Policy Research Working Paper 4497

How Sensitive Are Latin American Exports to Chinese Competition in the U.S. Market?

J. Ernesto López-Córdova
Alejandro Micco
Danielken Molina

The World Bank
Financial and Private Sector Development Vice Presidency
Enterprise Analysis Unit
January 2008

Abstract

This paper estimates the elasticity of substitution of U.S. imports using detailed trade data over the 1990-2003 period. The authors use a two-stage least squares framework in order to identify the elasticity parameter of interest. The authors use the elasticity estimates to assess the extent to which Latin American and Chinese goods compete in the U.S. market by providing forecasts of how alternative policy scenarios may affect exports to the United States. The analysis considers the following scenarios: (i) currency revaluation in China; (ii) elimination of U.S. tariffs on Latin American exports under a hemispheric free trade agreement; and (iii) the elimination of quotas on apparel and textile exports under the Multi-Fiber Agreement. The findings show that a 20-percent appreciation of the renminbi reduces Chinese exports to the United States by a fifth, although since other regions increase sales to that market (0.5 percent for Latin America), U.S. imports decline by only 1.7 percent. Hemispheric free trade would increase Latin America's exports to the United States by around 3 percent. The removal of the quotas would lead to a sharp increase in Chinese sales to the United States (40 percent), but Latin America would see its share of the U.S. market decline by around 2 percent (2.5 percentage points). China's gains would come mainly at the expense of other regions of the world.

This paper—a product of the Enterprise Analysis Unit, Financial and Private Sector Development Vice Presidency—is part of a larger effort to study and promote reforms in the business environment. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The corresponding author may be contacted at jlopezcordova@ifc.org.

How Sensitive Are Latin American Exports to Chinese Competition in the U.S. Market?

J. Ernesto López-Córdova, Alejandro Micco, and Danielken Molina*

Keywords: Trade elasticities; trade policy; United States; China; Latin America
JEL Classification: F1

* The authors are affiliated, respectively, with the International Finance Corporation, World Bank Group; the Chilean Ministry of Finance; and the University of California, San Diego. The opinions expressed herein do not necessarily reflect the views of those institutions.

1 Introduction

Chinese exports increasingly compete with Latin American and Caribbean (LAC) products in world markets.[1] Competition in the US market is of particular importance. The United States has been Latin America's most important trade partner over the postwar era. As a fraction of the region's trade with the world[2], trade with the United States stood at 60 percent in 2000, up from less than 47 percent in 1960, having grown continuously since the mid-1970s (see Figure 1). Latin America has also been an important trade partner for the United States, although there have been important fluctuations over the last three decades. As Figure 2 shows, total trade with Latin America fell in importance through the late 1980s, but has been picking up since then. What Figure 2 also highlights is the growing importance of US-China trade, which has come from representing an insignificant fraction of US trade to more than 5 percent nowadays.

The remarkable growth in US trade with China, and the challenges it portends for Latin American countries, are most impressive when we look at US import data; see Table 1. From 1990 to 2003, Latin American exports to the United States increased from $58 billion to $196 billion, growing, in real terms, at an annual rate of 6.9 percent. As US imports from the world as a whole grew at 4.8 percent over the same period, Latin America's share of the US market rose from 13.5 in 1990 to 17.5 in 2003. In the meantime, however, Chinese sales to the United States grew at a breakneck 16.6 percent annually, reaching $147 billion in 2003. China's export dynamism has allowed its share of US imports to increase four-fold to 13.2 percent in 2003.

Although Latin America as a whole had a fair export performance over the last decade, aggregate figures mask important differences among countries in the region. The lion's share of the growth in exports from Latin America, more than 80 percent, came from Mexico, a country that increased its share of the US market from 6 to 11.5 percent from 1990 to 2003. Over the same period, exports from Caribbean, Andean and

---

[1] See Devlin et al (2005).

[2] By trade here we mean the sum of exports and imports.

other South American countries grew more slowly than world exports to the United States; only Central America, along with Mexico, performed better than the world as whole. And even Mexico, despite being bound to the United States by geography and by the North American Free Trade Agreement, has not been able to keep up with China's export dynamism. By 2003 the latter had surpassed Mexico as the United States' second most important import supplier, only behind Canada.

Aggregate trade figures also hide differences in the sectoral composition of Chinese and Latin American exports to the United States (Table 2). The latter is an important supplier of agricultural and mining products (including oil) to the United States, with respective shares of around 50 and 30 percent of US important demand. Close to a quarter of all Latin American exports consists of non-manufacturing goods, or around three quarters in the case of the Andean countries. At the opposite extreme, Mexico has the highest share of manufacturing exports to the United States (86 percent), followed by Central America and South America (84 percent in both cases). Central American countries in particular saw a significant change in the composition of its exports, with a 20 percentage-point drop in the share of agricultural exports shifting to manufacturing. In contrast to Latin America, China is a relatively insignificant supplier of agricultural and mining exports, while manufactures represent over 99 percent of exports to the United States.

There are important differences within the manufacturing sector as well (Table 3). In 2003, approximately a fifth of all Chinese exports to the US market was comprised by leather (including footwear), textile and apparel products, compared with around 8 to 9 percent in the case of Mexico or South America, or with 75 percent for Central America. Moreover, machinery and equipment exports amounted to almost a half of all Chinese sales to the United States, compared to 5 percent or 10 percent for the Andean and Central American countries, respectively, or 76 percent in the case of Mexico.

China's strong export performance ---and Latin America's relative weakness--- has been made patently manifest since 2000. During the 2000-2003 period, as the US demand for world goods declined at a rate of 3.2 percent per year, or 2.7 percent in the case of Latin American goods, Chinese exports to the United States expanded at a rate of 11.9 percent per annum. Figures for the manufacturing sector are more dismal, showing a yearly decline of 3.9 percent in Latin American exports, or as high as 12 and 17 percent, respectively, for Caribbean and Andean nations. Chinese exports of leather goods, apparel and textiles expanded at a 7.3 percent annual rate, compared with negative rates greater than 8 percent for Mexico and South America; for Latin America as a whole exports in this area declined by more than five percent per year. In machinery and equipment, while China's exports grew by 15 percent annually, exports from Central America contracted at almost 18 percent per year, although the region as a whole performed slightly better.

China's export dynamism has been undeterred by higher tariffs, relative to Latin America, levied in the United States. In 2003, average tariff on manufacturing imports were more than three times higher on Chinese than on Latin American goods. Mexican exports of leather-goods, textiles and apparel paid on average 0.8 percent ad valorem, compared to 9.4 percent in the case of Chinese exports. Of course, averages hide differences in the composition of exports coming from each country and should be read with caution. Still, tariff provisions under the North American Free Trade Agreement (NAFTA), the Andean Trade Preference Act (ATPA) or the Caribbean Basin Initiative (CBI) give a preferential edge to some Latin American nations over China. While some studies demonstrate that indeed tariff preferences (e.g., those under NAFTA) have led to increased exports to the United States, China appears to have a comparative advantage that it is difficult to compensate through low tariffs on Latin American exports.

The picture that emerges from the previous barrage of trade statistics is one showing that China has become a direct competitor with Latin American countries in their prime export destination, and that such competition is rapidly eroding their share of the US market. That appears to be particularly the case for exporters of manufactures, such as Mexico, Central America and the Caribbean, and especially in low-wage industries, like leather-goods, textiles, and apparel. A natural question to ask is how changes in the policy environment would alter the current situation. For one, some of the countries that appear to be more vulnerable to Chinese competition have recently established trade agreements granting them preferential access to the US market —e.g., CAFTA[3]— and the region as a whole has contemplated establishing a hemispheric-wide Free Trade Area of the Americas (FTAA). Such initiatives might help the region compete

[3] The U.S.-Dominican Republic-Central America Free Trade Agreement.

more effectively with China in the United States. On the other hand, the January 2005 removal of quotas in place under the Multi-Fiber Agreement has led to an increased Chinese presence in US apparel and textile consumption. Beyond changes in the realm of trade policy, an additional factor that would impact Latin American exports to the United States is the possibility of a steep appreciation of the renminbi.

How much would hemispheric free trade improve the competitiveness of Latin American exports to the United States? How will the elimination of apparel and textile import quotas in place under the Multi-Fiber Agreement (MFA) affect the region's exports of these products? How much would a revaluation of the Chinese currency, the renminbi, translate in increased LAC exports? In order to shed light on some of the above questions, in this paper we use detailed U.S. import data (6-digit HS level, disaggregated by partner country, over the 1990-2003 period) to measure the elasticity of substitution between Latin American and Chinese exports to the United States. We assume that the preferences for domestic and imported varieties of a representative consumer in the U.S. market, are represented by a utility function with constant elasticity of substitution. We then derive an expression for U.S. demand for imports from each country, which is a function of the price of imports from the given country, a sectoral price index, the elasticity of substitution, and U.S. income allocated to the consumption of the product in question.

