

The Dynamism of Mexican Exports: Lost in (Chinese) Translation?

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Summary. — This paper analyzes the extent to which Mexican exports have penetrated US markets in recent years, and juxtaposes such an analysis with the performance of China. We find that Mexico's main non-oil exports are losing dynamism, and their relative share in the US market is either declining or growing slower than China's. This trend is a new one, and begins after China's entry into the WTO. A number of factors could explain these findings. These include: (i) the real appreciation of the real exchange rate of the peso relative to the US dollar combined with the trend toward undervaluation of the Chinese currency, (ii) the decline of public investment in Mexico, especially in infrastructure, (iii) limited access to bank credit in Mexico, and (iv) the absence of government policy in Mexico to help spur technological innovation and to strengthening its domestic backward and forward linkages.

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1. INTRODUCTION

The growing strength of the Chinese economy and how it will affect one's competitiveness is the topic of conversation in both board and seminar rooms in the developed and developing world alike. Mexico is no exception. When Mexico integrated with the US economy Mexicans thought being an export platform to the largest economy in the world would lead them on the road to riches. Now they fear that they are losing ground to China. After decades of an inward looking economic strategy, Mexico opened its doors to the global economy in the late 1980s to follow a strategy based on trade and investment liberalization. A key goal in this strategy has been to gain

ever-increasing access to the largest market in the world—Mexico's northern neighbor the United States. Liberalization began in the 1980s and culminated in the North American Free Trade Agreement (NAFTA), launched in 1994. The hope was that by transforming itself into an export-oriented economy with preferential access to the US, Mexico would attract foreign and domestic investment to support long-term economic growth.

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In terms of generating non-oil exports and increasing access to the US economy, Mexico's plan was a success. The volume of non-oil exports has increased by a factor of 10 since 1980, almost 90% of which are headed to the United States. In relation to the Mexican economy, exports formed only 10% of GDP in 1980 but stand at 30% today. Perhaps most successfully, the variety of exports increased. In 1980, 80% of all Mexican exports were from the oil sector, but today oil comprises approximately 10% of total exports. The bulk of Mexico's manufactured exports are in the automotive, electronic, and textile sectors—the majority of the latter being produced by in-bond firms (maquiladoras). Finally, Mexico enjoys a large trade surplus with the United States.

Today, Mexicans are very concerned that they are losing ground to other developing countries, especially China. Table 1 shows that China has left over Mexico's longstanding spot as the third largest exporter to the United States and displaced Japan as the second largest source of imports.

While Mexico retains a large share of the US market, its competitive position could erode. As Table 2 shows, the US market has become the linchpin of the Mexican economy. In this table, all values referred to Mexico ("Share of Mexican Exports," "Share of Mexican Imports") were calculated as the share of Mexico's overall trade flow that corresponds to bilateral trade with the United States. Similarly, all values referred to the United States ("Share of US Exports," "Share of US Imports") were calculated as the share of United States' overall trade flow that corresponds to bilateral trade with the Mexico.

This paper examines the extent to which Mexico is becoming more or less competitive by calculating Mexico's Dynamic Revealed Competitiveness Position in various export sectors. Because we examine the revealed compet-

itive advantage over time in a dynamic sense, we will refer to our analysis as dynamic revealed competitiveness position (DRCP).

We find that the fears of many Mexicans may be justified. Indeed, since China joined the World Trade Organization in 2001, over 70% of Mexico's exports are under some sort of "threat" from China.

This paper has five parts. This introduction is followed by a literature review of similar studies on this topic. Section 3 is a discussion of our research methodology and data. Section 4 presents our analysis results and Section 5 poses questions about the causes of our results and lays out suggestions for future research.

2. LITERATURE REVIEW

Insights from both traditional and new trade theories point to the importance of the Chinese challenge. Heckscher–Ohlin theories of trade emphasize the importance of endowments. As Mesquita Moreira points out in this journal, "with a population of 1.3 billion and a labor force of 640 million sitting on a limited amount of natural resources, China has a huge comparative advantage in labor-intensive goods" (Mesquita Moreira, 2007). However, Mesquita Moreira also underscores the fact that labor productivity has been growing much faster in China than in Latin America suggests that China represents a huge challenge in a "Ricardian" world. In addition, he argues that China's size enhances its competitive position by giving it an important edge in capital and technology intensive industries by reducing the unitary costs of research and development and maximizing knowledge spillovers, among other things.

Numerous studies have examined Mexican trade after NAFTA, but relatively few have focused on the relative competitiveness of Mexican

Table 1. *Top five sources of US imports (excluding oil)*

1994		1997		2000		2005	
Country	Share (%)	Country	Share (%)	Country	Share (%)	Country	Share (%)
Canada	19.5	Canada	19.5	Canada	18.9	Canada	17.3
Japan	18.9	Japan	14.8	Japan	12.9	China	16.8
Mexico	7.0	Mexico	9.4	Mexico	10.8	Mexico	9.6
China	6.3	China	7.8	China	9.2	Japan	9.2
Germany	5.0	Germany	5.3	Germany	5.2	Germany	5.6

The authors' elaboration based on official data from (United Nations Statistics Division, 2007).

Table 2. *Evolution of United States–Mexico trade*

Trade flow	1990	1995	2000	2005
Share of Mexican exports destined to the United States (%)	70.2	83.4	88.6	85.8
Share of Mexican exports destined to the United States (excluding oil) (%)	77.1	83.8	89.8	86.9
Share of Mexican imports originated in the United States (%)	67.1	74.5	73.3	53.6
Share of US exports destined to Mexico (%)	7.2	7.9	14.3	13.3
Share of US imports originated in Mexico (%)	5.9	8.1	10.9	10.0
Share of US imports originated in Mexico (excluding oil) (%)	5.5	7.9	10.8	9.6

The authors' elaboration based on official data from (United Nations Statistics Division, 2007).

exports compared to China. In light of the crucial importance that the US market has for Mexico, it is surprising that so little attention has been devoted to this issue. Has NAFTA sheltered Mexico from the impact of China's competitiveness in the US market? What categories of Mexican exports to the United States are most vulnerable to the Chinese challenge? Have the patterns of US–Mexico trade in non-oil goods and services changed because of China's increased presence? These are relevant questions that the literature has, to the best of our knowledge, not yet answered.

