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Determinants of Mexico's Comparative Advantages and of the Performance of its Manufacturing Exports during 1996-2005*

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Abstract

We analyze if the pattern of comparative advantages and the recent behavior of Mexican manufacturing exports, vis-à-vis its closest competitors, are related with productivity differentials or with differences in factor endowments. The relative abundance of relatively unskilled labor in Mexico locates this country in markets where other large countries with similar factor endowments, such as China, have entered rapidly. In comparison with China and other similar competitors, the most important determinant of Mexico's comparative advantages and export performance seems to be productivity differentials. When Mexico is compared against other relevant competitors that have been able to rise faster in the value chain, Mexican export performance also seems to reflect its relatively small endowment of human capital.

Keywords: Revealed Comparative Advantage, NAFTA, Export Performance, Productivity, Heckscher-Ohlin, Ricardian Theory of Trade.

JEL Classification: F14, F15, O14

Resumen

Se analiza si el patrón de ventajas comparativas y el desempeño reciente de las exportaciones manufactureras mexicanas, relativos a sus principales competidores, están asociados con diferenciales de productividad o con diferencias en las dotaciones de factores. La abundancia de mano de obra de niveles de calificación relativamente bajos ubica a México en mercados donde otros países con una dotación de factores similar, como China, han incursionado aceleradamente. En comparación con China y otros competidores similares, el determinante del desempeño exportador de México parecería ser el diferencial de productividades. En comparación con algunos competidores que han logrado escalar más en la cadena de valor, el desempeño relativo de México parecería también reflejar su relativamente reducida dotación de capital humano.

Palabras Clave: Ventaja Comparativa Revelada, TLCAN, Desempeño Exportador, Productividad, Heckscher-Ohlin, Teoría Ricardiana de Comercio.

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1. Introduction

The growth and the composition of Mexican manufacturing exports have been seemingly affected in a significant way since 2002 by the increased presence in the markets of China and other countries with similar factor endowments as Mexico. These events highlight the relevance of carrying out a research agenda that studies the determinants of Mexico's comparative advantages and how such determinants have influenced this country's recent export performance.

The first stage of this research agenda (Chiquiar, Fragoso and Ramos Francia, 2007) identified the pattern of Mexico's comparative advantages and documented the changes that this pattern could have undergone since other competitors specializing in similar products as Mexico started to increase their presence in the markets for manufacturing goods. That paper showed that Revealed Comparative Advantage (RCA) indexes are relevant indicators to explain the relative performance of Mexican manufacturing exports. That paper also provided evidence that the growing presence of countries with similar endowments as Mexico has caused this country to lose comparative advantage in some products in which it had previously specialized in. This, in turn, seems to have led Mexico's manufacturing exports to lose share in the U.S. market after 2001.

The previous results raise the following question: to what extent does Mexico's loss of competitiveness in manufacturing product markets reflects a problem of productivity? This paper looks for evidence that could be useful to solve this question.[1] In particular, it analyzes to what extent Mexico's patterns of comparative advantage and the recent performance of its manufacturing exports are related with productivity differentials or with differences in factor endowments, with respect to its main competitors.[2] This is carried out in two stages:

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[1] When the Chiquiar, Fragoso and Ramos Francia (2007) paper was written, the database used to identify the different countries' comparative advantages (United Nations COMTRADE database) only included information up to 2005. Although data for 2006 is now available, most of the analysis contained in the present article was fundamentally based on the estimates in the previously cited paper and was carried out before the 2006 data was published. Another reason why the analysis in the present paper is only carried out until 2005 is that Mexico's non-oil exports have increasingly diversified since 2005 in terms of their destination (see Banco de México, 2007). Indeed, the share of non-oil exports directed to non-U.S. markets rose from 11.4% in 2004 to 17.4% in 2007. Such diversification appears to respond to the fact that the Mexican peso is linked to the U.S. dollar, in a context in which the latter has tended to depreciate significantly against other currencies. The aforementioned event, along with the slight recovery of Mexican manufacturing exports' share of the U.S. market during 2006-2007, are topics currently being researched by Banco de Mexico's research division.

[2] It is worth pointing out that productivity and comparative advantage measurements can be influenced by diverse factors which characterize an economy, such as the distance from important markets or weather, and not only by technological advantages and factor endowments such as physical capital and skilled labor.

i) First, the paper analyzes whether the pattern of comparative advantages and the relative performance of Mexican manufacturing exports are significantly correlated with productivity differentials with respect to Mexico's closest competitors; and,

ii) Second, regression analysis is used to compare the role of productivity differentials and of differences in factor endowments, as possible determinants of comparative advantage patterns and of the performance of manufacturing exports of Mexico and its main competitors. This is made to identify both the determinants of Mexico and its competitors' comparative advantages, as compared to those of a large developed country (the United States), and the factors that could determine the differences in specialization patterns within the group of countries including Mexico and its closest competitors.

As expected, when compared to those of the U.S., the comparative advantage patterns of Mexico, China and several other similar competitors appear to be associated with their higher relative endowments of unskilled labor. The evidence also suggests that other countries that compete with Mexico but that have risen faster in the value chain and have achieved a greater accumulation of physical and human capital, such as South Korea, Taiwan and Hong Kong, exhibit comparative advantages in physical capital intensive goods and, as the U.S., in human capital intensive goods. In other words, a comparison of Mexico and its competitors' comparative advantage patterns with a developed country, such as the U.S., tends to give results that support the Heckscher-Ohlin model.

On the other hand, if the analysis is restricted to a comparison of specialization patterns within the group of countries including Mexico and its main competitors, the results tend to be more congruent with a Ricardian view, although differences in the endowments of human capital still appear as relevant determinants of trade patterns. In particular, the analysis leads to two important findings:

i) When Mexico is compared to China and to other competitors with similar factor endowments, the evidence suggests that differences in patterns of comparative advantage and in export performance reflect fundamentally productivity differentials at a sectoral level. Indeed, Mexico tends to exhibit a larger revealed comparative advantage and a relatively better export performance in product categories where its productivity differential with respect to the other countries is largest. It is important to mention, however, that the results also suggest that Mexico has also tended to specialize in goods with relatively higher human capital content than the group of competitors which, as a whole, has not achieved the same levels of productivity in the manufacturing industry (Indonesia, Thailand, the Philippines, Malaysia, Turkey, Hungary, Poland and Portugal).

ii) Productivity differentials also seem to be relevant determinants of Mexico's export performance when it is compared to the group of competitors which have risen faster in the value chain and, as a result, have achieved a greater level of development (South Korea, Hong Kong and Taiwan). In this case, the relative abundance of human capital of those countries is also a relevant variable explaining their differences in comparative advantages and export performance with Mexico. Indeed, once the effects associated with productivity differentials are controlled for, Mexico tends to exhibit a relatively less favorable export performance than such countries in sectors which make more intensive use of skilled labor. This suggests that, compared to these countries, Mexico's export performance partly reflects its relatively smaller abundance of human capital. It is important to recall that, during the last few decades, these competitors have risen faster in the value chain partly in response to the more accelerated growth of their population's education levels.

Thus, although the Heckscher-Ohlin model tends to explain the greater specialization of Mexico, China and similar countries in unskilled labor intensive goods, when the comparative advantage and the performance of Mexico's manufacturing exports are compared with its close competitors, the differences are mainly driven by Ricardian productivity differentials. As mentioned previously, relative differences in the abundance of skilled labor retain explanatory power even when the analysis focuses on this group of relatively homogeneous countries.

In this context, the results tend to be consistent with the current view in the empirical literature, which suggests that the Heckscher-Ohlin model tends to have greater explanatory power when specialization patterns of countries with very different factor endowments are analyzed, while the Ricardian model tends to become more relevant when comparing specialization patterns of countries with similar factor endowments (see Harrigan, 1997; Debaere, 2003; and Lai and Chun Zhu, 2007).

The paper is divided as follows: Section 2 describes the data sources and the methodology used to measure productivity in the different manufacturing divisions and in each of the countries included in the analysis. Section 3 illustrates the relationship of the countries' patterns of comparative advantage and export performance with their productivity differentials. Section 4 summarizes the results of a regression analysis that intends to identify the relevance of productivity differentials and of differences in factor proportions as possible determinants of comparative advantage and of the performance of Mexican manufacturing exports. Finally, Section 5 summarizes the paper's main findings.

2. Productivity estimates

In order to carry out the analysis of this paper, it is necessary to first estimate the productivity levels of Mexico and of its competitors in each different manufacturing category.[3] To achieve this, each country's labor productivity (LP) and total factor productivity (TFP) is estimated for 40 comprehensive manufacturing product groups.[4]

The data sources, the calculation methodology and the most important results obtained from this estimation exercise are described below. It is important to mention that the information used for the estimation of productivity is taken from diverse sources which differ in terms of their quality, aggregation level, measurement methodologies and time periods of observation. Furthermore, as is well known, TFP estimates require data which, on many occasions, is not available and must therefore be approximated through the use of indirect methods.[5] As a result, in order to carry out the estimation it was necessary to make certain assumptions and use different filters which are detailed below. It is important to mention that some of these assumptions affect TFP estimates, but not LP calculations.

For the reasons stated above, it is important to interpret this section's results as illustrative and not as precise estimates, especially in the case of TFP which, as already

[3] The basket of competitors used in this study includes China, Taiwan, Hong Kong, South Korea, Indonesia, Thailand, the Philippines, Malaysia, Turkey, Hungary, Poland and Portugal. The criteria under which this group of countries was selected is detailed in Chiquiar, Fragoso and Ramos Francia (2007).

[4] As will be shown below, this is the maximum level of disaggregation which could be defined for manufactured goods in order for the information from different sources to be comparable.

[5] For example, series for the stock of physical capital are not generally available and, therefore, they have to be calculated from investment data.

mentioned, depends upon a larger number of assumptions. In spite of this, and as will be shown later in the paper, the results do appear to correspond with prior expectations regarding the relationship which might exist between the countries' productivity and export performance. Likewise, in terms of their orders of magnitude, the results tend to be similar to those reported in other studies (Bosworth and Collins, 2003; Loayza, Fajnzylber and Calderón, 2004).

2.1. Information sources

The data used for the productivity level estimations comes from the following sources:[6]

a) For Mexico, data was taken from INEGI's (Mexico's National Statistics Bureau) Annual Industrial Survey (*Encuesta Industrial Anual*, EIA) for 1994-2002.

b) Data for Taiwan, Hungary, Poland and Portugal is from the "*Groningen Growth and Development Centre 60-Industry Database* (GGDC 60)".

c) Honk Kong's data is provided by its *Census and Statistics Department* http://www.censtatd.gov.hk/hong_kong_statistics/index.jsp

d) Information for China is taken from Szirmai, Ren and Bai (2005), who collected and homogenized data included in different documents from the *National Bureau of Statistics of the People's Republic of China* at a disaggregation level of 21 manufacturing industries from 1980 to 2002.

e) Information for the remaining countries included in the basket of Mexico's competitors (South Korea, Indonesia, Thailand, the Philippines, Malaysia and Turkey) was taken from the United Nations Industrial Development Organization (UNIDO) database INDSTAT4 2005 ISIC Rev.3. It is

[6] The sample period for each country varied according to the availability of information at the time of the analysis. Most countries had information available only up to 2002. This was therefore taken as the last available year for calculating productivity levels. The unit of measurement for all the figures was homogenized to U.S. dollars at 1995 prices. The exchange rates used in cases where information was not originally expressed in U.S. dollars were obtained from each country's central bank's web pages. The study used the 27 U.S. sector deflator series published by Groningen Growth and Development Centre (2005) to compute the output of different activities in real terms, as well as series of U.S. investment goods deflators from the U.S. Census Bureau (2005). The only exception to this was Mexico, where INEGI's own deflators were used for the 205 manufacturing divisions.

important to mention that this database uses information provided by each country's statistics authorities and, thereby, tends to be heterogeneous in terms of aggregation levels, detail, measurement methods and coverage periods.

As previously mentioned, the heterogeneity of the data sources used made it necessary to apply certain assumptions and use diverse filters so data from the different countries was as comparable as possible. Three particularly difficult aspects which were solved through the application of specific assumptions are: i) each country's data tends to be available with different disaggregation levels and, in some cases, the manufacturing categories defined for each country are not strictly comparable with those of other countries; ii) data available for various countries does not always correspond to the same time period; and, iii) the data does not usually cover long enough time periods in order to avoid that different events which temporarily influence production, employment and capital use (such as recessions) affect productivity estimates.

i) In order to illustrate the first point, we may note that, while Mexico's INEGI data is defined for 205 types of economic activity and data taken from the INDSTAT4 database is classified into 151 activities for this same country, available data for China reached a maximum disaggregation of only 21 industries. Similarly, information for Taiwan, Hungary, Poland and Portugal is disaggregated to 27 industries and that for Hong Kong to only 26 industries. The fact that information available for some countries is at a less disaggregated level than the rest made it necessary to assume that the productivity of each component of a determined aggregate behaves similarly to the total. In other words, the evolution of unreported subsector productivities was assumed to be equal to the sector it belongs to and for which information was available. Furthermore, as mentioned previously, given the differences between the manufacturing classifications used in the different countries analyzed, it was necessary to redefine a classification of 40 manufacturing categories in order to guarantee information comparability. Thus, for the reasons above the disaggregation level used in the study was significantly reduced.

ii) The fact that the information for different countries does not always correspond to the same time period became relevant especially when productivity levels for diverse country baskets were computed.[7] In such cases it was necessary to "complete" the series of countries in the basket with more limited information, using the assumption that each country's productivity grows at similar rates in reported and in unreported years.

iii) As for the third point, we may note that the period of analysis includes the 1995 recession in Mexico, as well as the crises in several Asian countries at the end of the nineties. Such events can bias the productivity estimates, especially when data on only a small period of time is used for the calculations. Indeed, the information available for most countries generally covered less than a decade. It was therefore necessary to smooth the productivity estimates with the use of moving averages. Furthermore, in several cases the time period used to make the estimations was restricted to drop data affected by recessions at the start or end of the sample period. For example, in Mexico's case, although information was available from 1994 on, the study used data from 1997 on in order to avoid biases from the use of data affected by the 1995 crisis.

2.2. Labor Productivity

The estimation of labor productivity (LP), defined as the ratio of value added generated in an industry to the number of employees occupied in such activity, does not present any particular problems and does not require any special assumptions. The LP of country *i* in industry *j* during year *t* is calculated as:

$$LP_{ijt} = Y_{ijt} / L_{ijt} \qquad (1)$$

where *Y* is value added and *L* is the total number of employees. It is possible to calculate the average labor productivity of country *i* in industry *j* for a determined period of time going from $t = 1$ to *T* as:

$$LP_{ij} = \sum_{t=1}^{T} LP_{ijt} / T \qquad (2)$$

[7] The labor productivity of a basket of *N* countries in determined sector *i* is calculated as the weighted average of the corresponding countries' labor productivity, where weights are each country's labor's share of such sector within the total employment in that sector for all the countries included in the basket. The TPF of basket *N* in sector *i*, A_{iNt}, can be calculated as $\ln A_{iNt} = \ln LP_{iNt} - \beta_{iN}(\ln K_{iNt} - \ln L_{iNt})$, where LP_{iNt} is the basket's labor productivity in such sector, β_{iN} is the technical capital coefficient of such sector's production function in basket *N*, K_{iNt} is the basket's total capital and L_{iNt} its total employment.