In order to correctly estimate the elasticity of substitution in the demand equation, one needs to deal with the endogeneity bias that arises between the demand equation and the price level of the good. Therefore, we instrument the price of the final good with three sets of instruments: *i) transport costs, ii) import tariffs, and iii) wages, cost of inputs, and cost of capital*. Given the level of desegregation of our data, we are able to estimate the elasticity of substitution per economic sector, which are in line with the results obtained by recent studies. We use the estimated elasticities to forecast how alternative policy scenarios that affect the relative price of Latin American and Chinese goods would change U.S. import patterns. The scenarios considered are: *i) a revaluation of the renminbi; ii) the elimination of tariffs on hemispheric exports to the United States as a result of a continent-wide free trade agreement; and iii) apparel and textile import quota elimination in the U.S. market.*

The rest of the paper proceeds as follows. Section 2 describes the empirical strategy followed to correctly estimate the elasticity of substitution per economic sector. Section 3 presents the estimation results. Section 4 uses the estimation results to perform the simulations to evaluate the impact on Latin American exports to the U.S. market of the policy scenarios described above, and Section 5 concludes.

2 Empirical Framework

In this section we present our empirical framework for estimating US import elasticities. We assume that there is a set of goods and that each country can produce a different variety of each good. For goods produced in a given sector, US imports are characterized by a constant elasticity of substitutions (CES) demand function. Therefore, US expenditures $\left(p^c q_{jsct}\right)$ on good j in sector s from country c in year t is given by (in logs):

$$p^c q_{jsct} = d_{jsct} + (1-\sigma_s)\left(p^c_{jsct} - p^c_{.s.t}\right) + y_{st} \tag{1}$$

Where $p^c_{.s.t}$ is the log US aggregate price for goods in sector s in year t. The term d_{jsct} is a demand shifter (in logs), σ_s represents the elasticity of substitution among good in sector s, p^c_{jsct} is the CIF price of good j from country c paid by consumers in the United States, and y_{st} is US expenditure in goods classified in sector s (in logs). We assume that the demand shifter could be decomposed into a country-good component $\left(d_{jsc}\right)$ plus a country-year component $\left(d_{ct}\right)$. This is a flexible specification that allows us to have different preferences for each good and variety and, moreover, it allows preferences for goods from a given country, as well as the US expenditure share in each sector, to vary over time.

Due to the standard simultaneity bias that arises when we try to estimate the demand elasticity (σ) in equation (1) using OLS, we proceed to instrument the CIF price variable $\left(p^c_{jsct}\right)$ with a set of three instrumental variables: transport costs, tariffs and prices of inputs. Once we have instrumented the price of the good, we proceed to estimate equation (1) with country-good fixed effects (d_{jsc}), country-year dummies (d_{ct}), and sector-year fixed effects. The latter controls aggregate prices $(p^c_{.s.t})$ and US expenditure in a given sector (y_{st}).

2.1 Price Instrument

We assume that firms produce q_{jsct} with labor and capital using a Cobb Douglas technology. Under this assumption the producer's price in a given country is given by:

$$p^s_{jsct} = \ln(\mu_{jsc}) - a_{jsct} + \alpha^l_{jsc} w_{ct} + \alpha^k_{jsc} r_{ct} + (1 - \alpha^l_{jsc} - \alpha^k_{jsc} - \alpha^m_{jsc}) q_{jsct} \qquad (2)$$

μ is the markup (price divided by marginal costs) and α_S are input elasticities, all of them fixed overtime. The term a_{jsct} represents log TFP, and w_{ct} and r_{ct} are the factor prices for employment and capital required to produce j in country c, respectively. We assume that TFP could be decomposed into a country-good component (a_{jsc}) plus a country-year component (a_{ct}). In equilibrium, the price per unit of consumption that a consumer pays in the U.S. market (in logs) is equal to the producer price (p^s_{jsct}) of the good, plus the tariff level (τ_{jsct}) and the transport costs (tc_{jsct}) :

$$p^c_{jsct} = p^s_{jsct} + \ln(1 + \tau_{jsct} + tc_{jsct}) \approx p^s_{jsct} + \tau_{jsct} + tc_{jsct} \qquad (3)$$

Substituting equation (2) into equation (3) we obtain the following equation:

$$\begin{aligned} p^c_{jsct} = {} & \ln(\mu_{jsc}) - a_{jsc} - a_{ct} + \alpha^l_{jsc} w_{ct} + \alpha^k_{jsc} r_{ct} \\ & + (1 - \alpha^l_{jsc} - \alpha^k_{jsc} - \alpha^m_{jsc}) q_{jsct} + \tau_{jsct} + tc_{jsct} \end{aligned} \qquad (4)$$

Equation (4) suggests the set of instruments required to correctly estimate the demand elasticity in Equation (1). The first set of instruments is given by the interaction between the input requirement and the price of the input used in the production of good

j, of sector s per country c (one instrument per type of input); a second set of instrument is given by the US tariff on good *j* from country c in year t; and, finally, the third instrument is given by the transport costs of importing good j from country c. On the one hand, it is important to note that an increase in US demand for goods from country c will increase country c's input prices. The co-movement between exports and input prices does not invalidate our instrument because in equations (1) and (4) we include a country-year dummy that captures any aggregate movement. More precisely, our first set of instruments is the *differential effect* of input prices across goods with different input requirements per economic sector. On the other hand, as pointed by Clark et al (2004), we should also note that transport costs are increasing in the value of the transported good. Therefore our third instrument should be the component of transport costs that is orthogonal to the good j's price. For this reason we regress transport costs against the good price and we use the residual as our third instrument.[4]

To compute our proxies for sector input elasticities we consider the direct and indirect requirement of labor and capital. We compute these requirements using each country input-output matrix (A).[5] In particular, total input requirements are:[6]

$$[\alpha^{l}_{jsc}, \alpha^{k}_{jsc}, \alpha^{m}_{jsc}] = inv(I - A') \times [Sh^{l}_{jsc}, Sh^{k}_{jsc}] \qquad (5)$$

where Sh^{l}_{jsc} and Sh^{k}_{jsc} are sector expenditures on labor and capital over sector output.[7] When we compute prices using these input requirements (equation (4)) we are implicitly assuming that imported and domestic intermediate goods have the same price path.[8]

---

[4] We also include country-year and product fixed effects in this regression.

[5] For each of the 11 countries we use in our analysis, beside the US, we use its own input-output matrix.

[6] The Input-Output matrix has the following format: $\begin{bmatrix} A_{dom} + A_{imp} \\ VA \end{bmatrix} [D]$ where A_{dom} and A_{imp} are the $N \times N$ matrices of required domestic and imported intermediate goods, respectively (*N* is the number of sectors). D is final demand, and VA is value added which is composed by labor compensation (WL) and others. Therefore:

$$\left[\alpha^{l}_{jsc}, \alpha^{k}_{jsc}, \alpha^{m}_{jsc}\right] = \left[\overline{VA}', A'_{imp} \times ones(1, N)\right]$$

where $\overline{VA}$ is the matrix of sector value added as a fraction of sector output.

3 Data

As mentioned before, equations (1) and (4) determine the set of variables needed to estimate the inter-sectoral elasticities of substitution. In general, our variables are given by the set of instruments required to estimate equation (4), and a second set of variables required to estimate equation (1). We performed the estimations using the information available for the period comprehended between 1990 – 2003 using the information available of the following countries: Brazil, Canada, China, Colombia, Germany, India, Indonesia, Japan, Mexico, Turkey and the United Kingdom. The selection of the countries is based on the relative importance of trade with the U.S. and the country representation according to the region that the country belongs too.

Taking this into account, our data are obtained from three sources. Data related to value of imports, tariff levied at the product level in the U.S., price of the product and transport costs of the product per country of origin are obtained from the U.S. Import Database. As it is known, the import data are reported at the ten digit level of the Harmonized System classification but, we proceed to use the information at the six digit level. At this level we were able to classify the products within industrial sectors; given by the ISIC rev. 2 industrial classification at the four digit level.

Input requirements calculated by equation (5), are obtained using the information available in the Input Output tables compiled in the GTAP database. As expected, input requirements are calculated at the two digit gtap - industrial

---

[7] The Input-Output matrix has the following format: $\begin{bmatrix} A \\ VA \end{bmatrix} [D]$,

where A is the $N \times N$ matrix of required intermediate goods (N is the number of sectors). D is final demand, and VA is value added which is composed by labor compensation (WL) and other (which we assume as capital). Therefore:

$$\left[Sh^l_{jsc}, Sh^k_{jsc}\right] = \left[\overline{VA}'\right]$$

where $\overline{VA}$ is the matrix of sector value added as a fraction of sector output.

[8] If we assume that imported and domestic intermediate goods have different prices over time we need to decompose the input-output matrix into its domestic and imported component. See Appendix A.

classification that happens to have an almost one to one classification to the ISIC rev 2. industrial classification.

Following equation (4), we interact the factor requirement with it's wage. We used GDP per capita as a proxy of wage. This information was obtained from the World Development Indicators. Finally, capital requirement was interacted with a time trend and country fixed effects.

It is important to acknowledge that the availability of the Input Output tables implies a constraint on the number of countries that can be used to estimate the first stage implied by equation (4). A second constraint is given by the lack of time variation of the IO tables because they are performed once in a while[9]. Even though we have this two limitations, we expect that the variation across sectors and countries will enable us to correctly identify equation (4).