The small but perhaps burgeoning literature on the competitiveness of Mexican exports with respect to China has mixed results. However, this is mostly due to the years under consideration. Those studies that look at a period ending in 2001 or 2002 and that use early base years find that China is not much of a threat to Mexico. Those studies that include analyses of years following China's entry into the WTO in 2001 find that Mexico should be very concerned about its competitive position in the United States and world economy relative to China.

In a recently published book, Devlin, Esteve-deordal, and Rodriguez-Clare (2006) compare penetration to the US manufacturing market during 1972–2001, with the aim of assessing the impact of China's export boom for Latin American exports. For this broad period, they find that the countries that experienced the greatest market share gain were first, China and second, Mexico. The gain for China came from “miscellaneous manufacturing” and for Mexico from “machinery.” They also look at the textile sector in more detail and find that since 1997 China has been an ever growing export force in the US market.

Lall and Weiss (2005) put forward a more detailed analysis of the evolution the shares of Latin American (in general) and Mexican (in

particular) import shares in both the US and world markets. They assess the “competitive threat” posed by China to Latin America. They compare export structures to evaluate “potential for competition”¹ and look at the evolution of China's shares in both the world and US markets. In cases where China's market share is increasing and the Latin American share is decreasing, they define the category as one of “direct competitive threat.” Categories in which both Latin America's and China's market share are increasing but China's share is increasing faster, are defined as a “partial threat.”

Lall and Weiss (2005) research the period 1990–2002. They have two major findings. First, they find that only Mexico and Costa Rica have similar enough export structures to be under possible threat from China. However, they find that Mexico (and Costa Rica) is not under significant threat by China. Indeed, the position of these countries improved. Working at the 3-digit SITC level they show that while in 1990 23.6% of Mexican exports to the United States were under some sort of threat, the percentage of exports in the same category in 2002 had decreased to 11.2%.

They do identify some product lines were being most threatened by China in the US market and which Mexican exports were most threatening to China in 2002 (in terms of exports to the United States). Among the most threatened Mexican exports they find “Vegetables, fresh, chilled, frozen/pres” (SITC 054), “Petroleum products, refined” (SITC 334), “Paper and paperboard” (SITC 641), “Inorganic Chemical elements, oxides” (SITC 522), and “Iron and steel bars, rods, angles, shapes” (SITC 673). On the other hand, the categories in which Mexican exports are most challenging to China's competitive position are “Passenger motor cars, for transport” (SITC 781), “Petrol, Oils, crude, & c.o.” (SITC 333), “Television

receivers" (SITC 761), "Outer garments, men's, of textile fabric" (SITC 842), and "Under garments, knitted or crocheted" (SITC 673).² On the whole, however, they find that Mexico was not threatened by China during this period. However, what a difference a year makes. A commentary to the Lall and Weiss article published in the same journal and using the same methodology with two new years of data the majority of Mexico's exports were under some type of "threat," and some sectors such as televisions receivers had become threatened by China (Gallagher & Zarsky, 2007).

A similar approach is adopted by Dussel Peters (2005) who looks at the top 10 Mexican and Central American exports to the US market in 2003. He analyzes the extent to which China poses a competitive threat, based on the evolution of each country or region's percentage of US imports for their top 10 exports (Dussel Peters, 2005). He shows that Mexico's top 10 exports to the US market represent 83.77% of its exports, and 52.27% for China, indicating a high potential for conflict. Moreover, Dussel concludes that light industrial sectors such as clothing and apparel and in electronics are beginning to experience threats from China and predicted that other final assembly sectors would follow.

A recent OECD study compares the export structure of China with Latin American countries over time. The aim was to identify which countries have export structures that are similar enough to China's that they could be under threat, looking at the period 1978–2004. Their conclusion, similar to the first finding of Lall and Weiss, is that most Latin American countries simply do not have export structures similar enough to China's (most Latin American countries specialize in primary products and resource-based goods rather than manufacturing). However, they conclude that Mexico is facing the potential of very strong competition from China (Blazquez-Lidoy, Rodriquez, & Santiso, 2006).

Very recent work by Feenstra and Kee (2007) compares trade liberalization and the proliferation of export varieties in Mexico and China during 1990–2001 (Feenstra & Kee, 2007). They find that Mexico on average exported 52% of all product varieties imported by the United States in 1990, and 67% in 2001—affirming the hypothesis that trade liberalization accelerates the proliferation of export variety. However, they also find that China had 42% in 1990 and 63% in 2001. Though China's

overall percentage is still shy of Mexico's it shows that China's proliferation of export varieties to the United States is growing much faster and may be a threat to Mexican exports.

Our work builds on this previous research. We look at the changes of Mexican competitiveness over time in the US economy, relative to China. We replicate the methodology used by Lall and Weiss and add years that include China's entry into the WTO. We also go deeper at a sectoral level and analyze these trends by technology level. Like the other studies that look at the period after China's entry into the WTO, we find that Mexico is under considerable threat from China. What is more, this threat is in some of its most cherished sectors. Like the previous papers, our methodology reveals trends that are only highly suggestive but do not imply absolute causation.

3. DATA AND METHODOLOGY

In this paper, we build on the research mentioned above by examining the relative competitiveness of Mexico's exports in the US economy during 1981–2005. The question we ask is: to what extent are specific Mexican export industries gaining access to the US economy over time? In sectors where Mexico may be losing market share, we examine the extent to which such sectors are under threat from China.