2.3. Total Factor Productivity

Total Factor Productivity (TFP) estimation is a more complex process and, in particular, requires several assumptions in order to define the concept to be estimated and to side-step the limitations of the available information. To estimate this concept, we assume that value added can be represented by a Cobb-Douglas production function in terms of labor and capital, whose respective exponents α and β are allowed to differ in each country and industry, but not over time. On the other hand, the technology level coefficient of the production function can vary over time as a result of technological progress. Formally, we assume that for each country *i* and industry *j*, the production function at moment of time *t* is:

$$Y_{ijt} = A_{ijt} K_{ijt}^{\beta_{ij}} L_{ijt}^{\alpha_{ij}} \tag{3}$$

where *A* is TFP and *K* is the stock of capital goods. Given this specification, the TFP level for each country *i* and industry *j* in year *t* can be computed from the data as:

$$A_{ijt} = \frac{Y_{ijt}}{K_{ijt}^{\beta_{ij}} L_{ijt}^{\alpha_{ij}}} \tag{4}$$

It is clear that calculation of the expression above requires not only data on value added and employment, but we also need estimates of the production function coefficients α and β and series for capital stocks.

Concerning the production function coefficients, it is well known that, under perfect competition and constant returns to scale, it is possible to link α and β with the labor and capital shares in value added, respectively. In such context, it is possible to use the available information concerning labor payments to estimate α_{ij} for each country *i* and industry *j* as:

$$\alpha_{ij} = \frac{1}{T} \sum_{t=1}^{T} \alpha_{ijt} \tag{5}$$

where $\alpha_{ijt} = Total\, labor\, payments_{ijt} / Y_{ijt}$.

One important problem we faced when estimating the labor coefficient in equation (5) is that the information sources we used generally implied very small values for this parameter, as compared to the values commonly assumed in the literature and that have been estimated with alternative data sources. For example, taking the U.S. as a reference, and using UNIDO data for the total manufacturing sector, the estimate for the wage share in total value added reaches a value 0.31. Such figure is around half of the values calculated by Bernanke and Gürkaynak (2001) or by Gollin (2001). Similarly, UNIDO figures for total manufacturing suggest that, in Mexico, the share of labor in value added is 0.26, while figures taken from the EIA suggest a value of 0.67 instead. Similar underestimations are observed for several other countries for which sufficient information is available to make this type of comparisons.

Despite the apparent underestimation of this parameter in the information sources used for this paper, such sources do have the advantage of allowing labor share estimates to be computed separately for each manufacturing sector in each country. In particular, the UNIDO database is useful to rank the different sectors within each country according to this parameter's levels, and provides information concerning differences of the values of this parameter for different countries.[8]

In light of the above, an attempt was made to transform the data from the sources used in this paper in order to increase the estimates for labor's share in value added to values more in line with those obtained in other studies, but maintaining the cross-sectoral variation of labor shares observed in the original sources. This exercise was carried out as follows:[9]

1. Based on the EIA, Mexico's labor share for the total manufacturing sector was estimated to be $\hat{\alpha}_{100}^{Mex} = 0.67$. As mentioned above, this compares with the value $\alpha_{100}^{Mex} = 0.26$ that would be obtained from the UNIDO database.

2. The value $\hat{\alpha}_{100}^{HK} = 0.72$ was chosen for Hong Kong's total manufacturing sector. Hong Kong is the country where wages have the highest share in manufacturing

[8] The Spearman rank correlation coefficient between the estimated values for each country with UNIDO data and data shown in Bernanke and Gürkaynak (2001) is 0.69, while Spearman's correlation between values estimated for each sector in Mexico using UNIDO and EIA data is 0.41. These correlation coefficients are significant to 5% and 1%, respectively.

[9] In this description parameters without a *hat* are values from the original sources, while those with a *hat* are the values obtained after the transformation has been applied. Within this analysis, the sub index 100 is assigned to total manufacturing.

value added according to the UNIDO database and the sample of countries considered in this paper ($\alpha_{100}^{HK} = 0.56$).[10]

3. Employing these two figures as starting values, the remaining values for α were computed according to the following equation:

$$\hat{\alpha}_{100}^{i} = \hat{\alpha}_{100}^{Mex} + \left[\frac{\alpha_{100}^{i} - \alpha_{100}^{Mex}}{factor} \right] \quad (6)$$

where: $factor = \dfrac{\alpha_{100}^{HK} - \alpha_{100}^{Mex}}{\hat{\alpha}_{100}^{HK} - \hat{\alpha}_{100}^{Mex}}$.

4. Once a transformed value for the labor share of each country's total manufacturing has been obtained, the within-country values of the labor share for each industry from the original sources were used to compute transformed values for the labor share in each sector. We assumed that the sector with the greatest labor share in each country according to the original data would be given a transformed value of $\hat{\alpha}_{x_{MAX}}^{i} = 0.85$.

5. The transformed value for the sector where the labor share is lowest, according to original sources, was estimated with the following formula:

$$\hat{\alpha}_{\min}^{i} = \frac{40\hat{\alpha}_{100}^{i} - (position_{100} - 1)0.85}{41 - position_{100}} \quad (7)$$

where $position_{100}$ equals the position occupied by α_{100}^{i} in the ordering of the 40 original sectors plus the manufacturing aggregate. For instance, if α_{100}^{i} is the median value, $position_{100} = 21$, in which case $\hat{\alpha}_{\min}^{i}$ would be at the same distance from $\hat{\alpha}_{100}^{i}$, as the latter of 0.85; i.e. $\hat{\alpha}_{100}^{i} - \hat{\alpha}_{\min}^{i} = 0.85 - \hat{\alpha}_{100}^{i}$. Once the

[10] Although the value chosen for $\hat{\alpha}_{100}^{HK}$ could be considered arbitrary, it is important to mention that the results did not vary significantly with changes in this assumption or with changes in the assumption for the parameter $\hat{\alpha}_{x_{MAX}}^{i}$ defined below. It is also important to mention that the assumptions described in this section only affect the estimation of TFP and do not affect the calculations of LP.

minimum transformed value is established, the transformed values for the remaining 38 sectors are estimated according to:

$$\hat{\alpha}_j^i = \hat{\alpha}_{\min}^i + (position_j - 1)\left[\frac{0.85 - \hat{\alpha}_{\min}^i}{40}\right] \tag{8}$$

where $position_j$ is the position occupied by α_j^i in the ordering of the 40 original sectors plus the manufacturing aggregate. Thus, $position_j$ takes the values 1, $position_{100}$ and 41, for $\alpha_{\min}^i$, α_{100}^i y $\alpha_{\max}^i$, respectively.

6. Once the transformed values for the labor share in each country and sector are obtained, using the constant returns to scale assumption we compute $\hat{\beta}_{ij} = 1 - \hat{\alpha}_{ij}$.

Series for capital stocks were unavailable at the disaggregated level required by this analysis. It was therefore necessary to estimate them using information on investment flows by country, sector and year. In the case of Mexico, the capital series prepared by Salgado and Bernal (2007) were used. These authors calculated each industry's capital stock for each year using an initial value of the capital stock reported in the 1993 Industrial Census (Censo Industrial) and investment series reported in the EIA for subsequent years. For the remaining countries, a perpetual inventory method was applied (see OECD, 2001). Given that the time period of available investment data was in many cases very short, $K_{ij0} = \bar{I}_{ij} / \delta$ was used as the initial capital value, where $\bar{I}_{ij} = \sum_{t=0}^{T} I_{ijt} / T$ is the average investment flow in industry j of country i and the rate of depreciation δ was assumed to be $\delta = 0.08$, as suggested in Fraumeni (1997). From this initial value, the complete capital stock series were generated for $t = 1, \ldots, T$ as:

$$K_{ijt} = K_{ijt-1}(1-\delta) + I_{ijt} \tag{9}$$

It is important to mention that investment data for China, Hungary and Taiwan were not available and, therefore, it was not possible to calculate capital stocks with the previous method. Wage data for China and Taiwan was also unavailable, so that their respective labor shares could not be calculated either. In order to include such countries in the analysis, some additional assumptions were made. Although these assumptions attempt to reflect such countries' levels of development, we have to accept that they are arbitrary and could affect TFP estimates. However, we found that variations in these assumptions did not have relevant effects on the results. In particular, the assumptions made are as follows:

a) To compute capital stock levels, we used the average ratio of capital to labor by sector in the remaining countries $i = 1, \ldots, I$:

$$c_{jt} = \frac{1}{I}\sum_{i=1}^{I}\left(K_{ijt}/L_{ijt}\right) \tag{10}$$

Based on (10), we assume that Taiwan exhibits a capital to labor ratio that is equal to the average of the other countries, that is $c_{jt}^{Tw} = c_{jt}$. We further assume that both China and Hungary have a below-average value for this ratio, so that we subtract half the distance between each sector's average and minimum from such ratio; i.e.:

$$c_{jt}^{Ch} = c_{jt}^{Hu} = c_{jt} - \frac{c_{jt} - \min_i\left(K_{ijt}/L_{ijt}\right)}{2} \tag{11}$$

Finally, in order to obtain the estimated capital series for these countries, we multiply the capital to labor ratio assumed above to each country and sector's employment data: $K_{ijt} = c_{jt}^{i}L_{ijt}$.

b) Estimates for the labor share of each sector in these countries were obtained in a similar way. In particular, we assumed China has a labor share that equals the average of such shares per sector for the countries for which that information was available, and that Taiwan's share is higher than such average. For the latter country, half the distance between the maximum value and the average value of labor's share per sector was added to such average.

2.4. Results

We now present a summary of the results of the estimation of manufacturing productivity levels and growth rates in each country included in the analysis.[11] Figure 1 compares Mexico's LP and TFP levels with those of the basket of its competitors and with U.S., Japan and Singapore. Similarly, Figure 2 illustrates the estimated LP and TFP growth rates for Mexico and its main competitors.[12]

As mentioned previously, diverse data deficiencies could be causing biases in these estimates. However, the countries' ranking in terms of productivity levels does seem to correspond to prior expectations. As may be noted, Mexico exhibits lower productivity levels than developed countries such as Japan, the U.S. and Singapore, as well as several other countries in the basket of competitors which have risen faster in the value chain (South Korea, Taiwan and Hong Kong). On the other hand, Mexico seems to exhibit higher productivity levels than the rest of its competitors and, particularly, than those observed in China. It is important to note, however, that Mexico's TFP growth rates appear to be lower than those observed in most of the countries included in the basket of competitors and, in particular, in China.

We should emphasize that the results presented above correspond to the aggregate manufacturing industry and therefore do not allow identifying differences in the relative productivity with which each country produces different categories of manufactured goods. It is precisely the inter-sectoral variation in productivity differentials between Mexico and its competitors what will be used later to identify the links that productivity differentials among Mexico and its competitors could have with comparative advantage patterns and with the performance of exports to the U.S. market. In this context, Tables 1 and 2 illustrate a more disaggregated view of the levels and growth rates of LP and TFP, respectively. Columns (1) to (4) exhibit productivity levels in each of the 40 product categories defined for the study, normalized so that the

[11] It is worth noting that the ordering of countries according to manufacturing TFP does not necessarily coincide with the ordering that the countries would exhibit according to per capita GDP. The reason for this is that ordering countries in terms of manufacturing TFP does not consider the full factor endowments of each country or the degree of each country's specialization in manufacturing and non-manufacturing sectors. Given differences in the availability of information, productivity levels for each country were estimated with different periods: the U.S., 1997-2001; Japan, 1994-2001; Singapore, 1994-2002; Hong Kong, 1994-2002; South Korea, 1994-2002; Taiwan, 1994-2002; Mexico, 1997-2002; Portugal, 1994-2002; Turkey, 1993-2000; the Philippines, 1998-1999; Poland, 1994-2002; Thailand, 1998-2000; Malaysia, 2000-2001; Hungary, 1994-2002; Indonesia, 1998-2002; and China, 1994-2002.

[12] Figure 2 omits countries for which productivity level estimates were based only on 2 or 3 years of available data (the Philippines, Thailand and Malaysia). This reflects the fact that, although it is possible to infer such countries' productivity levels, so few years of information makes it difficult to correctly estimate productivity growth rates since, in this context, their calculations would be significantly affected by short-run cyclical factors. The growth rates of more developed countries which do not belong to the basket of competitors were not included in this figure either.

average level of each country is 100.[13] Columns (5) to (7) illustrate inter-sectoral differentials in Mexico's productivity levels, as compared to China, the basket of competitors without China and the basket including China. The categories are shown in decreasing order according to the differential of Mexico's productivity levels vis-á-vis China. Columns (8) to (11) include the average annual growth rates of the 40 manufacturing categories, while columns (12) to (14) illustrate Mexico's productivity growth rate differentials with respect to its competitors. The information summarized in these tables will be used later in the paper to assess the relevance of productivity differentials as determinants of Mexico's comparative advantages and recent export performance.

2.5. Recent evolution of manufacturing productivity

The remainder of the paper is based on productivity estimates starting in 1997. With this choice, we include the years when Mexico increased its trading integration with the U.S. after the North American Free Trade Agreement (NAFTA) came into effect, but we avoid the results from being affected by the effects of the 1995 crisis. Furthermore, the sample chosen allows making a comparison of the results for the period before China entered the World Trade Organization (WTO) with those for the years following such event.

In Chiquiar, Fragoso and Ramos Francia (2007), product categories covering around 90% of Mexican manufacturing exports were classified into three groups: i) product categories in which Mexico had apparently been losing comparative advantage in recent years; ii) products in which Mexico apparently does not have a comparative advantage; and, iii) products in which Mexico does not currently seem to be threatened by competition from the countries included in the basket of competitors. In this context, we present below a series of graphs illustrating the 1997-2002 evolution of Mexico's LP and TFP levels and growth rates with those of China and of the basket of competitors, for representative sectors in each of these three manufacturing categories.

[13] Due to the fact that this analysis required us to define new manufacturing classifications in order to be able to combine information from different sources, the manufacturing categories presented here can in some cases differ in both their content and denomination from the categories shown in Chiquiar, Fragoso and Ramos Francia (2007).

2.5.1. Categories in which Mexico has been losing comparative advantage

Figures 3 to 5 exhibit results for the three main categories of the first group of products identified in Chiquiar, Fragoso and Ramos Francia (2007). The group contains products in which, according to that study's results, Mexico has recently been losing comparative advantage with respect to China and the basket of competitors. Such group includes: i) Electrical machinery, apparatus and appliances (15.0% of manufacturing exports in 2005); ii) Telecommunication and sound recording and reproducing equipment (14.2%); iii) Office and automatic data processing machines (6.1%); iv) Furniture and its parts (3.0 %); and, v) Non-metallic mineral manufactures (1.3%).

As may be seen, in the first few years of the sample period, Mexico's TFP levels in these products tended to be higher than those of its competitors. However, this group of countries has tended to reach Mexico's productivity levels over time and, in the cases of telecommunications and sound recording and reproducing equipment and of office and automatic data processing machines, they have overtaken them. This mainly reflects the fact that the basket includes countries that have achieved greater technological advances in such products. It is worth mentioning that Mexico's productivity growth rates in these sectors tend to be significantly lower that those of its competitors and, especially, than China's growth rates. This could represent a threat to Mexico's competitiveness in this type of industries in the near future.

2.5.2. Categories in which Mexico apparently has no comparative advantage

The second group of categories contains sectors in which, according to the results in Chiquiar, Fragoso and Ramos Francia (2007), Mexico apparently has no comparative advantage with respect to China or the basket of competitors. This group includes: i) Articles of apparel and clothing accessories (4.1%); ii) Miscellaneous manufactured articles, such as toys and sporting goods (2.8%); iii) Manufactures of metals (2.8%); iv) Textile yarn, fabrics, made-up articles (1.3%); v) Prefabricated buildings, sanitary, plumbing, heating and lighting fixtures and fittings (0.9%); and, vi) Photographic apparatus, equipment and supplies and optical goods (0.4%).

