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Mexican Trade with the US

A Study of the Impact of Chinese Competition

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Abstract

The world market changed quite dramatically when China joined the WTO in 2001 and fully entered the world market. It had implications for both importing and exporting countries, as China's entrance on the world market increased the supply of cheap manufactured goods. This is thought to have caused US consumers to replace Mexican products with Chinese, and to have slowed down or decreased Mexican exports to the US.

The aim of this essay is to investigate whether US imports from Mexico have changed due to increased Chinese competition. This is done by reviewing previous research and supplementing it with correlation and regression analysis built on OECD data. The results from these analyses show that the decrease of US imports from Mexico does not depend as much on Chinese competition as previously thought. Some Mexican industries, such as the textile sector, does seem to have been negatively affected by Chinas entrance at the market, but the general conclusion is that the slow, or negative, Mexican growth cannot be explained by Chinese competition.

Keywords: Mexico, USA, China, Competition, Imports

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1 Introduction

China is the world's most populous country, and when it opened up its economy to trade it rapidly grew to become one of the most important trading economies. The emergence of what is today the largest exporter and second largest importer, has changed the world market, as both world demand and supply have increased dramatically. This development is particularly evident in the change of trade between the US and China. However, increased trade between the US and China also affects the countries trading with the US. Mexico is one of these countries. It is one of the main trading partners of the US, and Mexico itself is heavily reliant on trade with the US. Several observers claim that Mexican trade with the US has suffered because of China's economic growth, see Kevin P. Gallagher and Roberto Porzecanski (2008). However, this is a statement that is not without controversy; Gordon H. Hanson and Gregory Robertson (2006) as well as José E. López-Córdoba (2007) claims that China is not such an important factor of explanation as claimed by Gallagher. This essay is aimed to contribute to this discussion with more recent data and an extended analysis of the topic. The purpose of this essay is to show if China's emergence on the world market has affected Mexican trade by analyzing US imports from Mexico and China. In short, the main question of investigation is:

Has China's emergence on the world market changed
Mexico's trade with the US?

In other words, this essay will investigate whether Mexican exports to the US have decreased because of Chinese competition, and whether Mexico is moving from producing goods that compete with Chinese exports towards goods that complement them.

The essay builds on previous research on Chinese influence on US-Mexico trade. It is meaningful to reevaluate previous conclusions on this topic as the

growth of China and its impact on other economies is rapidly changing. The classical Hecksher-Ohlin model is expanded and used as a theoretical framework and base for further analysis. OECD data is processed and analyzed in order to give an overview of the changes in trade between the US and Mexico and China. This is complemented by some statistical tests in order to establish whether the changes that have occurred in US-Mexican trade can be explained by increased US imports from China.

Mexico, USA, and China, are chosen as cases of observation because they are all important world economies. Mexico and China are both heavily reliant on trade, and especially with the US. Mexico is of particular interest, as it is repeatedly pointed out as an odd case in Latin America in terms of Chinese influence. It is thought to be one of few Latin countries where overall Chinese influence has been negative. The majority of Mexico's exports go to the US, and it is therefore interesting to see how an increased import of Chinese goods has affected trade between the two American countries. I have chosen to focus this essay on the period between 1999 up until now, since that covers a timespan of two years before China entered the WTO until now. China's entrance in the WTO marks a new stage of its liberalization and integration on the world market. Before joining the WTO China faced high tariffs, and could therefore not fully compete on the world market. 1999 can therefore be seen as the world without much Chinese influence whereas 2011 is a world market with a palpable Chinese influence. These two years are compared in order to illustrate what happened in Mexico-US trade when China entered the world market.

The introductory chapters of the essay are followed by an explanation on Mexican and Chinese trade, in general and with the US. The Chinese competition on Mexican exports with the US is investigated through previous research. This is followed by some empirical findings and statistical tests. The essay ends with an analysis to bring the theoretical and empirical parts together.

2 Theory

Globalization is the most important economic phenomena of our time and it comes with increased integration, political, socially but also economically (Smith et. al, 2008:2) International trade volumes keep increasing, which makes it more important than ever to understand trade patterns and what drives countries to trade, import, and export (WTO¹: 2012). A common method for analyzing this course of events is to compare relative advantages, which is explained by numerous theories, one of the most influential being the Hecksher-Ohlin model. The model can also be used to analyze the trade between the US and Mexico and China since it clearly points out what drives countries to trade with each other. A summary of the Hecksher-Ohlin model is presented and linked to the case of US-Mexican trade below.

2.1 The Hecksher-Ohlin model

The Hecksher-Ohlin model is used as a base for analysis in Lall and Weiss' article on Chinese competition on Mexican trade in the US, and it will also be used here (Lall and Weiss, 2007). The main assumption of the model is that a country will produce and export the goods that is using relatively more of their abundant factor of production and import the goods that is using relatively more of their scarce factor of production. Here, intensively using means to employ relatively more of a certain factor of production in terms of the other factor of production. The abundant factor is the factor a country has relatively more of in terms of the other factor compared to the partner country. For example, country H and country F both produce cars and toys. The production of cars is capital (K) intensive and clothes is labor (L) intensive, this can be written like $(K/L)^{\text{Cars}} > (K/L)^{\text{Toys}}$. In terms of the factor endowments of the both countries, $(K/L)^H > (K/L)^F$. This means that H is capital abundant and F is labor abundant. Note that what is intensively depends

on the ratio of labor used in production rather than in output, meaning a country will not be both labor and capital intensive (Krugman and Obstfeld, 2009: 54ff). If w notates wage (i.e. price of labor) and r notates rent (i.e. price of capital) then the production factor endowments for the two countries can be written like $(w/r)^H > (w/r)^F$. Since capital is relatively cheaper in H , they will produce more cars (capital intensive goods) than F , and import most of their demand for toys (labor intensive goods). The theory assumes that all factors are employed in the production of cars and toys, this means that any change of production factors will also change the production output. Furthermore, since there is perfect competition the price of a product is made up solemnly of costs of labor and capital. Goods prices are therefore influenced by factor prices. (Jones, 1956: 1ff)

In order to reach the above mentioned conclusions, identical technology, constant returns to scale, only two factors of production and that trade does not lead to complete specialization is assumed by the Hecksher-Ohlin. If this is true, trade in goods would replace international mobility of factors of production, such as capital or labor. It also means that there would be a factor price equalization in the long run, so that labor would get more expensive and capital would get cheaper in (labor-abundant) F , and vice versa for (capital-abundant) H , as long as technology is identical, countries are not fully specialized and there are constant returns to scale (Markusen et.al, 1995: 98ff).

Paul Krugman uses the H-O model to show that international trade is not a zero-sum game. If all parts specialize in trade the entrance of a new competitor can actually raise the welfare for all through increased consumption. Furthermore, since adjustment to new production patterns are instant and without cost the size of the competitor and its rate of export growth are deemed irrelevant within the model. It is however, crucial to keep in mind that this result of “everybody gains from trade” is dependent on the, unrealistic H-O assumptions. Scale economies, adjustment lags or technological gaps make the outcome of trade far more ambiguous (Lall and Weiss, 2007: 87).

This essay is based in the H-O model but is extended to include more than two goods and two countries. This is possible as the model is solemnly used as base for analysis. In accordance to the original model, the country that can produce a product relatively cheaper than the other country is going to export this good. This would logically also be true if there are two countries exporting to a third

importing country. Since it is essential to be relatively more productive than other countries in the competition for a market, a new trading competitor can lead to changes in relative factor endowments and subsequently factor prices, production and trade. Country F might initially have had an advantage in the production of toys, but if the new country Z is relatively more abundant in labor than both F and H, it will be able to produce toys relatively cheaper than both of them. Both F and H will therefore start importing goods from Z, and F will export more of another good by which it has comparative advantages. This does not necessarily mean F stops producing toys altogether, but the production will decrease.

