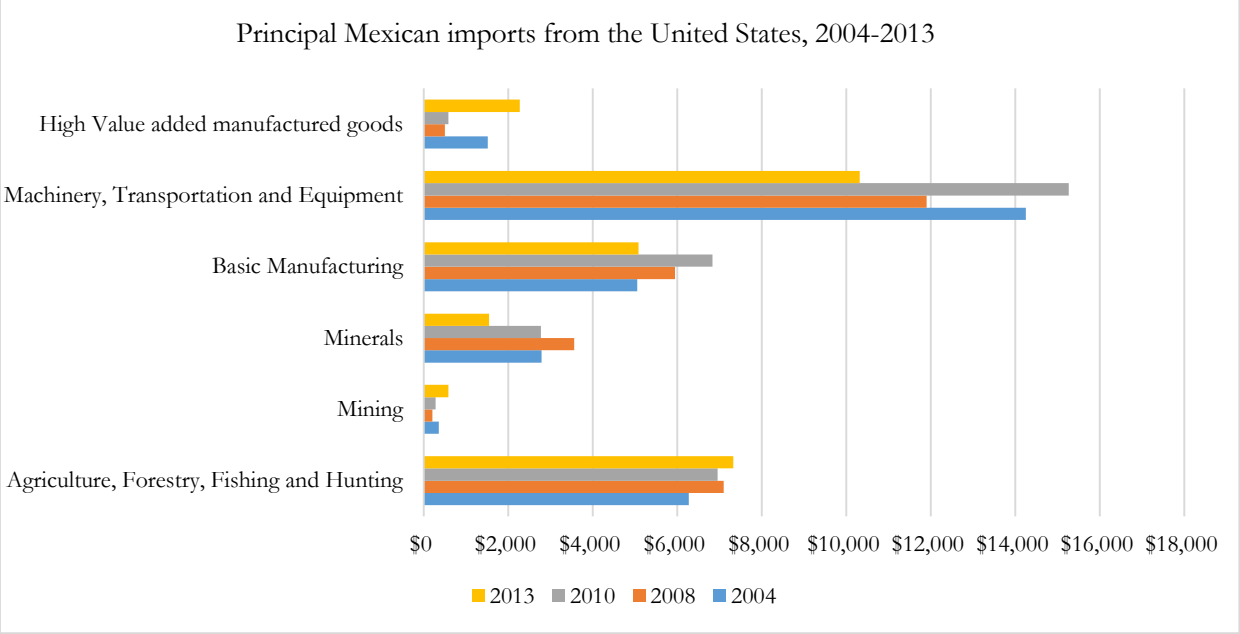


Source: United States Census Bureau (2014)

Based on figure 10 and 4 it can be clearly demonstrated that there has been a shift of the export structure of United States with Mexico since the signature of NAFTA. In figure 3, we can observe that the principal export sectors from United States to Mexico are: machinery, vehicles, chemicals and scientific instruments. Whereas in figure 10, a substantial shift towards more capital-intensive industries has taken place. Other sectors such as parts and accessories of vehicles, petroleum products, computer accessories and semiconductors are example of these changes in trade.

Figure 11 shows that with regard of United States' exports to Mexico, United States is a net exporter of Machinery, transportation and equipment followed by agriculture, forestry, fishing and hunting and basic manufacturing.

Figure 11. - Principal United States exports to Mexico, 2004-2013



Source: United States Census Bureau (2014)

Based on the empirical evidence we can conclude that trade patterns between Mexico and United States previous to NAFTA for the period 1986 to 1991 are consistent with the Heckscher-Ohlin model of comparative advantage theory. In the case of Mexico the theory suggest that Mexico -which is characterized by abundant supply of low-skilled labor- should specializes in labor-intensive industries. Therefore, as previously presented in the graphics during the pre-NAFTA period the principal exports from Mexico to United States were mainly machinery, oil, transport equipment, fruit, vegetables products, clothing and footwear, all of them under the category of labor-intensive industries. The same conclusions can be drawn for the post-NAFTA period from 2004 to 2013.

In this period, the data provided by the United States Census Bureau presented in figure 9 shows the principal Mexican exports to United States. This figure shows that Mexico mainly specializes in basic manufacturing goods which is comprised by labor-intensive industries such as: paper products, natural fiber, tobacco, synthetic cloth and plastic materials. It is important to remember that labor-intensive industries are characterized by a much higher proportion of labor used for production than the proportion used of capital. We can conclude that Mexico after reducing its trade barriers through NAFTA has mainly specialized in labor-intensive industries and there is no a significant shift towards capital-intensive industries.

