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DISCUSSION PAPER

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China in Mexico: Some Environmental and Employment Dimensions

WORKING GROUP ON DEVELOPMENT AND ENVIRONMENT IN THE AMERICAS

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This study explores the unique characteristics of Mexico's trade with China and investment from China, especially for Mexico's manufacturing sector. In addition, we examine the environmental and social characteristics of these flows, looking specifically at greenhouse gas (GHG) emissions and employment-related impacts for Mexico. Finally, we perform a case study of a Chinese company doing business in Mexico's manufacturing industry.

Mexico is unique relative to the other studies in this project. Mexico has indeed experienced a surge in exports to China but these still remain very modest as compared to the great flow of imports from such country. This phenomenon reflects Mexico's difficulties in competing in the manufacturing sector with China, both at home and abroad and its still incipient primary goods exports to that country. Moreover, Mexico has thus far not received as extensive amounts of foreign direct investment from China as compared to the other countries in the region.

GHG due to Mexico's exports to China are increasing much faster than Mexico's GHG generated by its total exports. Though there has been some offsetting of these emissions because of technological changes in Mexican export to China in several sectors, the change in export structure toward more polluting sectors (including primary sectors), together with the high rate of growth of these exports, explain this tendency. When looking into manufacturing exports from Mexico to China, the structure or composition effect favors less polluting sectors, so this has a somewhat compensating effect together with the technology effect. This shows up in our statistical analysis and in our case study we find a serious effort by a Chinese enterprise to comply with Mexican environmental regulations. Regarding employment, Mexican manufacturing firms, particularly in the textiles and apparel sector, have shed jobs due to competition with China. However, technical innovation in several sectors where there is competition with China, has also had an important role in these job losses especially in more recent years.

In analyzing a group of 36 manufacturing Chinese enterprises in Mexico, we can see that, in general, they display a varied environmental performance and labor conditions, but generally comply with Mexican environmental law, which has improved dramatically over recent years (though its enforcement is still weak). Our case study exemplifies the fulfillment of environmental regulations. Of course, these results should be interpreted with caution, as this may not apply equally in sectors where Chinese OFDI is present and expanding in Mexico. Furthermore, both OFDI and exports to China are shifting to include more primary sectors, especially mining. In terms of labor relations, labor law violations appear to be the exception rather than the rule in the manufacturing Chinese enterprises and in our case study, but important cultural differences seem to lead to some incompatibilities between what Chinese firms expect from their workers and what the local Mexican workers' customs are, with some conflictive outcomes.

In moving forward, there are important roles to play for Chinese firms (in adapting to Mexican labor and environmental laws), Mexican authorities (in enforcing those laws), and Mexican labor unions (in ensuring that labor law violations are addressed).

1. INTRODUCTION

General trends show that trade between China and Mexico, particularly imports from the former to the latter, has grown enormously over the last two decades as a result of China's entry into the WTO in 2001, the end of the Multifiber International Accord (MIA) in 2005, and various loopholes in Mexican import oversight. This phenomenon has created a significant foreign trade deficit for Mexico with China. Competition has been especially intense in the textile and apparel market. Chinese exports to the US displaced Mexican ones in this sector during the 2001-2006 period, but overall Mexico has been expanding and gaining US markets again, albeit with a different export structure. These trends in the first half of the 2000s contributed to great tensions between China and Mexico, which only very recently have begun to subside. These phenomena have widely been studied by different researchers (Dussel Peters and Gallagher, 2013; Dussel Peters, 2013, Jenkins and Dussel Peters, 2009, Gallagher and Porzecanski, 2010; Ayala and Villarreal, 2009).

As to Mainland Chinese OFDI, Mexico has received a very limited and fluctuating amounts, while its structure is increasingly favoring primary goods sectors, namely mining, and to a lesser extent the construction (of infrastructure), while manufacturing has lost importance in the whole.

The paper is organized as follows: the second section gives a general background on trade between Mexico and China and on Chinese OFDI flowing to the manufacturing sector in Mexico. The third section looks into the environmental effect of Mexican exports to China as well as that of Chinese OFDI in the Mexican manufacturing sector. The fourth section studies the effects on employment and labor conditions of Mexican imports from China, especially in the textiles and apparel industry and that of OFDI in the manufacturing sector in Mexico. The fifth part presents a case study on GDA. Finally, we draw conclusions and propose some public policies for Mexico that might help improve environment and labor conditions as Mexican exports to China and Chinese OFDI in the manufacturing sector expand.

Two caveats are warranted regarding this study, since it is one of eight country studies in Latin America and the Caribbean (LAC) on environmental performance and effects on labor conditions of trade flows and OFDI from China. First, while competition from manufactured Chinese products has had a visible impact in Mexico, especially on employment and labor conditions in some sectors and time periods, neither Mexican exports to China nor Chinese OFDI in Mexico are drivers of environmental or social conditions in Mexico, because in both cases these activities are very limited (in contrast with other LAC countries), albeit growing in the case of exports. Also, this study concentrates mostly on the manufacturing sector, so its focus is rather restricted. Finally, there were great information limitations to carrying out this research, especially regarding Chinese manufacturing firms' emissions, since very few of them generate reports on the subject. Hence, firm environmental behavior was evaluated indirectly, with international indicators, but mostly qualitatively, taking into account their great heterogeneity. The same was true for the labor conditions in Chinese firms in Mexico. More specific information was found for the case study on Golden Dragon Affiliates (GDA). Notwithstanding these difficulties, we consider this study to provide a relevant analytic precedent for a rapidly intensifying relationship between China and Mexico, which requires attention so that it will contribute to improving rather than harming the environmental and labor conditions of the country.

2. TRADE BETWEEN MEXICO AND CHINA AND CHINESE OFDI IN MEXICO

2.1. Mexico – China Bilateral Trade

There has been a growing trade relationship between Mexico and China, though quite asymmetric since the Mexican trade deficit with China increased almost tenfold between 2002 and 2012.[1] Imports from China have risen at a very high speed and it has become the second-largest trading partner for Mexico. Mexico is now the largest importer from China in LAC, accounting for 48% of the region's total purchases (Rosales and Kuwayama, 2012). Although exports from Mexico to China are very far from catching up with the inflows of goods, they have also grown very quickly over the last ten years (from 0.6 to 5.7 million dollars between 2002 and 2012, according to COMTRADE data), though they accounted for only 2% of total Mexican exports in 2013.[2]

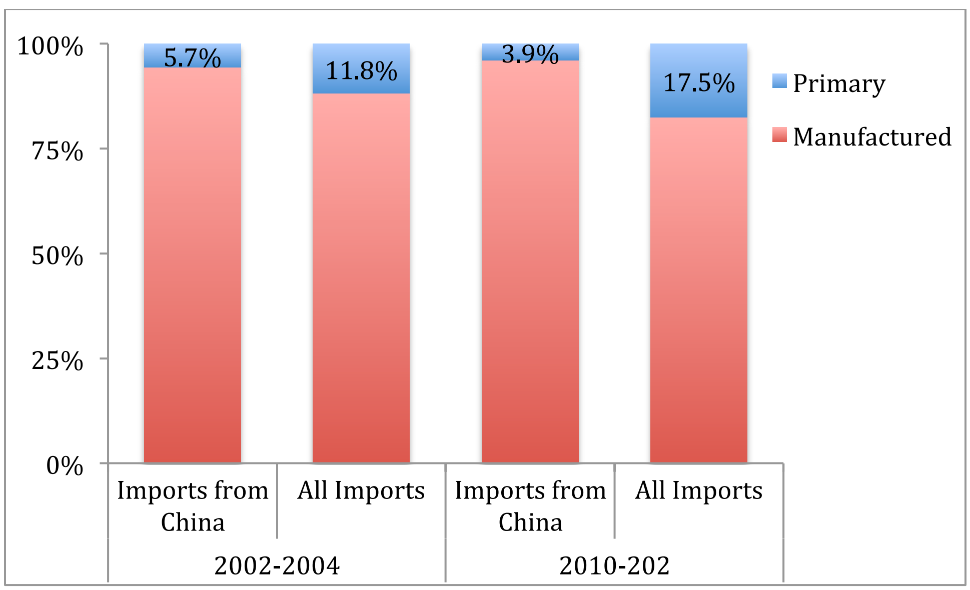
Imports from China consist mainly of manufactured goods (Figure 1), resembling the Mexican total import structure. However, its export structure to China has changed and is increasingly concentrated in primary goods (predominantly minerals and animal feed), reaching about half of the total exports to China in 2010-2012 (up from 13% in 2002-2004) while almost 80% of Mexican exports to the

[1] COMTRADE.

[2] Ibid.

world were still manufactured goods in 2010-2012 (Figure 2).[3] Within this overall export tendency at least two exceptions have to be made: Mexico's passenger vehicles, almost inexistent at the beginning of the 2000s, and telecommunications equipment parts, which gained great importance among exported goods. Within imports, around 85% of them are intermediate goods, among which electronic goods are important, especially telecommunications equipment and its parts, confirming Mexico's involvement in final assembly stage of the global value chain (GVC). Hence, the deep imbalance in this sector with China (Mexican manufacturing exports to China accounted for only 7% of the value of manufacturing imports from China of these goods in 2010-2012) is to some extent compensated by Mexican exports to the US with Chinese inputs. At the same time, the figures for imports of textiles and clothing seem to be underestimated since they explain only around 8% of total imports – a surprisingly low figure. In fact, these are reported in an irregular way and have negative consequences for competition in the domestic market.

