IDB WORKING PAPER SERIES #
IDB-WP-134

Trade Policy and Specialization

Antoni Estevadeordal,
Christian Volpe Martincus

Inter-American Development Bank
Vice Presidency for Sectors and Knowledge
Integration and Trade Sector

November, 2009

Trade Policy and Specialization

Antoni Estevadeordal,
Christian Volpe Martincus

Inter-American Development Bank
2009

Trade Policy and Specialization[1]

Antoni Estevadeordal
Christian Volpe Martincus[2]

Abstract

Trade liberalization leads to significant changes in countries' economic structures. The implied variation in the level and nature of specialization has important consequences for liberalizing economies. It is therefore extremely relevant for those countries pursuing trade liberalization initiatives to know how their specialization profiles would look like under lower trade costs. This paper examines the impact of trade policy on production specialization patterns in ten Latin American countries (Argentina, Brazil, Bolivia, Chile, Colombia, Ecuador, Mexico, Peru, Uruguay and Venezuela) over the period 1990-2001, and explicitly assesses the potential implications of a trade agreement with the United States. A theory-consistent measure of specialization is derived from the standard international trade theory: the share of the industry in a country's GDP. The role of trade policy in shaping the distribution of these shares is investigated using a simultaneous equation approach on sectoral value added and tariff and factor endowment data. Estimates are then used to predict countries´ specialization patterns under a trade arrangement with the United States.

Keywords: Specialization, Trade Policy, Latin America.
JEL-Codes F11, F15, C14, C23.

[1] We would like to thank Eduardo Mendoza Quintanilla and Jerónimo Carballo for their valuable research assistance. We also thank Enrique Alberola, Holger Breinlich, Sebastián Claro, Luca Debenedictis, Samuel Freije Rodriguez, Ángel Gavilán, Kishore Gawande, Crt Kostevc, Álvaro Lalanne, Günther Maier, Juliette Milgram Baleix, Daniel Navia, Laura Resmini, Andrés Rodriguez Pose, Juan Ruiz, Pablo Sanguinetti, Isidro Soloaga, Gabriele Tondl, Iulia Traistaru-Siedschlag, Federico Trionfetti, Marcel Vaillant, Josep Villarrubia, and participants at seminars at the University of Granada (Granada), the Bank of Spain (Madrid), the Economics and Social Research Institute (Dublin), and at the Annual Congress of the European Economic Association (Vienna), the Annual Conference of the European Trade Study Group (Vienna), and the Annual Meeting of the Regional Integration Network (Puebla) for helpful and insightful comments and suggestions.
[2] Correspondence Address: Inter-American Development Bank, Stop W0612, 1300 New York Avenue, NW, Washington, DC 20577, United States of America. E-mail: christianv@iadb.org. Tel: +1 202 623 3199. Fax: +1 202 623 2169.

1. Introduction

According to the standard international trade theory, trade liberalization is likely to lead to significant changes in countries' economic structures. In particular, reducing the degree of protection is expected to cause relative expansion of those sectors having comparative advantage and relative contraction of those industries suffering comparative disadvantage with respect to the rest of the world. This paper provides empirical evidence on these effects of trade policy using data on ten Latin American countries over the period 1990-2001.

The implied variation in the level and nature of specialization has important consequences for liberalizing economies. Thus, adjustment costs associated with those structural changes may be substantial and countries should be prepared for minimizing their possible negative impacts. For instance, re-training programs would be very helpful in facilitating re-allocation of labor across industries. Furthermore, the changing specialization profile of countries may affect their growth potential.[1] Greater specialization in fewer (more), intrinsically more (less) volatile sectors leads to higher (lower) aggregate volatility (see Koren and Tenreyro, 2007) and, as a result, to lower (higher) long-term growth rates (see, e.g., Fatás, 2002).[2] Income distribution is also likely to be influenced. According to the Stolper-Samuelson theorem, opening, by changing production specialization, will tend to shift income towards a country's abundant factor, thus affecting the degree of income inequality (see Davis, 1996).[3] Finally, if as a consequence of trade liberalization countries end up with more dissimilar production structures, they will become more sensitive to specific industry shocks and henceforth more idiosyncratic business cycles. Under these conditions, if economies use the exchange rate to adjust to those

---

1 In endogenous growth models specialization could promote productivity growth by learning-by-doing, but it may also induce specialization away from sectors with potential for technological progress, which would result in poorer growth performance and lower levels of welfare. See, e.g., Romer (1987), Lucas (1988), Quah and Rauch (1990), Grossman and Helpman (1991), Young (1991), Weinhold and Rauch (1999), and Redding (1999).

2 Higher concentration in natural resources sectors may increase a country's vulnerability to "Dutch Disease" episodes (see Corden and Neary, 1982). If harmed sectors are activities that promote a more complex labor division and stronger linkages with the rest of the economy, then development prospects will be negatively affected.

3 Leamer et al. (1999) argue that in countries that are abundant in natural resources such as the Latin American ones the appearance of manufacturing tend to be delayed and so the formation of the skills required by the lately emerging human capital intensive sectors. As a consequence, such countries are expected to go through longer periods of higher income inequality than those producing goods demanding gradual skill updating. Further, Engerman and Sokoloff (2002) state that the initial concentration of the ownership of natural resources in the Americas favored institutional structures that advantaged certain social sectors thus perpetuating a severely skewed income distribution.

shocks, a higher bilateral exchange rate variability should be expected and this could generate pressures to re-introduce protectionist measures within trade blocs.[4]

It is therefore extremely relevant for those countries pursuing trade liberalization initiatives to know how their specialization profiles would look like under lower trade costs because this will allow them to anticipate the sectoral adjustments to be faced and henceforth will give them valuable insights on the implied consequences of these changes in terms of the potential for development and the macroeconomic environment as well as on the possible policy strategies to deal with the challenges they impose. This is especially important for Latin America, given its disappointing growth performance in the last decades, the already high inequality levels, and the long history of macroeconomic instability and failed integration attempts.

In the last two decades Latin American countries implemented broad and comprehensive trade reform programs starting from relatively high tariff protection levels (see Figure 1). Removing trade barriers with respect to the rest of the world has proven to have a significant impact on Latin American countries' overall degree of manufacturing specialization. Thus, most of these countries have become increasingly specialized (see Figure 2).

NAFTA, a free trade agreement involving Mexico, the United States, and Canada entered in force in the mid-1990s. Chile and more recently Peru and Colombia have also signed a trade arrangement with the United States. More generally, even though its pace has experienced a slowdown in the last time, there is a project to establish a Free Trade Area of the Americas (FTAA) comprising almost all countries in the region. This trade agreement would mean a substantial deepening of Latin American countries' opening to the world which might be expected to accentuate the aforementioned trends. This document aims at assessing how likely this scenario is. More precisely, it analyzes the impact of trade liberalization with the United States on sectoral specialization of the Latin American countries.

In doing this, this study provides a descriptive picture of specialization patterns in those countries and their evolution over time. Second, starting from the standard international trade theory, an expression of the share of each industry in each country's total GDP as a function of

[4] See, e.g., Kenen (1969), Eichengreen (1992), Krugman (1993), and, for MERCOSUR, Fernandez-Arias et al. (2002).

relative prices, endowments, and technology is derived and econometrically estimated using data over the period 1990-2001.

This approach has been used by Harrigan (1997) to assess the role of technology and factor supplies in shaping the specialization patterns across developed economies and by Redding (2002) to quantify the influence of factor endowments in explaining the dynamics of these patterns.[5] Kee et al. (2004) have exploited this framework to estimate import demand elasticities and consistent measures of trade restrictiveness, Hanson and Robertson (2005) to investigate the factor behind countries' export capacities, and Feenstra and Kee (2006) to analyze the effects of sectoral export variety on country productivity.[6] More recently, Yeaple and Golub (2007) incorporated infrastructure in this setting as a determinant of productivity differences across countries.

We focus on the impact of relative prices on sectoral production specialization patterns. One main simplifying assumption is made in assessing this impact. Given that most Latin American countries are small economies, domestic prices will be assumed to be exogenously determined by given unique international prices and sectoral tariffs. Hence, changes in trade policies, by modifying domestic relative prices, will lead to changes in countries' specialization patterns. Under this assumption, we estimate a system of simultaneous sectoral shares equations on sectoral tariffs, factor endowments, and fixed-effects by three-stage least squares (3SLS). We find that trade policy has contributed to shape Latin American countries' specialization patterns over the sample period. Thus, for instance, higher tariffs on printing and publishing are associated with larger output shares of this sector and lower output shares of non-metallic mineral products and basic metals. In accordance with the theory, factor endowments also matter for specialization. A large relative endowment of capital favors specialization in food products and machinery, while that of forest and woodland negatively affects the relative importance of textiles and basic metals. Relative abundance of workers with primary education is linked to specialization in food products, textiles, and machinery. Finally, consistently with previous findings, the proportion of college-educated workers has either a negative or negligible effect on

---

5 Fitzgerald and Hallak (2004) use a slightly different approach to estimate the effect of factor proportions on the pattern of manufacturing specialization in a sample of OECD countries, once the fact that factor accumulation responds to productivity has been accounted for.

6 See, e.g., Anderson and Neary (1992, 1994, 2003) for derivations of alternative theoretically consistent indices of trade restrictiveness.

the output shares of most industries, which suggests that this factor may be intensively used in non-traded services.

We then re-estimate the system with all equations expressed relative to the United States and use the so-obtained estimates to examine the potential effects of a trade arrangement with that country. These effects are simulated by letting the relative prices to converge and assuming that relative factor endowments and parameters remain constant. We find that trade liberalization would be associated with a deepening of current patterns of specialization based on static comparative advantages. More specifically, sectors such as agriculture, mining, food and beverages, and chemical products, which use intensively natural resources abundant in Latin American countries will relatively expand, whereas those intensive in scarce factors such as textiles, machinery, and electrical machinery and transport equipment will relatively contract. We should stress that, given the restrictive assumptions under which this exercise is performed, these predictions should be taken with extreme caution and they should be accordingly considered at most indicative. Further, as mentioned above, simulations assume that nothing but tariffs change. However, public policies in other areas such as education partially determine comparative advantage over time. Hence, the implications of a trade initiative like the one examined here might be radically different if accompanied by proper complementary domestic policies.

The remainder of this paper is organized as follows. Section 2 derives the sectoral specialization measure from the international trade theory and identifies their main determinants thus establishing the estimation equation, and discusses the key issues to be addressed in the econometric analysis. Section 3 briefly describes the dataset and reports some descriptive evidence on the specialization patterns of the Latin American countries over the sample period. Section 4 presents the basic estimation results. Section 5 explores the implications of a trade arrangement with the United States, and Section 6 concludes.

2. Theory, Empirical Modeling, and Econometric Issues

To define the estimation equation and thus the appropriate functional form as well as the relevant variables to be included, we will follow the approach proposed by Harrigan (1997) and Redding (2002). The idea is to derive theory-consistent measure of sectoral specialization from the standard international trade theory.

Assume a set of small countries, each of them endowed with a fixed amount of factors of production. These factors are used to produce final goods under constant returns to scale and perfect competition conditions such that the value of output is maximized. This value is given by:

$$X_{ct} = r(p_{ct}, v_{ct}) \tag{1}$$

where *r()* is the revenue function, *p* is the vector of final good prices, *v* is the vector of production factors, $c=\{1,\ldots,C\}$ indexes countries, and *t* time. As long as the revenue function is twice continuously differentiable, the vector of the economy's profit-maximizing net output is given by:[7]

$$x_c(p_{ct}, v_{ct}) = \partial r(p_{ct}, v_{ct}) / \partial p_{ct} \tag{2}$$

Further, Hicks-neutral technology differences will be assumed across countries, industries, and time, so that the production function takes the following form:

$$x_{cjt} = \theta_{cjt} f_j(v_{cjt}) \tag{3}$$

where θ_{cjt} parametrizes technology in industry *j* of country *c* at time *t*. As shown in Dixit and Norman (1980), in this case, the revenue function is given by:

$$r(p_{ct}, v_{ct}) = r(\theta_{ct} p_{ct}, v_{ct}) \tag{4}$$

where θ_{ct} is an *nxn* diagonal matrix of the technology parameters θ_{cjt}. This formulation implies that industry-specific neutral technological changes have the same effect on revenue as industry-specific price changes.

Following Woodland (1982), Kohli (1991), and Harrigan (1997), in order to operationalize the model, a translog revenue function will be assumed:[8]

$$\begin{aligned} lnr(\theta p, v) = {} & \alpha_{00} + \sum_{j=1}^{n} \alpha_{0j} ln\theta_j p_j + \frac{1}{2}\sum_{k=1}^{n}\sum_{j=1}^{n} \alpha_{jk} ln(\theta_j p_j) ln(\theta_k p_k) + \sum_{i=1}^{m} \beta_{ih} lnv_i + \\ & + \frac{1}{2}\sum_{i=1}^{m}\sum_{h=1}^{m} \beta_{ih} lnv_i lnv_h + \sum_{j=1}^{n}\sum_{i=1}^{m} \gamma_{ji} ln(\theta_j p_j) ln(v_i) \end{aligned} \tag{5}$$

where *j,k* index goods and *i,h* index factors. Symmetry of cross-effects implies:

$$\alpha_{jk} = \alpha_{kj} \quad and \quad \beta_{ih} = \beta_{hi} \quad \forall\, h, i, j, k \tag{6}$$

---

[7] A sufficient condition is that there are at least as many factors as goods (see Redding, 2002).

[8] The translog model is frequently interpreted as a second order approximation to an unknown function form (see Greene, 1997).

Further, linear homogeneity in v and p requires:

$$\sum_{j=1}^{n}\alpha_{0j}=1 \quad \sum_{i=1}^{m}\beta_{0i}=1 \quad \sum_{j=1}^{n}\alpha_{kj}=0 \quad \sum_{i=1}^{m}\beta_{ih}=0 \quad \sum_{i=1}^{m}\gamma_{ji}=0 \tag{7}$$

Differentiating the natural logarithm of the revenue function with respect to each p_j, one obtains the share of sector j in country c's GDP at time t, s_{cjt}:

$$s_{cjt}=\frac{p_{cjt}x_{cjt}\left(\theta_{ct}p_{ct},v_{ct}\right)}{r\left(\theta_{ct}p_{ct},v_{ct}\right)}=\alpha_{0j}+\sum_{k=2}^{n}\alpha_{kj}ln\frac{p_{ckt}}{p_{c1t}}+\sum_{k=2}^{n}\alpha_{kj}ln\frac{\theta_{ckt}}{\theta_{c1t}}+\sum_{i=2}^{m}\gamma_{ji}ln\frac{v_{cit}}{v_{c1t}} \tag{8}$$

The theory-consistent measure of sectoral specialization is then the share of sector j in country c's GDP at time t, $s_{cjt.}$

Equation (8) relates a theory-consistent measure of sectoral specialization to their underlying economic determinants: relative prices, technology, and factor endowments. The translog specification implies that the coefficients on the variables are constant across countries and over time.