4 Empirical Results

We know turn to our estimates of US import elasticities. In Table 4 the mean elasticity of substitution is estimated using Equation (1) and setting $\sigma_s = \sigma$ for all sectors, but allowing for changes in US sector expenditures over time (sector-year dummies). In other words, all sectors have the same within constant elasticity of substitution, but the elasticities between sectors could be different.[10] To recapitulate, "*CIF Import Value*" is the (log) CIF value of US's imports of commodity j in sector s from country c at time t; "*CIF price*" is the (log) instrumented CIF price paid by US consumer on imported commodity j. All regressions include unreported country-product, country-year and

[9] For specific information of the year of each IO table, see the GTAP manual, version 5.

[10] If we believe that there is a constant elasticity of substitution within sectors (σ_w) that is different for the one between sector (σ_b) the expenditure for a given commodity j in sector s from country c is:

$$\begin{aligned} p^c q_{jsct} &= d_{jsct} + (1-\sigma_w)\left(p^c_{jsct} - p^c_{.s.t}\right) + (1-\sigma_b)\left(p^c_{.s.t} - p^c_{...t}\right) + y_{.t} \\ &= d_{jsct} + (1-\sigma_w)\left(p^c_{jsct} - p^c_{...t}\right) + (\sigma_w - \sigma_b)\left(p^c_{.s.t} - p^c_{...t}\right) + y_{.t} \end{aligned}$$

The last two terms on the right hand are captured by the sector-year dummies.

sector-year fixed effects.[11] Column (1) assumes there are only four sectors which have the same within elasticity σ although their expenditure share may change over time (1.-agriculture and mining, 2.-textiles, 3.-Manufacture of fabricated metal products, machinery and equipment, and 4.- other manufacturing products). In column (2) we split agriculture and mining, and in column (3) we assume the full range of sectors at 2 digits ISIC revision 2. The "*CIF price*" coefficient ($1-\sigma$) is of interest because σ is the key determinants of the effect of trade impediments on the bilateral volume of trade. Our estimates suggest that the within sector US import demand elasticity (σ) is around 4. The coefficient σ is estimated precisely and it does not vary when we change the number of sectors we use to control for changes on sector expenditure over time (columns 1 to 3). Our estimates are in the range of previous studies, in particular, in the case of Mexico our results are in the lower bound of Romalis (2003).[12]

As we already mentioned, to compute Table 4 we need to use two-stage least squares (2SLS). Table 5 presents the first stage of our previous estimations (equation 4). As in the previous case, columns (1)-(3) assume there are 4, 5 and 15 sectors, respectively. In all cases we include country-product, country-year and sector-year fixed effects. As instrument we use first the interaction of sector total labor share and GDP per capita, which we use as proxy for wages. As expected, the coefficient is positive and highly significant. A fall in wages reduces prices. It is important to remember that, due to country-product and country-year fixed effect, all the identification comes from the fact that changes on wages affect labor intensive sectors more. In all cases, this coefficient is statistically different from zero. The second instrument is transport costs (the orthogonal component with respect to the value of the commodity). As expected this coefficient is positive and significant at one percent. In this case, the coefficient is close to its theoretical value (one). The third instrument is the level of tariffs. This variable has a positive effect on consumer price and it is significant at 1 percent level. To control for the evolution of the cost of capital we also include the interaction of sector total capital share and a country-trend which we use as a proxy for the different

---

[11] Commodities are defined at 6 digits HS classification.

[12] The estimates are also similar in magnitude to elasticities estimated by Clausing (2001) and Head and Ries (2001).

evolution of capital costs per country through time. Summarizing Table 5, our instruments have the expected sign and they are highly significant.

In the previous exercise we assume that all sectors have the same within demand elasticity. This is strong assumption that, contrary to previous papers,[13] we can relax with our methodology. Table 6 presents our estimates for different within sector elasticities. In column (1) we compute 4 different within elasticities (1.-agriculture and mining, 2.-textiles, 3.-Manufacture of fabricated metal products, machinery and equipment, and 4.- other manufacturing products). Within manufacturing, textiles products have significantly larger within elasticity (4.5). Surprisingly, in column (1) agriculture and mining have a low elasticity (2.5). In the next column we split agriculture and mining and we observe that within elasticities significantly increase in both sub-sectors. For agriculture it becomes 2.9 and almost 1.5 for mining. These results are consistent with what we should expect for a commodity sector like mining. Summarizing our results in Table 6, within sector elasticities vary significantly across sectors and therefore it is important to consider this sector heterogeneity to estimate the potential effect of any change in trade policies on bilateral trade.

5 Policy scenarios

Using our previous within-sector elasticity results, this section considers alternative policy scenarios and forecasts their potential implications on exports to the United States from Latin America and the Caribbean, China, and the rest of the world. First we consider change in exports to the United States from a 1-percent reduction in the price of all Chinese goods (what we call the Chinese export-price elasticity of US imports in Table 7). Our estimates on this regard are relevant for considering, in turn, alternative scenarios such as revaluation of the Chinese renminbi. Second, we consider the extent to which US trade policy, such as eliminating tariffs on imports from Latin America or quotas on textile imports from China, would affect US import patterns. The methodology for computing such forecasts is described in Appendix B.

[13] In his paper Romalis (2004) states that "there is insufficient tariff variation to obtain meaningful substitution elasticity estimates for detailed industries."

5.1 Elasticity of US imports to changes in Chinese prices

Table 7 presents forecast estimates of the Chinese export-price elasticity of US imports in Table 6. Naturally, a price drop leads to an expansion of Chinese exports to the United States, by 3.7 percent according to our results, while exports from other regions falls. In particular, sales from Latin America and the rest of the world decline by 0.1 percent each. US overall imports increase by a mere 0.3 percent. As expected, the biggest impact is in the manufacturing sector, where China's export offer is concentrated. Chinese exports of leather goods, apparel and textiles rise by 4.5 percent, drastically displacing exports from Mexico (0.2 percent) and South America (0.8 percent). Machinery and equipment sales from Central America decline by 0.2 percent as they are displaced by the 3.7 percent increase in Chinese exports.

We apply the above export-price elasticities to an assessment of how a revaluation of the Chinese renminbi would affect US imports from China and, in turn, help the rest of the world increase exports to the United States.

5.1.1 Currency revaluation:

We apply the forecasts in Table 7 to an assessment of the potential implications of a revaluation of the Chinese currency, the renminbi, on US imports. The analysis is admittedly crude, as we assume that exchange-rate appreciation leads only to changes in the price of Chinese goods and that there are no general equilibrium effects on either the Chinese economy or in the rest of the world. We also ignore potential adverse effects of the revaluation on the Chinese economy, such as any disruptions on the financial sector.

We consider what would happen if the renminbi revaluates by 20 percent. That, however, does not imply that the price of Chinese exports increases by the same percentage. To a good degree, Chinese exports embody a large fraction of inputs imported from other countries, representing as much as 70 percent of the value of exports, according to some authors. We take that figure as valid. Thus, we assume that a revaluation only increases the price of Chinese inputs, including labor, embodied in exports, or 30 percent of their value. Under that assumption, a 20-percent revaluation implies a 6 percent increase in the price of Chinese exports. Table 8 shows our forecasts for US imports under the scenario described.

The revaluation of the renminbi reduces Chinese exports to the United States by more than a fifth ($43 billion based on 2004 trade figures), although total US imports decline by only 1.7 percent ($24 billion). Chinese sales of leather products, apparel and textiles are the most sensitive, falling by close to 27 percent. The decline in US imports from China is partly offset by increased exports from the rest of the world. Latin American sales grow by 0.5 percent, with South America benefiting the most. Exports of leather, apparel and textiles from the region grow by 1.5 percent, or 4.8 percent in the case of South America.

5.2 US trade policy

We now turn to an assessment of how changes in US trade policy would affect imports from Latin America and China. We consider, first, the potential impact of preferential tariff access to the United States for Latin American exports resulting from the subscription of free trade agreements; and, second, the expected effects of the January 1st, 2005, Multi-Fiber Agreement quota elimination.

5.2.1 Elimination of US tariffs on Latin American goods:

We first look at reductions in US tariffs on Latin American goods. The motivation for that is that since 1994, when the United States adopted NAFTA, the country has engaged in negotiations with other countries in the region to establish similar free trade agreements. In 2002 the United States approved an FTA with Chile; it recently finished negotiating the CAFTA and is holding negotiations with Andean nations to establish a similar agreement. Ultimately, the United States would eliminate tariffs on all Latin American countries under an FTAA.

We consider the elimination of US tariffs on imports from Latin America from their 2003 level; results are in Table 9. In the aggregate, the region's exports increase by 3 percent, although there is a wide variation among the different sub regions. The biggest increase would take place in Central America, with goods shipped to the United States expanding by 21 percent, driven largely by increased sales of leather goods, apparel and textiles, which grow by 36 percent. Indeed, for all Latin American sub regions, exports of the latter would grow the fastest: 21 percent for the Caribbean, 29 percent for Andean countries, and 36 percent for South American countries. The smallest increase in exports would come from Mexico, a country that by 2003 had seen tariffs on its exports to the United States drastically reduced as a result of NAFTA.