Moreover, it is important to keep in mind that the H-O model is a model that is designed to analyze the long term effects of trade. This does not exclude the possibilities of short term adjustment costs that might arise in periods of economic transition. However, since 13 years can be considered a long period the general conclusions of the model can still be applied.

2.2 Hecksher-Ohlin in a Mexico-China perspective

In the context of this essay it is relevant to investigate if China has relative advantages compared to Mexico in the production of export goods, and if this has led to a decrease in trade between Mexico and the US. The assumptions about comparative advantages are made to establish which country produces the good cheaper than the other, and to establish who will be more successful in competition with the other. Assuming China has a comparative advantage would mean that they can sell their goods to the US cheaper than Mexico. US customers would therefore prefer Chinese goods before Mexican ones because they are cheaper, leading to decreased imports in goods from Mexico and increased imports from China. If this happens there would be a so called displacement effect of China on Mexico. It is however possible that these effects differ from industry to industry and it is therefore interesting to look at disaggregated data for trade between Mexico and China, and the US. It is also worth noting that comparative advantages must not be solely in labor or capital, it can be land or skilled labor or even transport costs and tariffs. Moreover, the assumption of China's

comparative advantage in relation to Mexico is also discussed in order to give an explanation to said displacement effects.

3 Background

The last decade has been characterized by the rapid growth of China. This section gives a brief overview of China's emergence on the world market, as well as its trade relations to the US in order to make the analysis more comprehensible. The economic situation of Mexico and recent economic development is outlined below. Furthermore, a brief review of the discussion of Chinas impact on Latin America is presented, in order to put Mexico's recent economic development into context.

3.1 China – From Closed Economy to a Big Player on the World Market

China is one of the world largest trading economies today, but this has not always been the case. Up until 1978 China was a poor rural country with economic policies characterized by a communist planning economy. In 1978 Deng Xiaoping initiated extensive rural reforms which were soon to be expanded to liberalization of prices and fiscal decentralization. State-owned enterprises became more independent, which led to the creation of many manufacturing and service companies. (Hernández, 2012: 52). During the period post rural reform, from 1985 up until today, the Chinese government has made vast decentralizations and successively opened up to trade. Relations with foreign companies have been promoted, and foreign investments in the country facilitated, subsequently, the country grew more reliant on foreign imports and investments (Risso – Carrera, 2012: 82). In 1992, Deng Xiopeng visited Shenzhen in the Guangdong province, which is another landmark of China's road to liberalization. Shenzhen is a city where the government had experimented with loosening government control and implementing policies to promote FDI and inflows of technology in the 1980's,

leading to a growth from 70 000 inhabitants to almost two million in just a few years. Salaries there were substantially higher than in the rest of the country and the economic success of the experiment seemed unquestionable. This trip marked a change in Chinese attitude towards capitalism and made way for more extensive liberalizations (Thurston, 1993).

China joined the WTO in 2001, which led to Chinese economy becoming far more integrated on the world market than before. China had previously been subject to discriminatory high tariffs, but was now protected by the Most Favored Nation principle of the WTO and could compete more fairly on the world market. In 2005 when the MFA¹ quotas were removed, it marked another important step of the country's integration on the world market. This is of particular importance since China is a major producer, of labor intensive goods, and particularly textiles. The year after textile quotas were removed, US imports on previously restricted goods increased by an average of 270 per cent, demonstrating how important joining the WTO was for Chinese trade (Jenkins et. al, 2008:235; Hoekman-Kostecki, 2009:309).

China's GDP (measured in PPP) for 2011 was 11,3 trillion USD, making China the world's second largest economy after the US (Central Intelligence Agency, 2012). China's importance on the world market has continued to increase after they joined the WTO and the Chinese communist regime is currently more economically open than India, Brazil, and United States (Lora, 2007: 17). Trade is crucial to Chinese economy and 50 percent of GDP comes from trade, compared to the US where it was only 25 percent in 2011 (World Bank², 2011). Furthermore, China's exports were 13.3% of world exports and 12% of world imports in 2011, making it the largest exporter and second largest importer in the world (WTO¹, 2012). This makes China one of the most influential countries in the world.

China has come a long way in terms of liberalization, but the state still plays a remarkably large role in the economy. State-owned companies are many and government controls are plentiful and complicated (Hernández, 2012: 50ff).

¹ MFA stands for Multi-Fiber Arrangement under which "countries whose markets are disrupted by increased imports of textiles and clothing from another country were able to negotiate quota restrictions". (Hoekman-Kostecki, 2009, p.304)

3.2 Mexico –A General Background

Mexico was never as cut off from the outside world as China was in the 20th century, but Mexico has nevertheless restructured and liberalized its economy with a varied degree of success ever since the 1980's. Foreign direct investments and financial markets have been deregulated, trade liberalized and state-owned enterprises extensively privatized. This has facilitated Mexico to grow as an exporter and producer of manufactured goods (Hernández, 2012: 53).

Mexico's extensive trade liberalizations were followed by the creation of NAFTA, which resulted in Mexico's preferential access to the US and Canadian markets. This in turn increased incentives for US companies to place labor intensive productions in Mexico, since wages and taxes are significantly lower there than in the US, which could be fully taken advantage of as trade barriers disappeared. This caused Mexican companies to specialize in low added value products produced in Maquila industries². Moreover, FDI to Mexico grew significantly after joining NAFTA, and Mexican trade with the US increased substantially (Blázquez-Lidoy et.al , 2007: 57). In fact, the importance of trade more than doubled for the Mexican economy during the two years after joining NAFTA, indicating a growth of exports as well as a higher dependency on trade with the US (Campos-Vázquez - Rodríguez-López, 2011: 13). However, the expansion of trade and FDI increased Mexico's vulnerability to external shocks as the economy became more reliant on trade and foreign investment which has held back Mexican growth instead of promoting it (Hernández, 2012: 53).

Despite the promising beginning of NAFTA, trade growth between Mexico and the US slowed down significantly around the year 2000. Dominick Salvatore concludes that, even though Mexican exports to the US grew faster than total Mexican exports between 1994 and 2000, they grew slower between 2001 and 2008 (Salvatore, 2010: 33). Moreover, Mexico's economic development has been substantially slower than what has been expected of it, both in terms of growth and in exports. Legal constraints of investment, availability of credit to the private

² The formal definition of Maquila or Maquiladora is “a foreign-owned factory in Mexico at which imported parts are assembled by lower-paid workers into products for export” (Merriam-Webster, 2012)

sector, quality of education, and laws that create labor market rigidity are bottlenecks that can explain the lack of growth in Mexican skill-intensive industries. (Campos-Vázquez and Rodríguez-López, 2011: 5).

Mexico mainly exports manufactured goods and between 1993 and 2010 the share of manufacturing exports in total non-oil exports ranged from 93% to 97% per year (Campos-Vázquez and Rodríguez-López, 2011: 13). Most prominent of the manufacturing industry are the Maquilas. A Maquila is typically owned by a company in the US that import machinery and materials duty free to Mexico and export the finished products back to the US or elsewhere. These foreign owned companies take advantage of relatively low-cost Mexican labor, advantageous tariff regulations and geographical proximity to the US market (Made in Mexico INC, 2011). These products can be anything from clothes and toys to machinery equipment and electrical accessories (Corpwatch, 1999).