Following Redding (2002), non-traded good prices and technology differences will be assumed as being drawn from an estimable probability function:[9]

$$\sum_{k=n_1+1}^{n}\alpha_{kj}ln\frac{p_{ckt}}{p_{c1t}}+\sum_{k=2}^{n}\alpha_{kj}ln\frac{\theta_{ckt}}{\theta_{c1t}}=\mu_{jt}+\theta_{cj}+\varepsilon_{cjt} \tag{9}$$

Further, MFN tariffs will be used to capture cross-country differences in relative prices of traded goods (see Anderson and van Wincoop, 2004).[10] In particular, assuming that goods from sector *1* are freely traded up to transport costs and taking into account that countries face the same relative international prices:[11]

---

9 A priori, technology differences can be estimated using data on factor inputs and output (see Harrigan, 1997). However, reliable comparable data on capital inputs are not available at the sectoral level for most countries in the sample.

10 Prices are inaccurately measured at the level of aggregation used in this paper. In most Latin American countries, trade policy reform primarily took the form of drastic tariff reductions, so here these reforms are exploited as a source of (in principle) exogenous variations in prices (see Goldberg and Pavcnik, 2005). Note that, since we do not have a complete set of prices, we do not impose restrictions on the homogeneity in prices in the system.

11 Implicit or explicit acceptance of an untaxed *numeraire* is a common practice when addressing questions such as the effects of tax rates on the home and foreign price vectors (see Dixit and Norman, 1980). In particular, when using (sectoral statutory MFN) *ad valorem* tariffs, as it is the case in this analysis, the domestic price can be expressed as one plus tariff times the international price (see Dixit and Norman, 1980; and Feenstra, 2003). Gonzaga et al. (2006) show that the impact of trade liberalization on relative prices additionally depends on the different pass-through coefficients across sectors, which, in turn, hinge upon the sectoral import penetration ratio. More specifically, sectors in which the country has comparative advantage are the ones with lower import penetration and thus with lower pass-through.

$$\sum_{k=2}^{n_1} \alpha_{kj} ln \frac{p_{ckt}}{p_{c1t}} = \sum_{k=2}^{n_1} \alpha_{kj} ln[(1+\tau_{ckt})(1+\delta_{ckt})\eta_{ck}\varphi_{kt}] = \sum_{k=2}^{n_1} \alpha_{kj} ln[(1+\tau_{ckt})] + \xi_{jt} + \psi_{cj} \quad 10)$$

where n_1 is the number of traded goods, τ_{cjt}^{MFN} is the MFN tariff set by country c on products of sector j at time t, δ_{cjt} is a measure of non-tariff barriers on goods from sector j in country c at time t, η_{cj} measures the pass-through effect from tariffs to domestic prices in sector j in country c (see Feenstra, 1989, and Gonzaga et al., 2006), φ_{cjt} denote the international price of goods from sector j relative to that of goods from industry 1, and ξ_{jt} and ψ_{ck} are industry-year fixed-effects and country-industry fixed-effects, respectively, that account for the impact of the aforementioned variables.[12]

Plugging Equations (9) and (10) into Equation (8), we get the following estimation equation:

$$s_{cjt} = \sum_{k=2}^{n_1} \alpha_{kj} ln[(1+\tau_{ckt})] + \sum_{i=1}^{m} \gamma_{ji} \left[\ln\left(\frac{E_i}{L}\right)_{ct} \right] + \pi_{cj} + \rho_{jt} + \varepsilon_{cjt} \quad (11)$$

where the E_{ict}s are factor endowments (i=capital stock, arable land, pasture land, forest and woodland, oil reserves, gas reserves, coal reserves, copper reserves, tin reserves, zinc reserves, population with primary school, population with secondary school, and population with post-secondary education), of country c at time t, L_{ct} is the size of working age population in country c at time t, $\pi_{cj} (= \theta_{cj} + \varphi_{cj})$ stands for country-sector fixed-effects that control for any permanent country-specific barriers to trade (e.g., remoteness, non-tariff barriers), any permanent country-differences in technology (e.g., associated with social infrastructure, see Hall and Jones, 1999), and country-specific pass-through; and $\rho_{jt} (= \mu_{jt} + \xi_{jt})$ denotes sector-year fixed-effects that

[12] Data on non-tariff barriers are rather limited and not perfectly comparable over time (see Goldberg and Pavcnik, 2005). The scarce available information suggests they do not seem to exhibit clear country-sector specificities over time, but relatively constant country-specific patterns and common changes across countries over time for given sectors, so that the fixed-effects are likely to properly control for their influence.

capture common changes in relative international prices, technologies, and factor endowments across countries.[13]

Equation (11) suggests that, once controlled for forces which are common across countries and years, changes in countries' specialization patterns result from country-specific changes in relative prices and relative factor endowments. According to the theory, the estimated coefficient on the own tariff is the own-price effect and should therefore be nonnegative, while the estimated coefficients on factor supplies will hinge upon the sector. Furthermore, note that the sectoral shares not only depend on the own tariffs, but also on those of remaining sectors. Kee et al. (2004) work at the tariff line level and propose a method to re-express each n-good economy into n sets of two-good economies using the properties associated with price indices in translog GDP functions to avoid exhausting the degree of freedom (see Caves et al., 1982). They also propose an aggregation method to the industry level. Given that cross-sectoral effects could provide interesting information, we will pursue here a strategy comparable to the second one.

The system of equations implicit in Equations (11) will be estimated for the Latin American countries over the period 1990-2001 using a simultaneous equation approach. Three key econometric issues should be addressed.[14] First, the translog functional form implies that there are cross-equation symmetry restrictions among the systems of output share equations for a group of industries (see Equations (6) and (7)) (see Harrigan, 1997). These theoretical restrictions will be will be imposed yielding a restricted estimator.

Second, the classical LSDV model assumes that the only correlation over time is due to the presence of the same individual across the panel. In particular, the equicorrelation coefficient is the same no matter how far periods are in time. Clearly, this is also a restrictive assumption for the economic relationships under consideration, as an unobserved shock in the current period might affect the specialization patterns for at least some coming periods (see Baltagi, 1995). Ignoring serial correlation when it is present results in consistent but inefficient estimates of the

---

13 As in Harrigan (1997) and Redding (2002), our model does not allow for international capital mobility. Since we are focusing on developing countries where cross-border mobility of productive capital is substantially lower to diverse impediments, this assumption seems to be less problematic in our case. In a world where this mobility is present, when a country applies a tariff on goods from capital intensive sectors and the rest of the world does not, a capital inflow into the taxing country will result until the marginal product of capital and relative prices are equalized, so that no more trade is needed. However, when barriers to trade exist in both countries and capital owner do not move with their capital, complete equalization of factor and commodity prices will not take place because goods constituting interest payments on foreign-owed capital are subject to these impediments (see Mundell, 1957). Exploring these interesting issues is beyond the scope of this paper.

14 The sum over the sectoral shares is less than one, so there is no need to drop one of the equations.

regression coefficients and biased standard errors. In our case, the Baltagi-Li LM test for first order serial correlation in a fixed-effects model points out that the null hypothesis of no autocorrelation should be rejected for most industries. An estimation strategy that corrects these non-spherical disturbances is therefore required. Specifically, we remove autocorrelation from the data using the Prais-Winsten transformation (see Greene, 1997).

Finally, endogeneity biases can be expected due to reverse causality and measurement errors, both concerning tariffs and endowments. To address these problems, a three-stage least squares (3SLS) error components estimator will be used on the transformed data. We will compute a fixed-effect estimator, so that only time variation within countries is used to identify the parameters. Given the relative similarity of the Latin American countries, this seems to be the right strategy. There is also a statistical reason for using the fixed-effect instead of the random effect treatment (e.g., Baltagi's (1981) EC3SLS). As shown by Cornwell et al. (1992), when all exogenous variables are correlated with the effects, as *a priori* it is the case in our analysis, consistent estimators reduce to 3SLS after a within transformation of the system.[15]

Finding suitable instruments for the aforementioned variables is extremely difficult. Although admittedly imperfect, the following strategy is applied: we use as instruments 10-years lag of sectoral shares in total manufacturing employment, which captures the electoral strength of workers and thus protection for large industries (see Caves, 1976, Finger et al., 1982 and Trefler, 2004); 10-years lag of (inverse) import penetration ratios, which is related to the stakes from protection in politically organized industries (see Grossman and Helpman, 1994, and Goldberg and Maggi, 1999); and 10-years lag of relative endowments of capital, population with primary education, population with secondary education, and population with tertiary education.[16] Even though some countries started to liberalize trade in the seventies (e.g., Chile) or the middle 1980s (e.g., Bolivia and Mexico), before 1990 the import substitution schemes were still in place in most economies, which consistently remained relatively closed. Hence, 10-years lagged values of both political economy and endowment variables correspond to a completely different trade regime so that we can be relatively confident that identification is less an issue in our estimations. Just to illustrate this point: in Argentina the ratio manufacturing

[15] In a random model, the individuals effects would account for factor such as country differences in sectoral pass-through, which are correlated with countries' comparative advantages and thus with their relative endowments (see Gonzaga et al., 2006). Similarly, those effects may capture country differences in average non-tariff barriers, which may be correlated with tariffs (see Anderson and Schmitt, 2003).

imports to output increased from 0.07 in 1980 to 0.18 in 2000, whereas in Mexico this ratio grew from 0.15 to 0.52 over the same period. To formally confirm the validity of this strategy we will perform a test for overidentifying restrictions.[17] Finally, note that the systematic measurement errors (e.g., those resulting from differences in measuring procedures and factor quality across countries and over time) will be absorbed into the country and time fixed-effects.[18]

3. Data

The sample includes ten Latin American countries: Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Mexico, Peru, Uruguay, and Venezuela, and the United States of America. Annual data on sectoral value added are used to characterize production specialization in these countries over the period 1990-2001. These data come mainly from the database PADI (Version 5.0) and the Annual Statistical Yearbooks prepared by the United Nation's Economic Commission for Latin America and the Caribbean (ECLAC), and the International Industrial Statistics made available by the United Nations Industrial Development Organization (UNIDO). Table A1.1 in Appendix A1 identifies the specific data sources and time coverage.

We consider 14 sectors. Table A1.2 in Appendix A1 lists these sectors and specifies, when relevant, which 3-digit manufacturing industries as defined according to the ISIC Revision 2 are included in each of the sectors. This level of aggregation results from a trade off. On the one hand, given sectoral heterogeneity, one would ideally work with the most disaggregated data at hand, which, in the case of manufacturing, corresponds to the 3-digit level, i.e., 28 industries.[19] On the other hand, these disaggregated manufacturing data would sharply contrast with the highly aggregated data available on agriculture and mining and, most importantly, as it should be clear from Section 2, would turn the econometric exercise extremely difficult. We have therefore decided to choose a middle path, namely, we take the 2-digit classification as our basic

---

16 Inverse import penetration ratios are measured here as the ratio of exports to imports in the sector in question.

17 We do not use more (lagged) factor endowments as instruments because the power of this test may be dramatically reduced in a finite sample when the number of instruments is large (see Bowsher, 2002).

18 There might be also an omitted variable problem, as Latin American countries have signed sub-regional trade agreements and have experienced non-simultaneous periods of real exchange rate appreciations over the 1990s. We therefore also estimate the system of equations including dummy variables for MERCOSUR and CAN and the real exchange rate for imports to control for the influence of these trade arrangements and that of real exchange rate, respectively. Estimations results with these additional variables are similar to those reported later and will not be shown. These results can be obtained from the authors upon request.

19 Unfortunately, we do not have internationally comparable disaggregated data on agriculture and mining. Despite this data limitation, we have included these sectors because they account for significant shares of overall economic activity in most of the countries in our sample.

manufacturing level of aggregation and disaggregate those sectors, which, according to the existing evidence, posses manifest intra-sectoral heterogeneity, such as textiles and wearing apparel and leather and footwear; chemicals, petroleum, and rubber and plastics; fabricated metal and machinery, and electrical machinery and transport equipment.[20]

Table 1 presents these sectoral data for the initial and the final year of the sample period, 1990 and 2001. The first row of this table reports the share of manufacturing value added in each country's total GDP. Each Latin American country, with the exception of Mexico and Ecuador, has experienced a decline in the share of manufacturing in GDP over the last decade. The decrease has been particularly pronounced in Uruguay. By 2001, manufacturing share ranges between 12.04% in the case of Ecuador and 20.48% in the case of Mexico. The next twelve rows present the share of each industry in total manufacturing value added thus providing information about the countries' industrial structures. In the larger sample countries, Brazil, Mexico, and the United States, fabricated metals and machinery and, most prominently, electric machinery and transport equipment are the largest sectors and their shares have even increased over the 1990s. Chemical products is a relatively large sector in most countries in the sample. Its share does not exhibit a common time trend across economies. In the smaller Latin American countries, food products is another important sector. The share of this sector has increased in Argentina, Bolivia, Chile, and Uruguay. Petroleum refinery stands out in Bolivia, Ecuador, and Venezuela, which, as we shall see below, are well endowed with reserves of natural gas and oil, whereas basic metal industries account for a significant share of total manufacturing activity in Argentina, Brazil and two countries known for being abundant in metals such as Peru and Chile. Some sectors have seen a drop in their weight in these countries' total industrial production such as textiles and wearing apparel; leather and footwear; and shades, fabricated metal and machinery; and/or electrical machinery and transport equipment.[21] The last two rows of Table 1 inform the share of agriculture and mining in countries' GDP. Agriculture accounts for a relatively large share of the economy in Bolivia, Colombia, Ecuador, and to a less extent, in Peru, Uruguay, and Brazil. The same holds for mining in Venezuela, Chile, and Ecuador.

---

20 Electrical machinery and transport equipment have received special policy treatment in many Latin American countries over particular periods. Examples in this regard are the free trade zones of Manaus in Brazil and Tierra del Fuego en Argentina; and the Auto Regimes in Argentina, Brazil, and between Colombia, Ecuador, and Venezuela, respectively.

21 The rising share of electric machinery and transport equipment in Colombia and Venezuela essentially reflects the growing relative importance of transport equipment.