We should point out that our forecasts are in line with other studies. For example, a United States International Trade Commission report (USITC 2004, Table 4-4) analyzing the potential impact of CAFTA on trade patterns estimates that US imports from the five Central American counterparts in the agreement (Costa Rica, El Salvador, Guatemala, Honduras, and Nicaragua) and from the Dominican Republic would increase by 26 percent, which falls between our range of forecast for the Caribbean and Central America. With regard to the FTAA, Hertel et al (2004) estimate that total US imports would rise by around 2.2 percent, whereas Watanuki and Monteagudo (2002) put that figure at 1.1 percent; in contrast, we estimate an increase of only 0.4 percent in aggregate US imports.

Our results highlight the importance of preferential trade between the United States and Latin America for boosting exports from the region. The flip side is a small reduction in exports from China and the rest of the world to the United States of around 0.3 and 0.1 percent, respectively. The largest declines, as expected, would occur in exports of leather, apparel and textiles, and in manufacturing in general.

5.2.2 Elimination of textile quotas:

Table 10 presents a breakdown of US apparel imports by region. As we can see, China's share of US apparel imports rose from 13.2 to 18.6 percent from 2000 to 2004. During that same period, Latin America's share of the US market declined from 30.8 to 26.3 percent. China's increasing market share, and Latin America's loss, came despite the fact that tariffs on imports from the latter region declined more than those on Chinese goods. One potential explanation for the rising presence of Chinese apparel was the elimination, in 2002, of a number of import quotas on textile and apparel imports originally adopted under the Multi-Fiber Agreement (MFA). MFA quotas were binding for China and other Asian nations, limiting market access on apparel exports from those countries. During the Uruguay Round, countries agreed to dismantle such quotas gradually, removing them altogether by January 1st, 2005. Thus, the recent implementation of the final stage in the elimination of textile quotas in the United States and elsewhere has created widespread apprehension in Latin America that unfettered

Chinese exports to the United States will continue to erode the region's exports to the U.S. market.

We apply our framework to the analysis of the potential impact that MFA quota elimination might have on exports to the United States. We use available estimates of the export tariff equivalent of the quotas and our estimated elasticities of substitution to understand the implications of the ensuing relative price changes. According to [Usitc-02], the export tariff equivalent of the quota for Chinese apparel sales to the United States were approximately equal to 21 percent. In estimating elasticities in section 4, we assumed all Chinese apparel exports were subject to the export tariff equivalent rate, in addition to the usual duties applied in the United States. With the elasticities in hand, we then ask what the impact of eliminating the export tariff equivalent would be.

Columns 1 and 2 of Table 11 present our forecasts of the impact of quota elimination on US imports. Chinese exports increase by an impressive 40.3 percent, paralleled by falls everywhere else; as a result, US imports grow by a modest 2.2 percent. Latin America is undeniably affected but our forecasts are smaller than the common perception seems to be ---between 2 and 3 percent, except for South America, where it drops by 0.5 percent. Table 11 also shows what our forecasts imply for the change (in percentage points) in each region's share of the US market. China's share rises by 5.8 points, Latin America's falls by 1.7, whereas the rest of the world accounts for the balance.

In order to assess whether our estimates are reasonable, we adopt an alternative strategy to measure the impact of removing quotas on each region's market participation. We employ a difference-in-difference approach in which we compare the change in market shares from 2000 to 2003 in tariff lines that had import quota removed in 2002 (the treatment group), with those in tariff lines that had quotas eliminated in 2005 (the control group). Specifically, let $Share_{irt}$ stand for region r's share of US imports of good i (measured at the 10-digit harmonized system tariff line level) during period $t \in \{2000, 2003\}$. All goods i that had quotas removed on January 2002, are defined as belonging to the treatment group. The control group consists of all i that had quotas removed on January 1st, 2005. We believe the latter is a better control group than using all apparel goods —regardless of when they had their quotas removed, if they were ever subject to any. Then, for each region r, we estimate the following equation separately:[14]

$$\begin{aligned} Share_{irt} = \beta_o + \beta_1 \tau_{irt} + \beta_2 1(i \in Treatment) + \beta_3 1(t = 2003) \\ + \beta_4 1(t = 2003) \times 1(i \in Treatment) + \varepsilon_{it}. \end{aligned} \tag{6}$$

The US tariff on imports of i from r is represented by τ. Coefficient β_2 is captures time-invariant differences in the import share of good in the treatment group. Coefficient β_3 reflects shocks after 2002, other than the quota elimination, on the market share of all goods. The coefficient of interest, β_4, is equal to the change in market share of goods that had quotas removed in 2002. Our identifying assumption is that there are no unobserved shocks that affect the market share of goods in the treatment group that are contemporaneous with the elimination of the quota.

We summarize our findings in columns 3 and 4 of Table 11, alongside our previous elasticity-based results. For Latin America and the Caribbean, the difference-in-difference point estimates are remarkably similar to our previous findings --a market-share loss of around 2.5 percentage points-- although we cannot reject the null hypothesis that the impact on market share is zero, which is true for all sub-regions of Latin America. In contrast, the difference-in-difference estimates for China and the rest of the world are substantially higher (in absolute terms). Overall, the difference in difference approach suggests that Chinese market-share gains have not come at the expense of Latin America, but at the rest of the world instead.

Finally, as a robustness exercise, we proceed to calculate the same policy scenarios but instead of using our estimates of the elasticities of substitution, we proceed to use the estimates of the elasticities estimated by Broda and Weinstein (2006). In particular we used their estimates at the four digit level of industrial classification (isic rev 3). As shown in tables 12, 13 and 14, the results that we reported in tables 7 through

---

[14] We also estimated a variant of this equation pooling all regions together and incorporating region dummies and their interaction with all other regressors, except for the tariff τ . We obtained the same qualitative reports.

9, are very similar to the results obtained using their elasticities estimated at a higher level of desegregation.

6 Conclusions

In this paper we estimate the elasticity of substitution of exports to the United States using detailed trade data over the 1990-2003 period. We use a two-stage least squares framework to correctly identify the elasticity parameter of interest. Our elasticity estimates are in line with those of other recent studies.

We use those estimates to assess the extent to which Latin American and Chinese goods compete in the U.S. market by providing forecasts of how alternative policy scenarios may affect exports to the United States. We consider the following scenarios: (i) currency revaluation in China; (ii) elimination of US tariffs on Latin American exports under a free trade agreement among all countries of the Americas; and (iii) the elimination of quotas on apparel and textile exports under the Multi-Fiber Agreement.

We find that a 20-percent appreciation of the renminbi reduces Chinese exports to the United States by a fifth, although since other regions increase sales to that market (0.5 percent for Latin America), US imports decline by only 1.7 percent. With respect to productivity, we find that faster TFP growth in China explains about half of the gap in export growth between that country and Latin America. An FTAA would increase Latin America's exports to the United States by around three percent. The removal of MFA quotas would lead to sharp increase in Chinese sales to the United States (40 percent), but Latin America would see its share of the US market decline by around 2 percent (2.5 percentage points). China's gains would come mainly at the expense of other regions of the world.

Appendix A

In the main text to compute input requirements we assume that production only requires labor and capital. In this appendix we assume that firms produce q_{jsct} with labor, capital and imported intermediate goods using a Cobb Douglas technology. Under this assumption the consumer's price is:

$$\begin{aligned} p^{s}_{jsct} &= \ln(\mu_{jsc}) - a_{jsc} - a_{ct} + \alpha^{l}_{jsc} w_{ct} + \alpha^{k}_{jsc} r_{ct} + \alpha^{m}_{jsc} p^{m}_{ct} \\ &+ (1 - \alpha^{l}_{jsc} - \alpha^{k}_{jsc} - \alpha^{m}_{jsc}) q_{jsct} \\ &\tau_{jsct} + tc_{jsct} \end{aligned}$$

w_{ct}, r_{ct} and p^{m}_{ct} are the factor prices for employment, capital and imported good required to produce j in country c, , respectively. To compute the proxies for input elasticities we consider the direct and indirect requirement of labor, capital and imported intermediate goods of each produced good. Direct and indirect input requirements (α) are computed using each country Input-Output matrix (A), which are decomposed into domestic and imported intermediate goods ($A = A_{dom} + A_{imp}$.). We compute the direct and indirect input requirements as:

$$[\alpha^{l}_{jsc}, \alpha^{k}_{jsc}, \alpha^{m}_{jsc}] = inv(I - A'_{dom}) \times [Sh^{l}_{jsc}, Sh^{k}_{jsc}, Sh^{m}_{jsc}]$$

Where $Sh^{l}_{jsc}, Sh^{k}_{jsc}$ and Sh^{m}_{jsc} are sector expenditures on labor, capital and imported intermediated good (direct) over sector output.[15]

[15] The Input-Output matrix has the following format: $\begin{bmatrix} A_{dom} + A_{imp} \\ VA \end{bmatrix} [D]$ where A_{dom} and A_{imp} are the $N \times N$ matrices of required domestic and imported intermediate goods, respectively (*N* is the number of sectors). D is final demand, and VA is value added which is composed by labor compensation (WL) and others. Therefore:

$$\left[\alpha^{l}_{jsc}, \alpha^{k}_{jsc}, \alpha^{m}_{jsc}\right] = \left[\overline{VA}', A'_{imp} \times ones(1, N)\right]$$

Where $\overline{VA}$ is the matrix of sector value added as a fraction of sector output.