A recent study made by the bank HSBC shows that key industries of Mexico today is the aerospace industry, tourism, and mining (producing copper, gold, silver, zinc and gravel). The automotive industry is also important, seven out of the ten largest producers have plants in Mexico, and more than 90% of all car parts manufacturers are present in the country. The report also point to renewable energy, software and digital contents industries as important future industries in Mexico (HSBC, 2011). This indicates that the Mexican production is a fairly sophisticated and developed one requiring skilled labor but it also requires cheap, low-skilled labor for assembly of some products or extracting of minerals.

Today, Mexico is classified as a transition economy, well on its way to become a developed country. It is the second largest economy in Latin America after Brazil, but it is also one of the more populous with its 114,8 million inhabitants out of which 47 million make up country's workforce. As of 2011 it had a GDP of 1,155 trillion dollars. In 2011 Mexico had a GDP growth of 3.9 percent (World Bank, CIA², 2012). In 2012 exports and imports as a share of GDP was an astonishing 58,6% which is significantly higher than the same year for China (Thomson, 2012).

3.3 China and Latin America

The massive growth of China means that global markets have expanded but it has also resulted in world market prices changing. Chinese demand for primary goods has driven up prices whilst prices on some low-skill labor intensive goods have fallen due to increased Chinese supply. These changes have been large enough to affect most of Latin America, but countries have been affected in different ways (Lora, 2007:17). A brief overview of China's influence in the Latin American continent follows, in order to put the case of Mexico into context.

The double effect on Latin America has been an extensive area of research conducted by a number of authors such as Zho Hongbo (2012), Rhys Jenkins (2010) and Javier Santoso (2009). They all conclude that the overall effect on South American countries has been positive since the majority of countries have a complementary export structure. Kevin D. Gallagher and Roberto Porzecanski states that the main reason Latin American countries have benefitted from Chinese growth is because it has led to an increased demand on imported primary goods, which many Latin countries are exporters of (2008: 198). The increase of Chinese imports is large enough to viably affect the world market. For countries blessed with natural resources, such as Brazil and Chile, the increased Chinese demand for mining products and soybeans have boosted the economy. Most of the South American countries have been able to take advantage of this increase in demand and has been more positively than negatively affected by the Chinese development (Jenkins et.al, 2008:237).

However, the effect on Mexico and the Caribbean countries is more ambiguous. The Mexican economy is not as dependent on prime materials as other Latin American countries and has not been able to take advantage of the increased demand that Chinese growth has implied for these countries. On the opposite, Mexican economy has experienced a decade of slow and in some cases even negative growth. This has been explained by the fact that Mexico, just like China, produces manufactured goods rather than prime materials which is said to lead to that Mexico face an increased competition for US imports rather than increased demand. (Lora, 2007:17; Blázquez-Lidoy et al. 2007: 50ff). The continuation of this essay explores whether there is a negative “China effect” on

the Mexican economy that causes Mexican exports to the US to decrease due to Chinese competition.

3.4 Background Summary

Mexico as well as China has undergone extensive liberalizations during the last decades. For China this has enabled them to enter the world market and led to an extraordinary growth, both of trade and GDP. Mexico has also been growing, but to a far lesser extent, despite signing a free trade agreement with the US. Furthermore, there is a “double China effect”. Most of Latin America has experienced increased exports thanks to Chinese growth, but Mexico and a handful Caribbean countries have seen an opposite effect, due to what is generally explained through overlapping exports.

4 Mexican Trade

The following section shows the state of the Mexican economy today, with a special focus on trade with the US. A comparison between traded goods from Mexico to the US in 1999 and 2011 is made in order to investigate whether there has been a change in the goods traded or not, and also to see where the largest changes have occurred.

4.1 Changes in Mexican Trade with the US

Mexico is, as previously mentioned heavily reliant on trade with the US, 79 percent of Mexico's export are shipped across the border to the US (down from 88 percent in 1999). Mexican shares of US imports have only increased from 10 percent in 1999 to 12 percent in 2011. Simultaneously, Chinese exports to the US have increased with 375 percent, and today Chinese goods make up 18 percent of total US imports, an increase from only 8 percent in 1999. (OECD, 2012, authors calculations)

In order to illustrate how Mexico's trade with the US has changed from 1999 up until 2011, I have made a number of tables and calculations based on data from the OECD database. The data consists of trade data between the US, Mexico and China, in terms of imports to the US. All traded goods are categorized into the HS system at a fairly disaggregate level. Values are expressed in current USD, which means all values are converted into the value of a USD in 2011. Calculations of change are total change between the two years 1999 and 2011, which gives a general picture of the development over time.

Table A shows the 10 most imported goods from Mexico to the US, the two columns are strikingly similar, the only difference is that group 61 and 62, both are textile-related goods, have fallen out of the list. These goods go from being the 8th and 5th most imported goods onto 18th and 13th most imported goods from

Mexico. These goods have not only become less important for Mexican exports but have also experienced a negative growth since 1999. These results fit well with previous research which, since the entrance of China in the WTO to a large extent has been warning about the negative impact of China's growth on Mexico's textile exports to the US. In fact, employment in the Mexican textile industry has dropped since the early 2000, and the sector has experienced a severe crisis which has resulted in several bankruptcies and massive lay-offs (Ayala-Villareal, 2009: 327). Plastics as well as pearls, precious stones and metals are more important for Mexican trade in 2011 than they were in 1999. They have gone from being the 13th and 25th most important goods to 7th and 6th in 2011. A possible explanation for this spectacular increase in US imports is the increase in gold price since 1999. Prices have gone up approximately 430 percent, leading to an increase in export value for gold (onlygold.com). Furthermore, as mining is one of the most important Mexican industries today it makes sense that it has increased. Plastics have moved up only one spot, taking into account the fact that commodity group 61 and 62 fell several placements. So, Mexico's exports to the US seem to remain fairly unchanged, at least on the top level, despite the growth of China.

Table A
US Imports from Mexico (in Millions of Dollars)

	1999	\$		2011	\$
1	85: Electrical, electronic equipment	29 000		85: Electrical, electronic equipment	46 049
2	87: Vehicles other than railway, tramway	20 182		87: Vehicles other than railway, tramway	44 578
3	84: Nuclear reactors, boilers, machinery	14 294		27: Mineral fuels, oils, distillation products, etc.	38 418
4	27: Mineral fuels, oils, distillation products, etc.	7 866		84: Nuclear reactors, boilers, machinery	9 766
5	62: Articles of apparel, accessories, not knit or crochet	4 464		90: Optical, photo, technical, medical, etc. apparatus	9 759
6	90: Optical, photo, technical, medical, etc. apparatus	3 754		71: Pearls, precious stones, metals, coins, etc.	6 365
7	94: Furniture, lighting, signs, prefabricated buildings	3 364		94: Furniture, lighting, signs, prefabricated buildings	4 638
8	61: Articles of apparel, accessories, knit or crochet	3 336		07: Edible vegetables and certain roots	3 594
9	07: Edible vegetables and certain roots	1 595		39: Plastics and articles thereof	3 354
10	73: Articles of iron or steel	1 388		73: Articles of iron or steel	3 055

Note: Numbers in italics show HS-system classification number.

Source: OECD, 2012

Looking at how the shares of US imports have changed in table B, it becomes even clearer how Mexico has lost ground in the textile industry. Seven out of ten of the largest US share losers are in the textile industry, whereas food, metals, ships, and aircrafts seems to have been the big winners over time. Silk is a surprising commodity in which Mexico has gained market shares, but it remains a rather insignificant commodity in Mexican trade with the US.