To respond to this question, we draw on a classic 1965 work by Balassa who introduced the concept of "revealed comparative advantage" to empirically measure the competitiveness of different countries (Balassa, 1965). The revealed comparative advantage for sector i in country j was defined as follows:

$$RCA_{ij} = \frac{X_{ij} / \sum_i X_{ij}}{\sum_j X_{ij} / \sum_i \sum_j X_{ij}}.$$

The numerator represents the share that any given sector (i) represents of national exports of any given country (j). The denominator represents the percentage share of the same sector in OECD exports. Therefore, the RCA is a comparison between the export structure of any given country and the export structure of the OECD as a whole. When the RCA is greater than one for any given sector, then the country being analyzed is said to be specialized in that sector and *vice versa* when the RCA is smaller than 1 (Laursen, 1998).

The article by Lall and Weiss discussed in the literature review looks at the “revealed” competitiveness rather than comparative advantage. Competitiveness is measured by the share of Mexican exports in a given amount of US imports in that sector.

We utilize this same approach and refer to it as the “dynamic revealed competitiveness position (DRCP).” We follow Lall and Weiss’ approach to measuring competitive threat by looking at the evolution of market shares on the import side (Lall & Weiss, 2005). Because we are looking at competitiveness in the US market, we exclusively look at the evolution of market shares on the US market. In addition, because our focus is not static (i.e., the revealed advantage of different Mexican industries in the US market for any given year) but dynamic (that is, the evolution of the competitiveness of different Mexican industries over time) we compare values for two years and focus on the change.

Our central index, the DRCP, is calculated as follows for country x in sector y between the years z_1 and z_2 :

$$\text{DRCP}_{x,y,z_1-z_2} = \left(\frac{\text{USM}_{x,y,z_2}}{\text{USM}_{\text{World},y,z_2}} - \frac{\text{USM}_{x,y,z_1}}{\text{USM}_{\text{World},y,z_1}} \right) * 100,$$

where USM represent US imports from country x in sector y , in year z .

Throughout the paper, we refer to the term $\frac{\text{USM}_{x,y,z_1}}{\text{USM}_{\text{World},y,z_1}}$ as “Share of US imports” in sector y and year z .

We calculate DRCPs as measured by the change in the share of Mexican exports in the US economy during 1988–2005 (and also during 1997–2005). Such an analysis, looking at

the actual DRCP in two different years and the percentage point change during the two periods, allows us to examine the DRCP for each sector. Sectors in which Mexico is increasing its share of total US imports are described as experiencing a DRCP. We examine the DRCP for Mexico’s top 15 exports to the United States. These actually represent over 60% of Mexico’s total exports to the United States. In addition, we identify the most and the least dynamic among the 289 export sectors.

We juxtapose Mexico’s DRCPs with those of China for each sector. As mentioned earlier (Lall, 2000) we define those sectors in which Mexico is facing “direct competitive threat” as those in which its import share in the United States is decreasing and China’s is increasing. A “partial threat” is seen to occur in sectors where both Mexico and China experience increases in US market share but China’s is expanding at a faster rate than Mexico’s.

We also look at Mexico’s top 15 exports, as well as its most and least dynamic sectors. Finally, we also conduct this analysis by sorting Mexican exports to the US economy by level of technology. This allows us to assess the extent to which Mexico is gaining ground in the US economy relative to China by level of technology. Table 3 exhibits the technology classification system established by Lall (2000).

The dataset for this paper was built with data obtained from the United Nations Commodity Trade Statistics Database (United Nations Statistics Division, 2007). This is the same database used by all but one of the studies cited in the literature. It was constructed following the SITC Rev. 2 product classification. The “Share of US imports” data (and the percentage point changes derived from those shares) were calculated based on import data reported by

Table 3. *Classification of technology levels in the world economy*

PP	Primary products
RB1	Resource-based manufactures: agro-based
RB2	Resource-based manufactures: other
LT1	Low technology manufactures: textiles, garment and footwear
LT2	Low technology manufactures: other products
MT1	Medium technology manufactures: automotive
MT2	Medium technology manufactures: process
MT3	Medium technology manufactures: engineering
HT1	High technology manufactures: electronic and electrical
HT2	High technology manufactures: other

Source: Lall (2000).

the United States in CIF values.³ Mexico's share of US imports is calculated as usual, based on figures reported in US current dollars.

4. DYNAMIC REVEALED COMPETITIVENESS ANALYSIS

In this section we present the calculations of DRCP for the entirety of Mexico's exports to the United States and examine two things: (1) the extent to which they are gaining more access to the US market; and (2) the extent to which specific sectors are already "threatened" by China (see definition above). We find that as each year has progressed, especially since China's entry into the WTO, Mexican exports face an ever growing threat from China. Just a handful of sectors are keeping Mexico in its place as the third largest exporter to the United States. In this section we additionally identify the 15 sectors that in the period here analyzed that more rapidly penetrated the US market and reconstruct the analysis to examine to the extent to which Mexico is gaining ground on China in the US market with respect to technological sophistication.

Table 4 exhibits the percentage of Mexican exports threatened by China from 1988 to 2005. During the period 1988–91, 22.5% of Mexican exports were under threat (Lall and Weiss). By 2005 that figure is 53%. It is also important to note that the vast majority of threatened sectors are classified as a "direct threat" after 1997. That measure stood at 14.6 during the 1988–91 period, was as low as 6.5% during the period 1994–97, but reached 43.7% in 2005.

(a) Mexico's top 15 exports

This section looks at the relative competitiveness of Mexico's top 15 exports. The 15 sectors exhibited in Table 5 comprise over 56% of Mexico's exports to the US during 1997–2005, and

are largely clustered around textiles, electronics, and the auto industry.

The 15 products in this table are the top 15 exports by Mexico (as reported by Mexico) in the year 2005. The first column, "Trade Balance" is the value of Mexican exports to the United States minus Mexican imports from the United States in any given category for 2005 (the data are presented in 2000 dollars). The data are reported by Mexico. Positive numbers represent trade surpluses and negative numbers represent trade deficits, from the Mexican perspective.