In the case of United States, figure 4 shows the principal exports from United States to Mexico for the pre-NAFTA period of 1986 and 1991. Based on the figures we can observe that mostly the major exports from United States to Mexico during that period belonged to capital-intensive industries such as: vehicles, chemicals and scientific instruments. In relation to the post-NAFTA period the major sub-manufacturing export sectors from United States to Mexico' market (see figure 10) -in terms of sales volume- are: petroleum products, parts and accessories of vehicles, engines and engine parts,

electrical apparatus, computers and passenger cars. These sub-manufacturing industries are capital-intensive industries where the proportion of capital involved is less high than the proportion of labor. The figures presented in relation to United States' exports to Mexico are in accordance with the Heckscher-Ohlin model of comparative advantage theory, that suggest that United States should specialize in capital-labor industries since it is abundant in skilled labor.

It is important to note that United States mainly specializes in other sub-manufacturing sectors such as: machinery, transportation and equipment which are also labor-intensive industries (see figure 11). In reference to this, in figure 11 we can observe United States principal exports to Mexico for the period of 2004 to 2013 includes both capital and labor-intensive industries. Capital-intensive industries referred as high value added manufactured goods (e.g. military aircraft, engines and turbines for military aircrafts and petroleum) and labor-intensive industries referred to the categories of: basic manufacturing, agriculture, forestry, fishing and hunting. Whereas in the case of Mexico's major exports to United States are mainly labor-intensive industries.

With regard to these findings and the present case study of trade patterns between Mexico and United States, it can be concluded that both countries are consistent with the comparative advantage theory of international trade which indicates that each country exports the product which makes intensive use of whatever production factor it has relative abundance of and imports the other. In other words, before the signature of NAFTA and afterwards, Mexico's specialization has not shifted towards a more capital-intensive industry based rather it has kept its specialization or comparative advantage in labor-intensive industries.

The theory of comparative advantage suggest that opening up to trade as the case of Mexico and United States through NAFTA should lead to specialization of each country, as our conclusions indicate in our analysis of the major import-export sectors between Mexico and United States before and after NAFTA. Consequently, the discussion about specialization previously analyzed should be followed by the theorem of factor price equalization that states that with specialization there should be a convergence of factor prices such as the factor price of labor: wages. Moreover, the theorem of factor price equalization indicates that after Mexico has specialized in labor-intensive industries and United States in capital-intensive industries. Therefore, there should be a rise in the factor price of labor –wages- in the labor-intensive industries whereas in the side of United States´ labor-intensive industries there should be a reduction in the factor price of labor –wages-. According to the theorem of factor price equalization this should happen because Mexico specializes in specific sectors of the labor-intensive industry and as a result United States should reduce its production in those same sectors and to increase its exports of the same goods from Mexico. This will result in an increase in demand of labor in Mexico for labor-intensive industries which consequently should rise the factor price of labor: wages.

Chapter 5

Analysis II

5.1 Factor price equalization and convergence of real wages between Mexico and United States for labor-intensive industries after joining the North American Free Trade Agreement

With the aim to test the theorem of factor price equalization, I present empirical evidence of real wages from five sub-manufacturing sectors with regard to labor-intensive industries both from Mexico and United States. The classification of the sample presented is based on the North American Industry Classification System (NAICS) with the aim to present an accurate level of comparability in business statistics among the two North American countries. The study period is from 2003 to 2009 due to the fact that the database provided by National Institute of Statistics and Geography and the U.S. Bureau of Labor Statistics was available from both sources for these years.