Figures 6 to 8 suggest that Mexico's productivity levels tend to be systematically higher than those of its competitors in the first three categories of this second group of manufacturing activities. In proportional terms, however, these differentials are lower than those observed in 1997 for the first group of categories, where Mexico initially seems to have had a comparative advantage. In other words, productivity differentials between Mexico and its competitors tend to be higher in the first group than in the second group, even though they continue to be positive in the latter.[14] It is important to recall that, within a Ricardian framework, what is relevant to determine comparative advantage is the degree of industry-level differences in countries' relative productivity levels, and not absolute productivity levels.[15]

2.5.3. Categories in which Mexico does not appear to be threatened

Finally, Figures 9 to 11 illustrate the three main categories making up the group of sectors which in Chiquiar, Fragoso and Ramos Francia (2007) were considered as not being threatened by competition from China and other Asian countries. Such group includes: i) Road vehicles (19.3%); ii) Power generating machinery and equipment (4.8%); iii) General industrial machinery and equipment (4.6%); iv) Professional, scientific and controlling instruments and apparatus (4.6%); and, v) Beverages (1.6%).

As may be seen, Mexico has similar or higher productivity levels than Asian countries, and higher levels than China. Nonetheless, even in these sectors, China's productivity tends to grow at a faster pace than Mexico's. In such context, as confirmed in Chiquiar, Fragoso and Ramos Francia (2007), it is not possible to discard the possibility that the Mexican automotive industry could become vulnerable if China starts to enter into the automobile export market in the future. Furthermore, we have to recognize that, in this type of categories and, particularly, in the automotive industry, there may be other regions which exert greater competition on Mexican products.

[14] To give an example of this point, consider a comparison between productivity differentials in the cases of apparel and clothing accessories and of office and automatic data processing machines. As can be seen, although in Apparel and clothing accessories Mexico systematically exhibits a TFP level around 6 times larger than the one estimated for China, according to the results this proportional difference is significantly lower than the one observed in the case of office and data processing machines (around 36 times). This result is in line with the ordering of relative productivities summarized in Table 2, where Mexico TFP, relative to that of China, is higher in office and data processing machines than in apparel and clothing accessories.

[15] Differences between Mexico and China's wage levels reflect, among other things, differentials in such economies' average productivity. These wage differentials could be higher than productivity differentials in some sectors where Mexico apparently continues to enjoy greater productivity, as seems to be the case of Apparel and clothing accessories. In such context, the sectors in which Mexico would maintain comparative advantage would only be those where the productivity differential is higher than the wage differential. Thus, although Mexico appears to have systematically higher productivity levels than China in sectors such as Apparel and clothing accessories, this does not necessarily imply that it enjoys a comparative advantage with respect to China in these activities.

3. Productivity, comparative advantage and export performance

This section illustrates the links that industry-specific productivity differentials between Mexico and its competitors could have with the Revealed Comparative Advantage (RCA) indexes calculated in Chiquiar, Fragoso and Ramos Francia (2007) and with the relative performance of these countries' exports to the U.S. market. As in the aforementioned study, the analysis is based on dispersion diagrams and on the calculation of Spearman's rank correlation coefficients.[16] These correlation coefficients measure the degree of *ordinal* association between two series. In this study in particular, they are used to assess the degree of similarity between the ranking of manufacturing categories according to Mexico's productivity differentials *vis-à-vis* its competitors and their ranking in terms of Mexico's RCA or of its export performance with respect to its competitors, independently of the *cardinal* properties of the series used to make these assessments.

Formally, we study the correlations between average productivity estimates for 1997-2002 and average RCA indexes, along with relative export performance, for 1996-2005. In order to identify if China's entrance to the WTO had an effect on these correlations, the analysis is also made for two relevant sub-periods: i) 1997-2001; and, ii) 2002-2005. All the analysis is carried out in terms of a comparison between Mexico and China, as well as a comparison between Mexico and the basket of remaining competitors. For each category *i*, productivity differentials between Mexico and its competitors are measured as LP^i_{MEX} / LP^i_{Comp} and $TFP^i_{MEX} / TFP^i_{Comp}$, while Mexico's comparative advantages relative to its competitors are measured as $RCA^i_{MEX} / RCA^i_{Comp}$. Meanwhile, to measure Mexico's relative export performance, the "market gain" variable defined in Chiquiar, Fragoso and Ramos Francia (2007) was used. This measurement corresponds to the difference between the absolute change of Mexico's exports to the U.S. and the absolute change of China or the basket's exports to such market by category, expressed as a proportion of the sum of Mexico and China's (or the basket's) exports to the U.S. of the same product category; i.e.:

$$Market\ Gain_i = \frac{\Delta X_i^{Mexico} - \Delta X_i^{China}}{X_i^{Mexico} + X_i^{China}} \qquad (12)$$

[16] We attach to the Spearman correlation coefficients one, two or three asterisks when they are statistically significant at a 10%, 5% or 1% level, respectively.

We first study the correlation between productivity differentials and Mexico's revealed comparative advantages vis-á-vis its competitors. The correlation between productivity differentials and Mexico's export performance in the U.S. market is analyzed afterwards.

3.1. Productivity differentials and revealed comparative advantages

Figures 12 and 13 illustrate the correlations between Mexico's LP levels, relative to China and its other close competitors, and the corresponding relative RCA indexes. Meanwhile, Figures 14 and 15 show the results of a similar analysis, except that productivity differentials are now based on the countries' TFP calculations. The left side of each graph exhibits the calculation for 1996-2005 as a whole, while on the right hand side we include the results for the periods before and after China's entrance to the WTO.

As may be noted, when we analyze the correlation between Mexico's pattern of comparative advantages, relative to China, and these countries' productivity differentials, there is a positive and statistically significant correlation only after China's entry into the WTO. As suggested in Chiquiar, Fragoso and Ramos Francia (2007), this could be indicating that China's trade patterns may have been more consistent with this country's comparative advantages when it entered the WTO. On the other hand, when we study the correlation between productivity differentials and the pattern of comparative advantages of Mexico vis-à-vis the rest of its competitors, we also find a positive and statistically significant correlation, but only when TFP is used as a measure of productivity.

3.2. Productivity differentials and export performance

We now follow a similar approach to study the correlation between Mexico's productivity, compared to its competitors (measured with LP and TFP), and the relative performance of Mexico's exports to the U.S. market. The results are illustrated for the sub-periods before and after China entered the WTO since, as documented in Chiquiar, Fragoso and Ramos Francia (2007), the performance of Mexico's manufacturing exports in the U.S. market changed precisely after such event. Figures 16-19 summarize the results.

In line with the results of the previous sub-section, LP differentials between Mexico and China appear to exhibit a positive and statistically significant correlation with Mexico's relative export performance after China entered the WTO. Likewise, just as in the previous analysis, when the correlation between Mexico's relative performance and relative productivities with respect to the rest of the basket of competitors is analyzed, the results suggest a positive and statistically significant correlation when TFP is used as a measure of productivity.

Concluding this section, it is relevant to note that the results seem to suggest that Mexico's export performance, relative to its competitors, is apparently related with the presence of productivity differentials. Indeed, Mexico's export performance seems to have been relatively more favorable in sectors where it enjoys relatively higher productivity differentials with respect to its competitors. However, it is worth pointing out that such hypothesis has still not been evaluated against a relevant alternative, which could suggest that Mexico's comparative advantages and export performance are responding to differences in factor endowments instead. For this reason, a multivariate analysis is carried out in the following section.

4. Econometric estimates

The evidence in the previous section suggests that Mexico's pattern of comparative advantages and its export performance seem to be significantly correlated with its productivity differentials with respect to its main competitors. However, the analysis undertaken in that section does not allow distinguishing between a case where comparative advantage and export performance are truly determined by productivity differentials, from cases where other determinants, such as differences in relative factor endowments, are driving the performance of such variables. In fact, the productivity differentials computed before could be affected by differences in certain factor endowments that were not explicitly controlled for in their estimation. For example, the productivity estimates could appear to be higher in countries that have larger endowments of human capital and, in particular, would be especially affected in sectors that are more intensive in skilled labor. Not taking this into account could lead us to conclude that a Ricardian hypothesis is relevant when, in reality, it is the difference in human capital endowments what may be leading the results we have obtained.

Given the above, in this section we estimate several regressions that try to identify the relevance of productivity differentials, as compared to differences in factor endowments, as determinants of Mexico's comparative advantages and export performance, relative to the other countries included in the analysis. That is, we attempt to find econometric evidence that allows distinguishing between a Ricardian and a

Heckscher-Ohlin type hypothesis regarding the determinants of the recent behavior of Mexican manufacturing exports.

Two groups of regressions were estimated. We first estimated models where Mexico's comparative advantages, relative to its competitors, potentially depend on both productivity differentials and on industry-level physical and human capital intensity. In order to measure the intensity with which each product category uses such inputs, information from INEGI's Annual Industrial Survey concerning the share of physical capital in total costs, as well as each activity's relative mean wages, as compared to those for total manufacturing (in order to estimate the average qualification level of each sector's workers), was used.[17] Second, regression models were estimated where the relative performance of Mexican manufacturing exports to the U.S. depends on the same type of independent variables.

We should emphasize some important caveats related to this analysis. In particular, the results of this section may be especially affected by the limited information available. First, reflecting the fact that, in order to be able to combine data from different sources, it was necessary to reduce the level of disaggregation of the information used, the regressions are based on only 39 observations.[18] Second, errors in our productivity measurements could affect the results against the Ricardian hypothesis, reflecting the "attenuation bias" of coefficients associated with variables measured with error. As a consequence, there could be significant relationships between comparative advantage and productivity, or between export performance and productivity, which may not be identified by the analysis that follows. Thus, the results must be taken with care and, in particular, should be considered as illustrative and not as precise estimates.

4.1. RCA, productivity and factor endowments

This section describes the results of diverse regression models in which the countries' relative comparative advantages depend on productivity differentials (as

[17] Note that this procedure implies two assumptions which are maintained in the analysis: i) to evaluate the Heckscher-Ohlin hypothesis, we adopt the assumption that China and the basket of competitors use a similar technology as Mexico; and, ii) we assume three factors: unskilled labor, physical capital and human capital. Indeed, when the share of physical capital in total cost (which corresponds to 1 minus labor's share) is included in the regressions, together with a measure of human capital, it is possible to identify any specialization pattern in terms of the three aforementioned factors. It is worth noting that an extended version of the Heckscher-Ohlin hypothesis, which included transportation and electrical energy as additional inputs, was also analyzed. Nonetheless, no additional results were obtained from such specification.

[18] As mentioned in Section 2, the maximum disaggregation level which could be defined for manufacturing categories, so that the information from different sources would be comparable, was 40 comprehensive categories. However, the category for Tobacco Products was an outlier and thus was eliminated from the regressions.

measured with either LP or TFP) and on the factor intensity of different manufacturing categories. In order to have a reference case, we first analyze the determinants of the comparative advantage patterns of Mexico, China and the basket of Mexico's competitors, when these are compared with the comparative advantage pattern of a developed country, such as the U.S. We then apply the same methodology to identify the determinants of Mexico's comparative advantages, when they are compared to those of its competitors. For the analysis that follows, we separate the basket of competitors into China, the "high-tech competitors" (South Korea, Hong Kong and Taiwan) and the remaining countries (which we will call the "low-tech competitors"). The reason for separating the group of competitors as above reflects the fact that the comparative advantage patterns and export performance of each of the different groups may depend on different factors, when they are compared with a country such as Mexico.

4.1.1. RCA with respect to the U.S.

Tables 3 to 6 summarize the results of regression models which attempt to identify the determinants of the comparative advantage patterns of Mexico, China and the basket of high and low tech competitors, respectively, when they are compared with the U.S. own pattern of comparative advantages.[19] The regressions summarized in each column of the tables vary according to the combination of independent variables they contain. In particular, the first 2 equations (columns denominated ec. (1) and ec. (2), respectively) summarize the regression results where each countries' RCA, relative to the U.S., only depends on productivity differentials measured with TFP or LP, respectively. Equation (3) only includes physical and human capital intensities, while equations (4) and (5) combine variables associated with LP and TFP differentials with the factor use intensities.

In general, the results suggest that the productivity differentials of Mexico, China and the baskets of Mexico's competitors with respect to the U.S. do not appear to explain such countries' patterns of comparative advantage in international markets. In contrast, factor endowments do seem to be a relevant determinant of such advantages. This can be appreciated by noting that the goodness of fit F test rejects the null

[19] Each table exhibits the regression coefficients associated with each of the explanatory variables included in the regression, including within parenthesis the Student´s t statistic, whose significance at 10, 5, or 1% is shown by 1, 2, or 3 asterisks, respectively. The last rows include the determination coefficient R^2, the adjusted R^2 and the p value for the goodness of fit F test, in which the null hypothesis is that all the regression coefficients (except the constant) are jointly zero. Regressions for Mexico and for the basket of competitors (excluding China) are based on data for the complete sample period, while regressions for China only include the data corresponding to the period after its entry to the WTO.

hypothesis only when variables associated with each category's factor intensity are included.

Likewise, with the exception of the basket of high technology competitors (which will be discussed below), the rejection of such hypothesis reflects the statistical significance of the coefficient associated with relative wages. The negative value of this coefficient in the regressions of Mexico, China and the low-tech basket suggests that, as expected, the comparative advantages of such countries in international markets apparently lie in low-skilled labor intensive goods. In contrast, in the case of the countries in the high tech basket, the rejection of the null hypothesis is associated with the significance of the coefficient related with the intensity of physical capital, which appears with a positive coefficient. This result seems to reflect the fact that this basket includes countries which have achieved high rates of physical and human capital accumulation. Thus, such countries seem to be producing and exporting goods with similar human capital intensity and, according to the results, greater physical capital intensity than the U.S.

4.1.2. Mexico's RCA, relative to its competitors

Tables 7 to 9 summarize the results obtained when, following the same methodology as in the previous exercises, we estimate regressions trying to identify the determinants of Mexico's comparative advantages, when they are compared to China and to each basket of competitors, respectively. The structure of the tables is similar to the ones presented before.

Regarding the determinants of Mexico's comparative advantages with respect to China, the results suggest that productivity differentials are the only relevant variable. Indeed, we may note in Table 7 that the productivity differential between these two countries, measured with either LP or TFP, is the only variable which systematically appears in the regressions with a statistically significant coefficient. The value of this coefficient is consistently positive which, in line with a Ricardian hypothesis, suggests that Mexico tends to exhibit a greater revealed comparative advantage index (relative to China) in product categories where its productivity differential with respect to China is larger. This result contrasts with those in the previous subsection, where Mexico's comparative advantages with respect to the U.S. seemed to reflect mainly differences in factor endowments.

It is interesting to contrast the results above with those obtained when Mexico's comparative advantages are compared with those of the competitors in the high technology basket. In this case the results suggest that, as above, productivity differentials measured with TFP are a relevant variable determining Mexico's pattern of comparative advantages (see Table 8). On the other hand, labor productivity differentials do not seem to have explanatory power in these regressions. The statistical significance of TFP differentials persists when variables associated with the Heckscher-Olin model are included in the regression (see ec. (4)). It is worth noting that the intensity of human capital also appears as significant in this regression, which suggests that the specification in the fourth column is the most appropriate among the different models shown in Table 8.[20] Taking this regression as a reference, the results suggest that both productivity differentials and the intensity of human capital are relevant in determining Mexico's pattern of comparative advantages relative to the high technology competitors. In particular, Mexico tends to exhibit a larger revealed comparative advantage index (relative to these countries) in goods where it has a relatively higher productivity and/or in goods which are relatively less intensive in skilled labor.[21]

Thus, when Mexico is compared to countries with relatively similar factor endowments, such as China, productivity differentials appear to be the fundamental driver of the differences in comparative advantage patterns observed across countries. However, when Mexico is compared with countries which have risen faster in the value chain, it seems that its relatively lower endowment of human capital is also relevant to explain its specialization patterns. Once again, this evidence is consistent with the idea that the comparative explanatory power of Heckscher-Ohlin and Ricardian models depends on the degree to which the factor endowments of the countries being compared differ.