MFN tariffs at the 4 digit level of the ISIC Revision 2 over the period 1990-2001 come from IDB and TRAINS. Table 2 reports a simple average of tariffs for each sector.[22] These sectoral tariffs were very high at the beginning of the sample period exceeding 50% in particular cases such as textiles and wearing apparel in Colombia and Ecuador. Most Latin American countries significantly lowered their tariffs since then, but overall these are still well above than those of the United States. The differences of tariffs across sectors are also substantially smaller than in the past. Dispersion is the lowest in Bolivia and especially in Chile, which imposes an almost flat rate. Besides these countries, nominal protection is in general higher for food products and textiles and wearing apparel. The lowest sectoral tariffs are observed for mining and petroleum refineries. In general, figures indicate that protection structure has changed substantially over time in the countries covered by our study and this, according to the theory, may have played a role in changing their specialization patterns.

Tariffs presented above are just simple averages at the sectoral level. The theory suggests a more consistent way to aggregate them. Specifically, if the revenue function *r()* has a translog functional form and all translog parameters are time invariant (as assumed in Section 2), then its exact price index is a Tornqvist price index (see Diewert, 1976, Caves et al., 1982, Kee et al., 2004). Hence, we define in logarithm terms:

$$lnP_{ct} = \sum_{z=1}^{Z} \bar{\lambda}_{czt} lnp_{czt} \tag{12}$$

where we define z as a sub-sector at the 4 digit ISIC Revision 2 and $\bar{\lambda}_{czt} = (1/2)(\lambda_{czt} + \lambda_{ROWzt})$ with $\lambda_{czt}(\lambda_{ROWzt})$ given by the share of sub-sector z in country *c´*s (rest of the world's) total imports of sector j in period t. The Tornqvist price index is then a weighted average of the sector' prices.

22 Tariff data for most countries come from IDB own estimations. Average sectoral tariffs for Bolivia and the United States have been calculated with data taken from TRAINS. In the case of Bolivia, disaggregated data start to be reported in 1993 onwards. Based on partial evidence, we assume that the sectoral tariffs for 1993 apply also to 1990-1992.

In particular, the price index at the sector level is the weighted average of goods' prices within each sector.[23] We therefore obtain consistent sector-level tariffs as follows:

$$ln\left(1+\tau_{cjt}\right)=\sum_{z\in j}\bar{\lambda}_{czt}ln\left(1+\tau_{czt}\right) \quad (13)$$

In the next section, we use these tariffs as explanatory variables in the estimations aiming at assessing whether and to what extent changes in sectoral tariffs have driven observed changes in countries' sectoral specialization.[24]

Data on countries endowments include arable, pasture, forest and woodland data from the Food and Agriculture Organization (FAO) as well as data on economy-wide labor data (i.e., population over 15 years) and the skill level of population (i.e., population with primary and secondary school, and with post-secondary education) from the database prepared by Barro and Lee (2000) over the period 1960-2000.[25] The perpetual inventory method has been applied as indicated in Jacob et al. (1997) and Kamps (2004) with a depreciation rate of 13.3% (e.g., Schott, 2003) on gross fixed capital formation over the period 1970-2001 as reported by the World Bank´s World Development Indicators to derive countries' capital stocks. Data on oil, natural gas, and coal reserves distributed by the United States' Energy Information Administration (EIA) are used to account for minerals stocks. Accounting for these stocks is especially important for some Andean countries, given their abundant endowments of these resources. Finally, for the same reason, we include data on metal reserves, namely, copper, tin, and zinc, from the United States' Geological Survey.[26]

Factor endowments data for 1990 and 2001 are shown in Table 3. The United States is relatively abundant in capital and college-educated workers, whereas most Latin American countries have large relative endowments of workers with lower qualification levels. Argentina

---

[23] Since Mexico already entered a FTA with the United States in 1994 and given that a large fraction of its trade is concentrated with that country, average sectoral tariffs for Mexico are estimated as a weighted average of the MFN tariffs and the preferential tariffs to the United States, where the weighting factors are the shares of imports from the rest of the world and those from the United States, respectively. Preferential tariffs are taken from TRAINS. In this case, there are few intermediate years for which data are missing. Figures for those intervening years have been interpolated. Other bilateral trade arrangements with the United States, such as that with Chile, have not been entered into force during our sample period.

[24] Trade-weighted average tariffs are similar to the so-called mercantilist index of trade policy computed by Anderson and Neary (2003) for most of the countries in our sample.

[25] Barro and Lee (2000) report data each five years over this period. We interpolate intervening years as in Harrigan (1997). Data on skill levels for 2001 are obtained by projecting the trend from the previous period.

[26] These series are not complete in annual terms. We assume that a given value keeps being valid until a new figure is reported. This allows to us better mimic the time profile of new reserve discoveries across countries. We acknowledge, however, that measurement errors may not be negligible for these variables.

is relatively abundant in arable land, while Bolivia, Brazil, and Peru are so in forest and woodland. Ecuador and mainly Venezuela are relatively well endowed with oil reserves. The same is true for Bolivia in natural gas, Colombia and the United States in coal, and Chile in copper. Most economies witnessed declines in workers with primary education, arable land, pasture land, and forest and woodland over the period, while the share of workers with post-secondary education grew in all countries. Hence, there have been also noticeable changes in relative factor endowments that may have also contributed to shape the evolving industrial structures of Latin American countries. We formally explore this possibility in the next section.

4. Econometric Results

Table 4 presents standardized estimates of Equation (10).[27] As mentioned before, the estimated coefficient on own tariffs corresponds to the own price-output effects and hence should be nonnegative. This effect is positive and significant in the case of paper and printing and publishing and not significantly different from zero in the remaining sectors.[28] As suggested by the theory, the cross-price effects, when significant, alternate positive and negative signs. Thus, for example, higher tariffs on petroleum refineries and basic metals are associated with larger shares of manufacture of non-metallic minerals in GDP, whereas the opposite holds for tariffs on paper, printing, and publishing; and mining. Similarly, sectoral shares of basic metals are positively related to tariffs on leather and footwear; non-metallic mineral products; and fabricated metals and machinery; and negatively related to tariffs on paper, printing, and publishing; rubber and plastics; electrical machinery and transport equipment; and mining.

Factor endowments have different impacts depending on the sector, as expected from the theory. Capital has a positive influence on the share of food products, chemicals, and fabricated metals and machinery in GDP. Abundance of gas has a negative impact on this last sector, whereas that of tin on petroleum refineries. The proportion of workers with primary education has a positive effect on the output shares of food products, textiles, and fabricated metals and machinery, while that of workers with secondary education on electrical machinery and transport

[27] Standardized coefficients are obtained by multiplying the regression slope by the standard deviation of the explanatory variable and dividing by the standard deviation of the dependent variable.

[28] The cutoff used to determine statistical significance is $t>1.64$ ($t<-1.64$), which corresponds to the 10% significance level.

equipment. Finally, the endowment of workers with post-secondary education favor specialization in petroleum refineries.[29]

The restrictions imposed as mandated by the theory have been tested by computing a Wald statistic, which has a χ^2 distribution with degrees of freedom equal to the numbers of restrictions being evaluated. The null hypotheses of linear homogeneity on factors (i.e., the sum of the estimated coefficients on factor endowments is equal to zero) and symmetry of cross-price effects cannot be rejected, either when tested separately or when tested together. Moreover, the Hansen test for overidentifying restrictions indicates that the instruments are valid and henceforth that our estimates are consistent.[30]

Further, given the size of our sample, finite-sample biases may be an issue. We therefore check the significance of estimated coefficients using bootstrapped standard errors, based on 1,000 replications.[31] Results are reported in Table 5. Main findings are confirmed, with a few exceptions. For instance, now there is no single sector whose share is positively affected by the fraction of workers with post-secondary education. In other words, college-educated workers have either a negative or non-significant relationship with sectoral shares. Hence, abundance of this kind of labor draws resources out manufacturing, agriculture, and mining. This result is consistent with Leamer (1984) and Harrigan (1995, 1997) and, as suggested by these authors, can be interpreted as implying that highly educated labor is intensively used in non-traded services.

---

29 The average R^2 of the regressions of the share equations is 0.941. The smallest R^2 is 0.806 and corresponds to rubber and plastics. Leather and footwear and non-metallic minerals have also R^2s below 0.900, i.e., 0.853 and 0.880, respectively. This suggests that other factors than those considered here (e.g., specific public sectoral policies) may have played an important role in explaining specialization, especially in the former sector. The R^2 of the remaining regressions is above 0.924.

30 For the sake of comparison, we present in Table A2.1 in Appendix A2 the same estimation, but just for eight manufacturing sectors, i.e., an exercise closer to Harrigan (1997). Overall, many results are similar. For example, a higher protection on paper, printing, and publishing favors specialization in that sector and capital affects positively the output shares of food products and machinery. Notice, however, that the linear homogeneity and cross-price effect restrictions, when jointly tested, do not find support in the data. This coincides with findings reported in Harrigan (1997). Furthermore, the test for overidentifying restrictions suggests that the instruments, which are the equivalents to those used in our 14-sectors estimation, are not valid in this case.

31 Bootstrap can be used to reduce the finite-sample bias of an estimator (see Horowitz, 2001).

5. Specialization Patterns Under a Trade Agreement with the United States

The theoretical framework outlined in Section 2 is flexible enough to allow for assessing different scenarios.[32] Thus, a trade arrangement between the Latin American countries and the United States can be assessed by expressing all variables in Equation (11) relative to the US as follows:

$$s_{cjt} - s_{USAjt} = \sum_{k=2}^{n_1} \alpha_{kj} ln\left[\frac{(1+\tau_{ckt})}{(1+\tau_{USAkt})}\right] + \sum_{i=1}^{m} \gamma_{ji}\left[\ln\left(\frac{E_{ict}}{L_{ct}} \Big/ \frac{E_{iUSAt}}{L_{USAt}}\right)\right] + \pi_{cj} + \rho_{jt} + \varepsilon_{cjt} \tag{14}$$

where sectoral tariffs relative to the United States are defined as follows:

$$ln\left[\frac{(1+\tau_{cjt})}{(1+\tau_{USAjt})}\right] = \sum_{z\in j} \bar{\lambda}'_{czt} ln\left[\frac{(1+\tau_{czt})}{(1+\tau_{USAzt})}\right] \tag{15}$$

with $\bar{\lambda}'_{czt} = (1/2)(\lambda_{czt} + \lambda_{USAzt})$ and λ_{USAzt} given by the share of sub-sector *z* in the United States' total imports of sector *j* in period *t*.

A trade arrangement will lead to a convergence of relative prices.[33] In the limit, prices will be equalized.[34] In this case, the following expression holds:

$$s_{cjt}^{Predicted} = \tilde{s}_{USAjt} + \sum_{i=1}^{m} \hat{\gamma}_{ji}\left[\ln\left(\frac{E_{ict}}{L_{ct}} \Big/ \frac{E_{iUSAt}}{L_{USAt}}\right)\right] + \hat{\pi}_{cj} + \hat{\rho}_{jt} \tag{16}$$

The distribution of predicted sectoral shares will characterize the countries' specialization patterns in this scenario.[35] Note, first, that in those predictions reported below, all variables but tariffs will be assumed to take their last sample year values, so that these predictions will be conditional on current comparative advantage as determined by relative factor endowments. Second, simulations assume parameter constancy across trade policy shifts.[36] Needless to say,

---

32 For instance, a general opening to the world economy can be simulated by setting all sectoral tariffs to zero. Hence, the first term of Equation (11) cancels out and then predicted shares are given by: $s_{cjt}^{Predicted} = \sum_{i=1}^{m} \hat{\gamma}_{ji}\left[ln\left(\frac{E_i}{L}\right)_{ct}\right] + \hat{\pi}_{cj} + \hat{\rho}_{jt}$

33 Rogers (2002) has found a significant decline in traded goods price dispersion in Europe coincidentally with the completion of the single market. Similarly, using a panel data set of car prices across five European countries, Goldberg and Verboven (2006) find that integration has favored convergence towards both the absolute and relative versions of the law of one price.

34 More specifically, we are assuming a customs union scenario.

35 Similar exercises could be performed by varying the relative factor endowments, e.g., the share of workers with college education.

36 Furthermore, simulations based on Equation (16) take the share of each industry in the United Sates' GDP as given in 2001. Latin American countries are so small relative to the United States that it seems fair to assume that their production conditions and factor endowments do not affect prices in the United States (see Mundell, 1957) and henceforth their specialization patterns, especially at the level of aggregation we are working with.

these predictions are derived from a model based on a particular theoretical approach and under very specific conditions and should be accordingly interpreted with extreme caution.

Table 6 shows standardized estimates of Equation (14), i.e., when the United States are adopted as a benchmark.[37] Higher tariffs on rubber and plastics and agriculture are associated with larger relative output shares of these sectors.

[38] Moreover, larger relative endowments of capital relative to the United States imply larger relative shares of food products; chemicals; and fabricated metals and machinery in GDP. Pasture land negatively affects relative specialization in leather and footwear; wood and furniture; chemicals; rubber and plastics; and fabricated metals and machinery; whereas forest and woodland that in textiles; non-metallic minerals; and electrical machinery and transport equipment. Furthermore, relative abundance of oil has a negative relationship with the share of wood and furniture in output. The same holds for copper reserves and the share of electrical machinery and transport equipment. Finally, the relative share of workers with primary education has a positive effect on the relative share of food products; textiles; and electrical machinery and transport equipment; while that of workers with secondary education on the share of this last sector.

As mentioned above, the estimates obtained from this model can be used to simulate the impact of a trade agreement between Latin American countries and the United States on the specialization patterns as indicated in Equation (16). Results are presented in Figure 3. There is one picture for each country with two sets of bars. One set displays the share of each sector in the country's GDP in 2001 and the second one how these shares would be in case that convergence of relative prices took place as a result of tariff removal. The shares of agriculture and mining are predicted to increase in most countries, while the opposite holds for the manufacturing industry. In particular, food products, and, depending on the specific country, chemical products or petroleum refineries, would become relatively larger. This is precisely what one would expect

---

37 The average R^2 is 0.847. However, there is a significant variation across sectors. Agriculture and fabricated metals and machinery have the largest R^2s, above 0.990. The smallest R^2 is 0.37 corresponding to leather and footwear. Other sectors with average or below average R^2s are chemicals (0.643), wood and furniture (0.682), rubber and plastics (0.759), non-metallic minerals (0.789), and textiles (0.849). The same considerations concerning the goodness of fit made for the first set of estimations also hold for these regressions. More importantly, predictions for these sectors will be less precise and thus should be taken with even more caution. The other sectors have R^2s above 0.939.