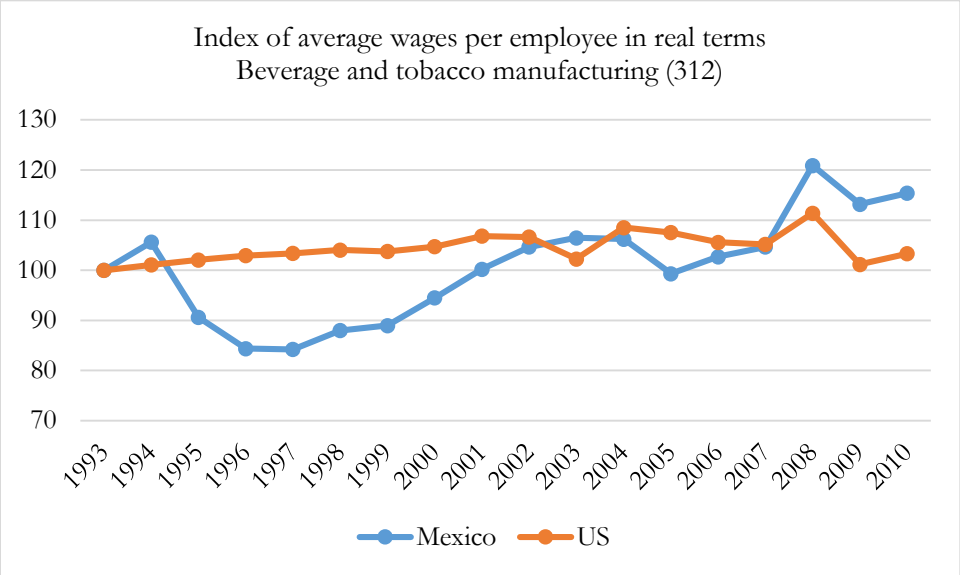
NAICS CODE 2012	**Sub-manufacturing sector**	**Capital Intensity**
311	Food Manufacturing	Low
312	Beverage and Tobacco Product Manufacturing	Low
322	Paper manufacturing	Low
326	Plastics and Rubber Products Manufacturing	Low
333	Machinery manufacturing	Low

In order to calculate the real wage of our manufacturing sample in United States we must deflate the nominal wage by the CPI. The reports of nominal wages in all our samples are annually and the reports of annual CPI in all our samples are accounted for urban areas only. We use the Consumer Price Index (CPI) reported annually by both the U.S. Bureau of Labor Statistics. Hence, in order to calculate the real wages we deflate the annual nominal wage by the average annual Consumer Price Index. The real wage of our manufacturing sample in Mexico is based on the Index of average wages per employee in real terms provided by the National Institute of Statistics and Geography in Mexico. Therefore, the real wages in our sample from the manufacturing sector in United States is also presented as an index. As for the definitions of the concepts used. The nominal wage "covers basic wages, cost-of-living allowances and other guaranteed and regularly paid allowances, but exclude overtime payments, bonuses and gratuities, family allowances and social security contributions made by employers", according to the International Labor Organization (2012). In the case of the CPI "shows the development of the prices of the items that particular individuals or households buy or consume during the same period, as it is designated to represent the average experience of private households from both urban and rural areas" (ILO 2012:69). Therefore, to obtain real wages in our sample of five sub-manufacturing sectors, from Mexico and United States, we must use real wages indexed for each sub-manufacturing sector.

Figure 12. - Real wage movement in the Food manufacturing sector from Mexico and United States, 1993-2010

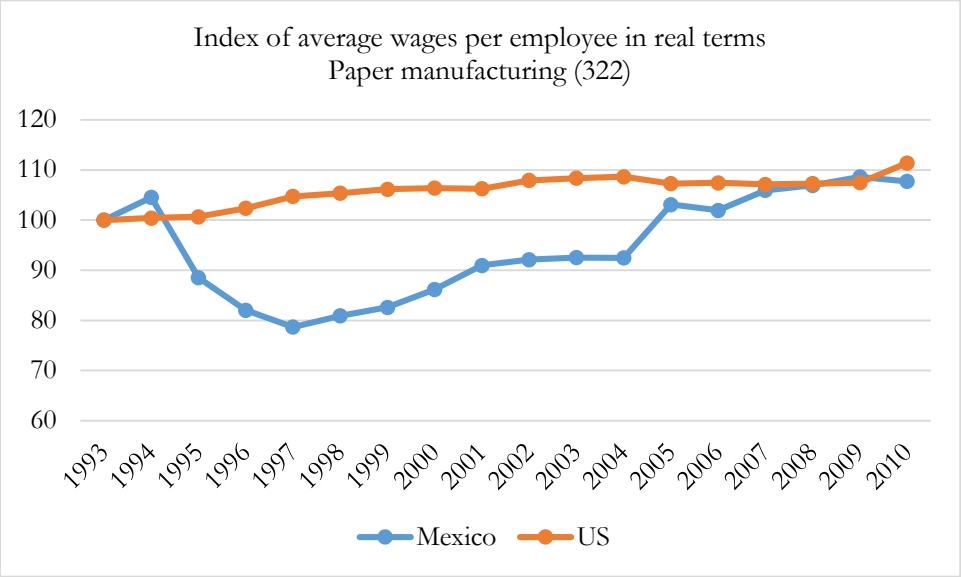
Source: Author's own computations based on database from National Institute of Statistics and Geography and the U.S. Bureau of Labor Statistics (2014)