Finally, Table 9 summarizes the results when we compare Mexico's comparative advantages with those of the low tech basket of competitors. In this case, the only relevant variable in the regressions seems to be the intensity of human capital, which appears with a positive sign. This result appears to suggest that Mexico tends to specialize in products which are more intensive in human capital than those countries. In the following sub-section, we will see further evidence supporting this hypothesis. Furthermore, although productivity differentials do not seem to be a significant variable

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[20] In fact, as can be seen in the table, this model entails a slightly higher adjusted R^2, as well as a stronger rejection of the null hypothesis that all coefficients are zero than the other regressions.

[21] Regressions (3) and (5) in Table 8 would seem to suggest that the intensity of physical capital is a significant variable in this model. However, this seems to be a result of a specification error. In particular, these regressions do not include TFP differentials which, as has been noted, do appear to be relevant regressors. When such differentials are included in equation (4), the intensity of physical capital loses statistical significance. Thus, its statistical significance in regressions (3) and (5) seems to be reflecting the omission of a relevant variable which may be correlated with it.

in the regressions in Table 9, the additional results we present below will be more supportive of the idea that these differentials are indeed relevant determinants of Mexico's export performance relative to the low-tech basket of competitors.

4.2. Export performance, productivity and factor endowments

This section presents the results of regressions that are similar to those in the previous section, but the dependent variables are now related to Mexico's export performance to the U.S., relative to that of China and of the high and low technology baskets, respectively. In particular, the dependent variables correspond to the market gain measurements described in equation (12). The results are summarized in Tables 10, 11 and 12. The first column of each table presents the results of a regression in which the performance of Mexican exports, relative to the relevant country or group of countries of comparison, depends only on the corresponding ratio of comparative advantages. This is made simply to show the significantly positive association between the relative comparative advantage index and relative market performance. Specifications (2) and (3) include only the productivity differential measured with TFP and LP, respectively, as explanatory variable. Specification (4) only includes variables associated with factor intensity, while specifications (5) and (6) include both factor intensity variables and productivity differentials measured with TFP and LP, respectively.

As may be noted, the results of these regressions tend to give additional support to the previous section's most relevant conclusions, and also lead to several additional insights:

a) In line with the previous results, the productivity differential between Mexico and China, as measured with either LP or TFP, seems to be the relevant determinant of Mexico's export performance, relative to China (see Table 10). In particular, Mexico seems to exhibit a relatively more favorable performance in product categories where its productivity differential with respect to China is higher.[22] Meanwhile, the variables that approximate factor intensity do not seem to have explanatory power in the regressions that attempt to explain Mexico's export performance, relative to China.

[22] It is important to recognize that this inference is based on coefficients with a 10% significance.

b) The results of the regressions that try to explain Mexico's export performance, relative to the basket of high-tech competitors, are also very similar to those obtained in the previous section (see Table 11). Indeed, productivity differentials appear as relevant variables to explain Mexico's export performance with respect to this basket of countries, independently of whether additional variables are included or not. According to the adjusted R^2, TFP differentials seem to have a slightly greater explanatory power than LP differentials. Likewise, just as in the previous section, the regression which seems to have the greatest explanatory power is the one that includes the TFP differential, as well as the variables associated with the Heckscher-Ohlin model (ec. (5)). In line with the previous section, the results suggest that Mexico tends to have a less favorable export performance in goods where it has a relatively lower productivity and/or in products which are relatively more intensive in human capital.[23]

c) Finally, with respect to the comparison of Mexico with the basket of low technology competitors, and in contrast to the regressions in the previous section, the LP differential appears with a significantly positive sign, independently of whether other variables are included or not. Furthermore, turning to regression (6), which has the greater explanatory power according to the adjusted R^2, the results are still in line with the hypothesis that, once the effects of productivity differentials are controlled for, Mexico has a relatively better export performance as these countries in goods which are more intensive in human capital.

5. Conclusions

The results of this paper suggest that Mexico and several of its competitors' comparative advantages, as compared to those of developed countries such as the U.S., seem to be determined by their relatively lower endowment of skilled labor and, therefore, tend to support a Heckscher-Ohlin type hypothesis to explain their

[23] Once again, equations (4) and (6) would seem to suggest that the intensity of physical capital is a significant variable in such model. Just as in the previous section, this seems to reflect the omission of a relevant variable (i.e. the TFP differential).

specialization patterns.[24] Nonetheless, once the analysis focuses within this group of countries and, in particular, when Mexico's patterns of comparative advantages and export performance are compared with those of its main competitors, productivity differentials tend to become more relevant determinants of such economies' specialization patterns.[25] The evidence suggests, however, that even within this group of countries, relative differences in human capital endowments have certain explanatory power for the observed specialization patterns and export performance.

Thus, the abundance of relatively unskilled labor in Mexico seems to be a factor determining its specialization patterns. This feature locates Mexico in markets where other large economies with relatively similar factor endowments have entered recently. With respect to several of these countries, such as China, the determinant of Mexico's comparative advantages and export performance is apparently related with productivity differentials. However, Mexico's relatively smaller endowment of human capital also seems to have influenced its recent export performance, as compared with some other competitors which have risen faster in the value chain.

The results described above represent a significant challenge for the Mexican economy, if we take into account the facts that its productivity growth tends to be lower than the one registered by its closest competitors, and that several of these countries have achieved a more accelerated accumulation of human capital. This may have relevant implications for the Mexican economy's recent and future performance. In particular, low productivity growth rates, together with relatively low levels of human capital, can be part of the set of fundamental factors that have caused Mexico to differ from other countries that have achieved higher economic growth rates during recent years (see Ramos-Francia, 2006). It is for this reason that, within the research agenda concerning Mexico's competitiveness, research intended to identify the main factors hindering productivity in the Mexican manufacturing industry is especially relevant.[26]

[24] However, some of Mexico's relevant competitors, such as South Korea, Taiwan and Hong Kong, have managed to climb the value chain and, as a result, their comparative advantages currently seem to reflect the higher levels of physical and human capital they have accumulated.

[25] In more formal terms, it would seem that Heckscher-Ohlin type mechanisms determine in which diversification cone these countries are located in, while Ricardian productivity differentials determine the specific specialization pattern of each country within their respective cones.

[26] The paper by Salgado and Bernal (2007) represents the first attempt in Banco de México to address this topic.

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Table 1: Labor Productivity - Levels and Average Growth Rates, 1997 - 2002
(Average Level by Country =100)

	Labor Productivity Level							Labor Productivity Growth Rate						
Sector	Mexico (1)	China (2)	Basket wo/China (3)	Basket w/China (4)	(5) (1)/(2)	(6) (1)/(3)	(7) (1)/(4)	Mexico (8)	China (9)	Basket wo/China (10)	Basket w/China (11)	(12) (8)-(9)	(13) (8)-(10)	(14) (8)-(11)
Organic chemicals	243	125	215	110	194	113	222	2.44	10.30	3.23	6.76	-7.87	-0.79	-4.32
Nonmetallic mineral manufactures	112	60	110	51	187	101	219	0.48	5.77	-1.16	2.88	-5.29	1.64	-2.40
Plastics in primary forms	171	100	182	138	172	94	124	4.37	12.99	2.20	7.12	-8.62	2.17	-2.75
Essential oils, resinoids and perfume materials	166	125	182	98	133	91	170	3.51	10.30	3.65	6.87	-6.80	-0.15	-3.36
Coffee, tea, cocoa, spices and manufactures thereof	119	91	63	76	130	187	156	3.60	7.62	-3.99	2.17	-4.01	7.59	1.43
Miscellaneous manufactured articles	75	57	79	161	130	95	46	0.94	8.38	-1.26	0.34	-7.43	2.20	0.61
Paper, paperboard, and articles of paper pulp	93	73	119	74	127	78	125	1.97	10.02	1.11	6.28	-8.06	0.85	-4.32
Miscellaneous edible products and preparations	112	91	62	90	123	179	124	4.25	7.62	-3.39	1.02	-3.37	7.64	3.22
Iron and steel	196	162	207	184	121	94	106	4.57	8.61	2.63	5.63	-4.04	1.94	-1.07
Medicinal and pharmaceutical products	149	125	195	125	119	76	120	1.93	10.30	2.85	6.20	-8.38	-0.92	-4.27
Sugars, sugar preparations and honey	108	91	46	70	119	237	153	4.19	7.62	-4.78	0.29	-3.42	8.98	3.90
Textile yarn, fabrics and made-up articles	59	51	60	47	116	98	126	3.33	6.09	-2.40	3.45	-2.76	5.73	-0.12
Dairy products and birds' eggs	104	91	113	107	115	92	97	3.96	7.62	-4.49	0.37	-3.65	8.45	3.60
Chemical materials and products	162	149	280	160	108	58	101	3.46	11.51	17.15	15.50	-8.05	-13.69	-12.04
Power generating machinery and equipment	80	76	71	57	106	113	142	8.65	11.49	4.51	10.21	-2.83	4.14	-1.55
Road vehicles (including air-cushion vehicles)	123	119	165	166	103	74	74	3.67	13.24	1.80	5.47	-9.58	1.87	-1.80
Beverages	111	110	192	102	102	58	109	1.97	5.95	-22.80	-8.21	-3.98	24.77	10.19
Photographic apparatus, equipment and supplies	74	75	75	63	99	99	117	2.32	10.60	-8.35	1.98	-8.29	10.67	0.33
Dyeing, tanning and coloring materials	121	125	169	89	97	72	137	3.35	10.30	2.99	7.50	-6.95	0.36	-4.15
Nonferrous metals	152	162	156	110	94	98	138	6.06	8.61	4.28	6.70	-2.55	1.78	-0.65
Manufactures of metals	76	83	72	82	92	106	92	3.83	11.55	-0.49	5.33	-7.71	4.32	-1.49
Rubber manufactures	86	100	71	92	87	121	94	0.76	12.99	-0.51	5.13	-12.23	1.27	-4.37
Meat and meat preparations	77	91	65	90	85	120	86	0.97	7.62	-1.48	-1.64	-6.64	2.46	2.61
General industrial machinery and equipment	64	76	96	77	85	67	84	0.39	11.49	2.51	7.47	-11.09	-2.11	-7.07
Cereals and cereal preparations	76	91	47	71	84	161	108	1.29	7.62	0.67	3.22	-6.33	0.62	-1.93
Machinery specialized for particular industries	60	76	85	51	79	71	118	-2.20	11.49	1.17	7.66	-13.68	-3.36	-9.86
Office machines and automatic data processing machines	148	191	1028	860	77	14	17	9.91	17.92	40.86	40.40	-8.01	-30.95	-30.49
Profssional, scientific and controlling instruments	50	75	69	80	67	72	62	-0.08	10.60	0.30	5.05	-10.69	-0.38	-5.14
Tobacco and tobacco manufactures	514	813	199	466	63	258	110	4.48	5.13	31.25	25.38	-0.65	-26.77	-20.90
Plastics in nonprimary forms	62	100	75	129	62	82	48	2.64	12.99	0.73	4.33	-10.35	1.90	-1.69
Telecommunications equipment	109	191	414	796	57	26	14	0.91	17.92	29.57	28.49	-17.01	-28.66	-27.58
Furniture and parts thereof	38	69	37	68	55	103	56	1.56	12.81	-0.23	3.37	-11.25	1.79	-1.82
Petroleum, petroleum products and related materials	164	307	2331	1262	53	7	13	1.30	14.38	23.69	28.86	-13.09	-22.39	-27.56
Articles of apparel and clothing accessories	36	78	39	63	46	93	57	-1.62	11.24	-1.14	2.76	-12.86	-0.48	-4.38
Fish, crustaceans, molluscs and aquatic invertebrates	40	91	45	71	44	89	57	0.93	7.62	-6.44	-2.49	-6.69	7.37	3.42
Leather manufactures	32	83	68	66	38	47	48	0.21	13.40	-0.54	3.85	-13.20	0.74	-3.64
Cork and wood manufactures other than furniture	21	59	34	61	36	63	35	2.66	15.34	1.56	5.24	-12.68	1.09	-2.59
Footwear	25	83	27	59	30	90	42	-1.43	13.40	-2.37	0.86	-14.83	0.94	-2.29
Transport equipment	31	119	119	95	26	26	33	-4.06	13.24	2.51	6.68	-17.30	-6.56	-10.74
Electrical machinery, apparatus and appliances	75	353	110	168	21	68	44	2.78	36.95	2.33	21.23	-34.16	0.45	-18.45

Table 2: TFP - Levels and Average Growth Rates, 1997 - 2002

(Average Level by Country =100)

Sector	TFP Level							TFP Growth Rate						
	Mexico	China	Basket wo/China	Basket w/China	(5)	(6)	(7)	Mexico	China	Basket wo/China	Basket w/China	(12)	(13)	(14)
	(1)	(2)	(3)	(4)	(1)/(2)	(1)/(3)	(1)/(4)	(8)	(9)	(10)	(11)	(8)-(9)	(8)-(10)	(8)-(11)
Essential oils, resinoids and perfume materials	1162	87	91	61	1336	1278	1912	2.39	10.30	3.52	6.82	-7.91	-1.13	-4.43
Tobacco and tobacco manufactures	2279	410	94	223	556	2415	1023	2.98	5.13	32.77	26.17	-2.15	-29.79	-23.19
Medicinal and pharmaceutical products	511	110	101	76	463	508	674	-0.16	10.30	3.01	6.20	-10.47	-3.17	-6.36
Beverages	143	35	44	29	403	321	492	0.47	5.95	-18.23	-7.51	-5.49	18.70	7.97
Office machines and automatic data processing machines	327	106	691	589	308	47	55	5.69	17.92	43.43	41.29	-12.23	-37.74	-35.61
Rubber manufactures	458	162	119	150	283	386	306	-0.08	12.99	0.54	5.43	-13.07	-0.62	-5.51
Dyeing, tanning and coloring materials	271	97	134	72	280	203	378	2.00	10.30	3.35	7.51	-8.31	-1.35	-5.52
Petroleum, petroleum products and related materials	139	53	309	186	260	45	75	0.38	14.38	27.48	29.60	-14.00	-27.10	-29.22
Miscellaneous manufactured articles	284	111	151	284	257	188	100	-0.13	8.38	-0.19	1.07	-8.50	0.06	-1.20
Cereals and cereal preparations	170	68	40	54	250	429	314	0.74	7.62	0.42	3.10	-6.88	0.32	-2.37
Sugars, sugar preparations and honey	169	72	70	80	234	241	210	3.47	7.62	-3.83	0.73	-4.15	7.30	2.74
Coffee, tea, cocoa, spices and manufactures thereof	138	62	39	46	223	358	297	2.86	7.62	-2.13	2.71	-4.76	4.99	0.15
Nonmetallic mineral manufactures	76	37	62	31	206	123	244	1.35	5.77	-0.37	2.96	-4.43	1.72	-1.61
Dairy products and birds' eggs	134	65	60	62	205	224	217	3.07	7.62	-3.55	0.55	-4.55	6.62	2.52
Miscellaneous edible products and preparations	164	87	56	80	188	293	206	3.10	7.62	-2.18	1.45	-4.52	5.28	1.65
Machinery specialized for particular industries	360	253	308	177	142	117	203	-2.92	11.49	0.97	7.60	-14.41	-3.89	-10.52
Power generating machinery and equipment	211	169	293	173	125	72	122	9.04	11.49	5.16	10.30	-2.44	3.88	-1.26
General industrial machinery and equipment	201	166	182	152	121	110	132	0.58	11.49	2.65	7.38	-10.91	-2.08	-6.80
Chemical materials and products	46	38	70	43	119	66	105	2.29	11.51	17.14	15.51	-9.22	-14.85	-13.22
Meat and meat preparations	144	154	114	149	94	126	97	0.88	7.62	-3.85	-2.58	-6.73	4.73	3.46
Plastics in primary forms	31	37	42	38	84	73	81	1.70	12.99	2.61	6.98	-11.29	-0.90	-5.28
Telecommunications equipment	113	135	218	400	83	52	28	0.74	17.92	29.85	28.80	-17.18	-29.10	-28.06
Profsional, scientific and controlling instruments	137	172	196	206	80	70	67	-0.58	10.60	1.29	5.35	-11.19	-1.88	-5.94
Road vehicles (including air-cushion vehicles)	88	112	143	150	79	62	59	1.64	13.24	2.68	5.72	-11.61	-1.04	-4.08
Paper, paperboard, and articles of paper pulp	42	59	80	57	71	52	73	2.14	10.02	1.92	6.31	-7.89	0.22	-4.17
Organic chemicals	15	24	41	23	64	38	66	0.95	10.30	3.95	6.86	-9.36	-3.00	-5.91
Textile yarn, fabrics and made-up articles	53	88	118	90	61	45	60	1.90	6.09	-1.61	3.47	-4.19	3.52	-1.57
Articles of apparel and clothing accessories	229	410	199	311	56	115	74	-1.36	11.24	-0.50	3.06	-12.60	-0.86	-4.42
Leather manufactures	76	139	92	95	54	83	79	0.19	13.40	-0.75	3.82	-13.21	0.94	-3.63
Manufactures of metals	81	167	171	184	49	47	44	3.04	11.55	-0.18	5.26	-8.51	3.22	-2.22
Photographic apparatus, equipment and supplies	61	142	223	161	43	27	38	-0.63	10.60	-6.28	2.53	-11.24	5.65	-3.16
Furniture and parts thereof	93	220	130	218	42	72	43	1.91	12.81	0.33	3.64	-10.90	1.58	-1.73
Cork and wood manufactures other than furniture	47	134	74	128	35	64	37	2.61	15.34	2.60	5.75	-12.73	0.01	-3.14
Plastics in nonprimary forms	50	166	127	207	30	39	24	2.12	12.99	1.99	4.96	-10.87	0.13	-2.84
Electrical machinery, apparatus and appliances	107	379	127	189	28	84	57	1.66	36.95	3.16	21.35	-35.29	-1.50	-19.69
Footwear	126	470	195	370	27	65	34	-1.41	13.40	-1.96	1.12	-14.81	0.55	-2.53
Fish, crustaceans, molluscs and aquatic invertebrates	20	86	73	89	23	28	23	0.10	7.62	-7.32	-2.84	-7.51	7.42	2.94
Iron and steel	26	156	123	129	17	21	20	2.29	8.61	3.40	5.78	-6.32	-1.11	-3.49
Nonferrous metals	11	69	107	62	17	11	18	3.73	8.61	4.58	6.76	-4.88	-0.85	-3.03
Transport equipment	37	313	439	310	12	8	12	-3.79	13.24	2.30	6.62	-17.03	-6.08	-10.40