In this setup the implicit assumption is that all imported intermediate goods have the same price, more precisely the same price path. In the main text, the implicit assumption is that imported and domestic intermediate goods have the same price path over time (product by product). In this case, everything collapses to labor and capital requirements. In non - reported exercises, we estimate equation (5) under the assumption of different price trends of imported and domestic intermediate inputs, and the results remained statistically equal to the results obtained under the assumption of same price pattern of domestic and imported intermediate goods.

Appendix B

Under the assumption that the consumer in the US. market has a constant elasticity of substitution utility function for goods classified in the same economic sector, we know that the expenditure function of good j imported from country c at time t is given by the following equation:

$$p^c q_{jsct} = \left(\frac{p^c_{jsct}}{p^c_{.s.t}} \right)^{(1-\sigma_s)} b_{st} Y_{st}$$

$$Where:$$

$$p^c_{.s.t} = \left[\sum_{j \in S} \sum_c p^{c\;\;(1-\sigma_s)}_{jsct} \right]^{\frac{1}{(1-\sigma_s)}}$$

$$b_{st} Y_{st} \equiv y_{st}$$

Therefore, the effect on the expenditure of a change in the price of the imported good is given by the following equation:

$$\frac{\partial \ln\left(p^c q_{jsct}\right)}{\partial p^c_{jsct}} = (1-\sigma_s)\left[\frac{\partial \ln p^c_{jsct}}{\partial p^c_{jsct}} - \frac{\partial \ln p^c_{.s.t}}{\partial p^c_{jsct}} \right] \Delta p^c_{jsct}$$

Where the total effect on expenditure per good is explained by two effects: the own price effect, and the indirect effect that is explained by the change of the sectoral price index.

Where the indirect effect is given by the following expression:

$$\frac{\partial \ln p^c_{.s.t}}{\partial p^c_{jsct}} = \frac{p^{c\;\;1-\sigma_s}_{jsct}}{\left[\sum_{j \in S} \sum_c p^{c\;\;(1-\sigma_s)}_{jsct} \right]} = \varphi_{jsct}$$

Therefore, the change in expenditure of a good is given by the following equation:

$$\frac{\partial \ln\left(p^c q_{jsct}\right)}{\partial p^c_{jsct}} = (1-\sigma_s)\left[1-\varphi_{jsct}\right]\frac{\Delta p^c_{jsct}}{p^c_{jsct}}$$

Aggregating the effect per economic sector and region we obtain the following expression:

$$E_{s,reg} = \sum_{c\in reg} \omega_c \sum_{j\in S} \frac{\partial \ln\left(p^c q_{jsct}\right)}{\partial p^c_{jsct}}$$

$$E_{s,reg} = (1-\sigma_s)\sum_{c\in reg} \omega_c \sum_{j\in S}\left[1-\varphi_{jsct}\right]\Delta \overline{p}^c_{jsct}$$

$$where\ \omega_c = \frac{\sum_{j\in S}\left[p^c_{jsct} q^c_{jsct}\right]}{\sum_{c\in reg}\sum_{j\in S}\left[p^c_{jsct} q^c_{jsct}\right]} \quad and \quad \Delta \overline{p}^c_{jsct} = \frac{\Delta p^c_{jsct}}{p^c_{jsct}}$$

Therefore the aggregate effect per region is given by:

$$E_{reg} = \sum_{s} \omega_{cs} \sum_{c\in reg} \omega_c \sum_{j\in S} \frac{\partial \ln\left(p^c q_{jsct}\right)}{\partial p^c_{jsct}}$$

$$E_{reg} = \sum_{s} \omega_{cs}(1-\sigma_s)\sum_{c\in reg} \omega_c \sum_{j\in S}\left[1-\varphi_{jsct}\right]\Delta \overline{p}^c_{jsct}$$

$$where\ \omega_{cs} = \frac{\sum_{c\in reg}\sum_{j\in S}\left[p^c_{jsct} q^c_{jsct}\right]}{\sum_{S}\sum_{c\in reg}\sum_{j\in S}\left[p^c_{jsct} q^c_{jsct}\right]}$$

These two equations are the expressions used to estimate the effect of any of the policy scenarios studied within the paper. The simulations assume that any change produced by a policy scenario is reflected in a change in the price of the imported good. Therefore, we only have to aggregate the effects per economic sector and per region so that we get the desired calculations.

References

Clark, Ximena, David Dollar, and Alejandro Micco, "Port Efficiency, Maritime Transport Costs and Bilateral Trade", NBER Working Paper 10353, March 2004.

Devlin, Robert, Antoni Estevadeordal, and Andrés Rodríguez, eds, The Emergence of China: Opportunities and Challenges for Latin America and the Caribbean, Washington, DC: Inter-American Development Bank, March 2005.

Hanson, Gordon and Raymond Robertson, "The Evolution of Mexico's Manufacturing Exports: A Gravity Framework for Evaluating Supply and Demand Factors," Paper commissioned by the Inter-American Development Bank, February 2006.

Hertel, Thomas, David Hummels, Maros Ivanic, and Roman Keeney, "HowConfident Can We Be in CGE-Based Assessments of Free Trade Agreements?," GTAP Working Paper 26 March 2004.

Loayza, Norman, Pablo Fajnzylber, and César Calderón, "Economic Growth in Latin America and the Caribbean: Stylized Facts, Explanations and Forecasts," 2002. World Bank, Processed.

López-Córdova, Ernesto and Mauricio Mesquita Moreira, "Regional Integration and Productivity: The Experiences of Brazil and Mexico," in Antoni Estevadeordal, Dani Rodrick, Alan M. Taylor, and Andrés Velasco, eds., *Integrating the Americas: FTAA and Beyond*, Cambridge, Massachusetts: David Rockefeller Center for Latin American Studies, Harvard University Press, 2004, chapter 17, pp. 573—609.

Moreira, Mauricio Mesquita, "Fear of China: Is There a Future Fror Manufacturing in Latin America?," Working Paper 33, Latin America/Caribbean and Asia/Pacific Economics and Business Association (LAEBA) December 2004. Paper presented at the 2004 LAEBA Annual Conference, Beijing, PR China, December 3-4, 2004.

Nordas, H. K., "The Global Textile and Clothing Industry post the Agreement on Textiles and Clothing", World Trade Organization, Geneva, 2004.

Romalis, John, "NAFTA's and CUSFTA's Impact on North American Trade," December 2003. Graduate School of Business, University of Chicago.

USITC, The Economic Effects of Significant U.S. Import Restraints. Third Update, USITC Publication 3717 June 2002. Investigation No. 332-325. Publication 3519, 2002.

USITC, U.S.-Central America-Dominican Republic Free Trade Agreement: Potential Economywide and Selected Sectoral Effects USITC Publication 3717, Investigation No. TA-2104-13. August 2004.

Watanuki, Masakazu and Josefina Monteagudo, "FTAA in Perspective: North-South and South-South Agreements in the Western Hemispheric Countries," 2002. Unpublished manuscript presented at the 5th Annual Conference on Global Economic Analysis, Taipei, Taiwan.

TABLES AND FIGURES

Table 1: US Imports and Average Tariffs, by Origin

	US Imports									Average Tariffs (%)		
	Volume (Millions of dollars)			Distribution (%)			Annual real growth rate (%)					
	1990	2000	2003	1990	2000	2003	1990-2000	1990-2003	2000-2003	1990	2000	2003
Total trade												
World	431,318	1,152,203	1,116,347	100.0	100.0	100.0	7.3	4.8	-3.2	4.6	2.5	2.1
Latin America and the Caribbean	58,286	198,906	195,848	13.5	17.3	17.5	10.0	6.9	-2.7	3.0	1.3	0.8
Mexico	25,872	128,408	128,430	6.0	11.1	11.5	14.2	10.2	-2.2	2.8	0.8	0.4
Central America	2,704	11,824	11,654	0.6	1.0	1.0	12.7	9.0	-2.7	5.0	5.2	4.4
Caribean	4,494	9,770	9,193	1.0	0.8	0.8	5.1	2.9	-4.1	4.9	3.3	2.2
Andean	14,670	29,295	25,011	3.4	2.5	2.2	4.2	1.5	-7.2	1.4	0.7	0.5
South America	10,546	19,609	21,560	2.4	1.7	1.9	3.5	2.9	1.0	4.3	2.4	1.6
China	14,254	98,267	146,989	3.3	8.5	13.2	18.0	16.6	11.9	7.8	4.7	3.6
Rest of the World	358,778	855,030	773,510	83.2	74.2	69.3	6.1	3.3	-5.4	4.7	2.6	2.2

Notes : Annual real growth rates calculated using US CPI as deflator. Average tariffs are calculated duties divided by the value of imports.

Source : Authors' calculations based on US Customs Data.