Column 2, "Share of Exports" is the percentage that Mexican exports in any given category in 2005 represent of total Mexican exports (to the world) in 2005. The data are reported by Mexico. Finally, column 3, "Export Value" is simply the value of total Mexican exports (to the world) for any given category in 2005. The data are presented in 2000 dollars.⁴

During the period analyzed we find that over 75% of Mexican exports are under "direct" or "partial" threat—when Chinese exports in the same sector grow and Mexican exports decline or when Chinese exports grow faster than their Mexican counterpart. In the industries that account for the largest bulk of Mexico's exports did not register a major gain in the US market, and some of them saw their share actually recede. Table 6 exhibits the DRCP for the top 15 exports and shows that although the share in the US market increased for seven of the 15 sectors, on the whole there was a 0.7% non-weighted average decrease in the share of these top 15 sectors in the United States:China, in contrast, averaged a 11.3% gain in these same 15 sectors.

In only two sectors did Mexico's share in the US market rise, and China's diminish: Lorries and medical instruments. In other words Mexico poses a direct threat to China. Mexico also poses a partial threat to China in piston engines and (almost) in motor vehicle parts. These goods are Lorries which are quite heavy by volume and thus have higher transportation costs.

Table 4. *Percentage of Mexican exports under "threat from China, 1988–2005"*

	1988–91	1991–94	1994–97	1997–2000	2000–2005
Direct threat (%)	14.6	15.2	6.5	22.1	43.7
Partial threat (%)	7.9	32.9	22.1	19.7	9.3
Total (%)	22.5	48.1	28.6	41.8	53.0

The authors' elaboration based on official data from (United Nations Statistics Division, 2007).

Table 5. *Characteristics of Mexico's Top 15 (non-oil) 2005 exports*

Code	Commodity	2005 Values (2000 dollars)		
		Trade balance	Share of exports (%)	Export value
781	Passenger motor vehicles (excluding buses)	7,217,072,588	7.2	11,936,231,473
764	Telecommunication equipment, nes; parts and accessories, nes	6,786,520,283	6.4	10,670,153,111
761	Television receivers	7,884,135,109	5.6	9,188,215,069
784	Motor vehicle parts and accessories, nes	1,611,113,840	5.3	8,726,580,607
752	Automatic data processing machines and units thereof	5,774,461,097	5.0	8,228,038,264
773	Equipment for distribution of electricity	4,208,873,662	4.0	6,560,761,541
782	Lorries and special purposes motor vehicles	4,695,524,900	3.8	6,363,859,707
778	Electrical machinery and apparatus, nes	4,106,820,436	3.8	6,304,001,565
772	Electrical apparatus for making and breaking electrical circuits	396,540,165	3.0	4,966,905,961
713	Internal combustion piston engines, and parts thereof, nes	626,250,666	2.6	4,314,007,102
821	Furniture and parts thereof	3,225,844,693	2.5	4,064,786,276
874	Measuring, checking, analysis, controlling instruments, nes, parts	925,711,520	1.8	2,959,291,485
699	Manufactures of base metal, nes	-702,142,304	1.8	2,955,607,080
54	Vegetables, fresh or simply preserved; roots and tubers, nes	2,469,206,972	1.7	2,791,659,177
872	Medical instruments and appliances, nes	1,650,320,547	1.6	2,687,599,306
	Total	50,876,254,173	56.02	92,717,697,727

The authors' elaboration based on official data from (United Nations Statistics Division, 2007).

Table 6. *DRCP for Mexico's top 15 (non-oil) 2005 exports*

Code	Commodity	Share of US imports (%)		DRCP	
		1997	2005	Mexico	China
781	Passenger motor vehicles (excluding buses)	11.1	8.7	-2.5	0.2
764	Telecommunication equipment, nes; parts and accessories, nes	17.1	12.5	-4.5	17.4
761	Television receivers	69.3	44.8	-24.5	22.0
784	Motor vehicle parts and accessories, nes	14.4	18.3	3.8	4.0
752	Automatic data processing machines and units thereof	6.9	8.8	1.9	42.6
773	Equipment for distribution of electricity	64.3	56.4	-7.8	8.0
782	Lorries and special purposes motor vehicles	29.6	37.2	7.6	0.0
778	Electrical machinery and apparatus, nes	16.3	21.1	4.8	13.1
772	Electrical apparatus for making and breaking electrical circuits	20.3	27.4	7.1	7.9
713	Internal combustion piston engines, and parts thereof, nes	17.0	20.1	3.0	1.3
821	Furniture and parts thereof	16.4	12.6	-3.8	30.5
874	Measuring, checking, analysis, controlling instruments, nes, parts	12.8	13.8	1.0	6.5
699	Manufactures of base metal, nes	12.3	18.0	5.7	17.2
54	Vegetables, fresh or simply preserved; roots and tubers, nes	56.4	52.2	-4.2	1.4
872	Medical instruments and appliances, nes	19.7	22.1	2.4	-2.8

The authors' elaboration based on official data from (United Nations Statistics Division, 2007).

In addition, NAFTA's rules of origin require that over 60% of transport vehicles sold in North America are manufactured in the region as well—acting like a local content standard.

In five sectors the Mexico rate of penetration of the US market increased, but China dynamism was stronger ("partial threats"). These are "automatic data processing" or computers where Mexico gained 1.9 percentage points but China gained 42.6. China's success in these industries is remarkable given that computers take 18 h to travel to the United States from Mexico, *versus* almost 18 days by ship from China (Gallagher & Zarsky, 2007). Clearly transportation costs have lost relevance relative to other costs of production in this sector. In addition, during this period, China faced a tariff of six and Mexico's was zero, even after WTO entry for these products (Dussel Peters, 2005).