Table 3: Ratio of Mexico's RCA with respect to U.S. RCA

Dependent Variable: $\ell n\left(\frac{RCA_i^{Mex}}{RCA_i^{US}}\right)$

Independent Variables:	ec. (1)	ec. (2)	ec. (3)	ec. (4)	ec. (5)
$\ell n\left(\frac{TFP_i^{Mex}}{TFP_i^{US}}\right)$	-0.0697 (-0.36)			0.1003 (0.42)	
$\ell n\left(\frac{LP_i^{Mex}}{LP_i^{US}}\right)$		0.1154 (0.32)			0.0445 (0.11)
Capital Intensity			0.6968 (0.34)	1.2442 (0.49)	0.5966 (0.26)
Human Capital Intensity			-0.9071*** (-3.13)	-1.0108** (-2.51)	-0.9012*** (-3.11)
Constant	-0.7328 (-0.75)	0.4170 (0.18)	0.3956 (0.49)	0.8784 (0.63)	0.7199 (0.23)
R^2	0.0050	0.0036	0.1290	0.1369	0.1295
Adjusted R^2	-0.0219	-0.0233	0.0806	0.0629	0.0549
Prob F	0.7238	0.7476	0.0030	0.0082	0.0085

The *t* statistic is shown in parenthesis.
*, **, *** indicates statistical significance at 10, 5 or 1 percent, respectively.

Table 4: Ratio of China's RCA with respect to U.S. RCA (Data corresponds to the period after China entered to the WTO)

Dependent Variable: $\ell n\left(\frac{RCA_i^{China}}{RCA_i^{US}}\right)$

Independent Variables:	ec. (1)	ec. (2)	ec. (3)	ec. (4)	ec. (5)
$\ell n\left(\frac{TFP_i^{China}}{TFP_i^{US}}\right)$	-0.2606 (-0.68)			-0.3852 (-1.27)	
$\ell n\left(\frac{LP_i^{China}}{LP_i^{US}}\right)$		0.3022 (0.66)			-0.2721 (-0.72)
Capital Intensity			0.9930 (0.37)	-0.7778 (-0.31)	1.2231 (0.42)
Human Capital Intensity			-1.6638*** (-3.83)	-1.6974*** (-3.87)	-1.8426*** (-4.13)
Constant	-1.2664 (-0.95)	0.5583 (0.35)	1.0253 (0.84)	0.3429 (0.21)	0.2375 (0.12)
R^2	0.0151	0.0160	0.2290	0.2557	0.2393
Adjusted R^2	-0.0115	-0.0106	0.1862	0.1919	0.1741
Prob F	0.5001	0.5121	0.0000	0.0000	0.0000

The *t* statistic is shown in parenthesis.
*, **, *** indicates statistical significance at 10, 5 or 1 percent, respectively.

Table 5: Ratio of High Tech Basket RCA with respect to U.S. RCA

Dependent Variable: $\ell n\left(\frac{RCA_i^{HTBkt}}{RCA_i^{US}}\right)$

Independent Variables:	ec. (1)	ec. (2)	ec. (3)	ec. (4)	ec. (5)
$\ell n\left(\frac{TFP_i^{HTBkt}}{TFP_i^{US}}\right)$	-0.2428 (-0.70)			-0.0476 (-0.16)	
$\ell n\left(\frac{LP_i^{HTBkt}}{LP_i^{US}}\right)$		0.4911 (0.90)			0.0317 (0.06)
Capital Intensity			5.0938** (2.08)	4.9424** (2.30)	5.0437* (1.89)
Human Capital Intensity			-0.6901 (-1.55)	-0.6922 (-1.55)	-0.6840 (-1.56)
Constant	-0.6836 (-1.58)	-0.0387 (-0.07)	-1.1208 (-1.14)	-1.1202 (-1.12)	-1.0861 (-0.87)
R^2	0.0117	0.0194	0.1250	0.1254	0.1251
Adjusted R^2	-0.0150	-0.0071	0.0764	0.0504	0.0501
Prob F	0.4900	0.3733	0.0230	0.0513	0.0568

The *t* statistic is shown in parenthesis.
*, **, *** indicates statistical significance at 10, 5 or 1 percent, respectively.
China is not included in the basket.

Table 6: Ratio of Low Tech Basket RCA with respect to U.S. RCA

Dependent Variable: $\ell n\left(\frac{RCA_i^{LTBkt}}{RCA_i^{US}}\right)$

Independent Variables:	ec. (1)	ec. (2)	ec. (3)	ec. (4)	ec. (5)
$\ell n\left(\frac{TFP_i^{LTBkt}}{TFP_i^{US}}\right)$	-0.2561 (-1.44)			0.1607 (1.04)	
$\ell n\left(\frac{LP_i^{LTBkt}}{LP_i^{US}}\right)$		-0.2755 (-1.20)			-0.1903 (-0.77)
Capital Intensity			2.2121 (1.12)	2.5666 (1.29)	2.6107 (1.29)
Human Capital Intensity			-1.4776*** (-4.97)	-1.6061*** (-4.59)	-1.4459*** (-4.95)
Constant	-0.5333 (-1.41)	-0.6152 (-1.39)	0.9427 (1.12)	1.3087 (1.35)	0.3850 (0.37)
R^2	0.0301	0.0188	0.3155	0.3248	0.3238
Adjusted R^2	0.0039	-0.0077	0.2775	0.2669	0.2658
Prob F	0.1574	0.2384	0.0000	0.0000	0.0000

The *t* statistic is shown in parenthesis.
*, **, *** indicates statistical significance at 10, 5 or 1 percent, respectively.
China is not included in the basket.

Table 7: Ratio of Mexico's RCA with respect to China's RCA
(Data corresponds to the period after China entered to the WTO)

Dependent Variable: $\ell n\left(\frac{RCA_i^{Mex}}{RCA_i^{China}}\right)$

Independent Variables:	ec. (1)	ec. (2)	ec. (3)	ec. (4)	ec. (5)
$\ell n\left(\frac{TFP_i^{Mex}}{TFP_i^{China}}\right)$	0.4549** (2.10)			0.4459* (1.75)	
$\ell n\left(\frac{LP_i^{Mex}}{LP_i^{China}}\right)$		0.7060** (2.24)			0.7005* (1.91)
Capital Intensity			-0.8282 (-0.50)	-0.5057 (-0.30)	-1.9107 (-1.21)
Human Capital Intensity			0.5463 (1.57)	0.0378 (0.11)	0.1614 (0.45)
Constant	0.8414* (1.80)	2.2704** (2.24)	-0.3488 (-0.47)	0.9222 (1.05)	2.6008 (1.65)
R^2	0.1408	0.1330	0.0421	0.1417	0.1472
Adjusted R^2	0.1176	0.1096	-0.0111	0.0681	0.0741
Prob F	0.0429	0.0312	0.1506	0.1426	0.0356

The *t* statistic is shown in parenthesis.
*, **, *** indicates statistical significance at 10, 5 or 1 percent, respectively.

Table 8: Ratio of Mexico's RCA with respect to the High Tech Basket RCA

Dependent Variable: $\ell n\left(\frac{RCA_i^{Mex}}{RCA_i^{HTBkt}}\right)$

Independent Variables:	ec. (1)	ec. (2)	ec. (3)	ec. (4)	ec. (5)
$\ell n\left(\frac{TFP_i^{Mex}}{TFP_i^{HTBkt}}\right)$	0.5327*** (3.02)			0.7125*** (4.65)	
$\ell n\left(\frac{LP_i^{Mex}}{LP_i^{HTBkt}}\right)$		0.3023 (1.15)			0.3579 (1.32)
Capital Intensity			-4.3969** (-2.29)	-2.7725 (-1.41)	-4.6372** (-2.32)
Human Capital Intensity			-0.2169 (-0.59)	-0.9853** (-2.48)	-0.2394 (-0.64)
Constant	2.3939*** (2.95)	1.8947 (1.18)	1.5164** (2.37)	4.9572*** (5.80)	3.7341** (2.11)
R^2	0.2172	0.0226	0.0768	0.3734	0.1081
Adjusted R^2	0.1960	-0.0038	0.0255	0.3197	0.0317
Prob F	0.0045	0.2593	0.0480	0.0000	0.0678

The *t* statistic is shown in parenthesis.
*, **, *** indicates statistical significance at 10, 5 or 1 percent, respectively.
China is not included in the basket.

Table 9: Ratio of Mexico's RCA with respect to the Low Tech Basket RCA

Dependent Variable: $\ell n\left(\frac{RCA_i^{Mex}}{RCA_i^{LTBkt}}\right)$

Independent Variables:	ec. (1)	ec. (2)	ec. (3)	ec. (4)	ec. (5)
$\ell n\left(\frac{TFP_i^{Mex}}{TFP_i^{LTBkt}}\right)$	0.0067 (0.05)			-0.0573 (-0.35)	
$\ell n\left(\frac{LP_i^{Mex}}{LP_i^{LTBkt}}\right)$		-0.0800 (-0.89)			-0.0219 (-0.22)
Capital Intensity			-1.5153 (-1.03)	-1.7015 (-1.04)	-1.5118 (-1.02)
Human Capital Intensity			0.5706** (2.16)	0.5840** (2.16)	0.5640** (2.05)
Constant	-0.3361 (-0.66)	-0.7279 (-1.58)	-0.5472 (-0.99)	-0.6925 (-1.05)	-0.6429 (-0.94)
R^2	0.0000	0.0048	0.0926	0.0955	0.0929
Adjusted R^2	-0.0270	-0.0221	0.0422	0.0178	0.0151
Prob F	0.9639	0.3767	0.0507	0.1105	0.0998

The *t* statistic is shown in parenthesis.

*, **, *** indicates statistical significance at 10, 5 or 1 percent, respectively.

China is not included in the basket.

Table 10: Relative Market Gain of Mexico vs. China in U.S. Imports (Data corresponds to the period after China entered to the WTO)

Dependent Variable: $\frac{\Delta X^{Mexico} - \Delta X^{China}}{X^{Mexico} + X^{China}}$

Independent Variables:	ec. (1)	ec. (2)	ec. (3)	ec. (4)	ec. (5)	ec. (6)
$\ell n\left(\frac{RCA_i^{Mex}}{RCA_i^{China}}\right)$	0.3654** (2.22)					
$\ell n\left(\frac{TFP_i^{Mex}}{TFP_j^{China}}\right)$		0.2725* (1.78)			0.4422* (1.83)	
$\ell n\left(\frac{LP_i^{Mex}}{LP_i^{China}}\right)$			0.3479 (1.66)			0.5582* (1.77)
Capital Intensity				-1.4044 (-0.99)	-1.0846 (-0.73)	-2.2669 (-1.53)
Human Capital Intensity				-0.2328 (-0.71)	-0.7370 (-1.44)	-0.5394 (-1.27)
Constant	-0.2464 (-1.58)	0.2741 (0.66)	0.8891 (1.12)	0.3965 (0.61)	1.6568 (1.49)	2.7467 (1.64)
R^2	0.1271	0.0610	0.0390	0.0181	0.1365	0.0987
Adjusted R^2	0.1035	0.0356	0.0130	-0.0365	0.0625	0.0214
Prob F	0.0327	0.0829	0.1064	0.5425	0.2513	0.2332

The *t* statistic is shown in parenthesis.

*, **, *** indicates statistical significance at 10, 5 or 1 percent, respectively.

Table 11: Relative Market Gain of Mexico vs. High Tech Basket in U.S. Imports

Dependent Variable:	$\frac{\Delta X^{Mexico} - \Delta X^{HTBkt}}{X^{Mexico} + X^{HTBkt}}$					
Independent Variables:	**ec. (1)**	**ec. (2)**	**ec. (3)**	**ec. (4)**	**ec. (5)**	**ec. (6)**
$\ell n\left(\frac{RCA_i^{Mex}}{RCA_i^{HTBkt}}\right)$	0.8761*** (3.42)					
$\ell n\left(\frac{TFP_i^{Mex}}{TFP_i^{HTBkt}}\right)$		0.7998** (2.58)			1.1045** (2.67)	
$\ell n\left(\frac{LP_i^{Mex}}{LP_i^{HTBkt}}\right)$			0.5803* (1.76)			0.6538* (1.97)
Capital Intensity				-5.1335* (-1.78)	-2.6152 (-0.83)	-5.5724* (-1.82)
Human Capital Intensity				-0.4016 (-0.59)	-1.5928* (-1.72)	-0.4426 (-0.64)
Constant	0.7062*** (3.15)	4.2403*** (2.72)	4.2425** (2.08)	2.6045** (2.64)	7.9387*** (3.02)	6.6554** (2.61)
R^2	0.2998	0.1913	0.0325	0.0477	0.3261	0.0885
Adjusted R^2	0.2809	0.1694	0.0063	-0.0052	0.2683	0.0104
Prob F	0.0015	0.0141	0.0867	0.0791	0.0361	0.0920

The *t* statistic is shown in parenthesis.
*, **, *** indicates statistical significance at 10, 5 or 1 percent, respectively.
China is not included in the basket.