Figure 13. - Real wage movement in the Beverage and Tobacco product manufacturing sector from Mexico and United States, 1993-2010



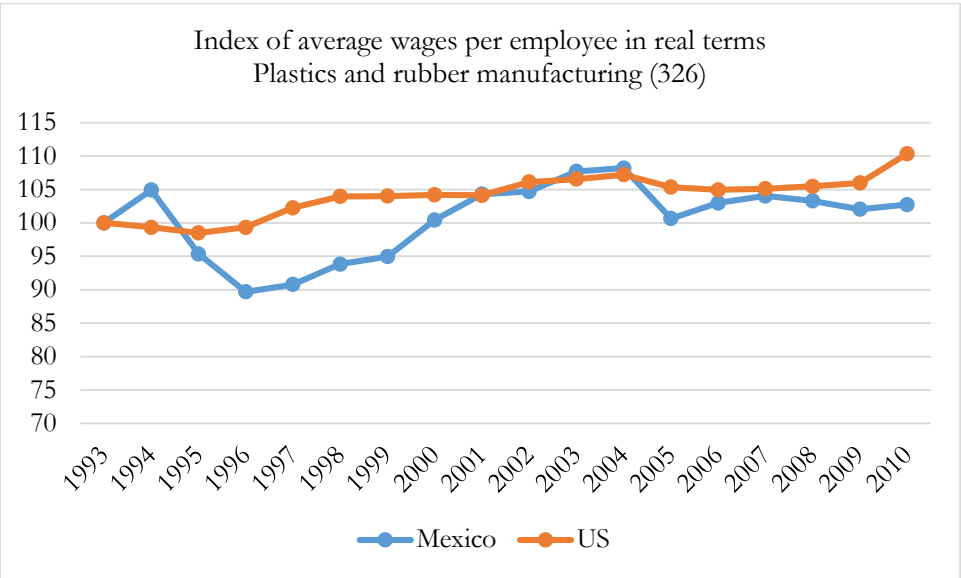
Source: Author's own computations based on database from National Institute of Statistics and Geography and the U.S. Bureau of Labor Statistics (2014)

Figure 14. - Real wage movement in the Paper manufacturing sector from Mexico and United States, 1993-2010



Source: Author's own computations based on database from National Institute of Statistics and Geography and the U.S. Bureau of Labor Statistics (2014)

Figure 15. - Real wage movement in the Plastics and Rubber products manufacturing sector from Mexico and United States, 1993-2010



Source: Author's own computations based on database from National Institute of Statistics and Geography and the U.S. Bureau of Labor Statistics (2014)

Figure 16. - Real wages movement in the Machinery manufacturing sector from Mexico and United States, 1993-2010