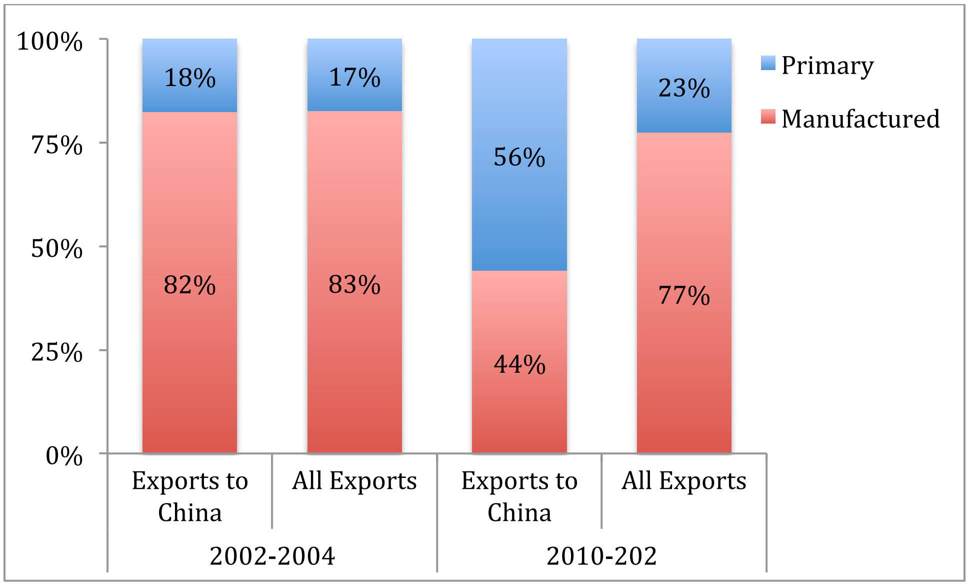
Figure 1: Mexican Import Structure from China and the World



Source: COMTRADE

[3] Ibid.

Figure 2: Mexican Export Structure to China and the World



Source: COMTRADE

2.2. Chinese OFDI in Mexico

We will devote more space to Chinese OFDI, and especially to that going to the manufacturing sector in Mexico (section 2.3.), than we did to trade between Mexico and China, because of the limited availability of statistical data. The following analysis develops a more qualitative assessment of environmental and social issues.

Mainland China had become the third largest source of worldwide FDI in 2012 after the US and Japan and its importance is rising for developing nations (UNCTAD, 2013). There is evidence that China's government has given wide support to its enterprises to invest abroad, making use of the massive foreign currency reserves, especially through the Going Global Strategy (since 1999). The support given to OFDI by the Chinese government has included financial backing (through ExIm

Bank, the National Development and Reform Commission, China Development Bank, and since 2003 commercial banks), logistics help, preferential insurance coverage, and others (Dussel Peters, 2012; Dussel Peters 2013; ECLAC, 2010; Lumsden, 2013).[4]

In general, Chinese OFDI is carried out mainly by state-owned enterprises (SOEs) and to a lesser degree by privately owned companies (Dussel Peters, 2012a; CCPIT, 2012; CCPIT, 2013). More specifically, CCPIT (2012) categorizes OFDI in three groups, according to its target: i) State-owned energy and resources enterprises, which seek resource access; ii) high-tech companies, especially those in communications and IT industries, which seek greater competitiveness and access to technology; and iii) enterprises with comparative advantages, mainly in textiles and apparel as well as in home appliances, which look for greater access to international markets, while avoiding trade restrictions. Some domestic restrictive elements motivating Chinese enterprises to go abroad include increasing domestic costs, rising market competition in their markets and the difficult access to talent and capital (CCPIT, 2012).

The performance of Chinese industries in foreign countries is quite different depending on the activity they undertake. Mineral and oil extraction can be done efficiently by Chinese firms abroad and can be securely sold to the Chinese market itself, so it does not entail much risk. As for construction, their knowledge, logistics and technology is advanced and the end product does not need to be marketed. Chinese investment in the manufacturing sector abroad is a different matter: it is a relatively recent phenomenon and when its initiative comes from enterprises with little or no prior experience investing abroad countries, there is a risk of being unsuccessful because of lack of marketing networks, and/or technology access, or cultural misunderstandings that may hinder efficient results.

When dealing with international manufacturing investments, Chinese firms frequently looks for joint ventures, mergers and acquisitions (M&A), or strategic alliances with developed countries' companies because this paves the way for acquiring technology (and transferring it to the home country), market access and

[4] In 2009 and 2010, China ExIm and CDB together lent more to developing countries than the World Bank (Dyer, Anderlini and Sender, 2011; cited by WRI, 2013)

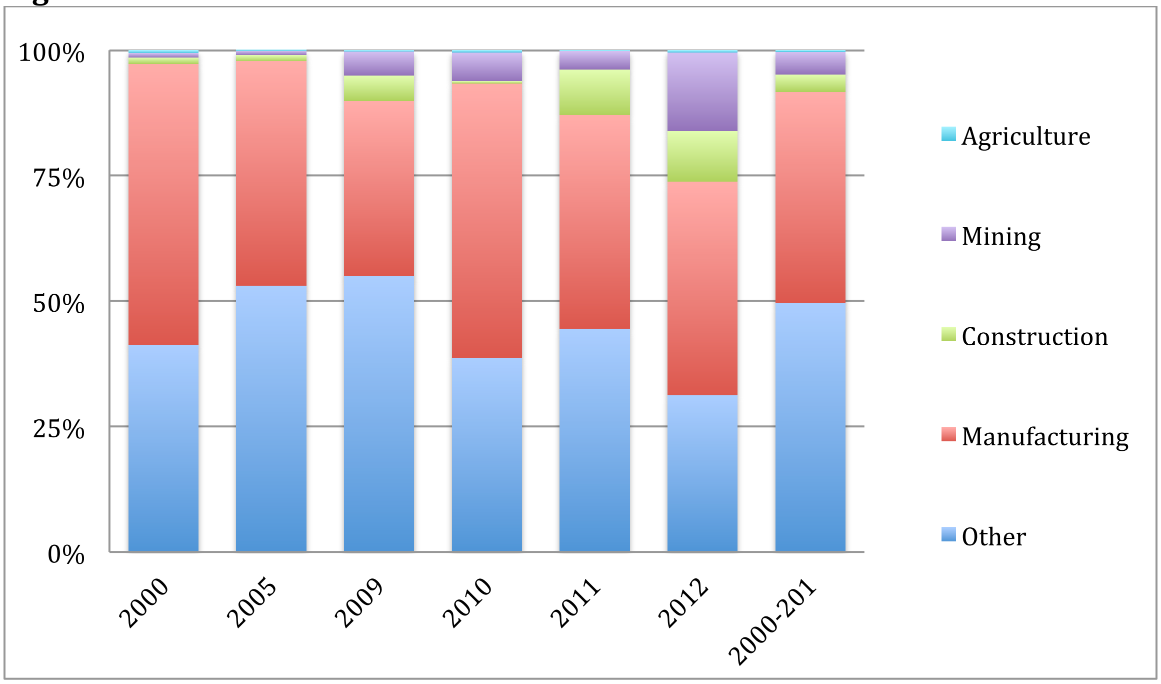
even cultural familiarity of the firm with its surroundings (Zhang, et al, 2013).[5] So countries like Mexico often receive OFDI of Chinese manufacturing firms that have already made joint ventures or other forms of relationship with developed countries' enterprises.

Although measuring Chinese OFDI abroad is a controversial issue (ECLAC, 2010; WRI, 2013; Lin, 2013; Dussel Peters, 2012b, Dussel Peters, 2014), by any standard such flow going to Mexico has been very modest. According to the Mexican official data this country had received 270.5 million dollars between 1999 and the second quarter of 2013 (Economic Secretariat, Mexico). Mexico has attracted less OFDI as compared to that of other large LAC countries, because of its more limited availability of natural resources, the comparatively fewer incentives to foreign investors, as well as the trade and political tensions between China and Mexico, which permeate other activities, though these have been settling.

When comparing Chinese FDI to total FDI going to Mexico during 2000-2012, we can see from Figures 3 and 4 that the first has recently become considerably more concentrated in mining than total FDI received by Mexico, while almost all FDI went to manufacturing at the beginning of the 2000s (though the amount was insignificant). The FDI profile in Mexico is acquiring that of the Chinese FDI going to South American countries, where mining and other primary goods are very attractive and construction is acquiring relevance (Lin, 2013).