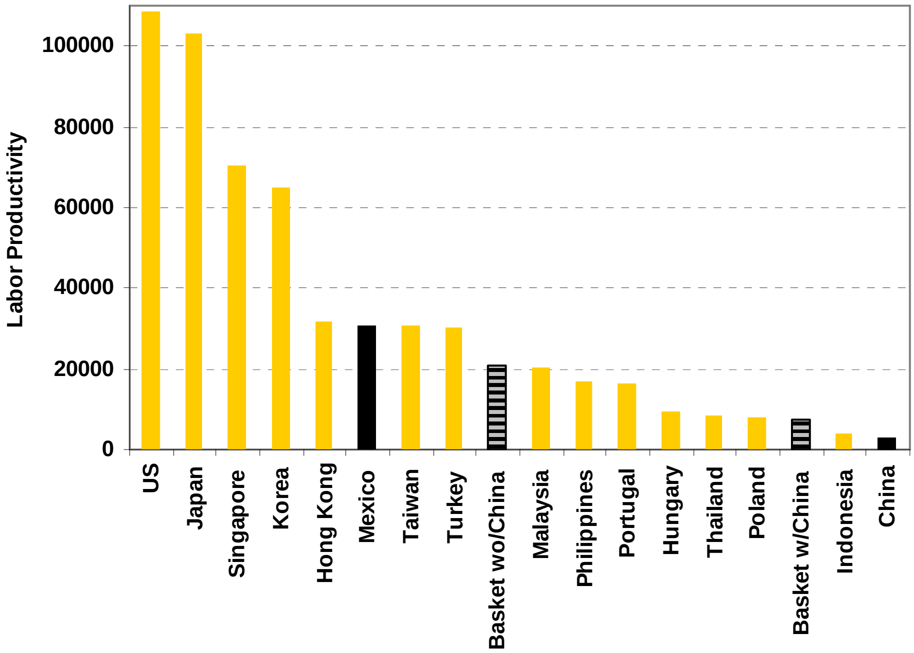
Table 12: Relative Market Gain of Mexico vs. Low Tech Basket in U.S. Imports

Dependent Variable:	$\frac{\Delta X^{Mexico} - \Delta X^{LTBkt}}{X^{Mexico} + X^{LTBkt}}$					
Independent Variables:	**ec. (1)**	**ec. (2)**	**ec. (3)**	**ec. (4)**	**ec. (5)**	**ec. (6)**
$\ell n\left(\frac{RCA_i^{Mex}}{RCA_i^{LTBkt}}\right)$	0.3905** (2.40)					
$\ell n\left(\frac{TFP_i^{Mex}}{TFP_i^{LTBkt}}\right)$		0.2305 (1.28)			0.1456 (0.76)	
$\ell n\left(\frac{LP_i^{Mex}}{LP_i^{LTBkt}}\right)$			0.3296*** (3.03)			0.3971*** (3.16)
Capital Intensity				-3.4582 (-1.63)	-2.9848 (-1.30)	-3.5208 (-1.57)
Human Capital Intensity				0.5386 (1.40)	0.5044 (1.30)	0.6572* (1.71)
Constant	0.7436*** (5.64)	1.3350** (2.11)	2.1309*** (3.93)	0.9743* (1.69)	1.3437 (1.58)	2.7061*** (3.41)
R^2	0.1624	0.0540	0.0865	0.1433	0.1632	0.2650
Adjusted R^2	0.1397	0.0284	0.0618	0.0957	0.0915	0.2020
Prob F	0.0215	0.2087	0.0044	0.1948	0.3419	0.0147

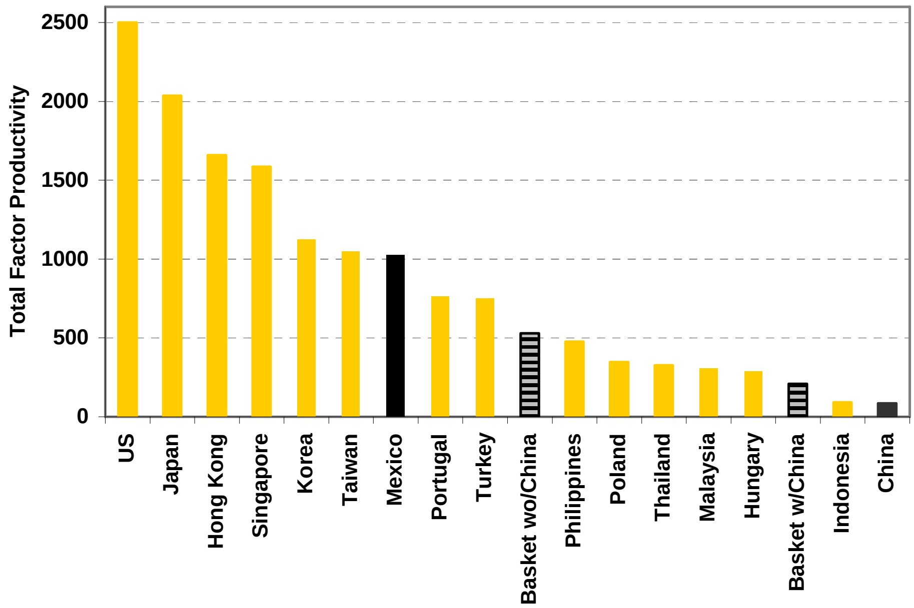
The *t* statistic is shown in parenthesis.
*, **, *** indicates statistical significance at 10, 5 or 1 percent, respectively.
China is not included in the basket.

Figure 1: Productivity Levels (1995 Dollars)

(a) Labor Productivity



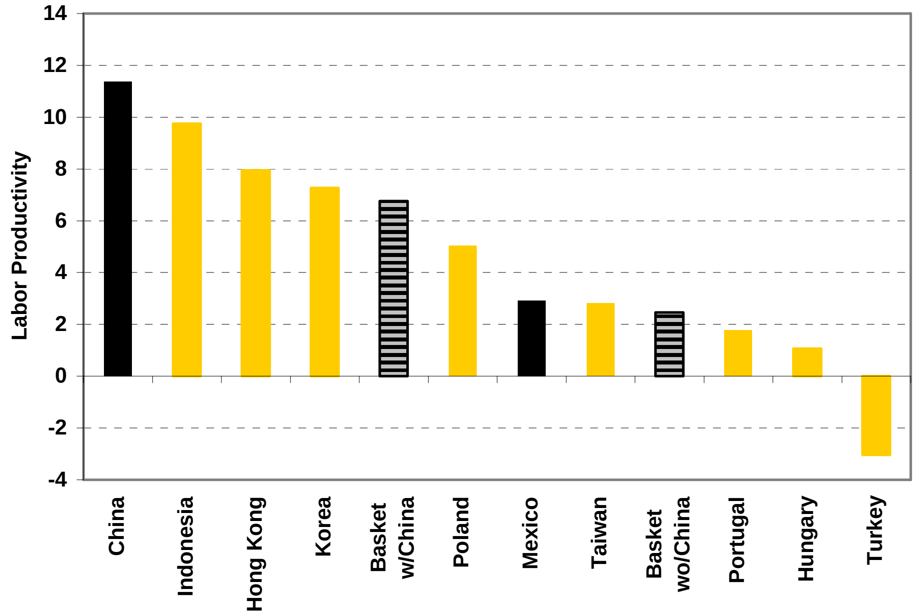
(b) TFP



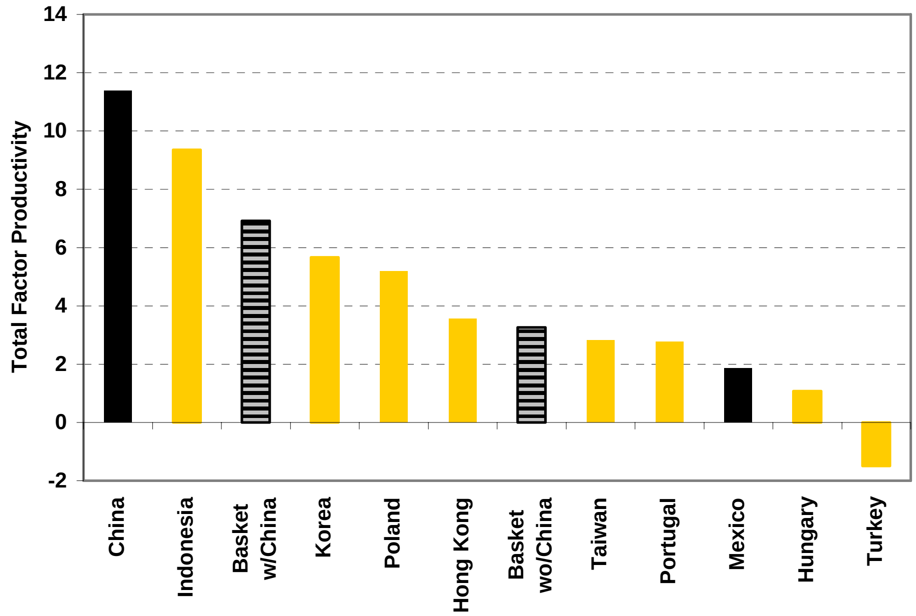
Note: Productivity levels for each country were estimated with different periods: the U.S., 1997-2001; Japan, 1994-2001; Singapore, 1994-2002; Hong Kong, 1994-2002; South Korea, 1994-2002; Taiwan, 1994-2002; Mexico, 1997-2002; Portugal, 1994-2002; Turkey, 1993-2000; the Philippines, 1998-1999; Poland, 1994-2002; Thailand, 1998-2000; Malaysia, 2000-2001; Hungary, 1994-2002; Indonesia, 1998-2002; and China, 1994-2002.

Figure 2: Productivity Growth Rates (Annual % Change)

(a) Labor Productivity



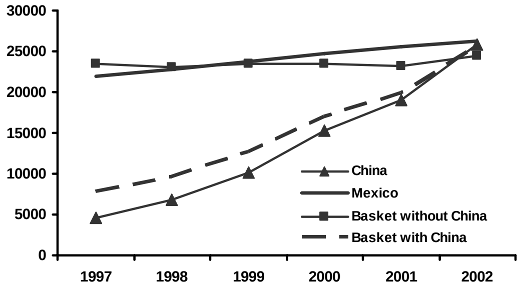
(b) TFP



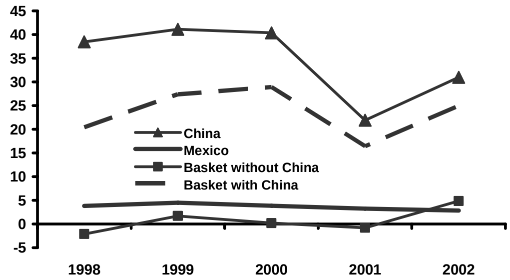
Note: Productivity levels for each country were estimated with different periods: the U.S., 1997-2001; Japan, 1994-2001; Singapore, 1994-2002; Hong Kong, 1994-2002; South Korea, 1994-2002; Taiwan, 1994-2002; Mexico, 1997-2002; Portugal, 1994-2002; Turkey, 1993-2000; the Philippines, 1998-1999; Poland, 1994-2002; Thailand, 1998-2000; Malaysia, 2000-2001; Hungary, 1994-2002; Indonesia, 1998-2002; and China, 1994-2002.

Figure 3: Electrical Machinery, Apparatus and Appliances
(1995 Dollars)

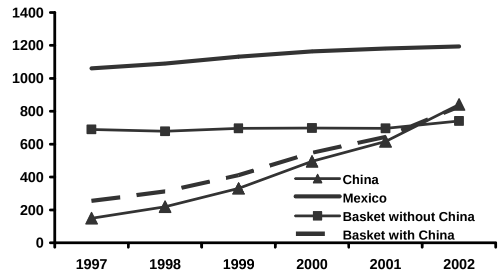
(a) Labor Productivity Level



(b) Labor Productivity Growth Rate



(c) TFP Level



(d) TFP Growth Rate

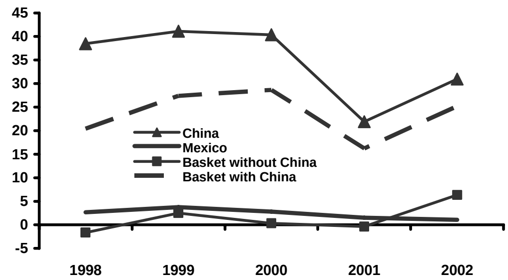
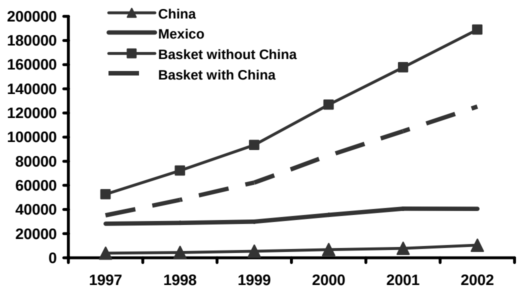
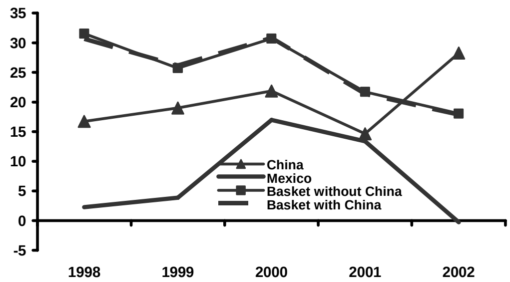


Figure 4: Telecom. and Sound Rec. And Rep. Apparatus and Eq.
(1995 Dollars)

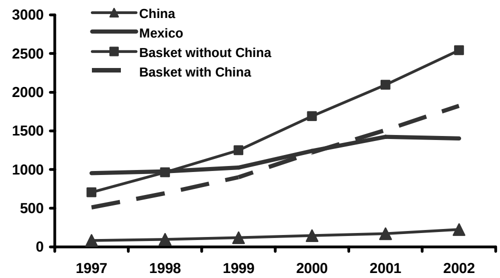
(a) Labor Productivity Level



(b) Labor Productivity Growth Rate



(c) TFP Level



(d) TFP Growth Rate

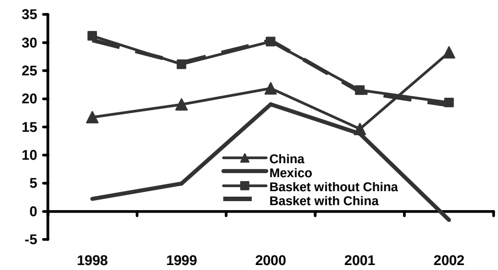
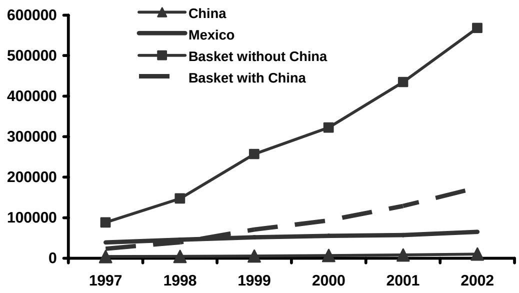


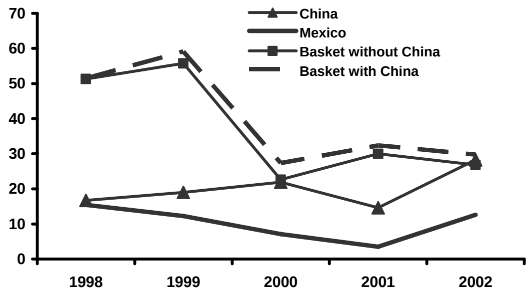
Figure 5: Office and Automatic Data Processing Machines

(1995 Dollars)