38 Remaining relative sectoral tariffs are not significantly different from zero with the exception of that on mining, which is negative. This might be related to country-time specific problems in the measurement of metal reserves (see footnote 25).

according to the theory given the comparative advantage of many Latin American economies in those sectors that intensively use their relatively abundant land, fuel, and metal endowments. In contrast, the shares of fabricated metals and machinery; and electrical machinery and transport equipment are expected to contract relatively. This is far from being surprising given the evident comparative advantage of the United States in these sectors relative to the Latin American countries.

Summarizing, a trade agreement with the United States, without concomitant changes in relevant domestic complementary policies, would reinforce the current patterns of specialization based on static comparative advantage along specific sectoral dimensions. More specifically, in this scenario, sectors intensive in natural resources relatively abundant in Latin American countries, i.e., agriculture, mining and related industries such as food and chemical products, would relatively expand; whereas sectors intensive in capital and labor with intermediate qualification, i.e., fabricated metals and machinery, and electrical machinery and transport equipment, would relatively shrink.

6. Concluding Remarks

Trade liberalization induces changes in countries' specialization patterns and thus sectoral adjustments governed by the logic of comparative advantage. Sectors in which countries enjoy comparative advantage are expected to expand, while sectors in which the countries suffer from comparative disadvantage are predicted to contract. The reallocation of resources across sectors is not automatic and, at least in the short run, unemployment problems might arise or accentuate. Changing specialization patterns may also affect the growth potential, income distribution, and macroeconomic volatility.

Integration into the world economy is the right strategy, but this strategy is associated with costs that should be neither overlooked nor underestimated. The same holds for those developing countries seeking a free trade arrangement with developed economies. Gaining insights about the adjustments to be expected is relevant from an economic policy point of view.

Using the standard neoclassical trade theory as a framework, this paper has analyzed the role of trade policy, and factor endowments, in shaping sectoral specialization of the Latin American countries over the period 1990-2001 and, under specific assumptions, has generated consistent predictions of how this specialization would look like if these countries signed a trade agreement with the United States. This deepening of trade liberalization will be associated with a relative expansion of those sectors intensive in natural resources relatively abundant in those countries, such as agriculture, mining, and food and chemical products; and with a relative contraction of those sectors intensive in capital and labor with more than basic qualification, mainly machinery. Further opening will therefore reinforce the preexisting patterns of specialization based on static comparative advantage.

However, comparative advantage is not static and, over time, is partially determined by public policies (e.g., supply of educated workers). Hence, the final outcome might substantially differ from our forecasts if specific domestic complementary policies are implemented alongside opening. These policies may allow involved countries to ameliorate the short-run costs and properly shape intra- and inter-sectoral specialization to face the challenges imposed by the lowering of trade barriers.

References

Anderson, J. and P. Neary, 1992. Trade reforms with quotas, partial rent retention and tariffs. Econometrica, 60, 1.

Anderson, J. and P. Neary, 1994. Measuring the restrictiveness of trade policies. World Bank Economic Review, 8, 2.

Anderson, J. and P. Neary, 2003. The mercantilist index of trade policy. International Economic Review, 44, 2.

Anderson, S. and N. Schmitt, 2003. Nontariff barriers and trade liberalization. Economic Inquiry, 41, 1.

Baltagi, B., 1981. Simultaneous equations with error components. Journal of Econometrics, 17.

Baltagi, B., 1995. Econometric Analysis of Panel Data. John Wiley & Sons, Chichester.

Barro, R. and J.-W. Lee, 2000. International data on education attainment: Updates and implications. CID Working Paper 42, Harvard University.

Bowsher, C., 2002. On testing overidentifying restrictions in dynamic panel data models. Economic Letters, 77, 2.

Caves, D., 1976. Economic models of political choice: Canada's tariff structure. Canadian Journal of Economics, 9.

Caves, D., L. Christensen, and E. Diewert, 1982. Multilateral comparisons of output, input, and productivity using superlative index numbers. Economic Journal, 92.

Corden, M. and P. Neary, 1982. Booming sector and de-industrialisation in a small open economy. Economic Journal, 92, 368.

Cornwell, C., P. Schmidt, and D. Wyhowski, 1992. Simultaneous equations and panel data. Journal of Econometrics, 51.

Davis, D., 1996. Trade liberalization and income distribution. NBER Working Paper 5693.

Diewert, E., 1976. Exact and superlative index numbers. Journal of Econometrics, 4, 2.

Dixit, A. and V. Norman, 1980. Theory of international trade: A dual, general equilibrium approach. Cambridge University Press, London.

Engerman, S. and K. Sokoloff, 2002. Factor endowments, inequality, and path of development among New World economic. NBER Working Paper 9259.

Eichengreen, B., 1993. European monetary unification. Journal of Economic Literature, 31.

Estevadeordal, A. and C. Volpe Martincus, 2006. Specialization and diverging manufacturing structures: The aftermath of trade policy reforms in developing countries. Centro Studi d' Agliano. Working Paper 220.

Fatás, A., 2002. The effects of business cycles on growth. Loayza, N. and R. Soto (eds.), Economic Growth: Sources, Trends and Cycles, Banco Central de Chile.

Feenstra, R., 1989. Symmetric Pass-through of tariffs and exchange rates under imperfect competition: An empirical test. Journal of International Economics, 27, ½.

Feenstra, R., 2003. Advanced International Trade: Theory and Evidence. Princeton University Press, Princeton, New Yersey.

Feenstra, R. and H. Kee, 2004. Export variety and country productivity. NBER Working Paper 10830.

Fernández-Arias, E., U. Panizza, and E. Stein, 2002. Trade agreements, exchange rate disagreements. Inter-American Development Bank, Washington.

Finger, J., H.K. Hall, and D. Nelson, 1982. The political economy of administered protection. American Economic Review, 72, 3.

Fitzgerald, D. and J. Hallak, 2004. Specialization, capital accumulation, and development. Journal of International Economics, 64, 2.

Goldberg, P. and G. Maggi, 1999. Protection for sale: An empirical investigation. American Economic Review, 89, 5.

Goldberg, P. and N. Pavcnik, 2005. Trade, wages, and the political economy of trade protection: Evidence from the Colombian trade reforms. Journal of International Economics, 66, 1.

Goldberg, P. and F. Verboven, 2005. Market integration and convergence to the law of one price: Evidence from the European car market. Journal of International Economics, 65, 1.

Gonzaga, G., C. Terra, and N. Menezes Filho., 2006. Trade liberalization and the evolution of skill earning differentials in Brazil. Journal of International Economics, 68, 2.

Greene, W., 1997. Econometric analysis. Prentice Hall, New Jersey.

Grossman, G. and E. Helpman, 1991. Innovation and growth in the global economy. MIT Press. Cambridge, MA.

Grossman, G. and H. Helpman, 1994. Protection for sale. American Economic Review, 84, 4.

Hall, R., and C. Jones, 1999. Why do some countries produce so much more output per worker than others? Quarterly Journal of Economics, 114, 1.

Hanson, G. and R. Robertson, 2005. Boom and busts in Mexican exports: A gravity framework for evaluating supply and demand factors. Paper presented at the workshop “China: Impact and policy implications for the Mexican economy”, IDB, Washington, DC.

Harrigan, J., 1995. Factor endowments and the international location of production: Econometric evidence for the OECD, 1970-1985. Journal of International Economics, 39, 1-2.

Harrigan, J., 1997. Technology, factor supplies, and international specialization: Estimating the neoclassical model. American Economic Review, 87, 4.

Horowitz, J., 2001. The bootstrap, in J. Heckman and E. Leamer (eds.). Handbook of Econometrics, 5, 52. Elsevier Science.

Jacob, V., Sharma, S., Grabowski, R., 1997. Capital stock estimates for major sectors and disaggregated manufacturing in selected OECD countries. Applied Economics, 29.

Kamps, C., 2004. New estimates of government net capital stocks for 22 OECD countries: 1960-2001. IMF Working Papers, WP/04/67.

Kee, H., A. Nicita, and M. Olarreaga, 2004. Import demand elasticities and trade distortions. CEPR Discussion Paper 4669.

Kenen, P., 1969. The optimum currency area: An eclectic view, in Mundell, R. and A. Swoboda (eds.). Monetary problems of the international economy. University of Chicago Press. Chicago.

Koren, M. and S. Tenreyro, 2007. Volatility and development. Quarterly Journal of Economics, 122, 1.

Kohli, U., 1991. Technology, duality, and foreign trade. University of Michigan Press, Ann Arbor.

Krugman, P., 1993. Lessons of Massachusetts for EMU, in Giavazzi, F. and F. Torres. The transition to economic and monetary union in Europe. Cambridge University Press. New York.

Krugman, P., 1987. The narrow moving band, the Dutch disease, and the competitive consequences of Mrs. Thatcher: Notes on trade in the presence of dynamic scale economies. Journal of Development Economics, 27.

Leamer, E., 1984. Sources of international comparative advantage: Theory and evidence. MIT Press, Cambridge.

Leamer, E., H. Maul, S. Rodriguez, and P. Schott, 2003. Does natural resource abundance increase Latin American income inequality. Journal of Development Economics, 59, 1.

Lucas, R., 1988. On the mechanics of economic development. Journal of Monetary Economics, 22.

Mundell, R., 1957. International trade and factor mobility. American Economic Review, 47, 3.

Quah, D. and J. Rauch, 1990. Openness and the rate of economic growth. UCSD. Mimeo.

Redding, S., 1999. Dynamic comparative advantage and the welfare effects of trade. Oxford Economic Papers, 51.

Redding, S., 2002. Specialization dynamics. Journal of International Economics, 58.

Rogers, J., 2002. Monetary union, price level convergence, and inflation: How close is Europe to the United States? Board of Governors of the Federal Reserve Bank System, International Finance Discussion Papers, 740.

Romer, P., 1987. Growth based on increasing returns due to specialization. American Economic Review, 77, 2.

Schott, P., 2003. One size fits all? Heckscher-Ohlin specialization in global production. American Economic Review, 93, 3.

Treffler, D., 2004. The long and short of Canada-US free trade agreement. American Economic Review, 94, 4.

Yeaple, S. and S. Golub, 2007. International productivity differences, infrastructure, and comparative advantage. Review of International Economics, 15, 2.

Weinhold, D. and J. Rauch, 1999. Openness, specialization, and productivity growth in less developed countries. Canadian Journal of Economics, 32.

Woodland, A., 1982. International trade and resource allocation. North-Holland, Amsterdam.

Young, A., 1991. Learning by doing and the dynamics effects of international trade. Quarterly Journal of Economics, 106.

Table 1

Share of Manufacturing in GDP and Shares of Industries in Total Manufacturing in 1990 and 2001 (Percentage)												
	Year	**Argentina**	**Bolivia**	**Brazil**	**Chile**	**Colombia**	**Ecuador**	**Mexico**	**Peru**	**Uruguay**	**Venezuela**	**US**
Manufacturing Industry	**1990**	18.22	16.69	21.64	18.59	17.27	11.87	19.41	15.18	25.82	17.48	19.41
	2001	15.46	16.31	19.64	15.78	14.05	12.04	20.48	14.58	17.42	13.97	15.16
Food, Beverages, and Tobacco	**1990**	37.51	25.05	15.14	26.05	31.67	21.97	22.42	28.56	31.27	16.97	10.60
	2001	41.71	40.22	14.89	30.85	29.57	21.42	21.99	24.90	50.77	13.86	8.07
Textiles and Wearing Apparel	**1990**	9.18	3.21	9.95	6.25	12.71	8.79	8.52	11.94	14.65	3.72	4.85
	2001	4.80	2.52	6.51	2.71	11.56	3.08	7.15	9.22	4.04	1.24	2.98
Leather and Footwear	**1990**	0.82	2.08	2.40	1.86	1.48	0.77	2.13	1.09	3.67	1.07	0.32
	2001	0.73	1.25	1.00	0.81	1.31	0.60	1.49	0.44	3.36	0.88	0.11
Wood and Furniture	**1990**	1.16	1.88	1.49	4.10	1.25	2.12	3.32	5.94	1.37	0.83	2.78
	2001	1.20	1.26	1.19	3.00	0.43	1.51	2.47	13.05	0.96	0.87	2.04
Paper, Printing, and Publishing	**1990**	3.80	2.03	6.51	8.37	7.34	5.12	5.09	4.73	5.54	3.77	10.64
	2001	4.65	2.80	7.63	7.38	9.21	2.63	4.28	5.66	6.18	3.30	6.98
Chemicals	**1990**	9.77	2.71	12.94	10.21	14.29	7.78	12.35	6.17	9.70	9.12	10.61
	2001	11.08	6.80	10.86	13.77	12.14	3.33	10.58	6.32	7.12	6.19	8.58
Petroleum	**1990**	7.98	53.19	6.23	5.57	3.21	31.68	2.56	10.33	10.15	39.22	1.69
	2001	8.18	34.58	8.85	7.48	7.45	54.85	2.06	7.58	10.93	54.29	0.67
Rubber and Plastics	**1990**	2.87	1.12	4.68	3.41	4.48	4.96	3.13	1.30	5.21	2.92	3.73
	2001	2.62	1.91	3.20	3.92	4.49	2.74	2.81	2.67	3.33	1.92	3.70
Non-Metallic Mineral Products	**1990**	2.53	4.98	2.57	3.11	5.97	6.25	6.44	8.91	3.56	3.43	3.11
	2001	1.96	3.99	2.30	5.26	4.16	3.10	5.62	12.31	2.86	3.80	2.31
Basic Metal Industries	**1990**	10.14	1.64	8.91	20.69	4.17	1.76	6.50	7.96	1.41	10.56	3.53
	2001	9.77	1.12	10.12	12.82	4.83	0.96	6.20	9.94	0.86	3.09	2.84
Fabricated Metals and Machinery	**1990**	5.82	0.89	12.71	6.84	6.25	3.92	7.24	2.65	4.01	4.26	19.04
	2001	5.20	0.61	13.42	9.20	5.35	2.20	7.40	2.82	2.62	3.11	27.02
Electrical Machinery, Transports and Scientific Equipment	**1990**	8.31	0.78	15.71	3.36	6.73	4.78	19.51	8.12	9.19	3.96	27.65
	2001	7.98	0.41	19.63	2.72	9.14	2.25	27.31	2.61	6.67	7.44	33.44
Agriculture	**1990**	5.82	15.37	7.96	6.36	15.29	16.45	5.06	8.22	8.19	5.90	1.67
	2001	5.43	14.44	8.60	5.90	13.59	18.95	4.44	9.07	7.34	5.74	0.97
Mining	**1990**	1.49	6.08	0.83	9.45	4.00	7.68	1.64	4.47	0.14	13.62	1.46
	2001	1.89	5.52	1.01	11.51	4.69	9.25	1.44	6.04	0.30	16.55	1.17

The table reports the share manufacturing in GDP and shares of each industry in total manufacturing value added. Source: Own Elaboration on PADI (ECLAC), Industrial Statistics Database (UNIDO), Annual Statistical Yearbook (ECLAC), World Development Indicators (World Bank), INE (Statistical Bureau of Venezuela).