The numbers in parenthesis show which ranking the industry group had in terms of share US imports in 1999, where 1 is the largest share and 96 the lowest. The largest changes have occurred in the groups where Mexico has and have had the smallest share of the US market with railways being a clear exception. This can be explained by the fact that small absolute changes yield larger changes in percent if the initial value is low. However, goods that had a low share of US imports in 1999 have increased in share of US imports, which implies that Mexican exports have diversified. This is supported by Robert C Feenstra and Hiau Looki Kee who state that both Mexican and Chinese exports to the US diversified substantially during the early years of the 2000's (2007: 20). It is also clear that, some goods that were very important in 1999, such as textile have gone through a massive decrease in terms of sales to the US.

Table B
Mexican Share of US imports

Top Ten Increase in Share of US Imports		Bottom Ten Increase of Share of US imports
1	89: Ships, boats and other floating structures (94)	53: Vegetable textile fibres nes, paper yarn, woven fabric (75)
2	02: Meat and edible meat offal (89)	45: Cork and articles of cork (80)
3	50: Silk (96)	43: Furskins and artificial fur, manufactures thereof (77)
4	46: Manufactures of plaiting material, basketwork, etc. (87)	61: Articles of apparel, accessories, knit or crochet (14)
5	71: Pearls, precious stones, metals, coins, etc.(72)	42: Articles of leather, animal gut, harness, travel good (56)
6	04: Dairy products, eggs, honey, edible animal products (83)	60: Knitted or crocheted fabric (39)
7	75: Nickel and articles thereof (96)	55: Manmade staple fibers (31)
8	18: Cocoa and cocoa preparations (67)	86: Railway, tramway locomotives, rolling stock,, equipment (3)
9	80: Tin and articles thereof (81)	37: Photographic or cinematographic goods (27)
10	88: Aircraft, spacecraft, and parts thereof (86)	63: Other made textile articles, sets, worn clothing etc. (12)

Note: Numbers in *italics* show HS classification number and numbers in parenthesis show the ranking of the industry group in 1999. 1 being the most imported commodities and 96 the least.

Source: OECD

As previously stated, the Mexican economy has been growing the last 12 years and so has exports. Total imports to the US have grown with 139 percent since 1999 and table C shows that, again, ships, metals and silk have increased a lot along with some food products and manufactures of plaiting material. These dramatic increases in volume can be compared with the three most exported goods in 2011, Electrical equipment, vehicles, and mineral fuels that increased with 89, 128, and 465 percent, respectively. Looking instead at which goods have decreased the most since 1999, different types of textiles stand out as the product group with the worst development. The exports to the US have more than halved since 1999 in apparel, cotton, knitted goods and fur. The biggest loser in terms of US exports is the vegetable textile fiber industry which experienced a decrease of 96% during the period of investigation. Railway, cork, photographic and wood exports have all decreased more than 70% which is an extraordinary downturn that shows on a clear change in export patterns from Mexico to the US since these goods started off being fairly important to Mexico in 1999. This is particularly interesting in terms of the textile exports which in 1999 were amongst the most important traded goods³.

In table C the number in parenthesis show the 1999 ranking of each type of good in terms of US imports. 1 is the most imported Mexican good and 96 is the least. The biggest increases have occurred in the bottom segment of the list, with the exception of pearls and precious stones. The biggest decreases on the other hand are spread out on both prominent and minor import goods. This is interesting since a high ranking in 1999 indicates a larger absolute change and a lower ranking a smaller absolute change in US imports. Articles of apparel as well as railway goods that were ranked 8th and 17th, fell to place 17th and 53rd as US imports decreased sharply between 1999 and 2011. This indicates that there has been a change in trade between the two countries in some industry groups.

³ The industry groups in table C are the only groups that decreased with more than 50% in terms of US imports.

Table C
Change of US Imports from Mexico 1999-2011

	Largest increase	%	Least Increase	%
1	89: Ships, boats and other floating structures (92)	5 700	53: Vegetable textile fibres nes, paper yarn, woven fabric (86)	-96
2	02: Meat and edible meat offal (80)	3 200	45: Cork and articles of cork (27)	-92
3	71: Pearls, precious stones, metals, coins, etc. (16)	2000	43: Furskins and artificial fur, manufactures thereof (87)	-79
4	75: Nickel and articles thereof (94)	1 900	37: Photographic or cinematographic goods (38)	-72
5	18: Cocoa and cocoa preparations (64)	1 300	52: Cotton (33)	-70
6	80: Tin and articles thereof (88)	1 100	60: Knitted or crocheted fabric (55)	-70
7	46: Manufactures of plaiting material, basketwork, etc. (93)	1 100	86: Railway, tramway locomotives, rolling stock, equipment (17)	-70
8	23: Residues, wastes of food industry, animal fodder (90)	1 000	61: Articles of apparel, accessories, knit or crochet (8)	-57
9	11: Milling products, malt, starches, inulin, wheat gluten (84)	900	42: Articles of leather, animal gut, harness, travel good (35)	-54
10	50: Silk (96)	800	44: Wood and articles of wood, wood charcoal (27)	-52

Note: Numbers in italics shows the HS classification. Numbers in parenthesis shows ranking of the goods in terms of US imports in 1999, where 1 was the most imported good from China and 96 the least

Source: OECD, 2012

From these figures, it seems like the exports from Mexico to the US have been relatively stable since China entered the world market, and in general there does not seem to be any great changes in what type of goods that have been exported. Many of the goods that were important Mexican exports in 1999 keep on being important today. There are however some exceptions to this, mainly in the textile industry. Furthermore, the largest growth, both in terms of shares of US imports and growth in percent, has with few exceptions, occurred in industries that were not particularly prominent 1999. The continuation of the paper will explore whether the changes that have occurred can be explained by Chinese growth or if the explanation is to find elsewhere.

5 Chinese Competition

As previously mentioned, China is often described as a competitor to Mexico due to their similar export structure and China's strong comparative advantages in terms of labor costs and quality. This section is aimed at analyzing what strengths China has in terms of trade compared to Mexico, but also to show that Mexico also have some advantages compared to China. Moreover, an overview of China's trade with the US will be given in order to contrast it with that of Mexico.

5.1 Chinese Strengths

China's main advantage, in terms of production, relative to Latin American countries derives from the size of its economy, macroeconomic stability and its rapid expansion of transport, electricity and communications. The size of China means that companies can take advantage of economies of scale and agglomeration effects as well as company clusters when locating their production there (Lora, 2007: 17ff). A 2004 World Bank survey states that Chinese factories have the “best skilled workers and productivity quality, speed, production capacity productivity, quality, speed, technology, storage facilities and transportation” (Robinson, 2010: 53).

China is said to be more competitive than Mexico, which would make Chinese growth a threat to Mexican exports to the US, seeing as they have fairly similar export structures (Gallagher and Porzencanski, 2008: 196). The Global Competitiveness report, published by the organization World Economic Forum supports this suspicion. Twelve different categories of competitiveness⁴ are

⁴ The 12 categories are divided into: Basic requirements (institutions, infrastructure, macroeconomic environment, health and primary education), Efficiency enhancers (higher education training, goods market efficiency, labor market efficiency, financial market development, technological readiness and market size) and Innovation and sophistication factors (business sophistication and innovation)

analyzed and China is ranked as 29th while Mexico is only ranked as 53rd out of 144 countries. China also ranks higher than Mexico in most sub-indexes, such as labor market efficiency, technological readiness and higher education but also in the indexes of institutions and macroeconomic environment (World Economic Forum, 2012). This shows that China has far more favorable prerequisites for business and production than Mexico. It also indicates that China has competitive advantages towards Mexico in general. According to Eduardo Lora, countries tend to grow substantially faster the higher their ranking is in this particular index (Lora, 2007: 35). This could be an explanation to Mexico's relatively slow growth of exports. However, as this index is made for trade in general it is not possible to draw far reaching conclusions about competitiveness in terms of exports to the US, especially since many factors, such as transports and tariffs are not measured.