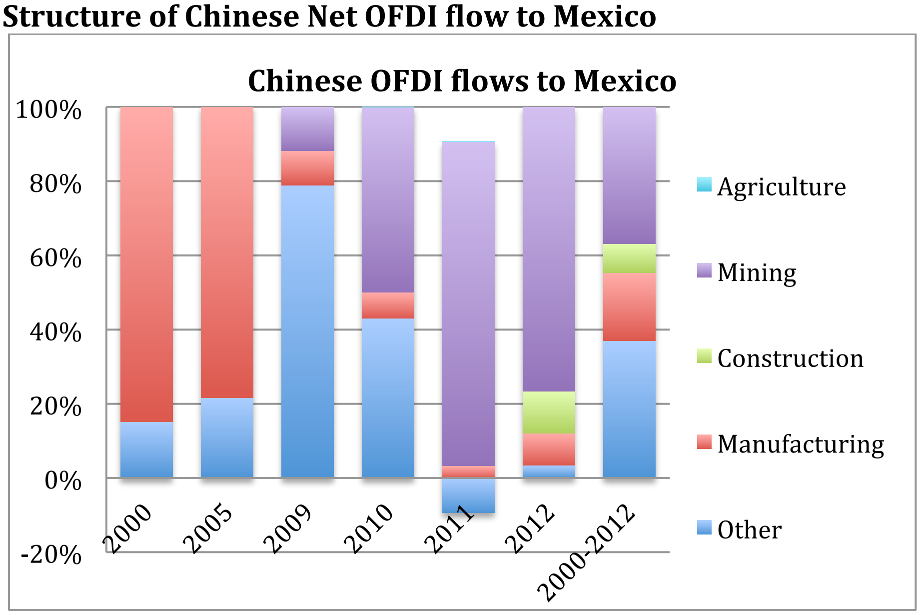
[5] Several interviews with different ProMexico and the Economics Secretary officials shared this view.

Figure 3: Structure of Total FDI flows to Mexico



Source: Secretaría de Economía, Mexico. Note: Sector Classification: NAICS.

Figure 4: Structure of Chinese Net OFDI flow to Mexico



Source: Secretaría de Economía, Mexico. Note: Sector Classification: NAICS.

2.3. Present Chinese OFDI in the Mexican Manufacturing sector

Mexico should be an interesting destination for Chinese OFDI in manufacturing, because of its proximity to the US. Producing or assembling goods in Mexico to be exported to the US has become more attractive, as many enterprises in China are starting to experience a rise in production costs in addition to existing transport costs and the time required to ship goods from China to the US (UNCTAD, 2013; Sirkin, Rose and Zinser, 2012). By investing in Mexico, Chinese producers have the additional advantage of paying lower tariffs because of the North American Free Trade Agreement (NAFTA), and may avoid facing some countervailing duties for unfair trade practices that are charged to them if exporting directly from China. Finally, the bilateral investment treaty (BIT) signed between Mexico and China in 2008[6] provides important legal guarantees for both parties, improving certainty for Chinese OFDI (Berger, 2013).

Yet Chinese OFDI has been very scarce in the manufacturing sector and there are still very few (mainland) Chinese manufacturing enterprises in Mexico. For this study we were able to identify 36 manufacturing enterprises of this kind. These enterprises are quite diverse: they are in the automobile industry, electronics industry, textiles, apparel and shoe industry; plastic materials, metal products, recycling, and products for the construction industry, among others (see Table 1).

The nature of investment is also varied. As stated above, a portion of Chinese OFDI has arrived to Mexico through Chinese companies already in joint ventures, especially from developed countries. This is the case of Lenovo, which bought the Personal Computer Department of IBM, and afterwards took the strategic decision of setting up its largest firm outside China in Mexico. Others have become Chinese because the mother company has been taken over by Chinese capital elsewhere, such as:

[6] http://www.economia.gob.mx/files/China_actual.pdf

- TCL-Thomson (TCL, with majority Chinese ownership, and French enterprise Thomson), merged with the purpose of producing TVs on a large scale and exporting them to the US, through Thomson's trade networks.

- Preh-Joyson (German enterprise Preh, specialized in automotive electronics, bought by Joyson Group, which produced automotive parts, in 2012) built a stronger position in the international market as an automotive supplier group, as they combined the strong market positioning of Preh in Europe and North America and access to the quickly expanding Chinese market through Joyson[7].

- TK Minth (a joint venture of Chinese Minth and Japanese Tokai Kogyo Co. Ltd. Firms) is another of these cases: the first is an auto parts maker and the second is a plastic and rubber products maker, and TK Minth produces plastic and rubber automobile parts; Minth is favored by Tokai's global resources and strategic partners[8].

- Foton, a very important truck and tractor Chinese producer at an international level, with one of its 23 subsidiaries in Veracruz, signed a joint venture agreement with Daimler, a German automobile industry, which will provide improved technology to the former and help diversify the range of products it makes. This will create an opportunity for the assembly of a wider range of trucks in Veracruz too[9].

There are a few examples of associations between Chinese and Mexican firms. An important case is Giant Motors de Latinoamérica (fully Mexican capital), which has had a strategic alliance with Faw trucks since 2006 by which the latter provides technology, technical advice and parts for different vehicle models to be produced in Mexico. Such models range from light passenger vehicles to heavy trucks, built with

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[7] http://www.prlog.org/12147592-preh-and-joyson-automotive-show-dynamic-growth-in-every-market.html

[8] "Minth and Tokai Kogyo Form Auto Parts Joint Venture", in Plastic News, January 20, 2012

http://www.plasticsnews.com/article/20120120/NEWS/301209978/minth-and-tokai-kogyo-form-auto-parts-joint-venture

[9] http://t21.com.mx/terrestre/2013/06/18/foton-autorizado-vender-camiones-daimler-mexico

imported parts from China but increasingly including Mexican inputs (Dussel Peters, 2014).

There also are investments made by fully Chinese-owned firms in Mexico in industries where China has a long manufacturing tradition and a mastery of the technology, such as textiles or apparel; or in steel and metal products. Among the most important are SINATEX S.A. de C.V in Sonora, which is a yarn producer and now a part of a very large Chinese conglomerate. Another one is Golden Dragon Affiliates, which produces precise copper tubes in Coahuila and also belongs to this category (see case study). One more case worth mentioning is HCP Packaging (packaging of cosmetic products), which established its fifth subsidiary abroad in Tamaulipas, Mexico, in 2009.

Other Chinese firms in Mexico were initially small in size but have grown to be medium size. This is the case of Long S.A. de C.V., which produces bicycles and motorcycles in Mexico City, mainly for the domestic market. Finally, there are those very small Chinese firms that continue being family owned for which little information is available.

One of the manufacturing sectors that would seem very promising, in theory, for Chinese OFDI in Mexico is the automobile and especially the auto parts industry, since Mexico has become a very important production and export platform, integrated to the NAFTA value chains and markets. As China needs to expand its industry abroad, Mexico is a promising location. However, the experience of OFDI in the automobile industry has met several challenges in Mexico and there are better chances that investment in auto parts will expand first rather than in finished vehicle production. The foreign enterprises that invest in this industry in Mexico have to comply with demanding regulations, such as producing a minimum of 50,000 vehicles a year, though under certain forms of strategic alliances, this is not an impediment as has been shown by Giant Motors (Dussel Peters, 2014).

Furthermore, some Chinese automobile enterprises may find it difficult to meet the high quality and environmental standards required by the US.[10]

In summary, Chinese OFDI in the Mexican manufacturing sector is diverse, though still very limited. The reasons for this are numerous: OFDI flow to Mexico has been inhibited by political tensions among the two nations, the scarce chances for Chinese firms to engage in the kind of joint ventures they are mostly interested in; the fact that their technology is somewhat behind the most modern required to enter the US market; the government-to-government tensions derived from trade conflicts between the two countries and the obstacles posed by cultural and linguistic differences between them, among others.

Table 1: Mexican Enterprises Owned by Mainland China Firms and/or Recipients of Capital Flows from China (1999-2012)

Firm	Activity	State	Emissions (CO_2 eq./USD)
Acerotech; S.A. de C.V.	Steel Industry	Nuevo Leon	1.66
Asontech S.A. de C.V.	Valve assembly plant	Baja California	0.53
Carrocerias y Remolques SA de CV	Car metal bodywork, lathe conversions	Baja California	0.39
Dong Fang Apparel; S.A. de C.V.	Apparel assembly	Yucatan	0.53
Fortune Plastic Metal de Mexico; S.A. de C.V. [v]	Recycling of different materials	Chihuahua	n.a.
Fortune Plastic Metal de Mexico; S.A. de C.V.	Recycling of different materials	Tamaulipas	n.a.
Foton	Trucks and agriculture tractors Assembly	Veracruz	0.39
Giant Motors Latinoamerica [v]	Light trucks	Hidalgo	0.39
Gdl Yuncheng; S.A. de C.V.	Cylinders for engraving, products for printing enterprises	Jalisco	1.66
Godak-Mex; S. de R.L. de C.V.	Broadwoven fabric mills, cotton (textile assembly)	Baja California	0.78
Golden Dragon Affiliates S. de R.L. de C.V.[v]	Copper tubes	Coahuila	0.91
HCP Packaging USA Inc vu	Cosmetic Plastics packaging materials and unlaminated film and sheets	Tamaulipas	1.09
Herramientas Cleveland; S.A. de C.V. [vu]	Cutting tools and special tools	Mexico City	0.66

[10] Interview with ProMexico officials in China.