Table 2

MFN Average Sectoral Tariffs in 1990 and 2001 (Percentage)												
	Year	Argentina	Bolivia	Brazil	Chile	Colombia	Ecuador	Mexico	Peru	Uruguay	Venezuela	US
Manufacturing Industry	**1990**	21.66	9.82	37.21	14.88	39.63	38.37	14.43	30.53	30.66	23.93	5.23
	2001	17.23	9.34	15.49	8.00	13.51	13.73	20.87	12.69	14.58	13.74	3.27
Food, Beverages, and Tobacco	**1990**	16.88	10.00	47.82	15.00	47.71	41.72	15.23	33.32	32.85	28.24	5.86
	2001	21.47	9.91	17.12	8.34	17.58	17.82	34.13	16.00	17.02	17.60	4.45
Textiles and Wearing Apparel	**1990**	26.14	10.00	41.99	15.13	52.34	57.77	17.49	42.17	35.22	35.77	9.93
	2001	24.65	9.93	19.98	8.00	17.99	18.44	23.98	16.12	19.63	18.07	7.42
Leather and Footwear	**1990**	26.67	10.00	37.56	15.00	53.72	52.33	15.54	43.91	31.30	31.98	7.48
	2001	20.96	10.00	17.86	8.00	14.00	14.74	22.95	14.37	18.21	14.24	5.66
Wood and Furniture	**1990**	25.58	10.00	25.88	15.00	48.94	53.72	17.27	36.53	36.72	38.37	4.49
	2001	17.78	10.00	14.10	8.00	14.92	15.75	19.99	11.53	14.08	15.23	1.81
Paper, Printing, and Publishing	**1990**	21.92	10.00	25.04	14.55	44.84	44.43	9.93	39.36	31.74	24.93	2.65
	2001	19.14	9.54	14.82	7.77	14.08	14.30	13.74	11.05	14.38	14.05	0.80
Chemicals	**1990**	19.03	10.00	31.91	15.00	30.89	28.33	12.70	23.83	27.02	16.25	3.91
	2001	14.11	9.87	11.42	8.00	9.97	9.62	13.01	8.42	12.44	10.19	2.50
Petroleum Refineries	**1990**	19.63	10.00	10.53	15.00	28.60	20.73	10.36	16.67	24.81	6.42	1.62
	2001	5.26	9.93	4.90	8.00	8.46	8.12	11.81	7.88	4.78	8.41	0.93
Rubber and Plastics	**1990**	24.13	10.00	52.46	15.17	35.43	37.03	15.49	22.91	32.05	26.75	5.42
	2001	18.88	9.98	17.02	8.00	15.29	15.08	19.10	12.05	16.60	14.74	3.63
Non-Metallic Mineral Products	**1990**	21.59	10.00	26.39	15.00	37.97	38.74	13.68	25.12	30.46	26.21	5.80
	2001	14.26	9.96	12.61	8.00	12.76	12.12	17.06	11.25	12.59	12.94	3.16
Basic Metal Industries	**1990**	21.10	9.95	17.92	15.00	25.49	22.05	11.12	19.81	25.11	7.95	4.47
	2001	12.58	9.88	12.56	8.00	8.14	7.68	13.89	9.01	12.38	8.34	1.98
Fabricated Metals and Machinery	**1990**	22.82	8.98	32.56	14.93	29.11	30.14	14.52	26.14	28.46	17.00	3.86
	2001	11.83	7.01	15.22	7.96	11.04	10.46	14.95	12.01	11.41	11.33	1.69
Electrical Machinery, Transport and Scientific Equipment	**1990**	22.07	9.76	42.09	14.39	32.26	29.69	13.97	26.97	28.34	17.58	4.72
	2001	15.27	8.79	16.20	7.65	10.64	11.91	17.84	11.92	13.67	11.43	2.50
Agriculture	**1990**	16.00	9.99	17.90	15.00	31.67	27.15	10.58	27.13	24.09	10.51	1.93
	2001	11.01	9.97	8.61	9.22	8.94	9.16	15.07	13.68	8.24	9.00	2.62
Mining	**1990**	19.46	10.00	6.68	15.00	21.96	14.56	9.67	16.80	22.45	5.31	0.65
	2001	5.26	9.92	5.77	8.00	5.09	5.45	11.89	9.32	5.53	5.18	0.11

Source: Own elaboration on IDB and TRAINS.

Table 3

Factor Endowments												
	Year	Argentina	Bolivia	Brazil	Chile	Colombia	Ecuador	Mexico	Peru	Uruguay	Venezuela	US
Labor Force	**1990**	22587	3864	97393	9195	20901	6266	52347	13440	2296	12061	195685
	2001	26988	5153	124680	11121	26891	8584	69620	17959	2509	16346	217190
Capital Stock per Worker	**1990**	10.47	1.29	7.97	3.95	3.34	3.99	8.77	3.52	5.64	13.73	34.85
	2001	11.83	1.76	7.12	8.54	3.43	3.11	10.01	4.04	7.52	11.46	50.50
Arable Land per Worker	**1990**	1.28	0.54	0.52	0.30	0.16	0.26	0.46	0.26	0.55	0.23	0.95
	2001	1.25	0.56	0.47	0.18	0.09	0.19	0.36	0.21	0.52	0.16	0.81
Pasture Land per Worker	**1990**	6.30	8.59	1.89	4.89	1.92	0.79	1.48	2.02	5.89	1.51	1.22
	2001	5.26	6.56	1.58	4.05	1.55	0.59	1.15	1.51	5.40	1.12	1.08
Forest and Woodland per Worker	**1990**	2.26	15.00	5.79	1.80	2.60	2.49	0.93	6.31	0.41	3.86	1.51
	2001	1.89	11.25	4.45	1.48	1.97	1.82	0.70	4.72	0.37	2.72	1.36
Oil Reserves per Worker	**1990**	0.13	0.07	0.05	0.05	0.18	0.46	2.01	0.06	0.00	10.15	0.18
	2001	0.15	0.12	0.10	0.02	0.12	0.44	0.70	0.03	0.00	8.39	0.12
Gas Reserves per Worker	**1990**	1.94	1.97	0.08	0.89	1.11	1.59	4.36	1.07	0.00	31.50	1.28
	2001	1.58	10.15	0.14	0.40	0.39	1.11	1.18	1.14	0.00	24.70	1.22
Coal Reserves per Worker	**1990**	10.02	0.18	63.50	282.12	585.42	10.67	91.25	207.50	0.00	113.83	2124.29
	2001	27.51	0.40	229.78	219.27	613.87	7.59	45.99	153.08	0.00	87.39	1824.22
Copper Reserves per Worker	**1990**	0.01	0.05	0.12	8.16	0.01	0.03	0.27	0.60	0.08	0.02	0.29
	2001	0.01	0.04	0.10	14.39	0.01	0.02	0.22	1.06	0.07	0.01	0.21
Tin Reserves per Worker	**1990**	0.00	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20
	2001	0.00	0.17	0.02	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.18
Zinc Reserves per Worker	**1990**	0.02	0.24	0.05	0.04	0.02	0.06	0.15	0.89	0.17	0.06	0.31
	2001	0.01	0.18	0.04	0.03	0.01	0.04	0.11	0.72	0.15	0.05	0.37
Share of Workers with Primary School	**1990**	51.20	41.40	63.90	50.10	49.70	48.20	42.80	44.60	49.60	56.40	8.60
	2001	20.90	13.42	7.66	14.94	10.10	15.42	10.80	22.62	15.08	14.42	48.88
Share of Workers with Secondary Education	**1990**	30.70	18.40	11.30	33.70	22.90	22.20	35.00	25.30	35.60	14.90	47.30
	2001	20.90	13.42	7.66	14.94	10.10	15.42	10.80	22.62	15.08	14.42	48.88
Share of Workers with Post-Secondary Education	**1990**	13.20	8.80	6.10	10.10	7.10	12.30	8.50	15.10	10.20	10.50	42.90
	2001	20.90	13.42	7.66	14.94	10.10	15.42	10.80	22.62	15.08	14.42	48.88

Sources: Data on labor force (population older than 15 years) come from Barro and Lee (2000) and are expressed in thousands of persons. Intervening years are interpolated as in Harrigan (1997). Capital stocks are estimated using the perpetual inventory method on country series of gross fixed capital formation taken from WDI (Worldbank) as suggested by Jacobs et al. (1997) and Kamps (2004). Data are expressed in thousands of 2000 US Dollars per worker. Arable land, pasture land, and forest and woodland data come from FAO are expressed as hectares per worker. Data on oil reserves (gas reserves, coal reserves) are taken from the database maintained by the US Energy Information Administration and are expressed in thousands of barrels (millions of cubit feets, short tons) per worker. Copper, tin, and zinc reserves are from the US Geological Survey and are expressed in thousands of metric tons per worker. The distribution of economically active population across qualification levels is taken from Barro and Lee (2000). Data correspond to 1990, 1995, 2000. Intervening years (2001) are interpolated (extrapolated) as in Harrigan (1997). Data are expressed in percentages.