Another explanation of the Chinese export miracle is the exchange rate of the Chinese currency, RMB, which is estimated to be undervalued by something between 10 and 50 percent. This is argued to give China an unfair trade advantage against other development countries, making it harder for countries such as Mexico to compete on the export market (Robinson, 2010: 53). A weak RMB would increase US imports from China since goods are cheaper than they are supposed to be due to a weak exchange rate (Xu, 2008: 716). The latest ILO report on labor costs repeats that China's export-driven growth has been possible thanks to a particularly competitive exchange rate which makes Chinese goods particularly competitive on the export market (ILO, 2012:57).

However, the Chinese economy is not without issues. The close ties between the state and market makes China's state enterprises substantially less efficient than they could have been. Furthermore, just as the countries in Latin America, China suffers from poorly distributed and relatively low quality education, high levels of corruption, difficulties in starting businesses and a weak rule of law (Lora, 2007: 37).

5.2 Mexican Strengths

In 2008, Kevin P. Gallagher and Roberto Porzecanski claimed that there is a “near unanimous consensus that Mexico is losing competitiveness to China” (2008: 186). This is sometimes illustrated by the development of the textile industry, which has traditionally been important for both China and Mexico. It is also an industry where developing countries often have a comparative advantage compared to developed countries, seeing as it is labor-intensive and requires relatively low-skilled workers (Hoekman-Kostecki, 2009: 303). In 1998, Mexico and China had an equal share of US imports, but ten years later China’s share had trebled while Mexico’s share had shrunk to less than half than what it was in 1998 (Robinson, 2010: 51). However, China does not only compete with Mexico in the textile industry but also in products with higher added value, such as electronics (Santiso, 2007: 9).

Mexico, striving to keep its cheap low-skill production afloat, has had a strong policy of holding wages down (Robinson. 2010: 53). Simultaneously, the economy in China has been thriving, which has led to a relatively large increase of salaries. When China emerged on the world market salaries were about a third of those in Mexico. Average manufacturing wages in 2000 was 0.3 USD per hour in China and 1.5 USD in Mexico. Chinese wages have increased almost fivefold to 1.6 USD per hour while Mexican wages have increased with a little more than 50% to 2.1 USD. In Chinese industry cities like Shanghai and Qingdao minimum wages have even surpassed those of Mexico City and Monterrey in Mexico (Gallagher and Porzecanski, 2008: 198; The Economist, 2012). This means there has been a substantially slower wage growth in Mexico than in China, and that Chinese salaries are now catching up with Mexican wages. Nonetheless, despite a slower wage growth in Mexico than in China, wages are still lower in China, making production there cheaper. This means Mexico’s comparative advantages have changed since China entered the world market since there is someone who can produce labor-intensive products cheaper than them. It is possible that this has contributed to the slow growth of Mexican exports.

In 2007 Jorge Blázquez-Lidoy, Javier Rodríguez and Javier Santiso predicted that Mexico's current export structure will change because of its vulnerability to Chinese competition. They point to how Singapore and South Korea already made moves away from manufactures and transport equipment where they were competing with China, towards chemical and energy products that are demanded by China (p.57). This may have happened to some extent in the case of textile industries, but it is not certain that it was caused by only Chinese competition. Also, Mexico is not Singapore. Mexico is located substantially closer to the US than both China and its Asian competitors, which gives Mexico one of its most important comparative advantages over China on the US market, namely proximity. In fact, a number of researchers have noted that trade costs are much more important than production costs, which in the case of Mexico would mean that it is cheaper for US companies to buy goods produced there than in China despite the products being slightly more expensive to manufacture (Deardoff, 2004:5). In 2004 Anderson and van Wincoop found that trade costs are twice as large as production costs on average (p.44). Blázquez-Lidoy et.al. draw the conclusion that perhaps "[...] trade costs are significant determinants of comparative advantage, perhaps even more than the production costs in which China has its competitive advantage." (2007:58.) Furthermore oil prices have trebled since the beginning of the millennia, making geographical proximity far more valuable today than it was in the year 2000 (Inflationdata, 2012). Trade costs are further decreased through tariff cuts and more efficient border controls since Mexico is a member of NAFTA. However, general liberalizations on the world market, such as those promoted by the WTO, undermine the importance of this free trade agreement (Persson, 2012: 1ff). As the tariff gap between countries within and outside NAFTA diminishes, so does Mexico's benefits of the agreement. Relatively short transport times is another of the advantages of geographical proximity, it takes only a couple of days to transport a cargo between Mexico and the US, whereas it can take three months to ship a container of goods all the way from China (The Economist, 2012: 5).

So, while there have previously been consensus that China is replacing Mexico in trade with the US, this is somewhat disputed today. Last year the consultancy firm Alix Partners claimed that Mexico is the cheapest place in the world for producing goods destined for the US, based on pay, logistics and currency fluctuations

(2011: 2). Gordon H. Hanson and Raymond Robertson wrote an article in 2006 concluding that China is responsible for only a small part of Mexico's decline in its share of US exports. They do however also show, using a gravity model, that if export levels from China would have stayed at the same level as in 1994, exports in Mexico would have been between 1.1 to 3.1 percentage points higher in the early 2000s (p.22). Enrique López-Córdova claims that the development of Mexican exports can be explained by internal factors rather than a "China effect". They claim that about half of the difference in annual growth rates of exports to the US can be explained by the simple fact that China is growing faster than Latin America, rather than replacing Latin American companies on a third market (2007: 124).

China seems to have a highly beneficial business environment and does in some cases seem to be a better choice for production than Mexico. Textiles appear to be a good example of this since China is far more successful in exporting this type of goods to the US. As mentioned above, Mexico is expected to diversify its exports, which it also seems to have done. Simultaneously, Mexico has some advantages in terms of exports to the US why it is not clear that China has ruined everything. This is explored further in the following chapters.

5.3 China and the US

In order to determine how Mexican trade has actually been affected by China's growth it is relevant to analyze US imports from China. This to establish whether the imports from both countries are similar and they are potential competitors.

China became the world's top provider of electronic goods and in 2004 they surpassed the US as the largest exporter of technology as they exported \$180 billion dollar worth of computers, mobile phones and other digital products, compared to \$149 billion worth of exports from the US (Lora, 2007: 25). China's main exports consist of office machines, data processing equipment, telecommunications equipment, electrical machinery and apparel and clothing (Trading Economics, 2012).

The US is one of China's main trade partners and in 2011 the US imports from China was worth approximately 417 billion dollars. Table D shows the ten most imported goods to the US from China in 1999 and 2011 in millions of dollars. An asterisk marks the goods that were also top Mexican exports that year and the number in bracket gives the ranking of that good for Mexican exports for the same year.