Hisense	Production of TVs among other electronic products	Mexico City	0.41
Industria Megacinta; S.A. de C.V.	Adhesive tape	Mexico State	1.09
Jincheng Ronda; S.A. de C.V.	Motorcycle production	Tlaxcala	0.34
KBL de México, S. A. de C. V.	Apparel assembly	Guanajuato	0.53
King Cordmex; S.A. de C.V.	Electric cables	Baja California	0.41
Konka	Consumer Electronics	n.a.	0.41
Lenovo [vu]	Personal computers and iPhones	Nuevo Leon	0.41
Long; S.A. de C.V.	Bicycles and motorcycles	Mexico City	0.34
Mexico Curtain Wall System Engineering; S de RL de CV	Glass and Aluminum walls, doors and windows	Baja California	0.91
New Field de Mexico; S.A. de C.V.	Shoe manufacturing	Guanajuato	0.49
Plastico Gigante de Mexico; S.A. de C.V. [vu]	Plastic parts for industrial use (molded plastic through injection)	Chihuahua	1.09
Polygroup Industrias Mexico S.A. de C.V.	Parts for Christmas trees and plastic small swimming pools	Chihuahua	1.09
Preh/Joyson	Parts for automobiles' transmission systems (it includes thermal processes)	Nuevo Leon	0.39
Ranboy Sportwear; S.A. de C.V.	Apparel (other exterior textile material clothing)	Baja California	0.53
Reciclamax Mexico; S.A. de C.V.	Recycling firm	Queretaro	n.a.
Rotomex Yuncheng; S.A. de C.V.[v]	Cylinders for engraving.	Mexico State	1.66
Sinatex; S.A. de C.V.	Yarn manufacturing	Sonora	0.78
Sinterama de Mexico S. A. de C. V.	Yarn made from hard natural fibers	Tlaxcala	0.78
TCL-Thomson	Consumer electronics (TV sets and DVDs)	Chihuahua	0.41
Textiles de Guaymas; S.A. de C.V.	Exterior apparel made from knitted yarn and other products	Sonora	0.53
TK Minth Mexico;S.A. de C.V.	Molded plastics for automobiles	Aguascalientes	1.09
Yuanda Mexico S. A. de C. V.	Glass and metal new construction materials	Baja California	0.91
ZTE	Smart Phones	n.a.	0.41

Source: Secretaría de Economía, Mexico; GTAP/Boston University China-Latin America Project Databases (GHG emissions per dollar produced in 2007); Semarnat/Profepa and own research.
v Enterprises which made annual reports for SEMARNAT (Cédula de Operación Anual, COA) on its emissions to the atmosphere, to the water system, and on their hazardous wastes and their disposal.
u Enterprises that reported to the Pollutant Release and Transfer Registry (PRTR)

3. Environmental Analysis of Mexican Exports to China and Manufacturing OFDI in Mexico

3.1. Environmental Characteristics of Mexican Exports to China

This section looks specifically into pollution (GHG) increases resulting from Mexican production for exports to China and we will compare them to those linked to total exports from Mexico. It also complied with the environmental impact assessment required by SEMARNAT. It distinguishes between emissions changes as a result of the rise in exports (scale effect), as a result of the changing structure of exports during the period under study (composition effect) and as a result of technology innovations (technique effect) [11]. The methodology is described in the technical appendix.

Table 2 shows that total exports from Mexico to China increased at a much higher rate (1,280%) than manufacturing exports (774%) between 2000-2002 and 2010-2012. This resulted in a change in the exports structure as mentioned before, in favor of primary goods, whose GHG emissions are higher, in general, than most manufacturing activities.

[11] To calculate the technique effect we used the sectorial GTAP GHG information of emissions for each dollar produced for exports in 2004 and multiplied it by the 2000-2002 average exports sector and did the same for exports in 2007, multiplying it by the 2010-2012 average exports by sector. We calculated what the emissions would have been in 2010-2012 if the increase in exports had generated the same amount of GHG than in 2004. Thus the technique effect is represented by the difference between these two values.

Table 2: Scale, Composition, and Technique Effects of Mexico's Exports (2000-2002 to 2010-2012)

	Exports to China		Exports to the World	
	Total Exports	Mfg. Exports	Total Exports	Mfg. Exports
Change in exports:				
In millions of USD	2,957.4	1,560.5	175,297.8	121,318.0
In percent	1,279.7	773.9	108.5	88.8
Change in export-based GHG emissions:				
In millions of kg CO_2 equivalent	2,286.6	993.8	103,753.9	52,079.2
Scale effect	2,384.6	1,843.7	158,982.4	103,897.8
Composition Effect	912.3	-496.7	36,759.4	-8,555.0
Technique Effect	-1,010.3	-353.2	-91,987.9	-43,263.6
In percent:	1,227.1	689.8	70.8	54.4

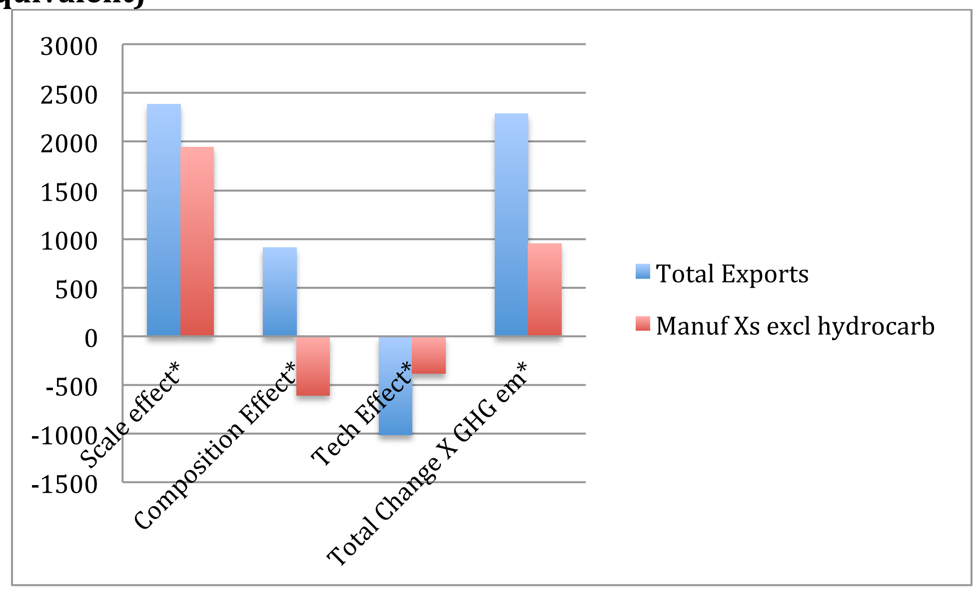
Source: GTAP Database and COMTRADE

The increase in total Mexican exports to China during this period generated a 1,227% rise in GHG emissions, most of which was caused by the scale effect. However, the composition effect also increased total export emissions because the change in their structure favored more polluting sectors. The technique effect had a partially compensating effect on GHG emissions, since these were 31% lower than what they would have been without that effect (see Table 2). The sectors for which technical change contributed the most to reduce emissions (50% of the total) where primarily the passenger motor vehicles and secondly the telecommunications equipment parts (sectors 781 and 734 of the Comtrade classification). These are the same sectors that had the highest technical offsetting effect for total Mexican exports GHG emissions.

The technique effect had a different behavior if exports to China and those to the world are compared. In both cases, this effect pushed emissions downward, but this impact was less pronounced in exports to China. Technology improvements reduced emissions in exports to China by about 31% compared to what they would have been otherwise, but for overall exports, they reduced emissions by 47% -- nearly half of what they would have been otherwise. This difference is even more pronounced in manufactured exports. Technology improvements reduced emissions from exports to China by 26%, but among overall exports they reduced emissions by 45%.

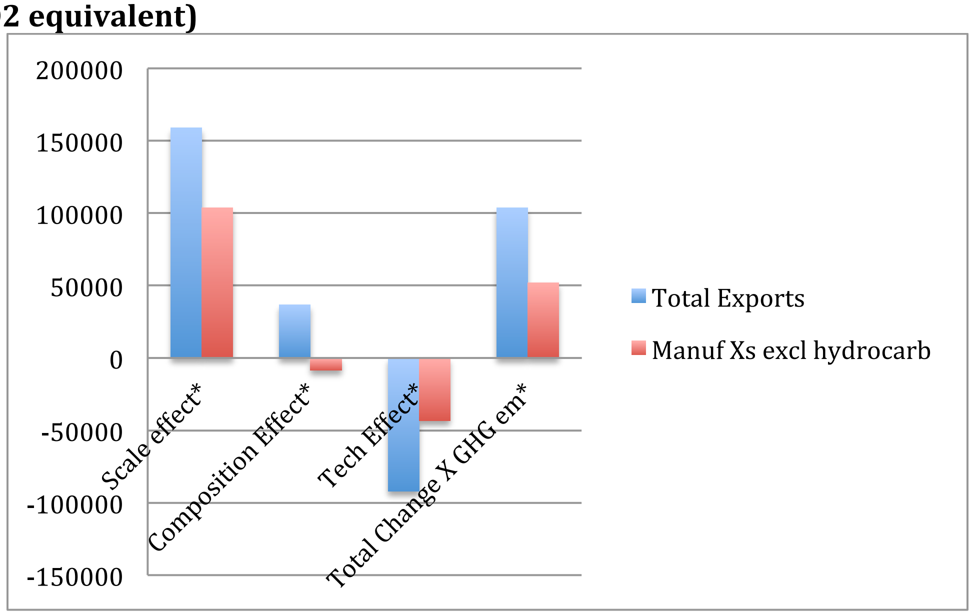
The GHG emissions growth produced by total Mexican exports to the world (Figure 6), as in the case of exports from Mexico to China can mostly be attributed to the scale effect. Also, as in the former case, Mexican manufacturing exports emissions to the world expanded at a considerably lower rate than those of total exports to the world.