One sector in which Mexico has clearly lost competitiveness is the television receiver industry. In the early 1980s practically no television receivers manufactured in Mexico were exported to the United States, but by 1997 Mexican television receivers covered almost 70% of the corresponding US imports. Indeed, Lall and Weiss found that it was one of the sectors where Mexico was a threat to China in the US market. However, from 1997 to 2004 Mexico saw a decrease in its share of 24.5 percentage points. During the same period, China's share increased by 22 percentage points.

These findings are consistent with the literature cited above that has looked at the post-2001 period. When taking into account years following China's accession to the WTO (which took place in 2001) by and large, Mexico's key exports have either stagnated or are growing much slower than their Chinese counterparts. Those sectors that hold ground are low skilled work assembly operations with higher transportation costs.

(b) *Most and least dynamic sectors*

In addition to Mexico's most important exports, we analyze DRCP for all sectors of the Mexican economy, regardless of their overall importance to Mexico's export profile. Here we exhibit 15 sectors where Mexico is gaining the most ground in the US economy, and the 15 sectors where Mexico is losing the most. Again we compare these gains and losses to China.

The 15 products in this table are the 15 most dynamic exports by Mexico to the US market, understood as the product whose percentage as share of total US imports (as reported by the United States) increased the most during 1997–2005. In columns 1 and 2, "Share of US Imports" is calculated dividing total US imports in commodity Z over US imports from Mexico (and China) in commodity Z for any given year. The DRCP in columns 3 and 4 is the

Table 7. *Most dynamic export sectors, 1997–2005*

Code	Commodity	Share of US imports (%)		DRCP		2005 (2000 dollars)		
		1997	2005	Mexico	China	Trade balance	Share of exports (%)	Tech level
47	Other cereal meals and flour	2.0	27.5	25.5	−0.4	4,871,726	0.0	RB1
783	Road motor vehicles, nes	4.2	21.9	17.7	0.0	581,654,519	0.4	MT1
269	Old clothing and other old textile articles: rags	17.2	32.7	15.5	1.1	33,676,509	0.0	RB1
1	Live animals chiefly for food	11.0	26.2	15.2	0.0	411,677,482	0.3	PP
686	Zinc	9.3	23.8	14.5	0.0	197,609,586	0.1	PP
22	Milk and cream	2.3	11.6	9.3	0.1	−341,955,004	0.0	PP
672	Ingots and other primary forms, of iron or steel	11.2	20.1	9.0	0.6	532,265,415	0.4	MT2
61	Sugar and honey	3.2	11.8	8.6	0.5	15,886,218	0.1	RB1
62	Sugar confectionery and preparations, non-chocolate	16.7	25.1	8.4	5.9	267,322,634	0.2	RB1
677	Iron or steel wire (excluding wire rod), not insulated	4.0	11.8	7.9	10.9	18,726,582	0.1	LT2
782	Lorries and special purposes motor vehicles	29.6	37.2	7.6	0.0	4,695,524,900	3.7	MT1
772	Electrical apparatus for making and breaking electrical circuits	20.3	27.4	7.1	7.9	396,540,165	2.9	MT3
712	Steam engines, turbines	1.7	8.6	6.9	−0.6	61,825,742	0.0	HT2
721	Agricultural machinery (excluding tractors) and parts thereof, nes	2.7	9.6	6.9	5.6	36,258,035	0.1	MT3
57	Fruit and nuts, fresh, dried	16.1	22.4	6.3	1.0	660,276,860	0.6	PP

The authors' elaboration based on official data from (United Nations Statistics Division, 2007).

Table 8. 15 Least dynamic export sectors, 1997–2005

Code	Commodity	Share of US imports (%)		DRCP		2005 (2000 dollars)		
		1997	2005	Mexico	China	Trade balance	Share of exports (%)	Tech level
263	Cotton	68.5	14.1	−54.3	−1.7	−404,803,388	0.0	PP
761	Television receivers	69.3	44.8	−24.5	22.0	7,884,135,109	5.0	HT1
245	Fuel wood and wood charcoal	40.9	21.6	−19.4	11.8	6,416,196	0.0	PP
685	Lead	23.0	4.7	−18.3	7.6	−25,587,792	0.0	PP
786	Trailers, and other vehicles, not motorized, nes	38.1	20.6	−17.5	31.9	122,784,393	0.2	MT2
274	Sulphur and unroasted iron pyrites	42.4	26.8	−15.5	0.0	15,371,382	0.0	PP
711	Steam boilers and auxiliary plant; and parts thereof, nes	16.4	3.0	−13.4	3.3	−18,431,472	0.0	MT3
289	Ores and concentrates of precious metals, waste, scrap	30.0	17.7	−12.3	0.2	−23,073,165	0.0	RB2
71	Coffee and coffee substitutes	16.9	6.7	−10.3	0.0	175,541,179	0.1	PP
613	Furskins, tanned or dressed; pieces of furskin, tanned or dressed	10.3	1.0	−9.3	3.4	−1,660,157	0.0	LTI
612	Manufactures of leather or of composition leather, nes; etc.	17.1	8.8	−8.2	30.8	−149,211,282	0.1	LTI
658	Made-up articles, wholly or chiefly of textile materials, nes	15.4	7.3	−8.1	19.4	538,262,013	0.4	LTI
773	Equipment for distribution of electricity	64.3	56.4	−7.8	8.0	4,208,873,662	3.9	MT3
591	Pesticides, disinfectants	14.7	6.9	−7.8	7.1	−80,021,336	0.0	MT2
266	Synthetic fibers suitable for spinning	15.2	7.8	−7.4	14.6	−81,132,013	0.0	MT2

The authors' elaboration based on official data from (United Nations Statistics Division, 2007).