Top import goods from China and Mexico are quite similar, and it seems like Mexico faced competition from China in the textile industry, which has continued to be important to China whereas it has become far less important for Mexico. Electronics and vehicles on the other hand continue to be important export industries for Mexico despite Chinese competition. Furthermore, the two countries' top exports to the US seem to be fairly similar over time. Six out of the ten most exported categories of goods are the same for Mexico and China both in 1999 and 2011. This is not statistically proved data, but still gives an overview of the situation.

Table D
US Imports from China (in Millions of Dollars)

Import Goods From China 1999			Import Goods From China 2011		
	Millions of Dollars		Millions of Dollars		
1	85: Electrical, electronic equipment*	15 803	84: Nuclear reactors, boilers, machinery*	99 566	
2	95: Toys, games, sports requisites (15)	12 074	85: Electrical, electronic equipment*	99 371	
3	84: Nuclear reactors, boilers, machinery*	10 661	95: Toys, games, sports requisites (27)	23 733	
4	64: Footwear, gaiters and the like, parts thereof (29)	8 901	94: Furniture, lighting, signs, prefabricated buildings*	22 708	
5	94: Furniture, lighting, signs, prefabricated buildings *	6 325	64: Footwear, gaiters and the like, parts thereof (40)	17 471	
6	62: Articles of apparel, accessories, not knit or crochet *	3 941	61: Articles of apparel, accessories, knit or crochet (20)	15 629	
7	42: Articles of leather, animal gut, harness, travel good (35)	3 217	62: Articles of apparel, accessories, not knit or crochet (13)	15 571	
8	39: Plastics and articles thereof (13)	2 736	39: Plastics and articles thereof *	11 838	
9	90: Optical, photo, technical, medical, apparatus *	2 397	73: Articles of iron or steel*	9 359	
10	61: Articles of apparel, accessories, knit or crochet *	2 122	87: Vehicles other than railway, tramway*	8 732	

Note: Numbers in italics show the HS Classification system

Source: OECD, 2012

Comparing the ten industries that have increased the most and the least of US imports, it seems as if China and Mexico are growing in different directions. There are a number of industries where Mexican exports are decreasing where China is increasing its share of the US market, and vice versa. The commodities where these contradictory developments have occurred are marked in bold.

Three things are evident looking at the table explaining Chinese imports to the US. The first is that growth has been incredibly high during the past 13 years. Growth has been high in a number of different categories ranging from weapons to knitted fabrics. And, last but not least, China has grown the most in some sectors where Mexico has declined the most, but it has also lost shares in industries where Mexico has grown the most.

Table E
Change of US Imports from China 1999-2011

	Largest Percent Increase of US Imports Iron China		Least Percent Increase of US Imports From China
1	<i>31:</i> Fertilizers	25 324	78: Lead and articles thereof -82
2	<i>60:</i> Knitted or crocheted fabric	4 833	<i>18:</i> Cocoa and cocoa preparations -75
3	<i>47:</i> Pulp of wood, fibrous cellulosic material, waste etc.	4 127	<i>04:</i> Dairy products, eggs, honey, edible animal product ne -52
4	<i>59:</i> Impregnated, coated or laminated textile fabric	3 800	<i>80:</i> Tin and articles thereof -32
5	<i>23:</i> Residues, wastes of food industry, animal fodder	3 726	<i>50:</i> Silk -20
6	<i>35:</i> Aluminous, modified starches, glues, enzymes	3 429	<i>10:</i> Cereals -0,07
7	<i>41:</i> Raw hides and skins (other than fur skins) and leather	2 663	<i>79:</i> Zinc and articles thereof 1,3
8	<i>45:</i> Cork and articles of cork	2 165	<i>27:</i> Mineral fuels, oils, distillation products, etc. 11,1
9	<i>93:</i> Arms and ammunition, parts and accessories thereof	1 962	<i>91:</i> Clocks and watches and parts thereof 19,4
10	<i>54:</i> Manmade filaments	1 791	<i>24:</i> Tobacco and manufactured tobacco substitutes 20,6

Note: Numbers in italics show HS-classification number. Industries marked in bold means the industry had experienced a large increase while China had experienced a large decrease of shares, and vice versa.

Source: OECD

Table F, just like Table E, shows that China has been growing the most in some sectors where Mexico has been growing the least. This is mostly textile related industries, but also in railways. At the same time, Mexico has grown the most in some of the sectors where China has grown the least. However, Mexican top growth has occurred in far more diverse types of industries than in China. This indicates that the two countries are growing in different sectors. According to Lall and Weiss a good way of measuring a competitive threat is to look at change in shares of a market. If a country's share of imports decreases while the other's is increasing, the other is most likely a competitive threat (2007:87). By this way of reasoning it seems as if China and Mexico are competitive threats to each other.

Table F
Change of Shares of US Market

	Largest Increase on US Market	Least Increase on US Market
1	65: Headgear and parts thereof	80: Tin and articles thereof
2	60: Knitted or crocheted fabric	78: Lead and articles thereof
3	86: Railway, tramway locomotives, rolling stock, equipment	36: Explosives, pyrotechnics, matches, pyrophoric, etc.
4	49: Printed books, newspapers, pictures etc.	46: Manufactures of plaiting material, basketwork, etc.
5	58: Special woven or tufted fabric, lace, tapestry etc.	91: Clocks and watches and parts thereof
6	63: Other made textile articles, sets, worn clothing etc.	79: Zinc and articles thereof
7	62: Articles of apparel, accessories, not knit or crochet	04: Dairy products, eggs, honey, edible animal product ne
8	61: Articles of apparel, accessories, knit or crochet	18: Cocoa and cocoa preparations
9	84: Nuclear reactors, boilers, machinery, etc.	13: Lac, gums, resins, vegetable saps and extracts
10	96: Miscellaneous manufactured articles	10: Cereals

Note: Numbers in italics show HS-classification number. Industries marked in bold means the industry had experienced a large increase while China had experienced a large decrease of shares, and vice versa.

Source: OECD

It does not seem like China is competing with Mexico in all industries, neither does it seem like China is always replacing Mexico in all of those where they are. This in turn indicates that, perhaps, the two countries have a similar export

structure, and they are competitors, but China is not more competitive in all types of production. Even though, as China has relative advantages in some industries, such as the textile industry, Mexico also have some advantages towards China that it seems to have explored. This is primarily seen in the industries where Mexican industries have grown a lot and Chinese industries have decreased. There does consequently seem to be some sort of correlation between the imports from the two countries which will be investigated further in the following sections.

6 China's Effect on Mexican Trade

There have however been cases where the two countries have experienced divergent developments of their exports to the US. In these industries China has grown where Mexico has decreased and grown less where Mexico has grown the most. The following section is devoted to investigate whether China is the driving force behind the changes in trade between the US and Mexico that have occurred since 1999. This is done through analysis of a series of correlations as well as a regression model.

6.1 Correlation Analysis

Previous findings show that the types of exports from Mexico to the US has remained fairly unchanged during the past 13 years, with some prominent exceptions, primarily in the textile industry. It also appears to have been some degree of negative correlation between US imports from Mexico, and China. To determine the statistical significance of this claim two correlations are presented below. The actual data is the same as previously and is taken from the OECD database. Each commodity group's share of US imports in 1999 and 2011 as well as their growth, both for shares of US market and for absolute values have been calculated. The first set of correlations is made with the share of Mexico's exports to the US 1999 and growth of US imports from Mexico and China, respectively. As discussed above, 1999 is two years before China entered the WTO and fully joined the world market, which means data from this year can interpreted as trade between Mexico and the US without Chinese influence.