Table 4

Tariffs, Factor Endowments, and Specialization Patterns - Equation (11)	Sector S1	Sector S2	Sector S3	Sector S4	Sector S5	Sector S6	Sector S7	Sector S8	Sector S9	Sector S10	Sector S11	Sector S12	Sector S13	Sector S14
Tariff Sector S1	0.079	0.035	-0.011	-0.186	-0.245	-0.186	0.001	0.411	-0.381	0.864	-0.060	0.196	0.006	-0.108
	0.716	*0.118*	*-0.017*	*-0.495*	*-0.608*	*-0.560*	*0.014*	*0.295*	*-0.559*	*3.093*	*-0.242*	*1.098*	*0.087*	*-1.961*
Tariff Sector S2	0.016	0.291	0.898	-1.064	-0.158	-0.418	0.244	0.229	0.728	-0.093	0.085	-0.477	0.219	-0.099
	0.118	*0.367*	*0.637*	*-1.416*	*-0.189*	*-0.670*	*1.532*	*0.083*	*0.594*	*-0.158*	*0.197*	*-1.446*	*1.565*	*-1.051*
Tariff Sector S3	-0.001	0.245	-0.228	-0.053	-0.478	-0.043	0.041	-1.206	0.391	0.619	0.217	-0.262	0.042	-0.065
	-0.017	*0.637*	*-0.219*	*-0.133*	*-0.927*	*-0.113*	*0.549*	*-0.785*	*0.575*	*1.876*	*0.875*	*-1.384*	*0.550*	*-1.374*
Tariff Sector S4	-0.049	-0.642	-0.117	0.305	0.377	0.058	-0.155	1.450	0.137	-0.570	-0.236	0.110	-0.008	0.124
	-0.495	*-1.416*	*-0.133*	*0.423*	*0.671*	*0.124*	*-1.321*	*0.790*	*0.152*	*-1.414*	*-0.774*	*0.455*	*-0.096*	*1.828*
Tariff Sector S5	-0.054	-0.079	-0.879	0.314	2.600	-0.157	-0.123	1.193	-1.881	-0.923	-0.295	0.643	-0.172	0.134
	-0.608	*-0.189*	*-0.927*	*0.671*	*2.488*	*-0.329*	*-1.108*	*0.588*	*-2.143*	*-2.247*	*-0.782*	*2.675*	*-1.630*	*2.027*
Tariff Sector S6	-0.047	-0.241	-0.092	0.056	-0.181	-0.756	0.047	2.409	-0.684	-0.043	-0.343	0.006	0.132	-0.010
	-0.560	*-0.670*	*-0.113*	*0.124*	*-0.329*	*-1.287*	*0.450*	*1.498*	*-0.961*	*-0.111*	*-1.186*	*0.029*	*1.492*	*-0.161*
Tariff Sector S7	0.001	0.553	0.335	-0.590	-0.578	0.193	0.000	-1.184	1.039	0.073	0.596	-0.357	-0.023	0.079
	0.014	*1.532*	*0.549*	*-1.321*	*-1.108*	*0.450*	*-0.002*	*-0.792*	*1.913*	*0.251*	*2.419*	*-1.954*	*-0.290*	*1.162*
Tariff Sector S8	0.048	0.060	-1.155	0.631	0.625	1.102	-0.133	-0.753	0.169	-1.107	0.552	-0.281	-0.203	0.168
	0.295	*0.083*	*-0.785*	*0.790*	*0.588*	*1.498*	*-0.792*	*-0.199*	*0.110*	*-1.699*	*0.929*	*-0.774*	*-1.278*	*1.584*
Tariff Sector S9	-0.075	0.333	0.665	0.103	-1.675	-0.524	0.208	0.289	-0.100	1.776	-0.490	-0.205	0.133	-0.168
	-0.559	*0.594*	*0.575*	*0.152*	*-2.143*	*-0.961*	*1.913*	*0.110*	*-0.073*	*3.698*	*-1.198*	*-0.677*	*1.292*	*-2.295*
Tariff Sector S10	0.270	-0.067	1.631	-0.671	-1.306	-0.052	0.023	-3.008	2.748	-0.104	0.760	-0.488	0.077	-0.122
	3.093	*-0.158*	*1.876*	*-1.414*	*-2.247*	*-0.111*	*0.251*	*-1.699*	*3.698*	*-0.213*	*2.628*	*-2.348*	*0.966*	*-2.179*
Tariff Sector S11	-0.020	0.063	0.592	-0.290	-0.437	-0.440	0.192	1.561	-0.804	0.793	-0.437	0.071	0.017	-0.076
	-0.242	*0.197*	*0.875*	*-0.774*	*-0.782*	*-1.186*	*2.419*	*0.929*	*-1.198*	*2.628*	*-1.248*	*0.388*	*0.239*	*-1.598*
Tariff Sector S12	0.139	-0.768	-1.548	0.292	2.057	0.017	-0.256	-1.728	-0.711	-1.094	0.153	0.209	0.000	0.155
	1.098	*-1.446*	*-1.384*	*0.455*	*2.675*	*0.029*	*-1.954*	*-0.774*	*-0.677*	*-2.348*	*0.388*	*0.563*	*0.000*	*1.862*
Tariff Sector S13	0.011	0.922	0.659	-0.059	-1.443	0.963	-0.042	-3.263	1.252	0.460	0.097	0.000	-0.186	0.081
	0.087	*1.565*	*0.550*	*-0.096*	*-1.630*	*1.492*	*-0.290*	*-1.278*	*1.292*	*0.966*	*0.239*	*0.000*	*-1.149*	*0.914*
Tariff Sector S14	-0.217	-0.434	-1.021	0.908	1.214	-0.078	0.159	2.906	-1.562	-0.730	-0.456	0.414	0.086	-0.153
	-1.961	*-1.051*	*-1.374*	*1.828*	*2.027*	*-0.161*	*1.162*	*1.584*	*-2.295*	*-2.179*	*-1.598*	*1.862*	*0.914*	*-1.599*
Capital	0.503	-0.196	0.014	-0.815	-0.456	1.755	-1.069	-0.324	0.907	0.159	0.610	0.130	-0.553	-0.217
	2.353	-0.499	0.022	-1.632	-0.785	2.852	-3.309	-0.187	1.627	0.617	2.394	0.672	-4.636	-2.235
Arable Land	0.105	-0.759	1.979	1.232	1.637	1.108	-0.625	7.574	-1.722	0.783	-1.547	0.604	0.118	-0.702
	0.258	*-0.851*	*1.336*	*1.163*	*1.289*	*0.897*	*-1.117*	*1.924*	*-1.352*	*1.225*	*-2.484*	*1.333*	*0.479*	*-3.301*
Pasture Land	1.498	1.120	-2.321	-2.681	-1.186	-0.241	1.702	-23.159	3.136	2.180	1.337	-2.762	-0.188	0.842
	1.114	*0.480*	*-0.654*	*-0.899*	*-0.222*	*-0.044*	*0.837*	*-1.477*	*1.134*	*1.569*	*0.691*	*-2.883*	*-0.231*	*1.685*
Forest and Woodland	-0.102	-2.651	-0.919	1.362	0.872	-2.429	-0.525	3.982	-0.762	-1.962	0.453	0.272	0.728	-0.067
	-0.107	*-2.166*	*-0.496*	*0.853*	*0.310*	*-0.726*	*-0.317*	*0.523*	*-0.528*	*-2.834*	*0.497*	*0.535*	*1.638*	*-0.234*
Oil Reserves	-0.073	0.798	0.260	-0.686	1.406	0.587	-0.335	-2.979	0.730	-0.317	0.736	-0.151	0.232	0.140
	-0.185	*1.149*	*0.235*	*-0.793*	*1.302*	*0.502*	*-0.566*	*-0.948*	*0.761*	*-0.711*	*1.505*	*-0.447*	*1.087*	*0.814*
Gas Reserves	0.405	-1.069	-0.974	-0.176	-0.765	-0.864	0.743	-0.773	-1.109	0.533	-0.825	-0.170	-0.205	-0.113
	1.102	*-1.574*	*-0.883*	*-0.211*	*-0.764*	*-0.813*	*1.492*	*-0.263*	*-1.132*	*1.152*	*-1.784*	*-0.498*	*-1.026*	*-0.712*
Coal Reserves	0.351	-0.353	-0.445	-0.035	-0.366	1.768	-1.593	-4.323	1.770	-0.046	1.161	-0.481	-0.199	0.240
	0.928	*-0.437*	*-0.325*	*-0.035*	*-0.317*	*1.474*	*-2.893*	*-1.169*	*1.455*	*-0.074*	*1.977*	*-1.220*	*-0.876*	*1.286*
Copper Reserves	-0.566	-0.501	1.207	1.799	2.932	-1.789	-0.205	8.383	-1.784	0.205	-0.609	-0.701	1.502	0.166
	-0.851	*-0.350*	*0.521*	*1.076*	*1.389*	*-0.854*	*-0.218*	*1.327*	*-0.898*	*0.208*	*-0.663*	*-1.050*	*3.506*	*0.527*
Tin Reserves	0.168	0.997	0.175	0.043	0.136	0.556	-0.652	-2.201	2.021	-0.296	0.905	-0.227	-0.157	0.023
	0.839	*2.347*	*0.246*	*0.085*	*0.206*	*0.873*	*-2.205*	*-1.101*	*3.224*	*-0.962*	*2.931*	*-1.072*	*-1.289*	*0.229*
Zinc Reserves	-1.131	1.058	3.714	-2.546	-5.747	-1.127	1.341	4.447	2.212	0.599	-0.461	0.085	-0.778	-0.995
	-1.007	*0.634*	*1.731*	*-1.075*	*-1.444*	*-0.263*	*0.725*	*0.377*	*1.086*	*0.654*	*-0.353*	*0.127*	*-1.399*	*-2.921*
Primary Education	0.277	0.648	-0.102	-0.296	-0.226	0.216	-0.238	-0.213	0.200	0.008	0.458	0.031	0.032	0.038
	2.540	*2.635*	*-0.227*	*-1.008*	*-0.610*	*0.643*	*-1.531*	*-0.214*	*0.505*	*0.041*	*2.721*	*0.233*	*0.478*	*0.639*
Secondary Education	-0.146	-0.198	-0.251	0.408	0.551	0.041	-0.098	2.303	-0.690	-0.021	-0.240	0.415	0.003	0.026
	-0.989	*-0.532*	*-0.374*	*0.884*	*1.068*	*0.076*	*-0.465*	*1.375*	*-1.041*	*-0.068*	*-0.976*	*2.169*	*0.032*	*0.323*
Post-Secondary Education	-1.130	-0.609	-0.370	1.506	0.768	-0.650	0.768	2.359	-1.643	-1.132	-1.140	0.641	0.029	0.273
	-3.973	*-0.729*	*-0.225*	*1.497*	*0.561*	*-0.660*	*1.847*	*0.692*	*-1.176*	*-1.720*	*-1.929*	*1.423*	*0.137*	*1.473*
Country Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	120	120	120	120	120	120	120	120	120	120	120	120	120	120

Specification Tests

Restrictions	Distribuion (Degree of Freedom)	Statistics (p-value)
Linear Homogeneity in Factors	$X^2(14)$	15.040 (0.375)
Symmetry of Cross-Price Effects	$X^2(91)$	72.700 (0.921)
Linear Homogeneity in Factors and Symmetry of Cross-Price Effects	$X^2(105)$	102.080 (0.563)
Overidentifying Restrictions	$X^2(147)$	167.411 (0.119)

Notes: The table reports standardized 3SLS estimates. Standardized coefficients are obtained by multiplying the slope by the standard deviation of the explanatory variable and dividing by the standard deviation of the GDP share. Tariff Sector k = ln(1+Tariff Sector k), calculated according to Equation (13). All endowments are expressed as log of share of labor (i.e., economically active population). Tariffs are instrumented with 10 years-lagged sectoral shares in total manufacturing employment and 10 years-lagged inverse import penetration ratios. 10 years-lagged values of relative endowments of capital, workers with primary education, workers with secondary education, and workers with post-secondary education are also used as instruments. t-statistics are below coefficients in bold.

Table 5

Tariffs, Factor Endowments, and Specialization Patterns - Equation (11) - Bootstrapped Standard Errors														
	Sector S1	Sector S2	Sector S3	Sector S4	Sector S5	Sector S6	Sector S7	Sector S8	Sector S9	Sector S10	Sector S11	Sector S12	Sector S13	Sector S14
Tariff Sector S1	0.079	0.035	-0.011	-0.186	-0.245	-0.186	0.001	0.411	-0.381	0.864	-0.060	0.196	0.006	-0.108
	0.533	*0.099*	*-0.012*	*-0.373*	*-0.410*	*-0.362*	*0.011*	*0.403*	*-0.448*	*2.567*	*-0.220*	*0.897*	*0.065*	*-1.297*
Tariff Sector S2	0.016	0.291	0.898	-1.064	-0.158	-0.418	0.244	0.229	0.728	-0.093	0.085	-0.477	0.219	-0.099
	0.099	*0.324*	*0.599*	*-1.257*	*-0.154*	*-0.563*	*1.321*	*0.132*	*0.521*	*-0.161*	*0.191*	*-1.413*	*1.293*	*-0.751*
Tariff Sector S3	-0.001	0.245	-0.228	-0.053	-0.478	-0.043	0.041	-1.206	0.391	0.619	0.217	-0.262	0.042	-0.065
	-0.012	*0.599*	*-0.158*	*-0.085*	*-0.694*	*-0.079*	*0.382*	*-0.981*	*0.440*	*1.423*	*0.707*	*-1.055*	*0.407*	*-0.739*
Tariff Sector S4	-0.049	-0.642	-0.117	0.305	0.377	0.058	-0.155	1.450	0.137	-0.570	-0.236	0.110	-0.008	0.124
	-0.373	*-1.257*	*-0.085*	*0.279*	*0.383*	*0.082*	*-1.010*	*0.893*	*0.112*	*-1.081*	*-0.596*	*0.353*	*-0.058*	*0.994*
Tariff Sector S5	-0.054	-0.079	-0.879	0.314	2.600	-0.157	-0.123	1.193	-1.881	-0.923	-0.295	0.643	-0.172	0.134
	-0.410	*-0.154*	*-0.694*	*0.383*	*1.900*	*-0.236*	*-0.928*	*0.749*	*-1.454*	*-1.704*	*-0.736*	*2.135*	*-1.278*	*1.202*
Tariff Sector S6	-0.047	-0.241	-0.092	0.056	-0.181	-0.756	0.047	2.409	-0.684	-0.043	-0.343	0.006	0.132	-0.010
	-0.362	*-0.563*	*-0.079*	*0.082*	*-0.236*	*-0.829*	*0.363*	*1.763*	*-0.705*	*-0.094*	*-1.011*	*0.020*	*1.050*	*-0.099*
Tariff Sector S7	0.001	0.553	0.335	-0.590	-0.578	0.193	0.000	-1.184	1.039	0.073	0.596	-0.357	-0.023	0.079
	0.011	*1.321*	*0.382*	*-1.010*	*-0.928*	*0.363*	*-0.002*	*-1.150*	*1.518*	*0.227*	*2.090*	*-1.575*	*-0.216*	*0.721*
Tariff Sector S8	0.048	0.060	-1.155	0.631	0.625	1.102	-0.133	-0.753	0.169	-1.107	0.552	-0.281	-0.203	0.168
	0.403	*0.132*	*-0.981*	*0.893*	*0.749*	*1.763*	*-1.150*	*-0.362*	*0.137*	*-2.316*	*1.512*	*-1.041*	*-1.731*	*1.729*
Tariff Sector S9	-0.075	0.333	0.665	0.103	-1.675	-0.524	0.208	0.289	-0.100	1.776	-0.490	-0.205	0.133	-0.168
	-0.448	*0.521*	*0.440*	*0.112*	*-1.454*	*-0.705*	*1.518*	*0.137*	*-0.043*	*2.711*	*-1.037*	*-0.573*	*0.961*	*-1.275*
Tariff Sector S10	0.270	-0.067	1.631	-0.671	-1.306	-0.052	0.023	-3.008	2.748	-0.104	0.760	-0.488	0.077	-0.122
	2.567	*-0.161*	*1.423*	*-1.081*	*-1.704*	*-0.094*	*0.227*	*-2.316*	*2.711*	*-0.168*	*2.284*	*-1.952*	*0.762*	*-1.317*
Tariff Sector S11	-0.020	0.063	0.592	-0.290	-0.437	-0.440	0.192	1.561	-0.804	0.793	-0.437	0.071	0.017	-0.076
	-0.220	*0.191*	*0.707*	*-0.596*	*-0.736*	*-1.011*	*2.090*	*1.512*	*-1.037*	*2.284*	*-1.088*	*0.297*	*0.199*	*-1.003*
Tariff Sector S12	0.139	-0.768	-1.548	0.292	2.057	0.017	-0.256	-1.728	-0.711	-1.094	0.153	0.209	0.000	0.155
	0.897	*-1.413*	*-1.055*	*0.353*	*2.135*	*0.020*	*-1.575*	*-1.041*	*-0.573*	*-1.952*	*0.297*	*0.448*	*0.000*	*1.210*
Tariff Sector S13	0.011	0.922	0.659	-0.059	-1.443	0.963	-0.042	-3.263	1.252	0.460	0.097	0.000	-0.186	0.081
	0.065	*1.293*	*0.407*	*-0.058*	*-1.278*	*1.050*	*-0.216*	*-1.731*	*0.961*	*0.762*	*0.199*	*0.000*	*-0.755*	*0.487*
Tariff Sector S14	-0.217	-0.434	-1.021	0.908	1.214	-0.078	0.159	2.906	-1.562	-0.730	-0.456	0.414	0.086	-0.153
	-1.297	*-0.751*	*-0.739*	*0.994*	*1.202*	*-0.099*	*0.721*	*1.729*	*-1.275*	*-1.317*	*-1.003*	*1.210*	*0.487*	*-0.704*
Capital	0.503	-0.196	0.014	-0.815	-0.456	1.755	-1.069	-0.324	0.907	0.159	0.610	0.130	-0.553	-0.217
	1.933	-0.399	0.016	-1.175	-0.494	1.684	-2.407	-0.245	1.222	0.360	1.687	0.440	-2.742	-1.278
Arable Land	0.105	-0.759	1.979	1.232	1.637	1.108	-0.625	7.574	-1.722	0.783	-1.547	0.604	0.118	-0.702
	0.229	*-0.787*	*1.013*	*0.921*	*1.036*	*0.747*	*-0.905*	*3.237*	*-1.140*	*0.956*	*-2.170*	*1.060*	*0.389*	*-2.316*
Pasture Land	1.498	1.120	-2.321	-2.681	-1.186	-0.241	1.702	-23.159	3.136	2.180	1.337	-2.762	-0.188	0.842
	0.805	*0.380*	*-0.383*	*-0.502*	*-0.149*	*-0.026*	*0.551*	*-2.040*	*0.688*	*0.907*	*0.474*	*-1.750*	*-0.138*	*0.826*
Forest and Woodland	-0.102	-2.651	-0.919	1.362	0.872	-2.429	-0.525	3.982	-0.762	-1.962	0.453	0.272	0.728	-0.067
	-0.046	*-0.776*	*-0.128*	*0.209*	*0.089*	*-0.214*	*-0.151*	*0.300*	*-0.142*	*-0.680*	*0.146*	*0.154*	*0.441*	*-0.056*
Oil Reserves	-0.073	0.798	0.260	-0.686	1.406	0.587	-0.335	-2.979	0.730	-0.317	0.736	-0.151	0.232	0.140
	-0.151	*0.927*	*0.148*	*-0.485*	*0.834*	*0.364*	*-0.487*	*-1.206*	*0.573*	*-0.470*	*1.048*	*-0.293*	*0.684*	*0.516*
Gas Reserves	0.405	-1.069	-0.974	-0.176	-0.765	-0.864	0.743	-0.773	-1.109	0.533	-0.825	-0.170	-0.205	-0.113
	0.984	*-1.550*	*-0.739*	*-0.180*	*-0.576*	*-0.671*	*1.349*	*-0.408*	*-1.150*	*1.012*	*-1.403*	*-0.438*	*-0.815*	*-0.574*
Coal Reserves	0.351	-0.353	-0.445	-0.035	-0.366	1.768	-1.593	-4.323	1.770	-0.046	1.161	-0.481	-0.199	0.240
	0.833	*-0.439*	*-0.284*	*-0.030*	*-0.268*	*1.142*	*-2.592*	*-1.907*	*1.507*	*-0.067*	*1.908*	*-1.052*	*-0.687*	*0.874*
Copper Reserves	-0.566	-0.501	1.207	1.799	2.932	-1.789	-0.205	8.383	-1.784	0.205	-0.609	-0.701	1.502	0.166
	-0.807	*-0.416*	*0.519*	*0.948*	*1.258*	*-0.733*	*-0.212*	*2.441*	*-1.017*	*0.196*	*-0.659*	*-0.947*	*3.122*	*0.407*
Tin Reserves	0.168	0.997	0.175	0.043	0.136	0.556	-0.652	-2.201	2.021	-0.296	0.905	-0.227	-0.157	0.023
	0.720	*2.134*	*0.184*	*0.063*	*0.172*	*0.729*	*-1.691*	*-1.926*	*2.537*	*-0.714*	*2.425*	*-0.840*	*-1.006*	*0.160*
Zinc Reserves	-1.131	1.058	3.714	-2.546	-5.747	-1.127	1.341	4.447	2.212	0.599	-0.461	0.085	-0.778	-0.995
	-0.784	*0.467*	*0.865*	*-0.724*	*-0.917*	*-0.167*	*0.582*	*0.532*	*0.613*	*0.333*	*-0.225*	*0.071*	*-0.696*	*-1.475*
Primary Education	0.277	0.648	-0.102	-0.296	-0.226	0.216	-0.238	-0.213	0.200	0.008	0.458	0.031	0.032	0.038
	1.840	*1.910*	*-0.137*	*-0.616*	*-0.383*	*0.398*	*-1.188*	*-0.241*	*0.338*	*0.027*	*1.840*	*0.158*	*0.302*	*0.407*
Secondary Education	-0.146	-0.198	-0.251	0.408	0.551	0.041	-0.098	2.303	-0.690	-0.021	-0.240	0.415	0.003	0.026
	-0.730	*-0.403*	*-0.247*	*0.546*	*0.674*	*0.047*	*-0.301*	*1.818*	*-0.735*	*-0.048*	*-0.679*	*1.396*	*0.019*	*0.173*
Post-Secondary Education	-1.130	-0.609	-0.370	1.506	0.768	-0.650	0.768	2.359	-1.643	-1.132	-1.140	0.641	0.029	0.273
	-2.971	*-0.577*	*-0.153*	*1.148*	*0.433*	*-0.461*	*1.192*	*0.918*	*-0.948*	*-1.225*	*-1.584*	*1.049*	*0.095*	*0.916*
Country Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	120	120	120	120	120	120	120	120	120	120	120	120	120	120