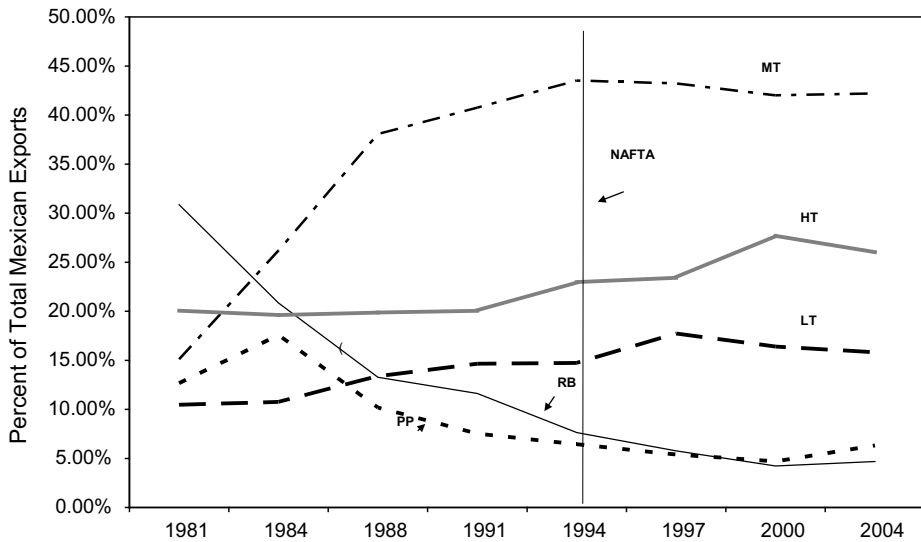


Figure 1. *Technology level of Mexico's non-oil exports. The authors' elaboration based on official data from (United Nations Statistics Division, 2007).*

Table 9. *DRCP by technology level: Mexico vs. China*

	Mexico		China	
	1991–97	1997–2005	1991–97	1997–05
PP	1.1	–1.2	–0.2	–0.1
RB	0.9	0.7	1.3	2.8
LT	4.2	–0.9	8.6	14.4
MT	5.5	0.7	2.2	6.0
HT	3.3	1.7	4.2	17.9

The authors' elaboration based on official data from (United Nations Statistics Division, 2007).

change between two values (in this case, 1997 and 2005) of the “Share of US imports” figure for Mexico and China.

Column 5, “Trade Balance” is the value of Mexican exports to the United States minus Mexican imports from the United States in any given category for 2005 (the data are presented in 2000 dollars). The data are reported by Mexico. Positive numbers represent trade surpluses and negative numbers deficits, from the Mexican perspective. Column 6, “Share of Exports” is the percentage that Mexican exports in any given category in 2005 represent of total Mexican exports (to the world) in 2005. The data are reported by Mexico. The final column is the technology level of the sector.

As Table 6 shows, in all but two (iron and steel and electrical circuitry) Mexico is a direct or partial threat to China. These products rep-

resent 9% of Mexico's total exports. All of them have gained more than six percentage points of access into the United States, and some sectors like cereals, live animals, old clothing, zinc, and motor vehicles have gained more than 14.5 percentage points. Of the top 15, eight are in primary product or resource-based sectors, seven are in manufacturing. And again, China is gaining share in all but two but at a slower pace.

These 15 very dynamic amount to less than 10% of all of Mexico's exports to the United States. Only two sectors, lorries and electrical circuits, are among the top 15 Mexican exports analyzed earlier. Take those away from Table 7 and these dynamic sectors comprise 2.5% of Mexico's exports to the United States. This in itself may not be problematic. After all, it may just reflect the fact that once you reach a certain share of the US import market it is not possible to keep expanding it at an accelerated rate.

Table 8 exhibits the 15 sectors where Mexico registers the largest reductions in its share of total imports in the US market (with calculations analogous to those in Table 6). Television receivers have lost more market share than any Mexican export sector except for cotton, which has been declining since the early 1980s. In 14 of these 15 sectors Mexico would be classified as under direct threat from China (i.e., Mexico share declined and China's increased).

In the remaining sector, both Mexico and China shrank their share in the US market: Cotton.

(c) *Competitiveness and technological development*

Developing countries hope that export openness and increased trade will result in climbing the technological ladder, diversifying from primary and resource-based production toward higher technology exports. Indeed, a recent economic study by Imbs and Wacziarg showed that as countries that develop, sectoral production and employment move from relatively high concentrations to diversity. They find that nations do not stabilize their diversity until they reach a mean income of over \$15,000 (Imbs & Wacziarg, 2003).

Using the technological scale developed by Lall (see Table 3), Figure 1 shows that since 1981 Mexico's export profile has indeed diversified away from primary (PP) and resource-based (RB) products. In 1981, 42% of Mexico's non-oil exports were PP and RB, by 2004 the two combined were less than 8%. The biggest growth has been in Medium Technology (MT) goods such as automobiles. In 1981 only 15% of Mexican exports fell in this category, but by 2004 MT exports were 42% of the total.

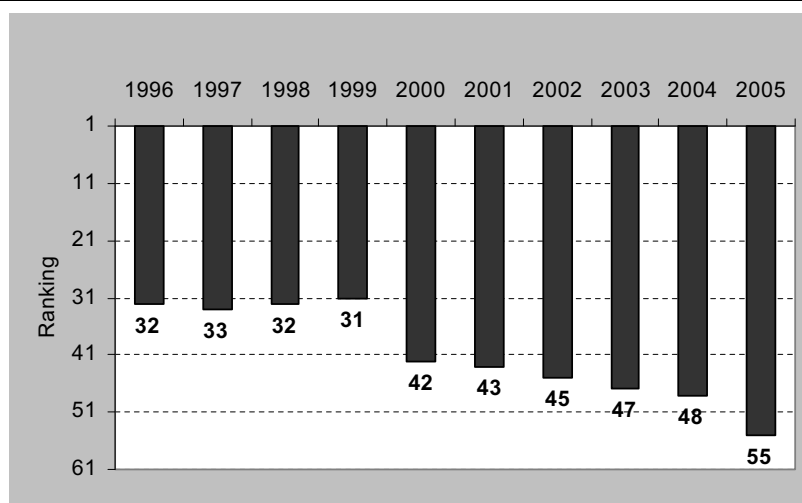
Interestingly however, the majority of diversification occurred before the NAFTA. Right of the vertical line indicates the post-NAFTA period. MT and LT shares more or less stagnated,

HT rose by almost five percentage points during 1994–2000, but lost two percentage points by 2004. Table 9 shows that in all three levels of technology sectors, Mexico is under partial or direct threat from China. Most alarming is the direct threat to HT exports. From 1997 to 2005 Mexico's increased by 1.7 percentage points where China's increased by 17.9.