Table G shows a fairly weak, but significant correlation between the growth in US imports of Mexican goods and Mexico's share in 1999. The correlation is negative which implies that Mexico has grown in industries that were not important in 1999 and have decreased in industries that were less

important in 1999. In other words, this gives support to the theory that Mexico has changed its export to the US since China joined the WTO. But, Chinese growth shows an almost equally strong negative correlation with the share of Mexican exports in 1999. This means that Chinese exports have grown mainly in goods that were not prominent Mexican export goods in 1999. It supports the above made argument that China and Mexico is growing in different industries.

Additionally, there is no significant correlation between Chinese and Mexican growth which indicates that Chinese growth does not directly affect Mexican exports in the US. According to this, China does not seem to be such a dangerous threat to Mexico's trade with the US.

Table G
Pearson Correlation

	Mexico export share 1999	Change in US Imports From Mexico	Change in US Imports from China
Mexico export share 1999	1	-0,300**	-0,294**
Change in US Imports From Mexico	-0,300**	1	-0,023
Change in US Imports from China	-0,294**	-0,023	1

** Correlation is significant at the 0.01 level

Table H shows Mexico's share of US markets in 1999 and growth of imports from Mexico and China in percent. This is different to the first correlation since it showed the goods that were most important relative Mexico's total exports while table Y shows the goods where Mexico had a strong position on the US market in 1999. Here, rather surprisingly, there is no correlation between China's growth and Mexico's share of the US market in 1999. This indicates that Chinese exports have been not growing in the industries where Mexico had a strong position neither on the US markets nor in the industries where Mexico had a weak position. Table Y further shows a negative correlation between the share of us imports in 1999 and growth in US imports from Mexico. This indicates that Mexico has grown more in sectors where it did not have a large share of the US market. In other words, Mexico has changed its exports to the US. This is

supported by the fact that the textile industry, which was previously very important, has lost shares in both US market and in Mexican production. Mexican growth has therefore been focused on other places. Meanwhile, the textile industry has been a key to Chinese growth on the US market. Chinese products have been cheaper, and this might have contributed to the decline in the Mexican imports.

Table H
Pearson Correlations

	Mexico's Share of US imports 1999	Change in US imports from Mexico	Change in US imports from China
Mexico's Share of US imports 1999	1	-0,223*	-0,098
Change in US imports from Mexico	-0,223*	1	-0,023
Change in US imports from China	-0,098	-0,023	1

*Correlation is significant at the 0,05 level

According to these results no correlation between Mexican and Chinese growth can be detected. The negative correlations that have been proved significant show that Mexico has been growing in sectors that were not important for their exports in 1999, but also in sectors that were not important in trade with the US. Chinese growth shows a correlation, and a negative such, only with Mexican exports in 1999, indicating that Chinese growth has generally occurred in sectors that were less important to Mexico. These results may seem contradictory to what has been discussed in the background, but they do match what previous authors have concluded in terms of China and Mexico. López-Cordova, Micco and Molina (2007), Ayala and Villarreal (2009) and Hanson and Robertson (2006) also concludes that China only explains a part of the changes in Mexican exports.

6.2 Regression Analysis

In order to further examine the results in the previous section, as well as to highlight different possible explanations to the developments of Mexican trade with the US, a regression analysis is made.

The dependent variable of the regression is the change of US imports from Mexico in dollars for the years 1999 to 2011. This is calculated as the difference between US imports in 2011 and 1999 for each category of goods. In order to build a model that explains the relation between Mexican and Chinese trade with the US, two control variables are included. These variables are incorporated to control that the relation between Mexican and Chinese growth does not depend on another factor than those included so that their relation is purely spurious⁵. Independent variables include US imports of Chinese goods in dollars as well as the control variables oil price and US exports in dollars. Oil price is included to check for the theory that transport costs correlates positively with Mexican exports to the US. Since Mexico is located very close to the US, we can expect a positive correlation between oil price and US imports from Mexico. Oil price is not a perfect measure for transport costs since it is possible that other costs are more important for Mexico's comparative advantage, such as container costs or transport times. The variable US exports is included in order to see if US production affects how much they import from Mexico. It is assumed that if production of a certain good goes up, so would exports of that good, and the US would subsequently import less from Mexico. This is not a perfect measure of production, but serves as a control variable.

In short US imports from Mexico is modeled as a function of US imports from China, US exports and oil price. The model is transformed to a logarithmic form so that the result reflects change in percent rather than changes in dollars. The algebraic form of the regression is as follows:

$$Y = \beta_1 + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + e_i$$

⁵ A spurious relation is purely coincidental and depends on an unknown variable rather than the X included in the model (Westerlund, 2007)

Where $Y = \log(\text{US imports from Mexico})$, $\beta_1 = \text{constant}$, $\beta_i = \text{coefficient}$, $X_{2i} = \log(\text{US imports from China})$, $X_{3i} = \log(\text{US total exports})$, $X_{4i} = \log(\text{oil price})$ and e_i is the random error.

Dependent Variable: LOG(MEXICO)
Method: Least Squares
Included observations: 1236 after adjustments

Variable	Coefficient	Std. Error	Prob.
C	-4.067886	0.608050	0.0000
LOG(CHINA)	0.417700	0.022189	0.0000
LOG(USA)	0.747506	0.025474	0.0000
LOG(OIL)	-0.344899	0.100421	0.0006
R-squared	0.618860	Durbin-Watson stat	1.882039
Adjusted R-squared	0.617932	F-statistic	666.8022
		Prob(F-statistic)	0.000000

The regression output shows that all three variables are significant due to very low probabilities. The R-square value however indicates that 60% of the variation in US imports from Mexico can be explained by the model. US production seems to be the most important factor here, correlating positively with Mexican imports. Somewhat surprisingly Chinese imports have a positive correlation and oil price correlates negatively with Mexican imports.

However, this regression is only significant if the following assumptions are fulfilled.

1. The dependent variable can be written like a linear function with an intercept and a “random error”, i.e. the regression is correctly specified
2. The expected value of $e_i = 0$, which means the residuals are random.
3. There is the same variance of e_i for all i , i.e. is homoscedastic.
4. There is no autocorrelation of the residuals.
5. The independent variables x_i are not random and no variable can be written as an exact linear combination of the other explanatory variables, in other words, there are no unit roots.
6. The residuals are normally distributed. (Westerlund, 2005)

To check these assumptions, I first check for erroneously omitted variables by performing a RESET test. The H_0 is that the model is correctly specified and if the H_0 hypothesis is rejected that means the model needs to be reviewed. Since

the F-statistic in the RESET test is above the 1% level, the H_0 cannot be rejected and the model is thereby correctly specified. This means assumption 1 and 2 is fulfilled.

Ramsey RESET Test			
	Value	df	Probability
F-statistic	3.067451	(3, 1229)	0.0271

To further analyze assumption two, a VIF or Variance Inflation Factors test is performed in order to check for multicollinearity. The centered VIF value is close to one, indicating that there is no multicollinearity which is good since it means the independent variables does not correlate.

Variance Inflation Factors	
Included observations: 1236	
	Centered
Variable	VIF
LOG(CHINA)	1.260387
LOG(USA)	1.208059
LOG(OIL)	1.060300

The existence of heteroskedasticity is reviewed by running a White's test, since this detects any type of heteroskedasticity. Here the H_0 states that the residuals are homoscedastic, and that the residuals are random. The test statistic of the White's test is below the 1% level, meaning the hypothesis of homoscedasticity is rejected, and that assumption 3 is not fulfilled.