Table 2: US Imports and Average Tariffs, by Origin and Sector

	US Imports												Average Tariffs (%)		
	Volume (Millions of dollars)			Regional distribution (%)			As % of imports from region			Annual real growth rate (%)					
	1990	2000	2003	1990	2000	2003	1990	2000	2003	1990-2000	1990-2003	2000-2003	1990	2000	2003
Agriculture															
World	10,350	17,621	18,266	100.0	100.0	100.0	2.4	1.5	1.6	2.6	1.8	-1.0	3.6	1.4	0.7
Latin America and the Caribbean	5,243	8,499	8,848	50.7	48.2	48.4	9.0	4.3	4.5	2.1	1.4	-0.9	2.9	0.6	0.3
Mexico	1,873	3,152	3,491	18.1	17.9	19.1	7.2	2.5	2.7	2.5	2.2	1.2	5.2	0.6	0.2
Central America	988	1,820	1,706	9.6	10.3	9.3	36.6	15.4	14.6	3.4	1.6	-4.3	0.7	0.1	0.1
Caribean	142	163	170	1.4	0.9	0.9	3.2	1.7	1.8	-1.4	-1.3	-0.9	0.6	0.0	0.0
Andean	1,188	1,611	1,622	11.5	9.1	8.9	8.1	5.5	6.5	0.3	-0.2	-2.0	2.2	0.2	0.1
South America	1,052	1,753	1,860	10.2	9.9	10.2	10.0	8.9	8.6	2.4	1.8	-0.2	2.1	1.6	0.7
China	105	298	401	1.0	1.7	2.2	0.7	0.3	0.3	8.0	8.0	8.0	2.4	28.5	1.8
Rest of the World	5,003	8,824	9,017	48.3	50.1	49.4	1.4	1.0	1.2	3.0	1.9	-1.5	4.3	1.2	1.0
Mining															
World	49,326	104,516	126,384	100.0	100.0	100.0	11.4	9.1	11.3	4.9	4.7	4.2	0.3	1.2	0.0
Latin America and the Caribbean	13,100	31,523	36,311	26.6	30.2	28.7	22.5	15.8	18.5	6.2	5.3	2.5	0.2	0.1	0.0
Mexico	5,064	12,116	14,589	10.3	11.6	11.5	19.6	9.4	11.4	6.1	5.7	4.1	0.2	0.0	0.0
Central America	25	154	181	0.1	0.1	0.1	0.9	1.3	1.6	16.6	13.3	3.2	0.3	0.3	0.0
Caribean	782	980	2,735	1.6	0.9	2.2	17.4	10.0	29.8	-0.5	7.3	37.7	0.2	0.0	0.0
Andean	6,912	17,325	17,110	14.0	16.6	13.5	47.1	59.1	68.4	6.6	4.4	-2.6	0.3	0.2	0.0
South America	318	948	1,696	0.6	0.9	1.3	3.0	4.8	7.9	8.5	10.8	18.8	0.4	0.1	0.1
China	725	608	329	1.5	0.6	0.3	5.1	0.6	0.2	-4.4	-8.3	-20.2	0.7	0.2	0.3
Rest of the World	35,501	72,385	89,743	72.0	69.3	71.0	9.9	8.5	11.6	4.5	4.6	5.1	0.3	1.7	0.0
Manufacturing															
World	371,642	1,030,066	971,697	100.0	100.0	100.0	86.2	89.4	87.0	7.7	4.9	-4.1	5.2	2.7	2.4
Latin America and the Caribbean	39,943	158,884	150,689	10.7	15.4	15.5	68.5	79.9	76.9	11.7	7.9	-3.9	3.9	1.6	1.1
Mexico	18,935	113,140	110,351	5.1	11.0	11.4	73.2	88.1	85.9	16.3	11.5	-3.0	3.3	0.9	0.4
Central America	1,690	9,849	9,767	0.5	1.0	1.0	62.5	83.3	83.8	16.0	11.5	-2.5	7.6	6.2	5.2
Caribean	3,570	8,627	6,288	1.0	0.8	0.6	79.4	88.3	68.4	6.2	1.7	-12.0	6.1	3.7	3.2
Andean	6,571	10,359	6,279	1.8	1.0	0.6	44.8	35.4	25.1	1.8	-2.9	-17.2	2.5	1.7	1.8
South America	9,177	16,908	18,004	2.5	1.6	1.9	87.0	86.2	83.5	3.4	2.6	-0.1	4.6	2.6	1.8
China	13,424	97,361	146,259	3.6	9.5	15.1	94.2	99.1	99.5	18.6	17.0	12.0	8.2	4.6	3.6
Rest of the World	318,274	773,822	674,749	85.6	75.1	69.4	88.7	90.5	87.2	6.3	3.2	-6.5	5.2	2.7	2.5

Notes : Annual real growth rates calculated using US CPI as deflator. Average tariffs are calculated duties divided by the value of imports.

Source : Authors' calculations based on US Customs Data.

Table 3: US Manufacturing Imports and Average Tariffs, by Origin and Industry

	US Imports														
	Volume (Millions of dollars)			Regional distribution (%)			% of manufacturing imports			Annual real growth rate (%)			Average Tariffs (%)		
	1990	2000	2003	1990	2000	2003	1990	2000	2003	1990-2000	1990-2003	2000-2003	1990	2000	2003
Apparel and Textiles															
World	43,417	97,872	102,332	100.0	100.0	100.0	11.7	9.5	10.5	5.5	4.0	-0.7	12.9	10.3	8.7
Latin America and the Caribbean	5,678	23,742	21,662	13.1	24.3	21.2	14.2	14.9	14.4	12.2	8.0	-5.1	13.0	6.0	4.6
Mexico	1,211	10,810	8,907	2.8	11.0	8.7	6.4	9.6	8.1	21.1	13.6	-8.3	12.0	2.4	0.8
Central America	876	6,806	7,241	2.0	7.0	7.1	51.8	69.1	74.1	19.4	14.6	-0.1	14.0	8.7	6.8
Caribean	1,362	3,249	2,769	3.1	3.3	2.7	38.1	37.7	44.0	6.1	2.9	-7.3	13.8	8.5	6.5
Andean	375	952	1,147	0.9	1.0	1.1	5.7	9.2	18.3	6.8	6.1	4.1	14.5	10.6	6.8
South America	1,854	1,925	1,598	4.3	2.0	1.6	20.2	11.4	8.9	-2.4	-3.7	-8.1	12.1	10.6	10.0
China	6,319	21,710	28,680	14.6	22.2	28.0	47.1	22.3	19.6	10.1	9.4	7.3	11.6	11.8	9.4
Rest of the World	31,420	52,420	51,990	72.4	53.6	50.8	9.9	6.8	7.7	2.4	1.2	-2.4	13.1	11.5	10.1
Machinery and Equipment															
World	193,344	611,125	563,178	100.0	100.0	100.0	52.0	59.3	58.0	9.1	5.8	-4.8	4.2	1.6	1.3
Latin America and the Caribbean	15,227	93,195	92,528	7.9	15.2	16.4	38.1	58.7	61.4	16.6	11.9	-2.4	2.6	0.7	0.4
Mexico	12,470	85,640	83,570	6.4	14.0	14.8	65.9	75.7	75.7	17.9	12.8	-3.0	2.7	0.7	0.4
Central America	90	1,602	954	0.0	0.3	0.2	5.3	16.3	9.8	29.8	16.8	-17.7	1.9	0.4	0.5
Caribean	283	881	970	0.1	0.1	0.2	7.9	10.2	15.4	9.0	7.1	1.0	2.0	0.5	0.5
Andean	189	345	315	0.1	0.1	0.1	2.9	3.3	5.0	3.3	1.3	-5.0	1.6	0.5	0.4
South America	2,196	4,728	6,719	1.1	0.8	1.2	23.9	28.0	37.3	5.0	6.2	10.0	1.8	0.6	0.6
China	2,517	44,330	71,850	1.3	7.3	12.8	18.7	45.5	49.1	29.6	26.0	14.9	5.1	2.3	1.9
Rest of the World	175,600	473,600	398,800	90.8	77.5	70.8	55.2	61.2	59.1	7.4	3.7	-7.6	4.3	1.7	1.5
Other manufacturing															
World	134,881	321,069	306,187	100.0	100.0	100.0	36.3	31.2	31.5	6.1	3.7	-3.7	4.1	2.4	2.3
Latin America and the Caribbean	19,039	41,946	36,499	14.1	13.1	11.9	47.7	26.4	24.2	5.3	2.4	-6.6	2.3	1.2	0.7
Mexico	5,254	16,690	17,874	3.9	5.2	5.8	27.7	14.8	16.2	9.2	7.0	0.1	2.7	0.9	0.3
Central America	725	1,441	1,572	0.5	0.4	0.5	42.9	14.6	16.1	4.2	3.4	0.7	0.6	1.1	0.7
Caribean	1,925	4,497	2,549	1.4	1.4	0.8	53.9	52.1	40.5	5.9	-0.5	-19.0	1.2	0.9	0.6
Andean	6,007	9,062	4,817	4.5	2.8	1.6	91.4	87.5	76.7	1.4	-4.2	-20.8	1.8	0.8	0.6
South America	5,127	10,255	9,687	3.8	3.2	3.2	55.9	60.7	53.8	4.3	2.3	-4.0	3.1	2.1	1.4
China	4,588	31,321	45,729	3.4	9.8	14.9	34.2	32.2	31.3	17.9	16.2	11.0	5.3	2.9	2.8
Rest of the World	111,254	247,802	223,959	82.5	77.2	73.1	35.0	32.0	33.2	5.4	2.8	-5.4	4.4	2.6	2.5

Notes: Annual real growth rates calculated using US CPI as deflator. Average tariffs are calculated duties divided by the value of imports.