5. SUMMARY AND CONCLUSION

Mexico's fears about China's competition have some justification. Indeed, our analysis of international competitiveness shows that over half of Mexico's non-oil exports are under partial or direct threat from their Chinese counterparts. This "threat" comprises all but a handful of Mexico's top 15 exports. What is more, recent changes indicate that Mexico's loss of export competitiveness to China may also be threatening the technological sophistication of its exports. Since 1994 Mexico is gaining ground on China only in primary products, and experiencing (on average) partial or direct pressure in resource and technology-based export penetration of US markets. Thus Mexico is losing out in sectors abundant in unskilled labor where value-to-transport costs are cheap, but holding steady in assembly sectors where transport costs are more significant, and NAFTA's rules of origin serve as local content rules mandating that production stay in North America, such as lorries and autos.

Table 10. *Mexico's relative competitiveness position*



Source: (World Economic Forum, 2004).

As Table 10 shows, in the last 10 years the Mexican economy has been systematically suffering a deterioration in its overall competitiveness position. From being around the 30th place in the late 1990s, it currently stands further down in 55th place. There are a number of factors that contribute to explain such decline. Analyzing each of them is beyond the scope of the present paper, but we find it most useful to provide a snapshot of those factors currently debated in policy circles.

First is the relatively lackluster performance of investment in Mexico over the last two decades. Although the macroeconomic reforms launched in the mid 1980s were aimed at positioning the private sector as the pivotal engine of growth of the Mexican economy, investment has not responded in a dynamic manner. In fact, since that earlier period gross fixed capital formation has never reached more than 22% of GDP. This is below the 25% benchmark identified by UNCTAD as the minimum investment ratio required to sustain the long-term annual rate of economic expansion of 5% that Mexico needs to absorb its increasing labor force. In contrast, China's gross fixed capital formation as a percent of GDP has been over 40% over the same period. This laggard response of investment is partly explained by the fact that the reforms were implemented when the Mexican economy was in deep stagnation, with virtually no access to foreign finance. Later in the mid 1990s, when foreign funds became available, they tended to benefit large, private conglomerates or the few big enterprises remaining within the public sector (Máttar, Moreno-Brid and Peres, 2003).

Domestic credit for productive activities or investment has also been scarce. Private banks have instead preferred to buy government securities or to lend for consumption or housing.⁵ This financial constraint for small and medium firms has become even more binding given that, as part of the shift in macroeconomic strategy, development banks were sized down and their capacities to award loans at preferential or subsidized rates drastically curtailed.

In addition, in Mexico there has been a relation of complementarity among public and private investment and not necessarily of competition. In fact, the decline of public investment brought about an acute deterioration in Mexico's infrastructure—quantity and quality wise—that tended to adversely affect the profitability of many private projects and thus to cut down overall investment below its

potential.⁶ In addition and with some major exceptions—*inter alia*, the auto industry and the maquiladoras—foreign direct investment in Mexico has tended, in general, to flow to the service sector than in its manufacturing one. With a lack of investment in manufactures it is difficult to expect that the dynamism of its exports will indefinitely continue (Gallagher & Zarsky, 2007; Máttar *et al.*, 2003).

The failure of capital formation to grow at a fast pace—after the years of decline during the debt crisis—has deterred the expansion and modernization of Mexico's productive capacity and simultaneously hindered its competitiveness. Using UNIDO's index of structural variation, it has been shown that between the late 1980s and 2003–04, the change in the composition of Mexico's exports of manufactured goods was equivalent to less than 35% of their total volume. If *maquiladoras* are excluded, the proportion is approximately eight points lower. However, applying the same methodology to the composition of *value added* in manufacturing gives an index of less than 15% (UNIDO, 1997). This difference indicates a much more limited change in manufacturing industries output than in its exports. In other words, there is scant evidence of a significant modernization of Mexico's manufacturing industry.

Another element that has tended to undermine Mexico's international competitiveness—relative to China's—is the evolution of the real exchange rates of the Mexican peso and of the Chinese currency against the US dollar. In the nearly two decades that have elapsed from the mid 1980s—when Mexico began its drastic trade liberalization process—up until 2006 the exchange rate of the peso *vis a vis* the US dollar (calculated in terms of their relative consumer price indices) has appreciated 21% in real terms. In stark contrast, the Chinese currency has depreciated. Comparative data shown in Figure 2 indicates that, due to the drastic devaluation of the Mexican peso in 1995, the average level of the real exchange rate of the peso against the US dollar was in 2004 similar to its level back in the early 1990s. Such evolution combined with the systematic depreciation of the Chinese currency has *a fortiori*, implied a loss of price competitiveness of Mexican goods in the US market *vis a vis* Chinese imports.