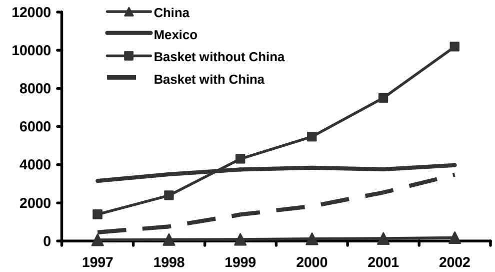
(a) Labor Productivity Level



(b) Labor Productivity Growth Rate



(c) TFP Level



(d) TFP Growth Rate

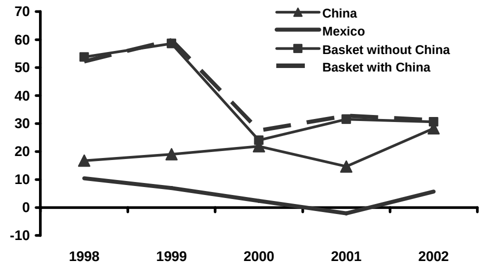
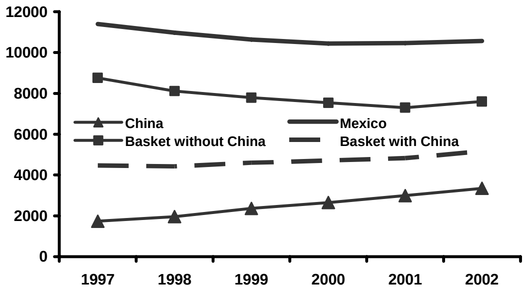
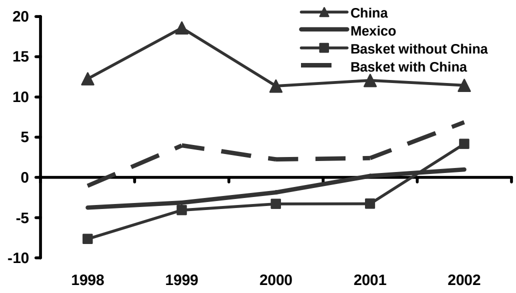


Figure 6: Articles of Apparel and Clothing Accessories
(1995 Dollars)

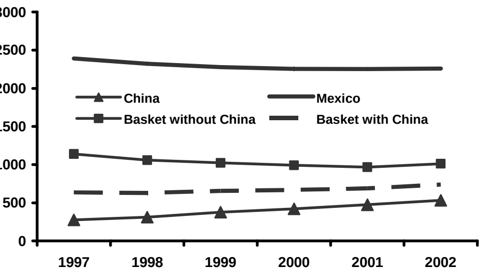
(a) Labor Productivity Level



(b) Labor Productivity Growth Rate



(c) TFP Level



(d) TFP Growth Rate

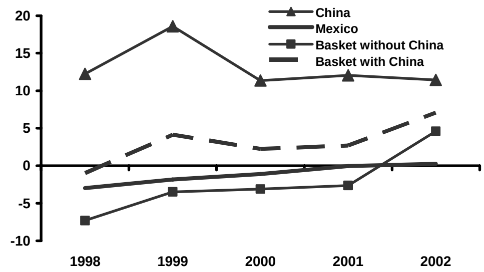
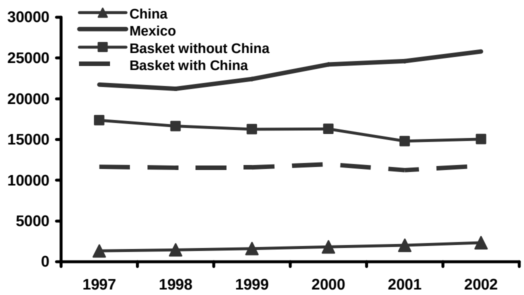
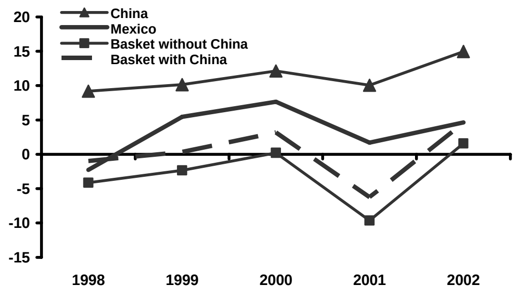


Figure 7: Miscellaneous Manufactured Articles
(1995 Dollars)

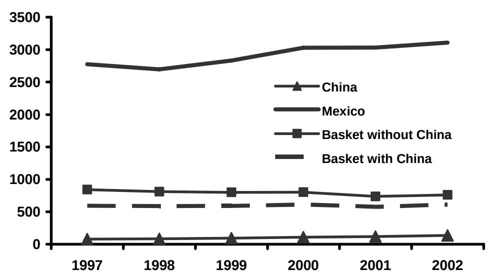
(a) Labor Productivity Level



(b) Labor Productivity Growth Rate



(c) TFP Level



(d) TFP Growth Rate

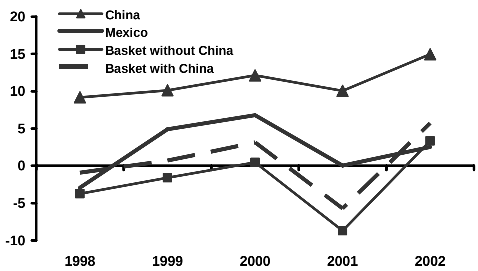
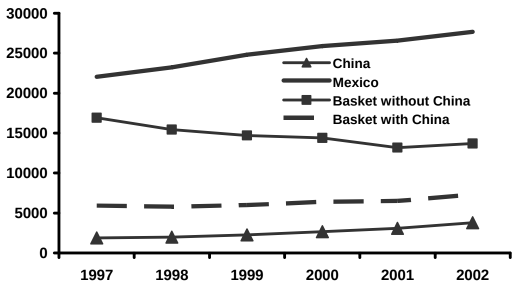


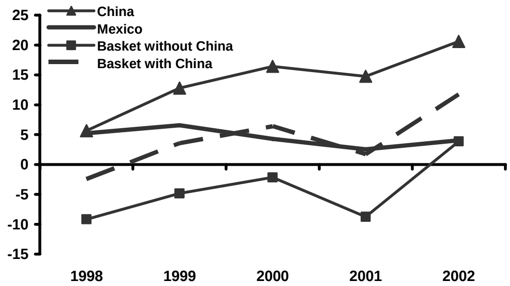
Figure 8: Manufactures of Metals

(1995 Dollars)

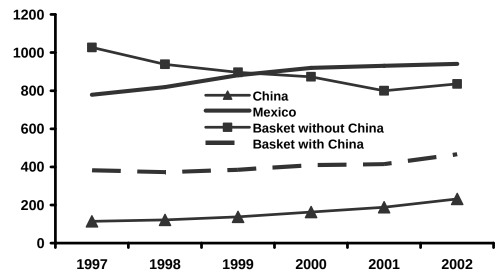
(a) Labor Productivity Level



(b) Labor Productivity Growth Rate



(c) TFP Level



(d) TFP Growth Rate

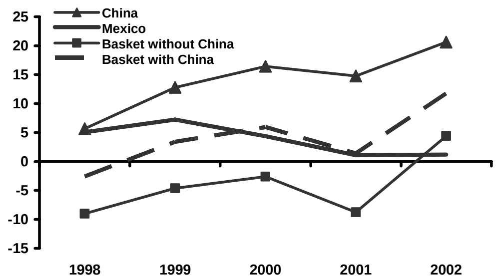
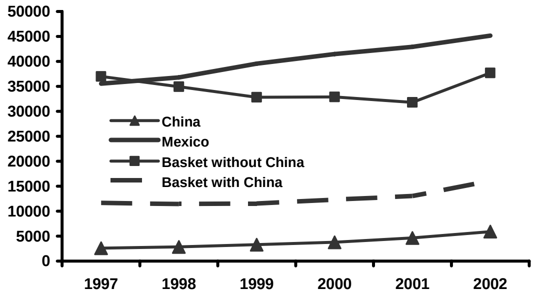


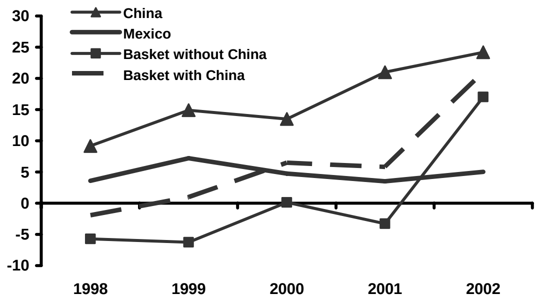
Figure 9: Road Vehicles

(1995 Dollars)

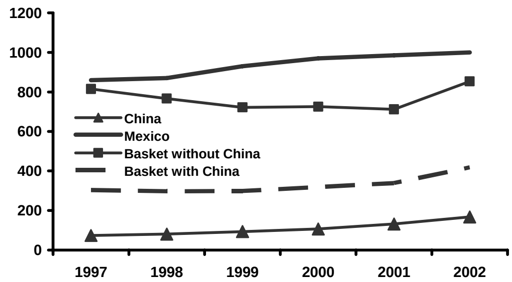
(a) Labor Productivity Level



(b) Labor Productivity Growth Rate



(c) TFP Level



(d) TFP Growth Rate

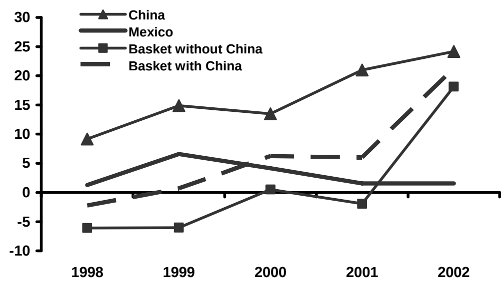
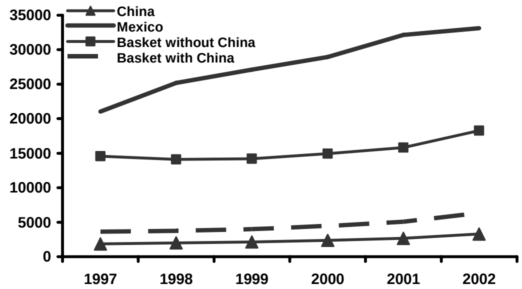


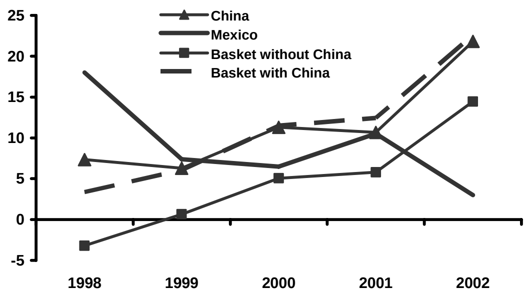
Figure 10: Power Generating Machinery and Equipment

(1995 Dollars)

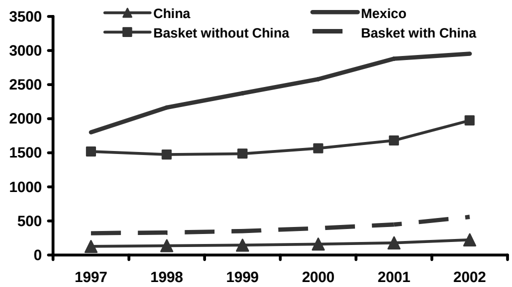
(a) Labor Productivity Level



(b) Labor Productivity Rate



(c) TFP Level



(d) TFP Rate

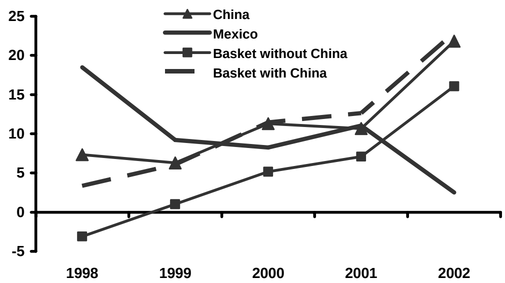
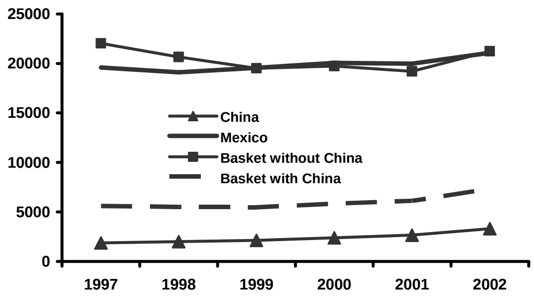


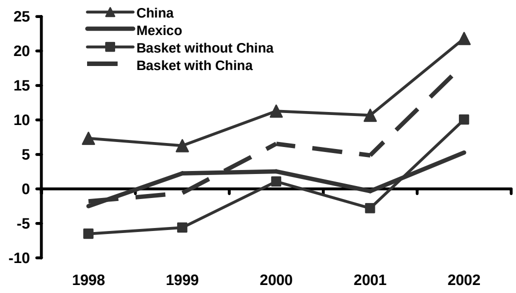
Figure 11: General Industrial Machinery and Equipment

(1995 Dollars)

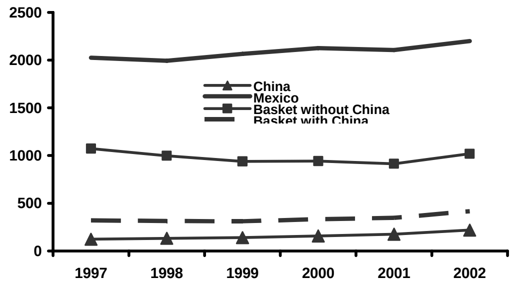
(a) Labor Productivity Level



(b) Labor Productivity Growth Rate



(c) TFP Level



(d) TFP Growth Rate

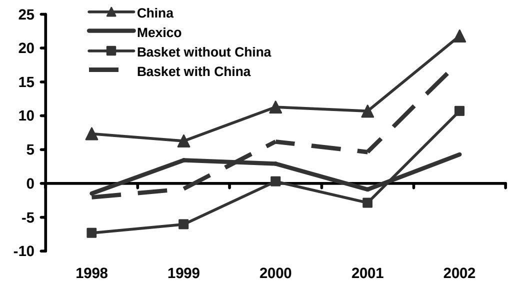


Figure 12: Mexico's RCA/China's RCA and Relative Labor Productivity Level of Mexico vs. China

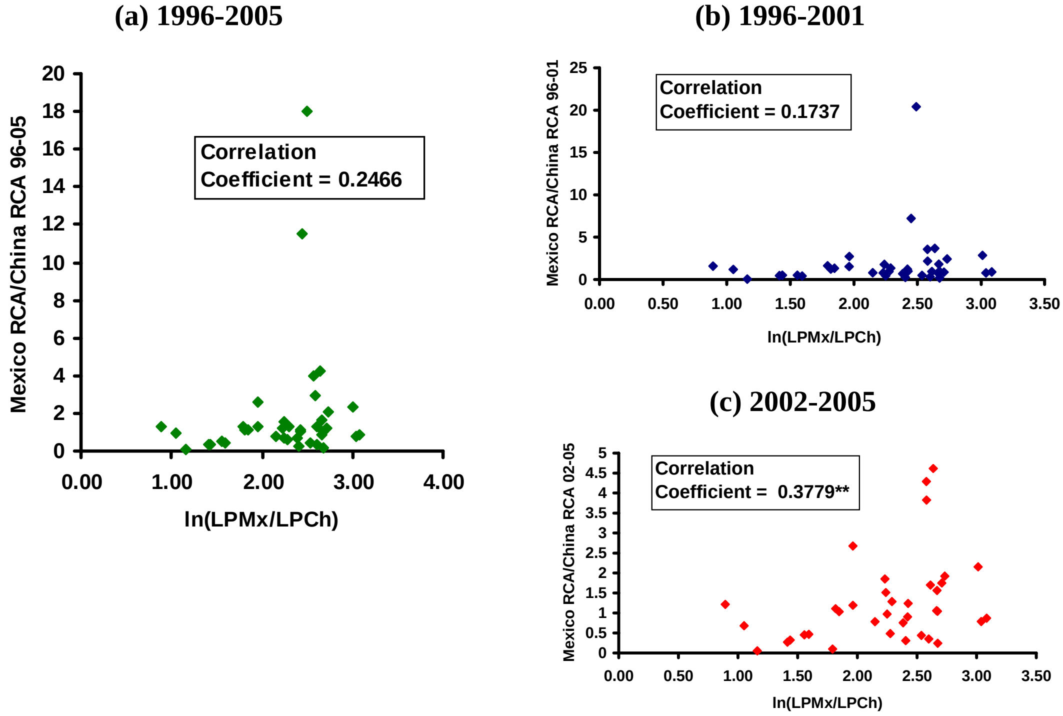


Figure 13: Mexico's RCA/Basket without China's RCA and Relative Labor Productivity Level of Mexico vs. Basket without China