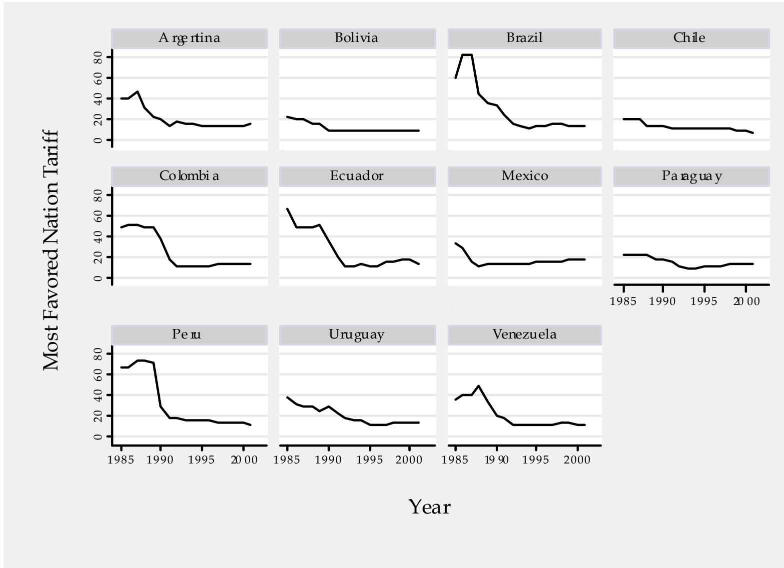
Notes: The table reports standardized 3SLS estimates. Standardized coefficients are obtained by multiplying the slope by the standard deviation of the explanatory variable and dividing by the standard deviation of the GDP share. Tariff Sector k = ln(1+Tariff Sector k), calculated according to Equation (13). All endowments are expressed as log of share of labor (i.e., economically active population). Tariffs are instrumented with 10 years-lagged sectoral shares in total manufacturing employment and 10 years-lagged inverse import penetration ratios. 10 years-lagged values of relative endowments of capital, workers with primary education, workers with secondary education, and workers with post-secondary education are also used as instruments. t-statistics, based on bootstrapped standard errors obtained after 1,000 replications, are below coefficients in bold.

Table 6

Relative Tariffs, Relative Factor Endowments, and Relative Specialization Patterns - Equation (14)	Sector S1	Sector S2	Sector S3	Sector S4	Sector S5	Sector S6	Sector S7	Sector S8	Sector S9	Sector S10	Sector S11	Sector S12	Sector S13	Sector S14
Tariff Sector S1	0.005	0.474	-0.546	-0.085	0.413	0.013	-0.021	-0.730	0.485	0.418	-0.091	0.295	-0.122	-0.095
	0.049	*2.298*	*-1.041*	*-0.301*	*1.143*	*0.041*	*-0.257*	*-1.276*	*1.033*	*2.332*	*-0.450*	*1.937*	*-2.115*	*-1.804*
Tariff Sector S2	0.195	0.462	-0.442	-0.151	0.074	-0.710	0.339	0.201	-1.568	-0.306	0.665	-0.025	0.038	-0.108
	2.298	*0.793*	*-0.414*	*-0.296*	*0.106*	*-1.461*	*2.881*	*0.166*	*-1.564*	*-0.684*	*1.643*	*-0.085*	*0.392*	*-1.181*
Tariff Sector S3	-0.065	-0.130	-0.672	-0.385	0.401	0.140	-0.101	-0.273	0.690	0.582	-0.717	0.055	-0.015	0.092
	-1.041	*-0.414*	*-0.638*	*-1.038*	*0.887*	*0.387*	*-1.199*	*-0.345*	*1.337*	*2.184*	*-2.484*	*0.240*	*-0.207*	*1.425*
Tariff Sector S4	-0.022	-0.100	-0.887	-0.052	-0.244	-0.448	-0.327	0.372	0.748	-0.043	-0.426	0.128	-0.010	0.251
	-0.301	*-0.296*	*-1.038*	*-0.085*	*-0.403*	*-1.046*	*-3.430*	*0.429*	*1.670*	*-0.165*	*-1.273*	*0.559*	*-0.114*	*3.562*
Tariff Sector S5	0.107	0.047	0.898	-0.241	1.321	-0.076	0.183	0.765	-1.650	-0.626	0.383	0.339	-0.124	-0.096
	1.143	*0.106*	*0.887*	*-0.403*	*1.274*	*-0.149*	*1.492*	*0.633*	*-1.452*	*-1.339*	*0.940*	*1.104*	*-1.209*	*-1.010*
Tariff Sector S6	0.003	-0.404	0.278	-0.399	-0.069	0.733	0.108	0.033	0.611	-0.043	-0.436	-0.241	0.031	0.010
	0.041	*-1.461*	*0.387*	*-1.046*	*-0.149*	*1.400*	*1.256*	*0.046*	*1.363*	*-0.179*	*-1.696*	*-1.131*	*0.437*	*0.170*
Tariff Sector S7	-0.022	0.829	-0.847	-1.258	0.732	0.477	0.173	-0.895	0.333	0.120	-0.277	-0.026	-0.239	0.209
	-0.257	*2.881*	*-1.199*	*-3.430*	*1.492*	*1.256*	*1.253*	*-1.128*	*0.670*	*0.421*	*-1.058*	*-0.129*	*-3.244*	*2.957*
Tariff Sector S8	-0.083	0.056	-0.262	0.160	0.338	0.016	-0.100	2.158	-1.060	-0.162	-0.239	-0.075	-0.033	0.144
	-1.276	*0.166*	*-0.345*	*0.429*	*0.633*	*0.046*	*-1.128*	*1.816*	*-1.245*	*-0.471*	*-0.823*	*-0.320*	*-0.498*	*2.105*
Tariff Sector S9	0.094	-0.771	1.178	0.538	-1.193	0.493	0.064	-1.801	1.767	0.631	0.295	-0.265	0.109	-0.213
	1.033	*-1.564*	*1.337*	*1.670*	*-1.452*	*1.363*	*0.670*	*-1.245*	*0.980*	*1.267*	*0.790*	*-0.803*	*1.615*	*-1.917*
Tariff Sector S10	0.129	-0.237	1.546	-0.049	-0.728	-0.056	0.037	-0.440	0.985	-0.029	0.658	-0.409	0.053	-0.126
	2.332	*-0.684*	*2.184*	*-0.165*	*-1.339*	*-0.179*	*0.421*	*-0.471*	*1.267*	*-0.065*	*2.426*	*-2.031*	*0.909*	*-1.884*
Tariff Sector S11	-0.031	0.561	-2.105	-0.548	0.501	-0.633	-0.092	-0.716	0.527	0.737	-0.618	0.157	-0.128	0.174
	-0.450	*1.643*	*-2.484*	*-1.273*	*0.940*	*-1.696*	*-1.058*	*-0.823*	*0.790*	*2.426*	*-1.594*	*0.618*	*-1.660*	*2.411*
Tariff Sector S12	0.216	-0.045	0.348	0.346	0.934	-0.743	-0.019	-0.480	-0.983	-0.971	0.333	0.652	-0.101	-0.080
	1.937	*-0.085*	*0.240*	*0.559*	*1.104*	*-1.131*	*-0.129*	*-0.320*	*-0.803*	*-2.031*	*0.618*	*1.345*	*-0.838*	*-0.658*
Tariff Sector S13	-0.248	0.188	-0.254	-0.074	-0.973	0.267	-0.477	-0.590	1.143	0.351	-0.763	-0.282	0.308	0.270
	-2.115	*0.392*	*-0.207*	*-0.114*	*-1.209*	*0.437*	*-3.244*	*-0.498*	*1.615*	*0.909*	*-1.660*	*-0.838*	*1.994*	*2.665*
Tariff Sector S14	-0.199	-0.537	1.549	1.890	-0.753	0.085	0.427	2.597	-2.143	-0.809	1.026	-0.217	0.270	-0.371
	-1.804	*-1.181*	*1.425*	*3.562*	*-1.010*	*0.170*	*2.957*	*2.105*	*-1.917*	*-1.884*	*2.411*	*-0.658*	*2.665*	*-2.825*
Capital	0.679	0.415	-0.158	-0.442	-0.089	2.621	-1.983	0.669	0.478	-0.015	0.576	0.247	-0.552	-0.216
	2.878	1.383	-0.213	-0.914	-0.124	3.606	-6.220	0.700	1.357	-0.067	1.805	1.189	-4.612	-2.337
Arable Land	0.922	-1.219	4.355	1.678	-0.408	3.270	-1.217	4.188	0.362	1.051	1.202	-0.504	0.225	-0.489
	1.950	*-1.649*	*2.130*	*1.424*	*-0.291*	*2.471*	*-2.122*	*2.180*	*0.359*	*1.841*	*1.615*	*-0.913*	*0.867*	*-2.135*
Pasture Land	1.343	1.142	-6.168	-4.843	6.891	-8.483	-0.394	-12.855	3.441	2.761	-6.112	1.165	-0.979	1.335
	0.989	*0.690*	*-1.763*	*-1.766*	*1.450*	*-1.701*	*-0.200*	*-1.959*	*1.725*	*2.754*	*-2.985*	*1.281*	*-1.465*	*2.771*
Forest and Woodland	-1.526	-2.155	0.996	0.092	-0.687	-0.984	3.713	1.930	-1.945	-2.222	1.755	-1.623	0.973	0.050
	-1.295	*-1.924*	*0.417*	*0.048*	*-0.185*	*-0.239*	*1.998*	*0.400*	*-1.382*	*-3.213*	*1.289*	*-2.422*	*1.967*	*0.147*
Oil Reserves	0.205	0.997	-0.173	-2.022	1.617	1.572	-0.433	-1.620	0.340	0.668	-0.466	0.260	-0.320	-0.109
	0.496	*1.585*	*-0.118*	*-2.149*	*1.265*	*1.270*	*-0.790*	*-0.849*	*0.444*	*1.395*	*-0.708*	*0.645*	*-1.430*	*-0.614*
Gas Reserves	0.441	-0.487	-1.946	1.020	0.316	-2.432	-0.087	-1.060	-0.164	-0.256	-0.518	0.239	0.081	0.018
	1.023	*-0.693*	*-1.232*	*0.969*	*0.228*	*-1.833*	*-0.164*	*-0.517*	*-0.196*	*-0.464*	*-0.714*	*0.548*	*0.346*	*0.101*
Coal Reserves	-0.702	-0.194	-2.169	-0.295	0.267	-0.310	0.026	-1.073	-0.580	0.296	-0.379	-0.377	-0.161	0.364
	-2.200	*-0.402*	*-1.812*	*-0.394*	*0.250*	*-0.306*	*0.061*	*-0.718*	*-1.020*	*0.853*	*-0.726*	*-1.158*	*-0.918*	*2.630*
Copper Reserves	-0.257	-2.161	6.521	2.903	0.503	0.617	2.312	4.560	-2.097	0.358	2.406	-2.044	1.008	-0.204
	-0.352	*-1.758*	*2.369*	*1.436*	*0.197*	*0.270*	*2.526*	*1.433*	*-1.448*	*0.386*	*1.878*	*-2.796*	*2.288*	*-0.608*
Tin Reserves	-0.038	0.934	-0.837	-0.810	0.965	0.070	-0.495	-0.670	1.184	-0.176	-0.502	0.111	-0.162	0.054
	-0.180	*3.187*	*-1.030*	*-1.730*	*1.654*	*0.109*	*-1.764*	*-0.781*	*3.239*	*-0.777*	*-1.600*	*0.510*	*-1.461*	*0.551*
Zinc Reserves	0.665	0.898	1.396	0.688	-3.706	5.600	-1.455	1.254	0.654	-0.185	2.421	0.652	-0.553	-0.852
	0.630	*0.822*	*0.662*	*0.381*	*-1.052*	*1.565*	*-0.924*	*0.258*	*0.458*	*-0.248*	*1.909*	*1.052*	*-1.163*	*-2.786*
Primary Education	0.274	0.881	-1.262	-0.771	0.164	0.160	-0.189	-0.106	-0.125	0.117	-0.163	0.485	-0.058	0.027
	2.557	*3.888*	*-1.621*	*-2.503*	*0.449*	*0.499*	*-1.396*	*-0.199*	*-0.303*	*0.507*	*-0.815*	*2.477*	*-0.889*	*0.384*
Secondary Education	0.083	0.085	-1.125	0.379	0.062	0.126	-0.669	1.220	-0.194	-0.107	-0.051	0.623	-0.008	0.025
	0.507	*0.297*	*-1.540*	*0.861*	*0.104*	*0.240*	*-3.033*	*1.385*	*-0.344*	*-0.425*	*-0.174*	*3.131*	*-0.089*	*0.297*
Post-Secondary Education	-1.568	-1.019	2.557	2.108	-2.270	-0.828	1.617	1.157	-1.002	-1.124	0.698	-1.057	0.443	-0.069
	-5.833	*-2.004*	*1.683*	*2.695*	*-2.348*	*-0.951*	*4.567*	*0.813*	*-1.296*	*-2.558*	*1.332*	*-2.761*	*2.671*	*-0.441*
Country Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	120	120	120	120	120	120	120	120	120	120	120	120	120	120