A different but closely related aspect is the deterioration of the relative prices of tradable goods in comparison to those of non-tradable ones. As Figure 3 shows, there has been a rather systematic increase in the relative prices

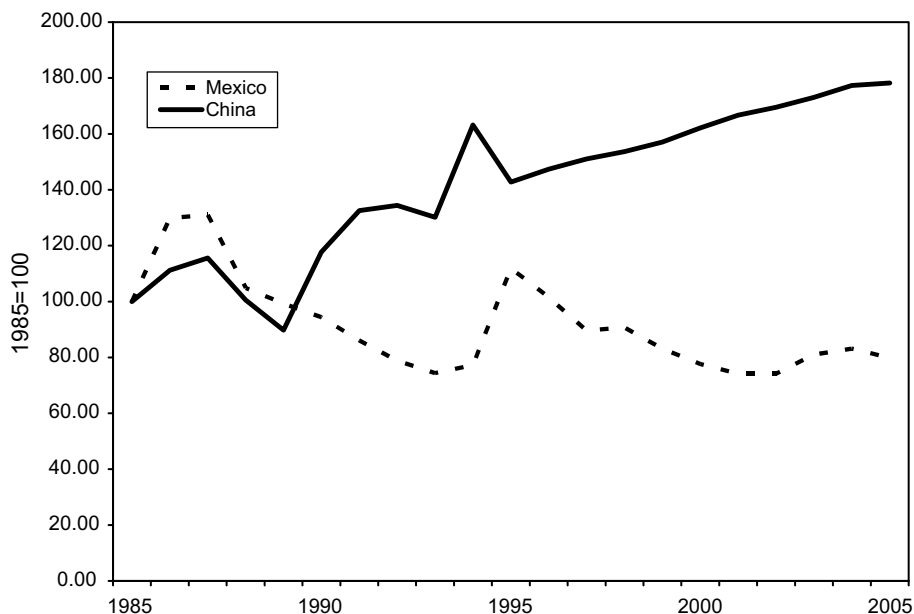


Figure 2. Mexican and Chinese currencies vs. the US dollar. Source: *Economic Research Service* (2007).

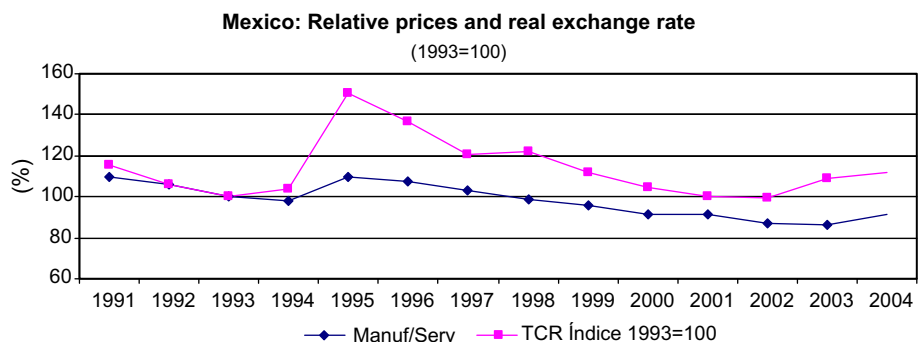


Figure 3. Mexico: Relative prices and real exchange rate (1993 = 100). Note: *Pnt* = Implicit prices deflator of services, *Pt* = Implicit prices deflator of manufactures. Source: Authors' elaboration based on data from INEGI and Banco de México.

of services (non-tradables) *vis a vis* manufactures. This change in relative prices shifts investment toward the production of non-tradables, and away from the tradable sector. And thus, it makes it more difficult to modernize and to expand the production capacity of manufactures; indispensable elements to strengthen their international competitiveness.

The laggard performance of total investment has had its toll on the evolution of productivity and unit labor costs. Different estimates indicate that total factor productivity in Mexico

has not grown to any significant degree after the macroeconomic reforms. In contrast, China's has increased at a fast pace (Mesquita Moreira, 2007). Average real wages, in turn, are certainly higher in Mexico than in China. Such difference tends to more than compensate the differences in their average levels of productivity (that still favor Mexico). Low wages are no longer a comparative advantage of the Mexican economy and, with scant investment, competing in high/tech or more value-added industries is unlikely.

Lastly, but nevertheless important, is the shift in the orientation of industrial policies in Mexico, away from development programs targeted to promote selected sectors. Up until 1984, Mexico's industrial policy was geared to intervene strongly in specific sectors. Since then, policy in Mexico has been to let markets determine the profile of Mexican manufacturing and exports. As Mesquita Moreira puts it:

"Whether or not these [Chinese] interventionist policies are behind China's takeoff or whether or not they guarantee or compromise China's long-term growth is already the stuff of a prolific policy debate, which, as it happened to other East Asian tigers, is bound to be inconclusive, not least because econo-

mists have yet to find a satisfactory way of dealing with the counterfactual. Yet, from LAC manufacturer's point of view, the omnipresence and generosity of the Chinese state has a very practical and immediate implication, that is to heavily tilt the playing field in favor of their Chinese competitors, either local or foreign affiliates, in a scenario where they already face endowment, productivity and scale disadvantages" (Mesquita Moreira, 2007).

This paper has shown that Mexico faces formidable challenges to its "secure" access to the US economy via NAFTA and geographical proximity. As long as the policy challenges identified above are not further investigated and overcome, the fears of Mexicans about China's competition may only increase.

NOTES

1. When comparing the export structures of Latin American countries and China the authors conclude that "For all products, Chinese exports overlap significantly only with Mexico and Costa Rica, and even here the correlation is relatively low (at only 0.47 and 0.27, respectively)." On the other hand, Devlin *et al.* (2006) analyze the "similarity of export baskets" between different Latin American countries and China, concluding that more than a fifth of the structure of Mexico's export basket approximated China's in 2001.

2. These detailed data were not included in the published version but in a previous Asian Development Bank Institute Research Paper with the same title (Lall & Weiss, 2004).

3. CIF ("Cost, Insurance, Freight") values represent the value of the merchandise at the importing country port, that is, including the costs associated with the

transportation of the merchandise (insurance, freight, etc.).

4. The conversion was done using the deflators provided by Robert C. Sahr at the Political Science Department of Oregon State University (Sahr, 2007), which are constructed based on the Consumer Price Index (CPI) reported by the Bureau of Labor Statistics, US Department of Labor.

5. In the last 15 years, the flow of private banks' credit to production purposes has shrunk more than 15 points as a proportion of GDP, and by 2005 this ratio was one of the lowest in Latin America.

6. In the late 1990, Mexico was, among the large economies in Latin America, the one with the lowest investment in infrastructure as a proportion of GDP (Calderón & Servén, 2004).

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