Figure 5: Decomposition of Mexican Exports to China (Emissions, million kg. CO_2 equivalent)



Source: Table 2

Figure 6: Decomposition of Mexican Exports to the World (Emissions, million kg. CO2 equivalent)



Source: Table 2

The composition effect on GHG emissions is somewhat different if Mexican exports to China and those to the world are compared. Such effect has a relatively greater impact on Mexican exports to China than those exports to the world, because of a more pronounced reorientation of Mexican exports to China toward primary goods. In contrast, within the manufacturing sector specifically, the composition effect reduced emissions more among Mexican manufacturing exports to China compared to those from Mexico to the world, indicating that manufacturing exports to China shifted to cleaner industries.

3.2. Environmental Characteristics of Manufacturing Chinese OFDI in Mexico

Because it is still quite limited, Chinese OFDI has not been an independent driver of environmental change in Mexico, either in primary goods or in the manufacturing industry, but it is an important issue to be studied, especially considering its growing flow.

Until now, Chinese investment in manufacturing in Mexico has not been concentrated in very polluting sectors. From the group of 36 manufacturing enterprises with Chinese capital in Mexico, only four of them had to report their emissions to the Pollutant Release and Transfer Registry (PRTR) (enterprises from environmentally sensitive sectors and large in size have to provide this information) and eight had provided a COA.

Regarding GHG emissions of these firms, two thirds of them emit less than 1 kg GHG (of CO_2 equivalent) for each dollar produced (Table 1). As a point of comparison, the most polluting sectors in the manufacturing industry are glass and mineral manufacturing, with 2.40 kg GHG per USD, according to GTAP. Among the 36 companies, the ones that register the highest GHG emissions are a steel producer and two metal products companies, with 1.66 kgs (CO_2 equivalent). GHG emissions are only one aspect of pollution, but soil and water pollution caused by these enterprises may be quite damaging too (Schatan and Castilleja, 2005). Thirteen of the Chinese firms produce hazardous wastes and three of these have been sanctioned for not complying with environmental regulations regarding hazardous wastes and soil pollution (information provided by Semarnat/Profepa). On the other hand, seven of the Chinese enterprises generated a COA and four provided PRTR environmental emissions accounts (see Table 1).

In general, our findings indicate that the environmental behavior of Chinese enterprises in Mexico is quite heterogeneous.

Firstly, as stated above, several of the important Chinese enterprises in Mexico are joint ventures or are acquisitions of third-country companies, and several of these are from developed countries. Hence, it is difficult to ascribe their environmental behavior to a pre-determined Chinese standard. In fact, in such cases, Chinese firms will be following technical and environmental procedures mostly inherited from their European, Japanese or US partners. Furthermore, one of the purposes of these joint ventures is for Chinese firms to be able to master new technologies, which are usually cleaner than obsolete ones.

Second, for those firms that have been fully owned by Chinese capital from the beginning, though the information is limited, there is evidence that some of them comply with local environmental norms (see Golden Dragon Affiliates, GDA, case study). For example, they may be contributing with environmentally groundbreaking products (as is GDA)[12]; or may have numerous quality and environmental certifications (as does CP Packaging USA Inc, a cosmetic plastics, packaging materials, unlaminated film and sheet producer, which has ISO 9001 and ISO 14001 certifications).

Third, there are three recycling enterprises among the 36 under study, which have an environmental value for Mexico, since these sorts of firms are still scarce in the country. The potential is much greater for both PET and scrap metal recycling (of which Mexico is also an important exporter to China).

[12] Golden Dragon Won the "Anti-dumping War" in the U.S. State Intellectual Property Office of the PRC (SIPO), http://english.sipo.gov.cn/news/iprspecial/201309/t20130909_817185.html

On the less encouraging side of this heterogeneity, the Chinese and Mexican legal and regulatory frameworks for environmental protection are still insufficient for OFDI to have an improved and more uniform environmental performance. China does not have a specific legal framework for corporate social responsibility (CSR) of its OFDI abroad, although there is an increasing awareness that environmental and social transgressions can contribute to the failure of Chinese OFDI projects (WRI, 2013). Still, OFDI can mostly choose to comply or not with the mostly voluntary guidelines provided by governmental institutions.

The greatest oversight over the environmental and social performance of Chinese OFDI seems to come from several Chinese institutions that intervene when financing or approving Chinese OFDI projects. This is the case of the China ExIm Bank, which has the *"Guidelines for Environmental and Social Impact Assessments of the China Export and Import Bank's Loan Projects"*, which, among other things, requires investors to perform environmental impact assessments (EIAs) on their projects. Also, the China Banking Regulatory Commission (CBRC) issued the "Green Credit Guidelines" in 2012, which gives guidance on environmental and social risk management for lending both at home and abroad (WRI, 2013). More recently, MOFCOM has produced the *Guidelines for Environmental Protection in Foreign Investment and Cooperation,* which help Chinese investors understand and observe environmental protection policies and regulations of the host country (MOFCOM, 2013)

When looking at the concrete CSR of Chinese OFDI abroad there are signs of very uneven company policies. The CCPIT (2013) report on a wide survey of Chinese firms with investments abroad found that SOEs are stronger and more institutionalized regarding CSR than private firms. A general result of the survey indicates a much higher level of CSR in OFDI operating in the European Union and in the US than those in developing nations. Therefore, CSR of Chinese enterprises abroad seems to respond to host countries' laws and regulations instead of having its own improved targets in this area, regardless of where they operate (CCPIT, 2013).

On the Mexican side, the country has developed and progressively improved its legal and regulatory framework for the protection of its environment, which makes it increasingly difficult for domestic and foreign investors to undertake activities that overtly violate the law.

The institutional setting for designing and enforcing the environmental policy is the Secretaría del Medio Ambiente y Recursos Naturales (SEMARNAT) and Procuraduría Federal de Protección al Ambiente (PROFEPA, linked to SEMARNAT). According to the information provided by PROFEPA, in June 2013 it had 69,124 sources of pollution under its surveillance. There also are several Mexican Official Norms and other rules that have been enacted during the last 20 years, meant to curb pollution of manufacturing sectors. The fact that Mexico has joined important international and regional agreements has also improved its environmental standards. By becoming a part of NAFTA, which includes an Environmental Side Agreement (ESA) with tools that offer cooperation among the three countries and a dispute settlement agreement, Mexico has received support both to improve its environmental standards and to enforce them, as well as to advance its capacity in many aspects of environmental protection.

Other initiatives by the Commission for Environmental Cooperation of NAFTA (CEC) include the Sound Management of Chemicals (SMOC), which aims at phasing out the use of specific substances through the North American Regional Action Plans (NARAPs). Two of these are meant to eliminate or reduce considerably the use of mercury and another will also try to do so with lead (CEC). All these measures impose limits on certain pollutant emissions for all producers, including Chinese ones, and have a positive environmental influence on the production process of some activities.

Therefore, Chinese OFDI coming to Mexico have had to comply with the rules, standards and international environmental agreements signed by Mexico, especially if the final destination of its goods is the US, and even if these products are to stay in the domestic market. However, Mexico still faces many corruption problems and capacity limitations that are an obstacle in the surveillance of environmental behavior by economic actors. Hence, with weak Chinese environment policies for their companies abroad, and still somewhat weak enforcement in Mexico, there is much to be done to ensure an efficient policy for Chinese and all FDI coming into Mexico.

4. Employment Effects of Trade between Mexico and China

4.1. Employment Effects of Trade between Mexico and China.

The accelerated growth of Chinese exports to Mexico, described above, has probably had a negative impact on overall employment in Mexico, especially in the first half of the 2000s. However, at an aggregate level there are no precise estimates on job losses from this cause, nor an econometric model that demonstrates a clear link between the import growth from China and employment in Mexico (Dussel Peters, 2009). However, at a disaggregated level there is much more evidence that this has happened, especially in the textiles and apparel industry (and to a lesser extent, this has also occurred in the steel and machinery industries, among others). Hence, we will concentrate in the textile-apparel sector to illustrate the employment effects of Chinese competition on Mexico. Such phenomena, as is well known, comes in two forms at least: the direct competition of Chinese imports in the Mexican markets, and the one posed by China to Mexico in the US market.