Source: Authors' calculations based on US Customs Data.

Table 4: Mean Sector Elasticity: Second Stage
Method: IV with fixed effects

	(1)	(2)	(3)
	CIF Import Value (logs)		
CIF price $(1-\sigma)$	-3.954	-3.952	-3.933
	(0.085)***	(0.085)***	(0.037)***
Country year dummies	Yes	Yes	Yes
Product-country year dummies	Yes	Yes	Yes
Observations	375302	375302	375302
R-squared	0.833	0.833	0.833
Number of sector-year dummies	56	70	210

Robust standard errors in parentheses.
*, **, *** significant at 1, 5, and 10%, respectively

Instruments for CIF price are: Sector labor share x GDP per capita; transport costs (orthogonal component of the FOB commodity price), US tariff and sector capital share x country-trend.

The reported R-squared includes the variance of "CIF Import Value" explained by the fixed effects

Table 5: Mean Sector Elasticity: First Stage
Method: OLS with fixed effects

	(1)	(2)	(3)
	CIF Price (logs)		
Sector labor share x GDP pc (a)	0.532	0.416	0.800
	(0.186)***	(0.185)**	(0.199)***
Transport costs (b)	0.728	0.728	0.726
	(0.028)***	(0.028)***	(0.020)***
US tariff (c)	0.401	0.405	0.397
	(0.059)***	(0.059)***	(0.061)***
Sector capital share x country trend	Yes	Yes	Yes
Country year dummies	Yes	Yes	Yes
Product-country year dummies	Yes	Yes	Yes
Observations	375302	375302	375302
R-squared	0.820	0.820	0.820
Number of sector-year dummies	56	70	210
F-test, instruments	253.42	252.36	479.66
Joint significance test for (a), (b), and (c) (Prob>F)	0.00	0.00	0.00

Robust standard errors in parentheses.
*, **, *** significant at 1, 5, and 10%, respectively

The reported R-squared includes the variance of "CIF Import Value" explained by the fixed effects

Table 6: Different Sector Elasticities. Second Stage
Method: IV with fixed effects

	(1)	(2)
	CIF Import Value (logs)	
CIF price (1-ﾉ)	-1.501	
Sectors 10-20	(0.119)***	
CIF price (1-ﾉ)		-1.969
Sectors 10		(0.147)***
CIF price (1-ﾉ)		-0.587
Sectors 20		(0.195)***
CIF price (1-ﾉ)	-3.525	-5.770
Sectors 32	(0.109)***	(0.099)***
CIF price (1-ﾉ)	-5.749	-4.172
Sectors 38	(0.099)***	(0.099)***
CIF price (1-ﾉ)	-4.153	-3.521
Sectors 3, other manufacturing	(0.098)***	(0.109)***
Country year dummies	Yes	Yes
Product-country year dummies	Yes	Yes
Observations	375,302	375,302
R-squared	0.834	0.834
Number of sector-year dummies	56	70

Robust standard errors in parentheses.
*, **, *** significant at 1, 5, and 10%, respectively

The reported R-squared includes the variance of "CIF Import Value" explained by the fixed effects

Table 7: Chinese Export-Price Elasticity of US Imports, by Region, 2001
(Change in US imports from each region in response to a one-percent reduction in the price of Chinese goods)

	Total trade	*Agriculture*	*Mining*	*Manufacturing*			
				Total Manuf.	*Leather, Apparel, Textiles*	*Machinery and Equipment*	*Other*
World	0.427	0.039	0.001	0.488	1.029	0.409	0.453
Latin America and the Caribbean	-0.080	-0.002	-0.001	-0.094	-0.245	-0.084	-0.032
Mexico	-0.084	-0.002	-0.001	-0.092	-0.247	-0.085	-0.049
Central America	-0.105	-0.001	-0.001	-0.130	-0.143	-0.182	-0.037
Caribbean	-0.099	-0.003	-0.002	-0.112	-0.208	-0.106	-0.009
Andean	-0.011	0.000	-0.001	-0.046	-0.186	-0.081	-0.010
South America	-0.111	-0.004	-0.002	-0.098	-0.800	-0.049	-0.016
China	3.737	1.921	0.546	3.719	4.553	3.716	3.200
Rest of the World	-0.074	-0.004	-0.001	-0.082	-0.385	-0.072	-0.029

Table 8: Chinese Revaluation and US Imports, by Region, 2001
(Change in US imports from each region in response to a 20-percent currency revaluation)

	Total trade	*Agriculture*	*Mining*	*Manufacturing*			
				Total Manuf.	*Leather, Apparel, Textiles*	*Machinery and Equipment*	*Other*
World	-2.560	-0.237	-0.003	-2.930	-6.172	-2.455	-2.718
Latin America and the Caribbean	0.479	0.011	0.006	0.566	1.468	0.502	0.191
Mexico	0.506	0.011	0.006	0.554	1.481	0.511	0.295
Central America	0.628	0.003	0.005	0.777	0.856	1.094	0.221
Caribbean	0.595	0.015	0.012	0.669	1.248	0.634	0.053
Andean	0.068	0.002	0.005	0.274	1.116	0.488	0.060
South America	0.665	0.025	0.013	0.587	4.802	0.292	0.097
China	-22.421	-11.525	-3.277	-22.311	-27.319	-22.294	-19.198
Rest of the World	0.444	0.023	0.005	0.491	2.311	0.433	0.172

Table 9: Tariff Elimination on Latin American Goods and US Imports, by Region, 2001
(Change in US imports from each region in response to tariff reduction on Latin American imports to the level of Mexico in 2001)

				Manufacturing			
	Total trade	*Agriculture*	*Mining*	*Total Manuf.*	*Leather, Apparel, Textiles*	*Machinery and Equipment*	*Other*
World	0.407	0.363	0.005	0.432	3.113	0.103	0.142
Latin America and the Caribbean	3.078	0.772	0.030	3.718	20.254	0.781	1.350
Mexico	0.802	0.952	0.000	0.837	2.809	0.670	0.634
Central America	20.960	0.000	-0.007	27.085	36.453	0.600	0.000
Caribbean	8.995	-0.125	0.000	9.752	21.210	0.989	0.638
Andean	1.335	-0.015	0.063	5.984	28.973	2.232	0.755
South America	6.463	1.911	0.013	5.807	36.180	2.091	3.374
China	-0.305	-0.031	-0.004	-0.240	-1.103	-0.044	-0.007
Rest of the World	-0.134	-0.020	-0.005	-0.156	-1.703	-0.029	-0.025

Table 10: US Apparel Imports and Average Tariffs, by Origin

	Volume (Millions of dollars)				Regional distribution (%)				Average Tariffs (%)			
	1997	2000	2003	2004	1997	2000	2003	2004	1997	2000	2003	2004
World	47,084	62,928	66,499	70,533	100.0	100.0	100.0	100.0	12.6	12.1	11.2	10.9
Latin America and the Caribbean	13,669	19,376	18,150	18,517	29.0	30.8	27.3	26.3	5.6	5.5	3.4	3.3
Mexico	5,317	8,704	7,178	6,930	11.3	13.8	10.8	9.8	1.0	0.4	0.7	0.7
Central America	4,781	6,702	7,159	7,560	10.2	10.7	10.8	10.7	8.9	9.9	6.0	6.0
Caribbean	2,871	2,987	2,540	2,481	6.1	4.7	3.8	3.5	6.9	7.5	2.5	2.3
Andean	575	844	1,062	1,331	1.2	1.3	1.6	1.9	13.1	14.7	4.1	1.8
South America	125	140	211	215	0.3	0.2	0.3	0.3	10.3	12.9	14.1	12.3
China	7,279	8,307	10,997	13,106	15.5	13.2	16.5	18.6	11.8	10.5	10.0	9.5
Rest of the World	26,136	35,245	37,352	38,909	55.5	56.0	56.2	55.2	16.6	16.1	15.3	14.9

Table 11: Elimination of MFA Quotas and US Apparel Imports, by Region, 2003

	Using elasticities of substitution		Based on difference-in-difference results	
	Imports (% change)	Market share participation (Change in percentage points)	Market share participation (Change in percentage points)	P-value of point estimate
World	3.6	0.0	--	--
Latin America and the Caribbean	-2.8	-1.7	-2.5	0.3
Mexico	-2.7	-0.7	-2.2	0.3
Central America	-2.9	-0.7	-1.8	0.3
Caribbean	-2.9	-0.2	-0.3	0.8
Andean	-2.7	-0.1	0.4	0.4
South America	-0.5	0.0	-0.6	0.4
China	40.3	5.8	25.3	0.0
Rest of the World	-4.0	-4.1	-24.4	0.0

Table 12: Chinese Export-Price Elasticity of US Imports, by Region, 2001. Broda and Weinstein (2006)
(Change in US imports from each region in response to a one-percent reduction in the price of Chinese goods)