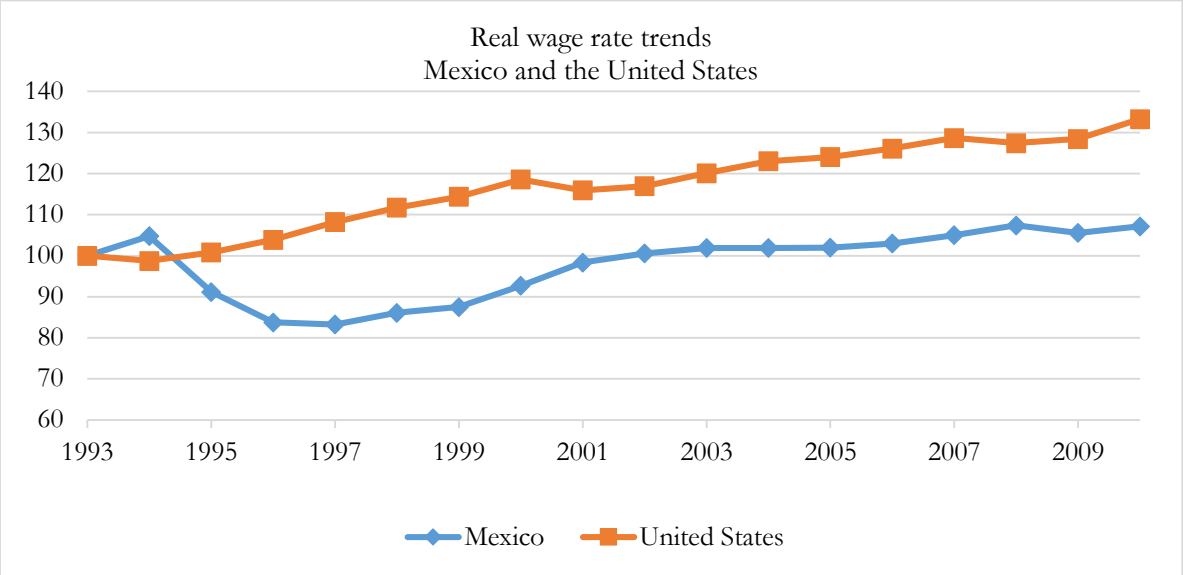
Source: Author's own computations based on database from National Institute of Statistics and Geography and the U.S. Bureau of Labor Statistics (2014)

5.2 Factor price equalization and convergence of real wages between Labor Intensive industries in Mexico and Capital Intensive industries in the United States after joining the North American Free Trade Agreement

With the aim to present wage movements between different industries. We present a second test for the factor price equalization theorem with regard to labor-intensive industries from Mexico compared to capital-intensive industries in the United States. We use a sample of five sub-manufacturing sectors for each country and the results are presented as index of average wages per employee in real terms.

Sub-manufacturing sectors in Mexico	*NAICS CODE 2012*
Food Manufacturing	311
Beverage and Tobacco Product Manufacturing	312
Paper manufacturing	322
Plastics and Rubber Products Manufacturing	326
Machinery manufacturing	333
Sub-manufacturing sectors in United States	
Petroleum and coil product manufacturing	324
Chemical manufacturing	325
Computer and electronic product manufacturing	334
Transportation equipment manufacturing	336
Miscellaneous manufacturing (medical equipment and others)	339

Figure 17. - Aggregate data of wage rate trends per employee in real terms between Labor Intensive industries in Mexico and Capital Intensive industries in the United States



Source: Author's own computations based on database from National Institute of Statistics and Geography and the U.S. Bureau of Labor Statistics (2014)

Figure 18. - Aggregate data of wage rate divergence per employee in real terms between Labor Intensive industries in Mexico and Capital Intensive industries in the United States

Source: Author's own computations based on database from National Institute of Statistics and Geography and the U.S. Bureau of Labor Statistics (2014)

Conclusions

The doctrine of comparative advantage and factor price equalization, as to link trade and wages, suggest that when developing countries opens to trade, demand for low skilled labor should increase. That in turn, should increase real wages for low skilled labor relative to those high skilled labor, and so have real wage convergence. Therefore, the principle objective of the present research paper is the study of the impact of the North American Free Trade Agreement on real wages in Mexico and the United States for the study period of 1993 to 2010.

We present a test and analysis to the theory of comparative advantage and factor price equalization in the specific case of the manufacturing sector in Mexico and the United States. We introduced evidence from real wages in the labor-intensive industries (low skilled labor) in Mexico and capital-intensive industries (high skilled labor) in United States after their integration to NAFTA. We used a sample of five sub-manufacturing sectors from labor intensive industries, respectively from Mexico and United States. We also presented a second sample of five sub-manufacturing sectors from labor-intensive industries in Mexico and capital-intensive industries from the United States.

Generally, our conclusions from our two samples suggest that there has been a divergence of wages per employee in real terms, contrary to Neo-classical disciplines and its theory of comparative advantage and factor price equalization. Benefits after NAFTA's integration can be only accounted for high skilled labor in the United States and not for the unskilled labor in Mexico. Specifically, in the analysis from our first sample with regard to the comparison of real wages per employee for the same industries (labor intensive industries) it is demonstrated that there is a substantial general trend of wage differentials' between Mexico and the United States. Thus as a result, divergence and not convergence, has taken place for most of the samples presented, with the exception of the beverage and tobacco sector. Clearly, there has been a relatively faster increase in real wages per employee in United States but not a faster increase in real wages in Mexico. Our results are not in accordance with the doctrine of comparative advantage and factor price equalization.