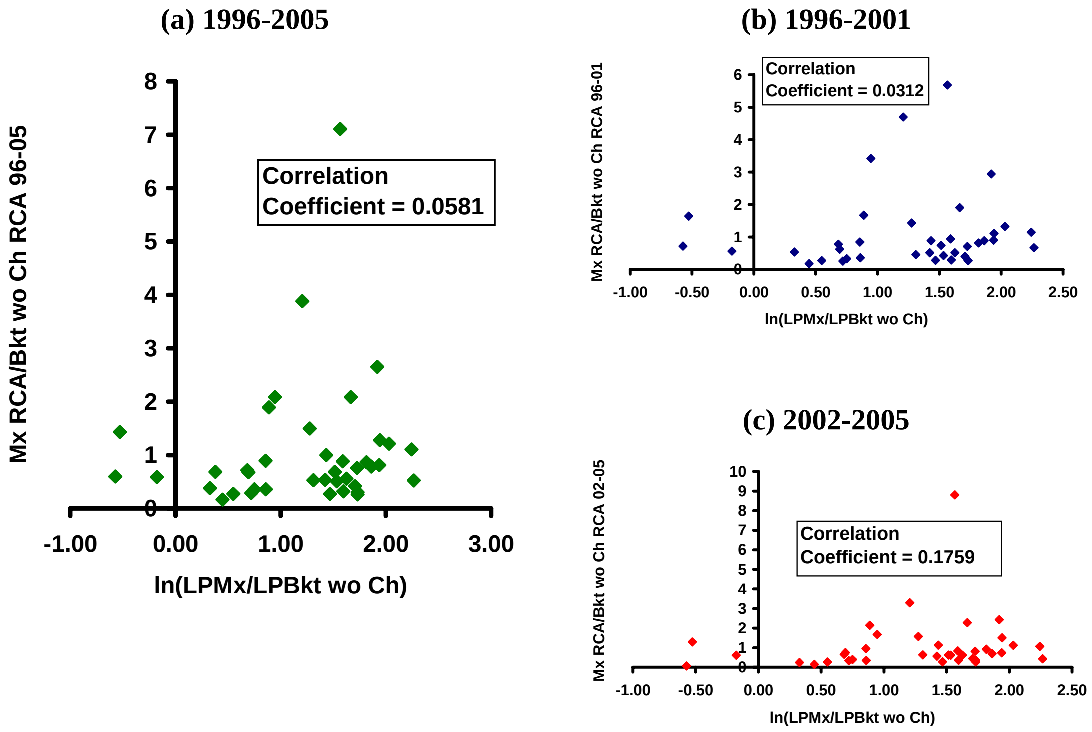


Figure 14: Mexico's RCA/China's RCA and Relative TFP Level of Mexico vs. China

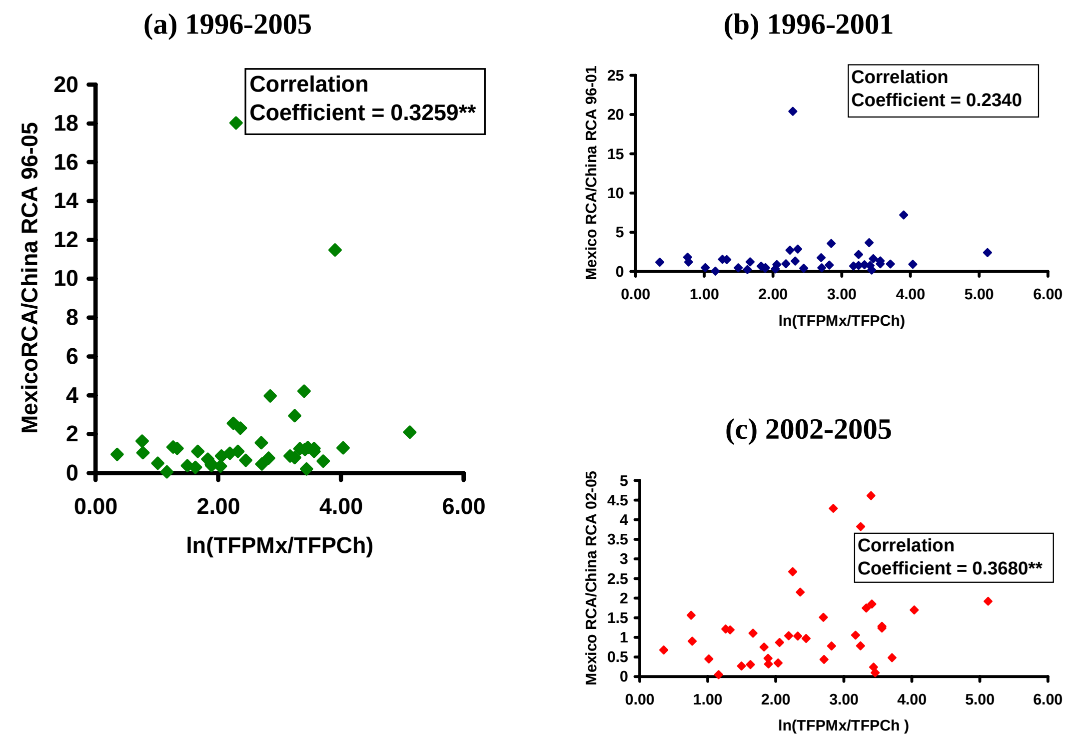


Figure 15: Mexico’s RCA/Basket without China’s RCA and Relative TFP Level of Mexico vs. Basket without China

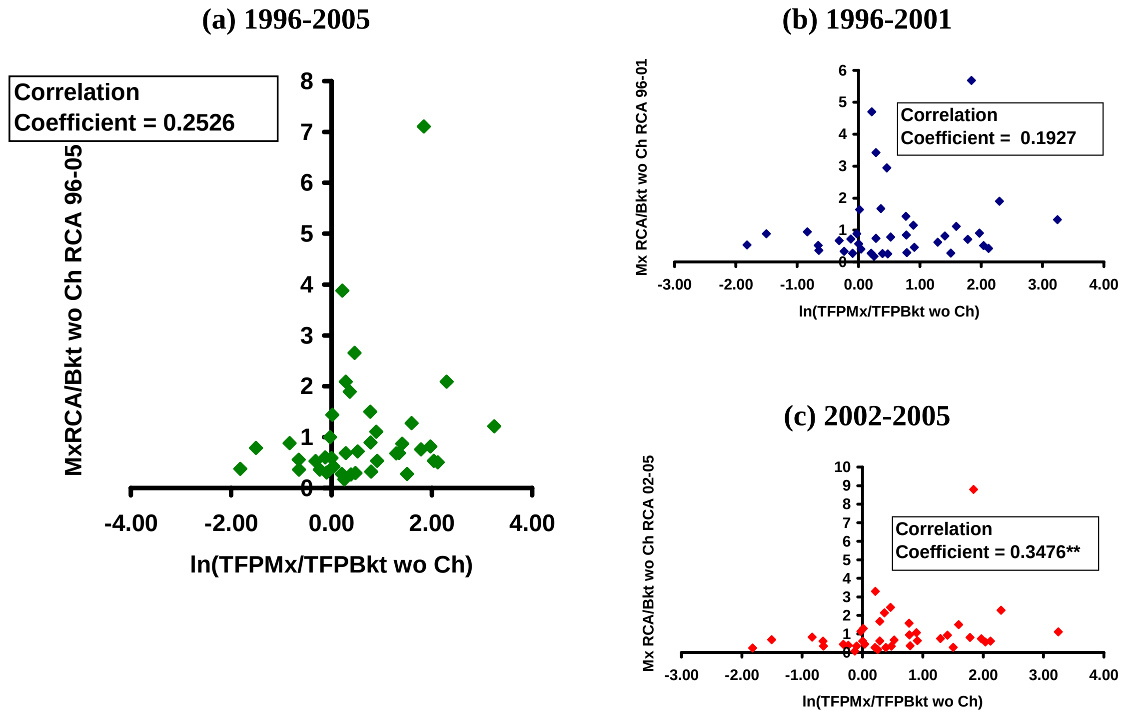


Figure 16: Relative Market Gain of Mexico vs. China and Relative Labor Productivity Level of Mexico vs. China

(a) 1996-2001 (b) 2001-2005

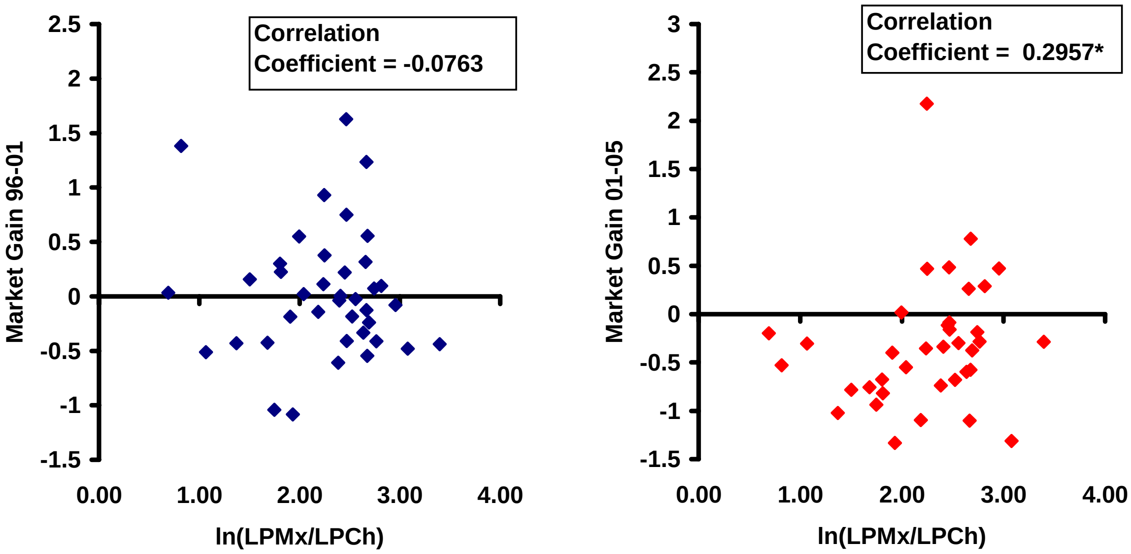


Figure 17: Relative Market Gain of Mexico vs. Basket without China and Relative Labor Productivity Level of Mexico vs. Basket without China

(a) 1996-2001 (b) 2001-2005

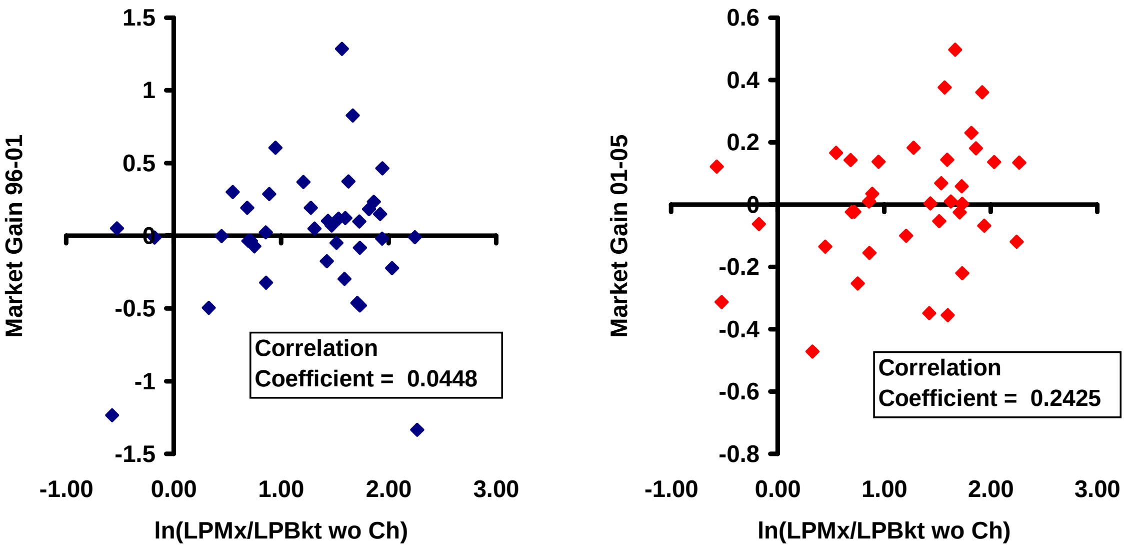


Figure 18: Relative Market Gain of Mexico vs. China and Relative TFP Level of Mexico vs. China

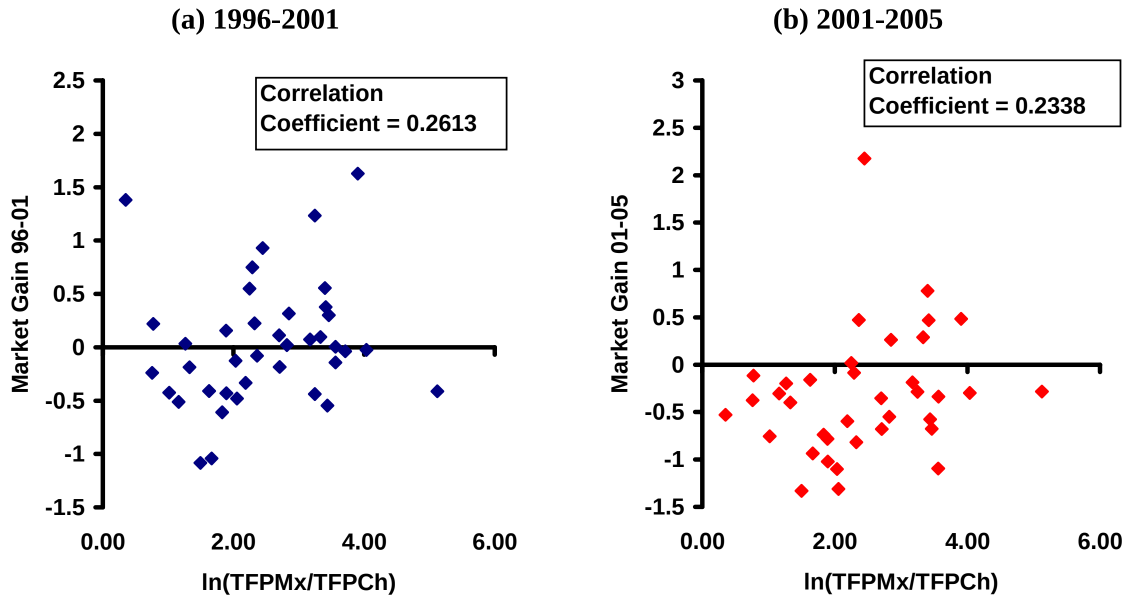


Figure 19: Relative Market Gain of Mexico vs. Basket without China and Relative TFP Level of Mexico vs. Basket without China