				Manufacturing			
	Total trade	*Agriculture*	*Mining*	*Total Manuf.*	*Leather, Apparel, Textiles*	*Machinery and Equipment*	*Other*
World	0.575	0.112	0.008	0.678	0.526	0.533	0.996
Latin America and the Caribbean	-0.085	-0.005	-0.016	-0.102	-0.125	-0.109	-0.070
Mexico	-0.101	-0.005	-0.015	-0.112	-0.126	-0.111	-0.108
Central America	-0.077	-0.002	-0.013	-0.090	-0.073	-0.237	-0.081
Caribbean	-0.067	-0.007	-0.031	-0.076	-0.106	-0.138	-0.019
Andean	-0.019	-0.001	-0.013	-0.039	-0.095	-0.106	-0.022
South America	-0.082	-0.012	-0.034	-0.079	-0.409	-0.063	-0.035
China	4.930	5.439	8.708	5.032	2.326	4.840	7.031
Rest of the World	-0.085	-0.011	-0.014	-0.092	-0.197	-0.094	-0.063

Table 13: Chinese Revaluation and US Imports, by Region, 2001. Broda and Weinstein (2006)
(Change in US imports from each region in response to a 20-percent currency revaluation)

				Manufacturing			
	Total trade	*Agriculture*	*Mining*	*Total Manuf.*	*Leather, Apparel, Textiles*	*Machinery and Equipment*	*Other*
World	-3.451	-0.670	-0.048	-4.068	-3.154	-3.198	-5.974
Latin America and the Caribbean	0.511	0.031	0.097	0.611	0.750	0.654	0.421
Mexico	0.604	0.031	0.090	0.670	0.756	0.666	0.649
Central America	0.460	0.009	0.079	0.541	0.437	1.424	0.485
Caribbean	0.404	0.043	0.189	0.455	0.638	0.826	0.116
Andean	0.113	0.006	0.077	0.237	0.570	0.636	0.131
South America	0.490	0.070	0.203	0.474	2.454	0.380	0.212
China	-29.578	-32.635	-52.249	-30.193	-13.959	-29.040	-42.187
Rest of the World	0.511	0.064	0.085	0.550	1.181	0.564	0.378

Table 14: Tariff Elimination on Latin American Goods and US Imports, by Region, 2001. Broda and Weinstein (200

(Change in US imports from each region in response to tariff reduction on Latin American imports to the level of Mexico in 2001)

				Manufacturing			
	Total trade	*Agriculture*	*Mining*	*Total Manuf.*	*Leather, Apparel, Textiles*	*Machinery and Equipment*	*Other*
World	0.346	1.029	0.079	0.343	1.591	0.134	0.312
Latin America and the Caribbean	2.499	2.186	0.480	2.831	10.349	1.018	2.967
Mexico	0.981	2.695	0.000	1.003	1.435	0.873	1.393
Central America	10.754	0.000	-0.104	13.885	18.626	0.782	0.000
Caribbean	5.083	-0.353	0.000	5.540	10.837	1.289	1.403
Andean	1.643	-0.044	1.001	4.123	14.804	2.908	1.660
South America	6.969	5.410	0.205	6.646	18.486	2.724	7.413
China	-0.174	-0.086	-0.058	-0.143	-0.564	-0.058	-0.015
Rest of the World	-0.100	-0.057	-0.083	-0.107	-0.870	-0.037	-0.054

Figure 1: Latin America's Trade with the United States, 1960-2000

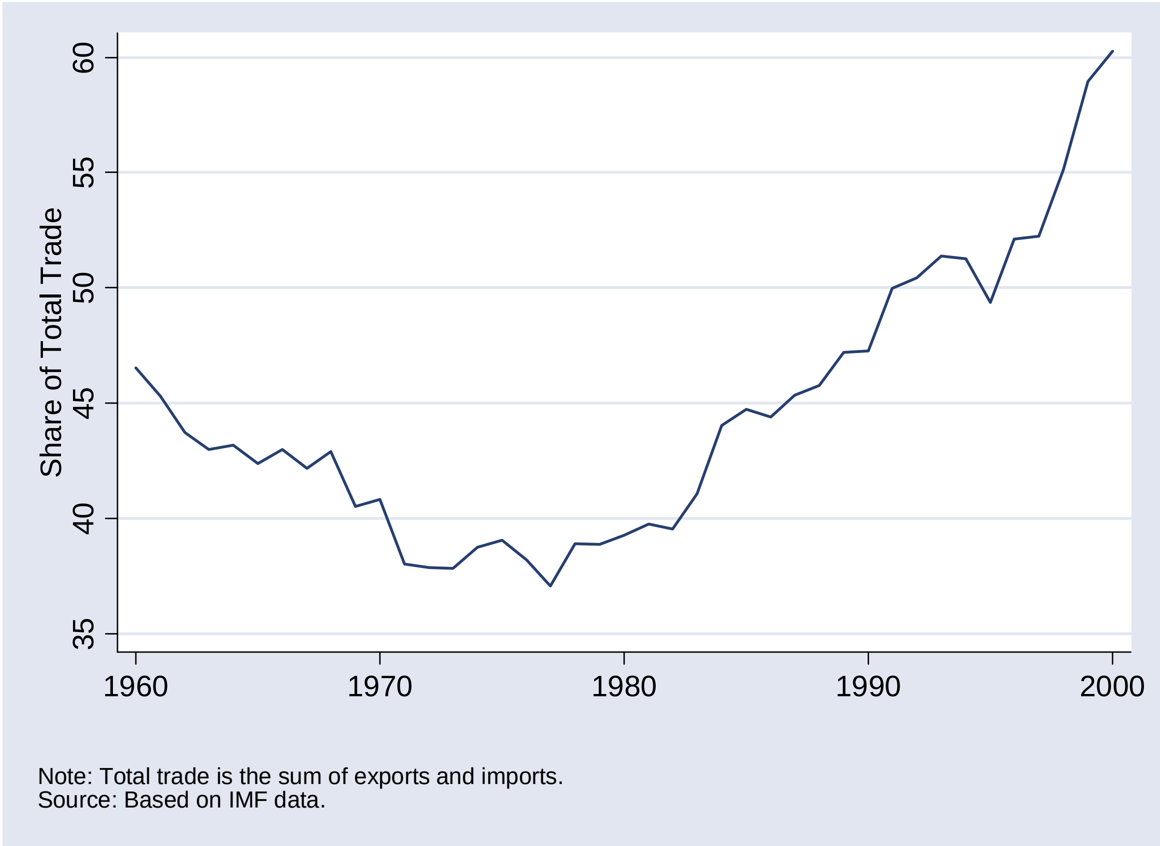
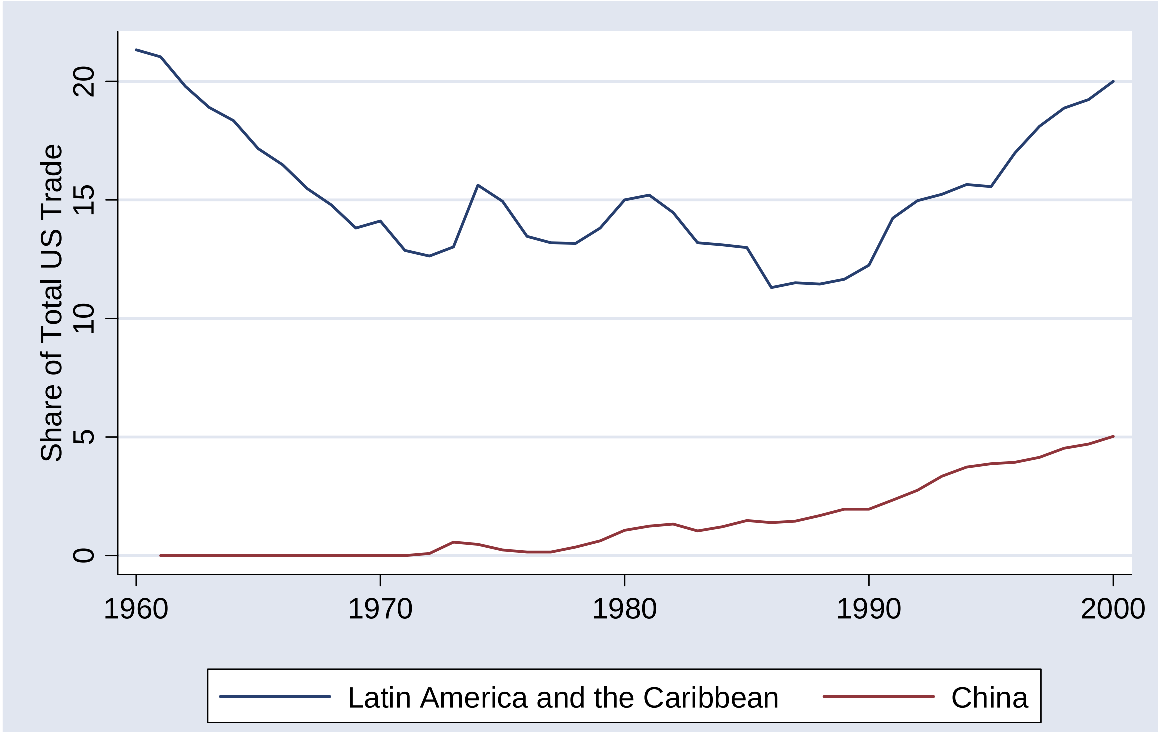


Figure 2: US Trade with China and Latin America, 1960-2000



Note: Total trade is the sum of exports and imports.
Source: Based on IMF data.