The textiles and apparel industry has lost prominence in total manufacturing industry employment in Mexico, from roughly 18% in 2000 to 15% in 2003 and 11% in 2012. During this period, within the aggregate sector of textile inputs, textiles and apparel, the greatest number of jobs were lost in textile inputs and apparel. It must be noted that apparel had its greatest jobs loss after 2004 (with the elimination of the MIA), but employment was still falling in all textile and apparel subsectors between 2007 and 2012 (INEGI, 2000, 2009, and 2013).

The surge penetration of Chinese textiles, and especially apparel, into the Mexican markets occurred through legal, but mostly illegal channels since the international opening up to China. It was estimated that in 2007, 65% of domestic consumption of textiles and apparel in Mexico was satisfied by illegal imports, especially from China (Dussel Peters, 2007b; interview with CANAINTEX, 2013). In fact, the surge in imports from China occurred notwithstanding the agreement Mexico and China signed when the latter country joined the WTO and which granted Mexico a 6-year transition period for phasing out its compensatory tariffs on Chinese products and a further three year trade remedy agreement.[13] Hence, the avalanche of these products was the result to a great extent of the irregular imports based on false declarations of goods descriptions and origins to avoid duties, as well as entry of Chinese exports to Mexico with US labels, and other forms of disguising mechanisms.[14] These Chinese imports have hit the whole yarn-textile-apparel value chain in Mexico, so this industry has not only been reduced in size but also has become more shallow, with fewer economic interrelationships, and hence engaging less employment at all stages of production (Dussel Peters and Gallagher, 2013).

Direct competition of Chinese textile and apparel goods in the Mexican market is only part of the problem faced by this industry, since the challenge they have had in the US market, where there has been a fierce competition from the first country, has been also important.

The signing of NAFTA (1993) allowed Mexico to be very successful in some goods exports to the US, among which textile and apparel (including footwear) was a prominent sector, contributing to this sector's employment expansion from 497,454 to 703,102 between 1994 and 1999. But over the following years the industry lost about 260,000 jobs, mostly in the apparel industry (INEGI, 2000; 2009; and 2013). There is little doubt that there is a role of Chinese competition in these job losses, but to what extent this is so is a matter of debate.

According to Dussel Peters and Gallagher (2013) between 2000 and 2009 52% of Mexican manufacturing exports to the US were under direct Chinese threat (i.e., China's market share in the US export market was expanding while Mexico's country's share was shrinking). They found 53 sectors in which both Mexico was threatened in the US and the US was under threat in Mexico, 17 of them were in yarn, textile and apparel (including leather products). Although the authors do not

[13] Over these three years, anti-dumping duties on China would be partly replaced by transitional duties, and finally these would be eliminated by December 2011.

[14] A. Vazquez, H. López-Portillo, V. Vázquez-Bravo; How far is Mexico willing to go to protect itself from China?, International Law Office, http://www.internationallawoffice.com/newsletters/detail.aspx?g=ccc3e33e-221a-44dd-abba-00290b32c6ca

analyze employment, we can infer that there were negative effects on this variable. There are few studies that estimate the impact of Mexican exports displacement by Chinese exports to the US on employment in the first country. Ayala and Villarreal (2009) find that such displacement occurred mostly in four Harmonized System sectors (three in textiles and apparel and one in non electrical machinery and equipment). According to their study, the period in which the contraction of employment was the greatest (-6.5% a year), Chinese displacement of Mexican exports to the US market explains one third of such loss, while the rest is the result of other factors, mainly of technical change.

The apparel sector is not only the sector hardest hit by job losses, but also among the sectors with the weakest collective bargaining, lowest trade union affiliation of workers, and greatest informal working arrangements. So it is unsurprising that labor conditions in this sector also had a setback. This sector has traditionally had lower salaries, on average, than most other manufacturing sectors, as well as more vulnerable labor conditions. Between 1995 and 2000, when there was a great expansion of exports to the US because of NAFTA and the peso devaluation, conditions improved somewhat (including a greater number of written contracts and more benefits offered to workers). But after 2001 conditions have worsened for most enterprises – predominantly medium and small size - contracts became shorter and included very few or no worker benefits (Guadarrama Olivera, et al, 2012).

Lastly, modern technology has borne an increasing responsibility for job losses and limited job creation in the textile-apparel sector and therefore has also been responsible for the deteriorating working conditions, especially in the apparel segment. In fact, technological innovation has widely been introduced in these sectors in China, Mexico and internationally, partly as a result of intensifying competition since the early 2000s (Duran and Pellandra, 2013; Watkins, 2013, INEGI, 2013).

4.2. Employment Effects of Chinese OFDI on the manufacturing sector in Mexico

There is considerable fear in Mexico that Chinese firms will bring Chinese workers, who may displace Mexican workers by working for lower wages and poorer rights compared to local workers, thus deepening the present employment scarcity and harming labor conditions. However, Chinese firms display the same heterogeneity in this aspect as in the environmental behavior described above. Social aspects of Chinese firms in Mexico are frequently inherited from businesses acquired by Chinese capital or from those with which they have joint ventures. This is not a rule, though, because there has been at least one case of joint Chinese and US capital firm where irregularities were spotted: the apparel firm KBL de México, S. A. de C. V. in Guanajuato, where the Immigration Office made a verification visit in 2006 and discovered 61 isolated Chinese workers, with 14 hours workdays and with their immigration documents held by the enterprise.[15]

Purely Chinese-owned firms seems to have a comparatively greater proportion of Chinese workers. This is the case of SINATEX S.A. de C.V., in which almost one fifth of workers are Chinese. In another common scenario, there may be a greater presence of Chinese workers in the initial stage of the firm's operation, after which most of them return to China and a much smaller group remains (as in GDA, for example). Finally, sometimes Mexican workers may not have access to all their potential rights, such as belonging to a trade union (as is the case of SINATEX), but this is not true in other enterprises (see case study, section 5).

From a number of personal interviews with public sector officials, private sector and Chinese representatives, it seems that the need for Chinese employees in manufacturing Chinese enterprises in Mexico stems not so much from the possibility of paying them lower wages but because they can understand each other better, they are used to the organization of the Chinese firms, and culturally and linguistically they have greater synergies than with the Mexican personnel. As was

[15] El Sol de Salmanca, *Se deterioran las instalaciones de la KBL de México*, http://www.oem.com.mx/elsoldesalamanca/notas/n2131938.htm, 04/07/2011.

mentioned above, one of the big obstacles for Chinese firms to successfully carry out manufacturing investments comes from the cultural complications. Also, a massive immigration of Chinese workers into this sector seems impossible, because of the rule that only 10% of workers in any enterprise can be foreign, as well as the lengthy procedures necessary for Chinese citizens to obtain the Mexican work permits (although the new migration law has eased the process somewhat).

Information on social and labor standards in the Chinese manufacturing enterprises in Mexico is difficult to access. However, it is very telling that the CCPIT (2013) survey of more than 1000 Chinese enterprises shows that the greatest threats that they face in the European Union and in the US were labor disputes. As with environmental performance, these firms must comply with host country standards as long as workers have ways of expressing their complaints and there also are enforcement mechanisms. On the other hand, if such standards are poor, firms may not aim at higher ones solely from their own convictions. Unlike environmental legislation, however, firms in many sectors have much stronger capacity to implement Mexican labor regulations than environmental ones. This capacity, though, is uneven in the textile-apparel industry, as the textile industry has stronger legislation and trade unions than the apparel industry.

5. Case Study on Golden Dragon Affiliates S., de R.L. de C.V. (GDA), Monclova, Coahuila

5.1 The Golden Dragon Group

5.1.1. General Characteristics and Background

GDA belongs to Golden Dragon Precise Copper Tube Group Inc. (GDG) – which is among the largest enterprises of precise copper tubes in the world. It was set up in 1988 in China as a State Owned Enterprise (SOE) and in 1994 it was privatized. It has six plants in different provinces in China; the most important is the Xinxiang Facility, with 1,700 employees and a capacity to produce 100,000 metric tons (MT) of copper tubes a year. It has one plant outside China - in Monclova, Coahuila, Mexico - and is building a second one in Alabama, US.

GDG was attracted to invest in Mexico by its closeness to the US market and also the benefits offered by this country: they were exempted from paying payroll taxes for one year; they offered one year scholarships for the first workers hired to study; and the government provided the land for them to construct and also helped in the construction process itself.

This firm produces several kinds of tubes: smooth tubes, IGT (inner grooved tubes), pancake coils, fin tubes,[16] solar tubes, and RF (radio frequency) tubes. These tubes have a very wide range of applications: air conditioning and refrigeration equipment, water supply for buildings, ship building, medical facilities, solar energy, mobile communication, and electromagnetic microwave technology. Three kinds of tubes are manufactured in Mexico: smooth tubes, IGT, and pancake coils.[17] [18]

5.1.2. GDG Technology

GDG produces seamless refined copper (SRC) tubes. The technology used in the production of SRC pipes and tubes in the US, China, and Mexico has improved over the last two decades. GDG uses the most recent technology available, which consists of a continuous horizontal cast and roll process. It is an improvement over the extrusion method, since it is quicker and does not require the billet reheating and extrusion steps of the former. Hence, it has lower production costs, reduces defects in the final products, and requires less energy and water for its manufacture. The process used also has better control of wall thickness along the length of the mother

[16] In comparison to plain tubes, these increases the surface area of the tube and improves the heat transfer efficiency.