Furthermore, the empirical evidence presented in the analysis of our second sample is clear and overwhelming. For NAFTA's supporters the figures presented might be destructive to their ideologies, where real wage rate divergence has increased disproportionally during the last two decades between the two NAFTA members. The picture is clear; real wages have increased in the United States but not in the case of Mexico which has not been benefited. In the case of real wage trends, our results are as well convincing, the figure shows that there is a strong trend of divergence of real wages per employee in the manufacturing sector between Mexico and the United States during the last two decades. Therefore, we can observe that NAFTA has not resulted in an increase of real wages in Mexico relative to its counterpart in the United States. Hence, Mexican employers in the manufacturing sector have not benefited from Mexico's integration to NAFTA in terms of improving their income.

At the political economic level; NAFTA's expectations failed as a model of development with the aim to increase living standards of Mexican workers in the manufacturing sector. Mexican's incomes were expected to increase and as a result, supporters of NAFTA such as policy makers, should had witnessed a decreased in illegal migration. According to our analysis, real wage convergence per employee did not occur neither in the labor-intensive industries between Mexico and United States nor between labor and capital intensive industries in Mexico and the United States. Neo-classical economics' ideologies and the political economic expectations of NAFTA failed to predict convergence of wages. Skills differentials played an important role in this matter. The factor price equalization theorem assumes that labor is the same quality in both Mexico and the United States. This is a strong assumption made by the Neo-classical theory and it does not correspond to the practice. As discussed and analyzed in chapter 3 of our study in the critics to the theoretical framework, it requires the same kind of labor in Mexico and the United States, as to have a factor price equalization area Mexico and the United States should comply with this condition.

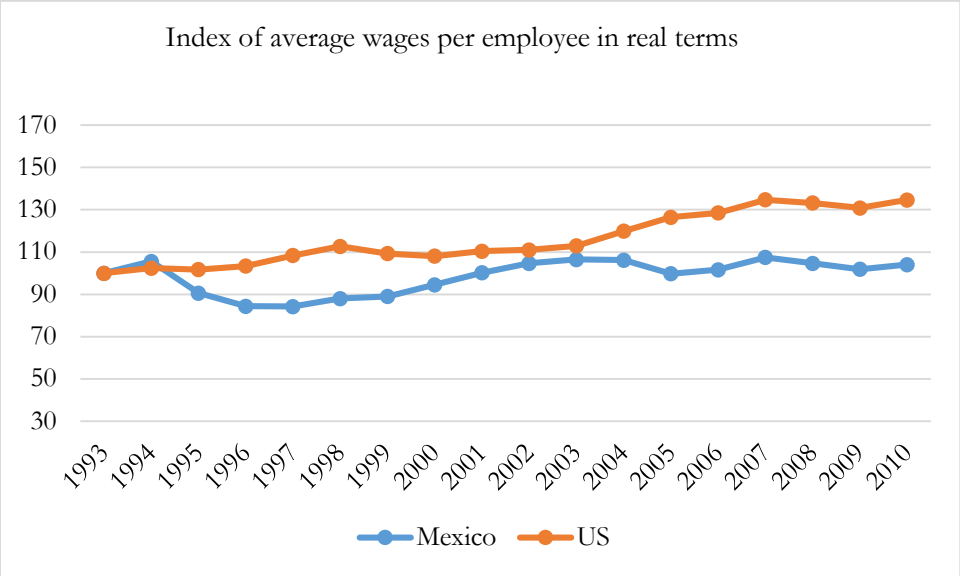
In addition, our study presents an assessment of Mexico's export structure before and after NAFTA with the aim to know whether or not Mexico did specialize in labor-intensive industries with regard to its NAFTA most important trading partner: United States. Our empirical evidence presented in the first analysis demonstrates that Mexico did specialize mostly in labor-intensive industries previous to NAFTA and that there has not been a significant shift towards capital-intensive industries during the post-NAFTA period (2004-2013). These results are in accordance with the assumptions made by the Heckscher-Ohlin model of comparative advantage that Mexico as a country with abundant labor should specialize in labor-intensive industries and the United States with abundant capital should specialize in capital-intensive industries. However, as our empirical evidence demonstrates, Mexico did shift slightly its production and exports to capital-intensive industries; demonstrating that countries with low-skilled labor can also improve and manipulate their comparative advantage and move towards high skilled industries.