Heteroskedasticity Test: White			
F-statistic	33.70518	Prob. F(3,1232)	0.0000

To correct the heteroskedasticity, the White's robust standard errors are used since we do not know what the heteroskedasticity of the model looks like. This yields a regression that is not the best estimator of the relation between the variables, but it still gives a correct inference regardless the shape of the heteroskedasticity since the sample is large. The new regression gives more or less the same results as the original regression.

Dependent Variable: LOG(MEXICO)
 Method: Least Squares
 Included observations: 1236 after adjustments
 White heteroskedasticity-consistent standard errors & covariance

Variabel	Coefficient	Std. Error	Prob.
C	-4.067886	0.690288	0.0000
LOG(CHINA)	0.417700	0.020993	0.0000
LOG(USA)	0.747506	0.033308	0.0000
LOG(OIL)	-0.344899	0.102357	0.0008
R-squared	0.618860	Durbin-Watson statistic	1.882039
Adjusted R-squared	0.617932	Prob(F-statistic)	0.000000

The forth assumption about autocorrelation is often not fulfilled in time series and is therefore tested by a Durbin-Watson test. The critical values for rejecting the H_0 hypothesis of no autocorrelation is tested against the H_1 hypothesis of positive autocorrelation. The critical upper value for the test is 1.85282 and lower value is 1.86044 on a 1% significance level⁶. Since the Durbin-Watson statistic from the regression above is above is higher than the upper value, the H_0 hypothesis is not rejected and the model does not have autocorrelation.

The fifth assumption regarding unit roots is tested by a test for unit roots, showing that US exports, Mexican imports and Chinese imports are free of unit roots. The variable oil has a unit root, which means this variable cannot be interpreted. The variable is kept in the model since it is only a control variable and is therefore not significant for further analysis regarding Mexico and China.

The last assumption is that the residuals are normally distributed. Since the sample is large this is supposed to be correct in accordance with the central limit theorem.

The results of the regression show a significant connection between both US exports and US imports from China. The standard errors are relatively small which means that the results are reliable. And the adjusted R-squared value shows approximately 0.61 which means 61% percent of the variation in US imports from Mexico can be explained by variations in US exports and imports from China.

⁶ Values from http://www.imm.bwl.uni-muenchen.de/dateien/3_lehre/market_analysis/durbin_watson_tables.pdf

6.3 Results

The results yielded from the regressions above differ from those of the correlations, where China did not seem to influence Mexico's trade with the US. Instead, it seems like Mexico has grown where China has, and decreased where China has decreased. The general notion that China is a dangerous competitor to Mexico cannot be supported as the regression shows a positive coefficient instead of a negative one this cannot be supported. The positive relation implies that China is not so much of a competitor to Mexico on the US market as previously thought. The fact that the imports from the two countries do correlate can be explained by the similar export structures of the two countries. For example, if both Mexico and China exports televisions to the US, and demand for televisions goes up, then both countries will export more. It could also be explained by industry specific technological progress. It is however still possible, and supported by what is showed earlier in the essay, that China grows a lot faster than Mexico on the US market. This is expected since the Mexican economy has not been able to keep up with the explosive growth of China. It does not seem like the Chinese industry has completely outcompeted Mexico, but it is possible that it has slowed down exports to the US.

The regression indicates that there is a positive relation between the change in Mexican imports to the US and the change in US exports and Chinese imports to the US respectively. In other words, if the US produces and exports more of a good, the US imports from Mexico will also increase. The causality here is not determined so no conclusion about which variable causes which can be made. An increased US production could lead to increased Mexican exports if US companies produce more of a good because domestic and world demand goes up. This would in turn mean that the market is growing, allowing Mexican companies to sell more to US companies. It is also possible that the US exports pieces of goods, or raw materials to e.g. Mexico that these commodities are assembled or get their finishing touch in Mexico, as is the case of the Maquila industry. However, no certain conclusion can me made about this since the HS system of classification is not divided into levels of refinement. The variable for oil price cannot be analyzed as it has a unit root.

7 Conclusion

Both Mexico and China have undergone extensive liberalizations that have facilitated export growth in both countries. China has been growing faster and more dramatically than Mexico, but both countries have increased their trade with the US over the past thirteen years. Mexican exports to the US were expected to grow rapidly thanks to NAFTA, but have grown relatively slowly, and in some industries growth has even been negative. Since Chinese exports to the US have been growing in some of these disappointing sectors, Chinese companies have become scapegoat for poor Mexican performance. However, the correlations and regression analysis made in this essay show that Chinese growth is not the prominent reason for this recent development. Mexico cannot be said to have changed its exports to the US because of China.

The main imports from Mexico to the US seem to be fairly similar over time. There are however some exceptions to this where trade has changed quite dramatically. The textile industry is the clearest example of this, and in this case it is clear that production is cheaper in China due to e.g. lower labor costs. China has a strong comparative advantage in low-skill intensive goods, and since it produces these goods cheaper than Mexico US costumers buy more of Chinese goods. This development goes both ways and can be seen in Mexico as well as China, where growth have been most prominent in industries where the other country has made losses or grown exceptionally slowly. There is no statistical evidence for this, neither in the correlations nor the regression analysis. This implies that the relation is purely coincidental, and that there are not enough support for the hypothesis that Mexico would be moving towards exporting the goods that China produce less of. To draw a certain conclusion about this it would be necessary to make an analysis of all different industries as they must to be evaluated one by one.

There are however evidence of a negative correlations for both countries with Mexican exports to the US in 1999. This implies that imports from both countries

grew in other industries than those that were important to Mexico before China joined the WTO. Furthermore, the regression showed a significant positive relation between US imports from Mexico and from China. This implies that both countries have grown in the same industries.

From these results it can be concluded that Mexico's comparative advantages in trade with the US have changed during the time that China has been a member of the WTO. Furthermore, since Mexico has grown in the same direction as China it does not seem like it is moving towards exporting goods that are complementing Chinese exports to the US. China seems to be more competitive than Mexico in general, but Mexico has some particular advantages in terms of trade with the US which makes it a lot more resilient to Chinese competition than it would have otherwise been. This can explain why Mexico stands pretty strong in competition with China.

Even if US imports from Mexico have increased somewhat, the share of Mexican exports aimed at the US have decreased. This implies that it is now exporting to countries other than its closest neighbor. The single fact that China has grown more than Mexico, both in terms of share and percent, does not prove anything about its causal impact on trade. China has gone through an extraordinary growth process which makes it difficult to compare its growth to that of any other country.

In conclusion, Mexico's exports to the US have undergone some changes since China entered the world market. The textile industry has experienced a particularly negative development, whereas the electronic and car industry have continued strongly. However, the Mexican trade with the US looks fairly similar to what it did before China entered the WTO at large, and there does not seem to be evidence to support the theory that China is replacing Mexico in trade with the US despite the fact that China does seem to have some comparative advantages in relation to Mexico. This does not mean that Chinese competition has affected all industries the same way; it seems like Mexican textile industry has suffered because Chinese companies produce these particular goods, but it has not affected Mexican exports negatively *in general*.

US imports from Mexico have not changed significantly (with the exception of the textile industry) since China joined the WTO. Despite the fact that China is a fast-growing and competitive country, it does not seem to be replacing Mexico

in its trade with the US. This shows that the fear of Chinese competition is not always rational, and that trade should not always be seen as a zero-sum game.

The conclusions of this essay will need to be re-evaluated in a few years time when, or if, average salaries in China surpass those of Mexico. It is possible that the results yielded here will be even stronger by then. Furthermore, since China does not seem to be the driving force behind the changes in US imports from Mexico, it would be interesting to investigate what other explanations to this change there are.

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