[17] http://www.gdcopper.com/en/ABOUT/Copindu/

[18] Mexican producer IUSA and Luvata, a subsidiary of a multinational enterprise, also use this technology.

tube compared to the extrusion process, making it possible to manufacture smaller diameter products that require less copper per meter.

The cast and roll process was developed by Outukumpu (now Luvata) in Finland, at the end of the 1980s and its patent expired in 2008. It was introduced in China in 1991 through China National Technical Import and Export Corporation (GDG at present), which bought licenses from the Finish company.[19] GDG has improved its technology considerably: originally, each line of production yielded 7,000 MT annually, but through re-engineering and machine improvement they are able to produce 25,000 MT at present.[20]

GDG has a strong R&D and innovation position for precise copper tube material research and has obtained around 100 new patents. The company has an advanced quality control system with several certifications: OHSAS18001, ISO9001, ISO14001 and ISO/TS16949.[21]

GDG has incorporated several important environmental innovations in their products: it uses core technology of high-quality refrigeration copper tube; it produces an efficient heat-transfer threaded pipe that the company developed independently; and has reduced the volume of air conditioners, increased the energy efficiency and reduced the use of the copper pipe since 2000.

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[19] Interviews at GDA.

[20] Interviews at GDA.

[21] http://www.made-in-china.com/showroom/gdlvguan/companyinfo/Golden-Dragon-Precise-Copper-Tube-Group-Inc-.html

5.2. Golden Dragon Affiliates S., de R.L. de C.V. (GDA), Coahuila, Mexico

5.2.1. Background and General Performance

The subsidiary of GDG, GDA in Mexico made an initial investment of around 100 million dollars and started operating in 2009. The company fabricates three kinds of tubes using the same technology as GDG in China, and has become a very important enterprise in this sector, with a capacity of 50,000 MT, though it has reached 40,000 MT in its three production lines. At present (2014), it has 420 employees (400 are Mexican and 20 are Chinese).

GDG set up GDA in Mexico with the purpose of exporting copper tubes to the US. However, in 2009 the US imposed a 60.6% anti-dumping duty on the seamless refined copper pipe and tubes imported from Mexico and China.[22] In 2013, USTR overruled the antidumping duty it had imposed on GDA[23] but according to GDA executives in Monclova, exporting to the US is still difficult.

As a result of this situation, GDA diversified its markets to Colombia, Japan, and occasionally Europe, but it also made a special effort to expand its market in Mexico[24], hence strengthening its forward linkages, managing to cover 58% of the Mexican local market in 2012 (up from 27% in 2010).[25] During this period, the enterprise was able to gain some market share from its competitors in Mexico (particularly IUSA and NACOBRE, but not Luvata, which is very competitive). As to the GDA backward linkages, they frequently buy copper domestically. Local inputs also include nitrogen (GDA has its own plant), energy (it has a plant but is not self-

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[22] US International Trade Commission, "Seamless Refined Copper Pipe and Tube from China and Mexico", *Investigation Nos. 731-TA-1174-1175*; Publication 4193, November, Washington, D.C.

[23] "Golden Dragon Won the 'Anti-dumping War' in the U.S."; State Intellectual Property Office of the PRC (SIPO), http://english.sipo.gov.cn/news/iprspecial/201309/t20130909_817185.html

[24] Some of their national and international customers are: MABE, MESA, Panasonic, IMBERA, Whirlpool, Carrier, Hitachi, Samsung, Bohn, Lennox, and Rheem, among others.

[25] 31,100 MT, up from 27,300 MT (according to GDA).

sufficient), and plastic and other packaging materials (though some are also imported from China).

The complications faced in entering the US market, together with security problems (GDA suffered repeated robbery of its products – twelve full containers in 2012), among others, have caused certain financial problems for the company, which is striving to overcome.

5.2.2. Environmental Policy of the Firm

Technology used by GDA is advanced and brought from GDG, China, since it has no R&D department in Mexico, while its modern nitrogen plant has French technology. The GDA plant has one person in charge of health, security, and the environment. The firm was certificated by ISO 9000, in 2010, but does not yet have ISO 14000 or other environmental certifications in Mexico.

The production process of GDA is energy and water intensive (a scarce resource in northern Mexico). It has no direct atmospheric emissions, since it uses electricity for its smelting and its annealing processes, (instead of using natural gas, which would generate CO_2 emissions from the plant). However, the CO_2 generated from the electricity use must be considerable.

The production process uses abundant water (of various types) to cool down its the tubes at different stages. First, when the mother seamless tube is formed; second, at different stretching phases; and finally, after the annealing processes.

Water is treated before entering the facility, because it is too rich in minerals to be used, especially in the first stage of production. All of the water used in the production process and in the sanitary facilities is recycled in the water treatment plants and reused. Water remnants are tested in laboratories certified by the official Mexican Certification Entity (EMA) before they are returned to the collection system of the city.

The most important component that needs to be recovered from the used water is oil, which is abundantly used to clean the copper tubes. GDA has a system to separate water from oil and once the latter is recovered, it is disposed of as a hazardous waste.

Hazardous wastes produced by GDA include: oil, lubricants, coolants, and wastes that have been contaminated by chemicals. All of these are recovered and kept in special areas for hazardous wastes, approved by SEMARNAT, until they are taken care of by private enterprises (authorized by SEMARNAT) that handle them. Other non-hazardous wastes, such as plastics, discarded wood board, and other leftovers from packaging materials are sold to Mexican firms for their recycling. In short, all wastes are either recycled or destroyed.

GDA, Monclova, has to meet several environmental standards and has to report its performance periodically on several fields. It has to file an annual report for SEMARNAT (Cédula de Operación Anual, COA) on its emissions to the atmosphere, its discharges into the water system, and its hazardous wastes and their disposal. This enterprise complies with this requirement; and it has been making an effort to improve its reports, as a way to keep a better record of its own environmental performance. GDA does quite well in this, considering that the environmental authority in Coahuila has a very limited capacity to keep track of the 3,000 companies they need to monitor. Very few of them prepare a COA, they pledge their accuracy under oath and only very seldom are they inspected.[26]

Each year the enterprise checks sound emissions, lights, vibration, oil mist, and water quality, to make sure they are complying with the standards set for each one of these indicators.

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[26] Vanguardia, *Incumplen empresas con norma ambiental; la SEMA no verifica a todas*. 03/02/2013 http://www.vanguardia.com.mx/incumplen_empresas_con_norma_ambiental%3B_la_sema_no_verifica_a_todas-1494962.html

As for environmental improvement programs, the firm has one to reduce hazardous waste and to lower energy consumption by using LED light bulbs; and to reduce oil mist, which may threaten workers' health.

The GDA case study has several characteristics in common with a group of 298 automobile and electronics assembly plants in three Northern cities in Mexico interviewed for a survey on technical and environmental behavior carried out in 2002 (Carrillo and Schatan, 2005). GDA, like two-thirds of those plants, has an environmental policy and has personnel dedicated to this matter. It also resembles 30% of the surveyed enterprises in that it has obtained an ISO 9001 certification, but GDA still lacks ISO 14001, which 18% of the firms in the survey had. The motives driving most of the enterprises to undertake an environmental policy in the survey (i.e., to comply with Mexican environmental standards), is similar to the GDA incentives to do so. However many years have passed since such survey and the measures taken by GDA must certainly be much more advanced in emissions measurement, disposal of hazardous wastes, and recycling.

5.2.3. Labor Conditions in GDA

Labor conditions in GDA comply with Mexican requirements overall[27], but have some specific problems. All Mexican workers are part of the Confederación de Trabajadores de México (CTM) trade union and earn a wage that is quite standard for such activities. Most workers are skilled, since the production process uses sophisticated technology and their job consists mostly of controlling machines and processes, rather than transforming inputs directly.

However, there seems to be a variety of difficulties that have to do mostly with differences between Mexican and Chinese working culture and an inadequate handling of overtime payments by the firm.

[27] Various interviews with GDA staff.

First, the incentives provided by Chinese and Mexican enterprises differ considerably. Chinese incentives are linked with productivity and the number of hours worked. So, while minimum wages are low in China, workers are capable of having relatively high salaries, by working very hard for long hours. Mexican workers are often not willing to sacrifice holidays and weekends and they are protected by the law in this sense. However, at GDA laborers have often been required to do their job on non-working days and, though these should be paid accordingly, complaints have been raised because the firm has not honored this obligation. Also, there are some workers that claim to have been fired because they have refused to work on officially non-working days and maintain that they have not been compensated according to the law.[28] Since the CTM trade union in of Coahuila also has internal disputes, they seem not be able to act effectively in these cases.[29]

Second, there is a communication problem between Chinese and Mexican personnel. There are strong linguistic barriers: none of the Mexican employees speak or understand Chinese, and none of the Chinese workers speak Spanish. English is not an alternative, because only few staff members understand that language. This is why the knowledge transmission process is relatively difficult and imperfect and mostly done through interpreters, who are not technicians. Though several Mexican staff and workers have spent some time in China learning the technical aspects of the production process, this seems to have been insufficient. If we add a considerable labor turnover to this situation, then the capacity of human capital to respond to the enterprise's needs falls short.