After twenty years of NAFTA's establishment, as the most important free trade agreement for Mexico, the wounds of NAFTA are still on debate. Whether in Mexico City, Washington D.C. or Ottawa, the disagreement and agreements of NAFTA's benefits for North American workers are still under discussion. Our paper is a story of trade, of human capital formation, of microeconomics and macroeconomics. It is also a story of deterioration and less benefits for Mexican workers, lower wages and less incentives for consumption. It is a story that sheds light to the last two decades of Mexico and the rupture of promises that comes with trade liberalization and political economic reforms. Certainly, the scope of our study and empirical evidence is limited and is only related to Mexico and the United States' trade relationship. Our conclusions bring evidence of NAFTA's effect on real wages of Mexican workers after two decades that the agreement came into effect. The story is important to Mexico and its workers in the manufacturing sector; as it measures and presents evidence of NAFTA's expectations and its failure as a development model that was aimed to improve

living conditions of Mexican workers. It is also a story of failure for those who believed there will be no losses from this agreement.

Annex

Figure 19. – Real wages movement between food manufacturing sector from Mexico and Petroleum and coal sector in United States, 1993-2010

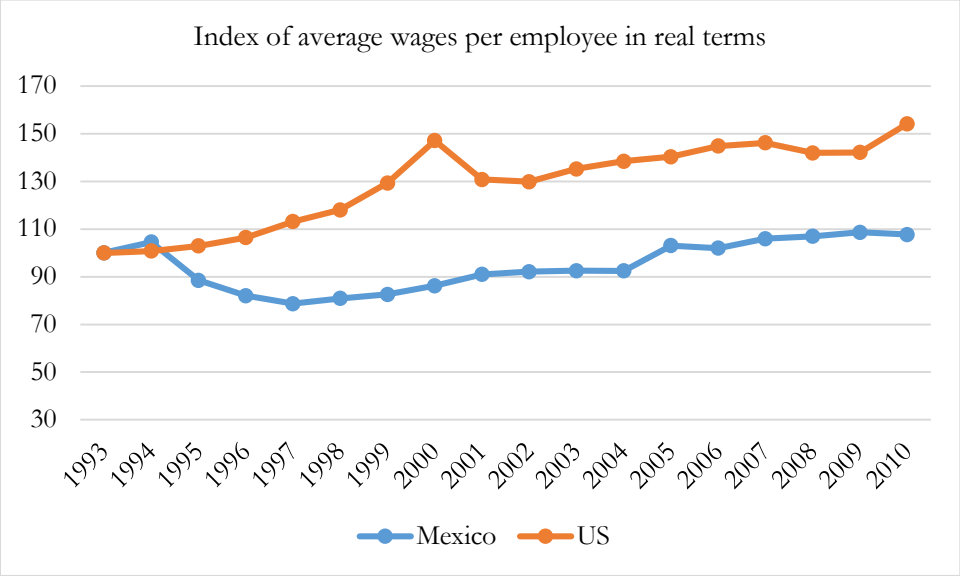


Source: Author's own computations based on database from National Institute of Statistics and Geography and the U.S. Bureau of Labor Statistics (2014)

Figure 20. – Real wages movement between Beverage and Tobacco product manufacturing sector from Mexico and Chemical sector in United States, 1993-2010

Source: Author's own computations based on database from National Institute of Statistics and Geography and the U.S. Bureau of Labor Statistics (2014)

Figure 21. – Real wages movement between Paper manufacturing sector from Mexico and Computer and electronic sector in United States, 1993-2010



Source: Author's own computations based on database from National Institute of Statistics and Geography and the U.S. Bureau of Labor Statistics (2014)

Figure 22. – Real wages movement between Plastics and rubber product manufacturing sector from Mexico and Transportation equipment sector in United States, 1993-2010

Source: Author's own computations based on database from National Institute of Statistics and Geography and the U.S. Bureau of Labor Statistics (2014)

Figure 23. – Real wages movement between Machinery manufacturing sector from Mexico and Miscellaneous manufacturing sector (medical equipment and others) in United States, 1993-2010

Source: Author's own computations based on database from National Institute of Statistics and Geography and the U.S. Bureau of Labor Statistics (2014)

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