Third, there is a very different social situation for Mexican and Chinese employees. The first live in their country, have social and family relations, and mingle in society without any problem. However, most of the Chinese staff come to Mexico without their families and are isolated from society, because of the language barrier. This also deepens the differences already mentioned.

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[28] Periodico El Tiempo, *Actúa Golden Dragon en Represalia*, 02/12/2012; Zocalo Saltillo, *Cumplen las empresas con pago de utilidades*, 05/05/2012,

[29] Periodico El Tiempo, *Truena Osvaldo Mata contra Tereso Medina,* 05/04/2012.

In short, GDA's characteristics are quite similar to other manufacturing Chinese enterprises abroad, which are technologically at the forefront in their sector. However, it faces challenges to reach the targets set by their own group, due to market access and insecurity problems and productivity shortcomings. Broadly speaking, GDA's environmental policies are in line with Mexican legislation, but there is room for improvement. Regarding labor policies there is room for GDA to make a greater effort to surmount cultural and linguistic obstacles, and comply appropriately with Mexican domestic labor laws.

6. CONCLUSIONS

This paper has looked into the question of whether trade between Mexico and China has had an adverse incidence on environmental indicators (through exports to China) and labor issues (through imports from China) in the first nation and whether Chinese OFDI has had a recognizable pattern of behavior regarding these same issues. The analysis mostly concentrated in the manufacturing sector.

Mexico has only had a significant trade relationship with China through imports coming from that country and those that compete with Mexico in the US market. Exports from Mexico to China have been much more limited, but they have had an upward trend. The amount of OFDI coming from China is quite modest still, especially compared with other LACs.

The issue of employment has been studied extensively, and most experts agree that displacement by Chinese imports contributed to important job losses in the first half of the 2000s, especially in the textile-apparel industry. However, there is no consensus on the strength of that phenomenon, or the extent to which the overall Mexican economy was harmed by Chinese imports, because of the pervasiveness of illegal imports from China (which are harder to trace) and simultaneous technological innovations that made the sector less labor-intensive (which make causation harder to attribute). Nonetheless, for this sector to strengthen, Mexico requires much more legal enforcement on rules of origin and illegal smuggling of products, especially apparel. The negotiations for China to be recognized as a market economy by Mexico before 2016 is also a critical issue because this new status could reduce the margins within which Mexico could claim unfair trade practices from China.

Regarding the environmental characteristics of Mexican exports, specifically GHG emissions arising from their production, a worrying sign is that their composition is changing towards more polluting sectors, particularly mining. This tendency is much more pronounced for Mexican exports to China than for those going to the world. Focusing specifically within the manufacturing sector, exports to China favor less polluting sectors, more so than it does for manufacturing exports from Mexico to the world. However, in all cases, it has been the rapid expansion of exports (scale effect) that has been, by far, the factor responsible for greater GHG emissions from exported goods. Improvements in technique had an offsetting influence, but much less for exports to China than for exports overall.

Chinese OFDI in Mexico has been very limited, most of it favoring the primary goods sector in recent years. This study focused on OFDI in the manufacturing sector in Mexico and identified a group of 36 Chinese manufacturing companies. Our results indicate that the firms are quite heterogeneous in their structure as well as their environmental and social behavior.

Above all, it is quite clear that there is no unique environmental policy followed by these firms in Mexico since their origin is varied. Few are wholly Chinese-owned; instead, many are either joint ventures, or have other forms of relationships, with firms from developed countries. They also vary considerably in size and sector, though the most important belong to sectors where China has traditionally had technological dominance. Of the group of enterprises identified, some are known to have adequate environmental standards, but for others it is not clear what their standards are since access to information is very difficult. The case study – Golden Dragon Affiliates – shows, in general, a compliance with Mexican environmental standards in water treatment and hazardous waste handling as well as GHG emissions, though there is room for improvement.

Chinese OFDI projects receive guidelines from China on fulfilling local requirements, especially EIA, but following these guidelines is still mostly voluntary for subsidiaries abroad. Chinese banks that back enterprises abroad can apply greater pressure to comply with local standards, because they have inferred that a negative image of such firms abroad may end in a failure of the investment they are backing. The Mexican environmental legal and regulatory framework has greatly improved and now includes keeping records from the most polluting firms, but enforcement is still rather weak and needs to be improved. As is the case with FDI, in general, unless there is an explicit company policy regarding environmental and labor standards, or rules set by the country of origin of the investor, it is usually the local legal framework and its implementation that sets the limits of what these firms may or may not do. Chinese OFDI in Mexico is no exception.

The labor record of Chinese OFDI in the Mexican manufacturing sector, as in the case of the environment, is not homogeneous. Unfortunately, the area that was hit the hardest by Chinese competition after that country joined the WTO (2001) and MIA ended (2005), the apparel sector, is also one of the most vulnerable in terms of its labor conditions in Mexico, with informal work arrangements, low wages, fewer benefits and weak trade unions. Feeble regulations in this area and the still-important flow of illegal imports continue to affect this sector's employment and working conditions.

The common preconception that Chinese firms bring important numbers of workers from China primarily in order to pay them lower wages, make them work longer and avoid social security expenses, seems to be an exception. When firms are fully owned by Chinese capital we saw examples where the proportion of Chinese workers can be relatively high, but the reasons for this seems to lie more in the challenge of technical knowledge transfer and communication between Chinese and Mexican employees, rather than firms trying to profit from low compensation. As to the conditions of Mexican workers in purely Chinese firms, there does not seem to be an overall trend of labor law violations, but there are specific problems related to differences in Chinese and Mexican labor law regimes. The GDA case study shows these characteristics.

Wages in China have been rising very quickly (with average real wages of the 700 million workers in China have multiplying by five over the last two decades) and working conditions have improved. Meanwhile, the legal framework has transformed accordingly, with greater legal entitlements given to Chinese workers (Brown, 2013). This may create greater incentives for Chinese firms to invest in Mexico but this country should aim at competing with increasingly more sophisticated goods with China, and attracting higher technology OFDI with greater value-added and better wages. Mexico needs to leap-frog in these kinds of goods as it has been doing in the automobile and aerospace industries, with a greater integration of value chains at home to face the challenge posed by China.

One aspect that must draw attention and that needs to be studied in greater depth is that Chinese OFDI, although favoring the primary sector, is also diversifying. In fact, investments going to sectors other than manufacturing (such as construction, agriculture and mining), while volatile, accounted for an average of about 40% of total Chinese OFDI between 2000 and 2012. Within this category there are very diverse activities that range from the construction of a very large new wholesale facility being built in the state of Quintana Roo (Dragon Mart), which is very controversial in terms of environmental impact, to high technological enterprises like Huawei, which provide telecommunication services and a training facility which are highly needed in Mexico. New investments also include Chinese Development Bank, which should help expanding that country's involvement in several activities in Mexico.

Technical Appendix: Scale, Composition, and Technique Analysis Methodology

This analysis is based on methodology used by Schatan (2000). For this analysis, we used the 3-digit SITC database for exports and the GTAP database for GHG emissions for 2004 and 2007 (Andrew and Peters, 2013; and COMTRADE). From a list of 262 sectors, we focused on 164 sectors with over 10,000 dollars in exports.

We analyze trends from 2000 to 2012 by comparing an average of 2000 to 2002 and an average of 2010 to 2012. By taking average, we compensate for volatility in emission data. We also compare production for Mexican exports to China to production for Mexican exports to the world. We decomposed the increase in GHG emissions into the three different components mentioned above:

$$D\ P = \{[xi1 * (X2 / X1)] * ti_1 - (xi1 * ti_1)\} + \{[(xi2 * ti_1) - (xi1 * ti_1)] - [(xi1 * (X2 / X1)) * ti_1 - (xi1 * ti_1)]\} - [(xi2 * ti_1) - (xi2 * ti_2)]$$

$$\text{Scale effect} = \{[xi1 * (X2 / X1)] * ti_1 - (xi1 * ti_1)\}$$

$$\text{Composition effect} = \{[(xi2 * ti_1) - (xi1 * ti_1)] - [(xi1 * (X2 / X1)) * ti_1 - (xi1 * ti_1)]\}$$

$$\text{Technique effect} = [(xi2 * ti_1) - (xi2 * ti_2)]$$

Where:

D P: is the pollution change between period 1 and period 2.

ti_1 : pollution index for sector i in period 1

ti_2 : pollution index for sector i in period 2

xi1: exports of sector i in period 1.

xi2: exports of sector i in period 2.

X1 = S xi1

X2 = S xi2

i = 1,2,……, 164.

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