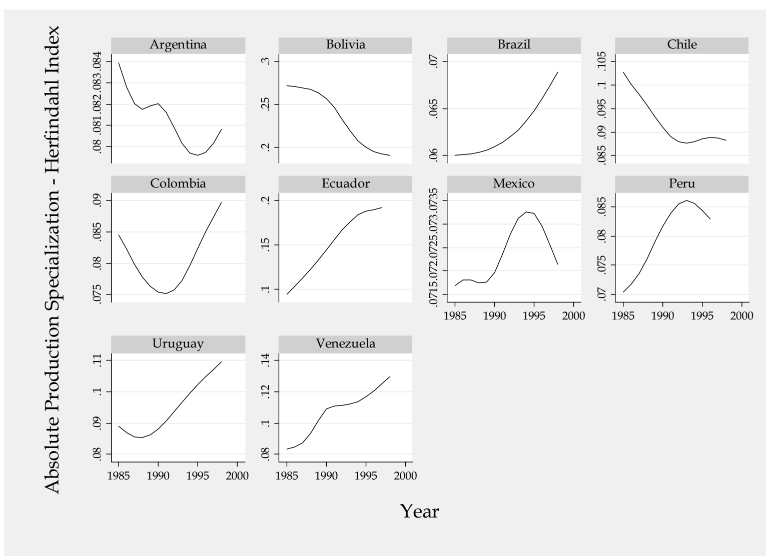
Notes: The table reports standardized 3SLS estimates. Standardized coefficients are obtained by multiplying the slope by the standard deviation of the explanatory variable and dividing by the standard deviation of the GDP share. Tariff Sector k = ln[(1+Latin American Country Tariff Sector k)/(1+US Tariff Sector k)], calculated according to Equation (15). All endowments are expressed as log of share of labor (i.e., economically active population) relative to that of the US. Tariffs are instrumented with 10 years-lagged sectoral shares in total manufacturing employment and 10 years-lagged inverse import penetration ratios. 10 years-lagged values of relative endowments of capital, workers with primary education, workers with secondary education, and workers with post-secondary education are also used as instruments. t-statistics are below coefficients in bold

Figure 1



The figure shows the evolution of MFN tariffs over the period 1985-2001. Source: Estevadeordal and Volpe Martincus (2006).

Figure 2



The figure shows the HP trends of the Herfindahl Index calculated using sectoral manufacturing value added over the period 1985-1998. Source: Estevadeordal and Volpe Martincus (2006).

Figure 3

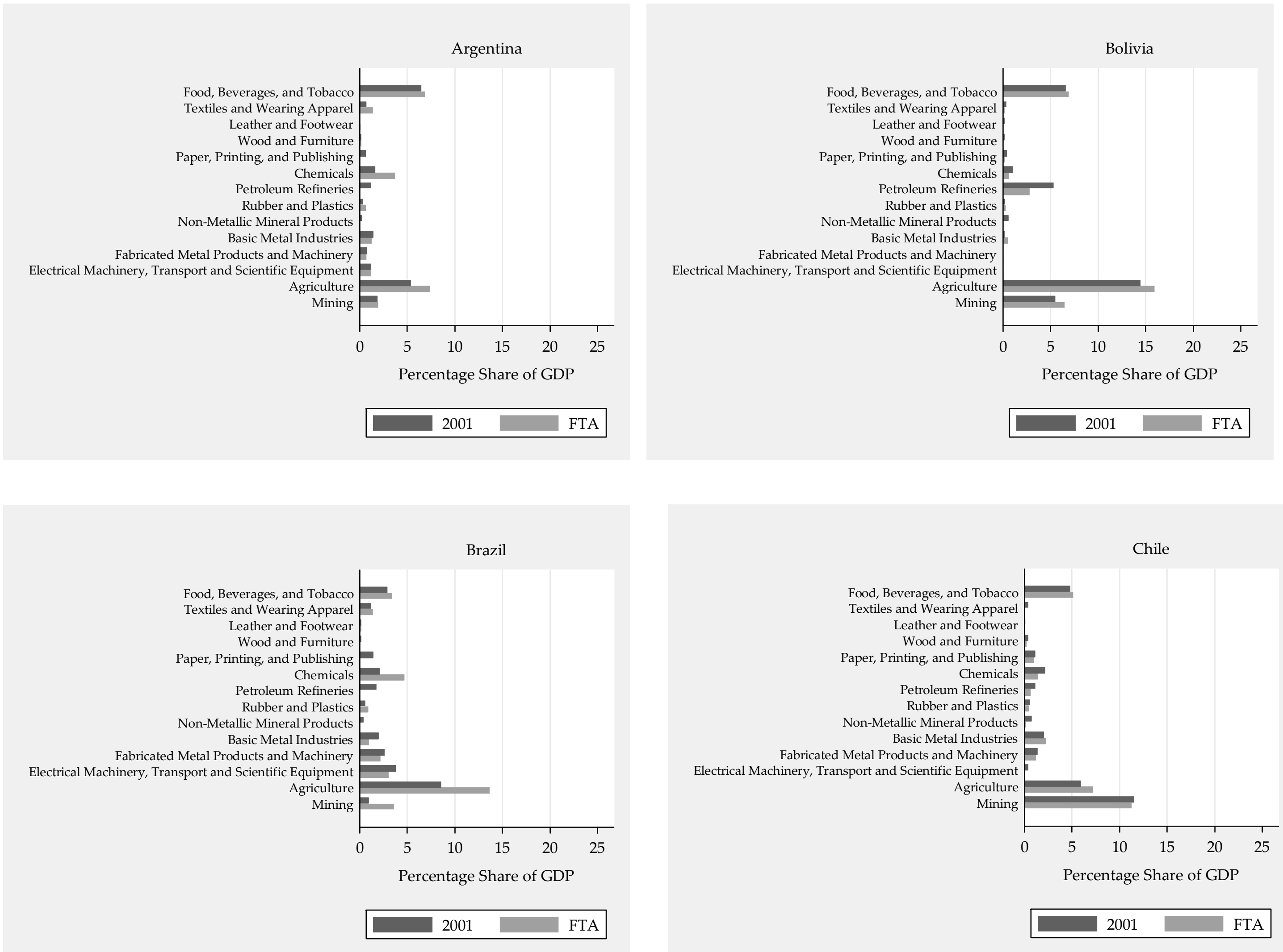
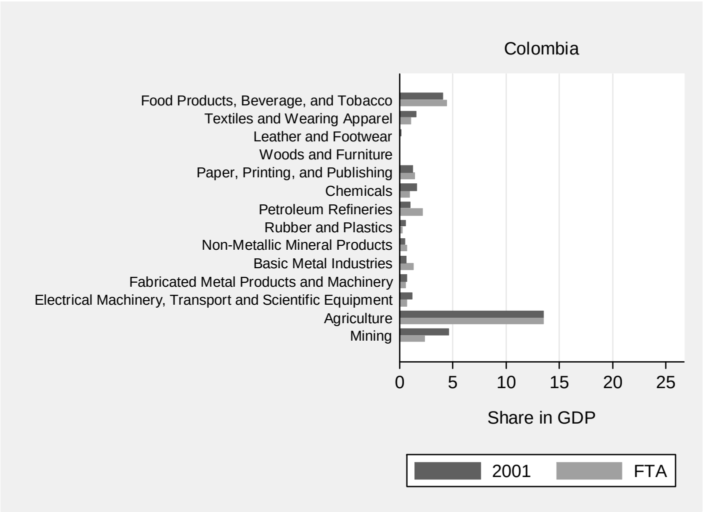
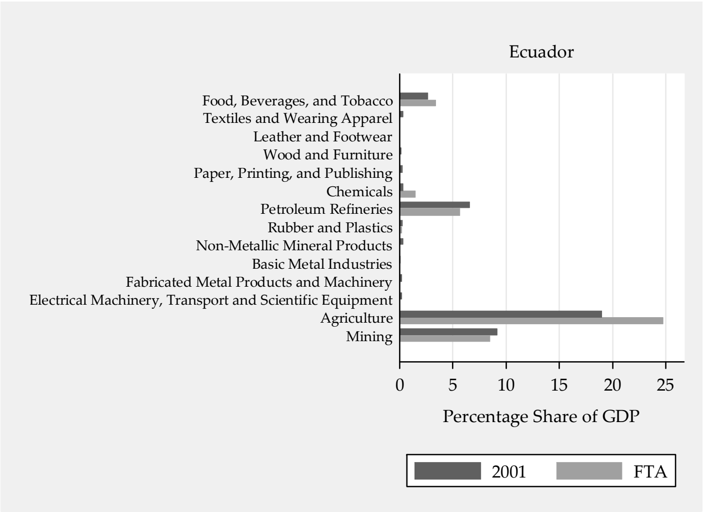
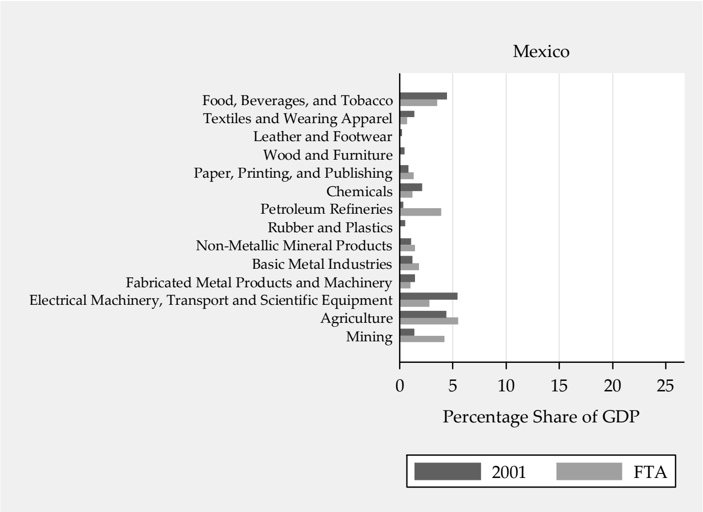

Argentina
Food, Beverages, and Tobacco
Textiles and Wearing Apparel
Leather and Footwear
Wood and Furniture
Paper, Printing, and Publishing
Chemicals
Petroleum Refineries
Rubber and Plastics
Non-Metallic Mineral Products
Basic Metal Industries
Fabricated Metal Products and Machinery
Electrical Machinery, Transport and Scientific Equipment
Agriculture
Mining
0 5 10 15 20 25
Percentage Share of GDP
2001
FTA
Bolivia
Food, Beverages, and Tobacco
Textiles and Wearing Apparel
Leather and Footwear
Wood and Furniture
Paper, Printing, and Publishing
Chemicals
Petroleum Refineries
Rubber and Plastics
Non-Metallic Mineral Products
Basic Metal Industries
Fabricated Metal Products and Machinery
Electrical Machinery, Transport and Scientific Equipment
Agriculture
Mining
0 5 10 15 20 25
Percentage Share of GDP
2001
FTA
Brazil
Food, Beverages, and Tobacco
Textiles and Wearing Apparel
Leather and Footwear
Wood and Furniture
Paper, Printing, and Publishing
Chemicals
Petroleum Refineries
Rubber and Plastics
Non-Metallic Mineral Products
Basic Metal Industries
Fabricated Metal Products and Machinery
Electrical Machinery, Transport and Scientific Equipment
Agriculture
Mining
0 5 10 15 20 25
Percentage Share of GDP
2001
FTA
Chile
Food, Beverages, and Tobacco
Textiles and Wearing Apparel
Leather and Footwear
Wood and Furniture
Paper, Printing, and Publishing
Chemicals
Petroleum Refineries
Rubber and Plastics
Non-Metallic Mineral Products
Basic Metal Industries
Fabricated Metal Products and Machinery
Electrical Machinery, Transport and Scientific Equipment
Agriculture
Mining
0 5 10 15 20 25
Percentage Share of GDP
2001
FTA

Figure 3 (cont.)







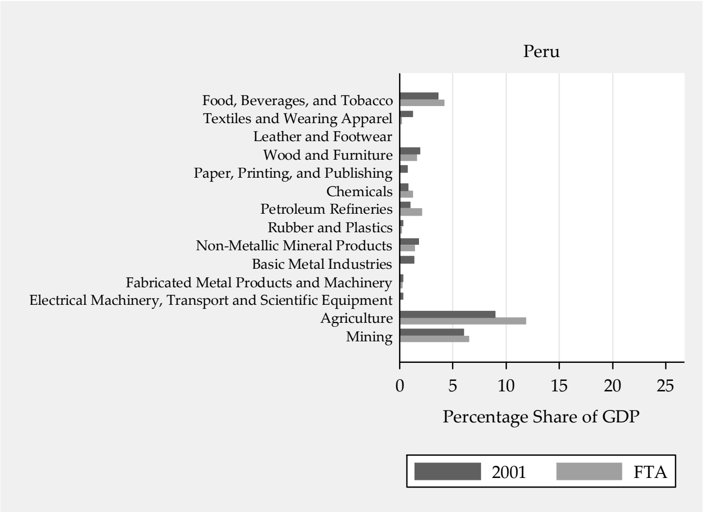
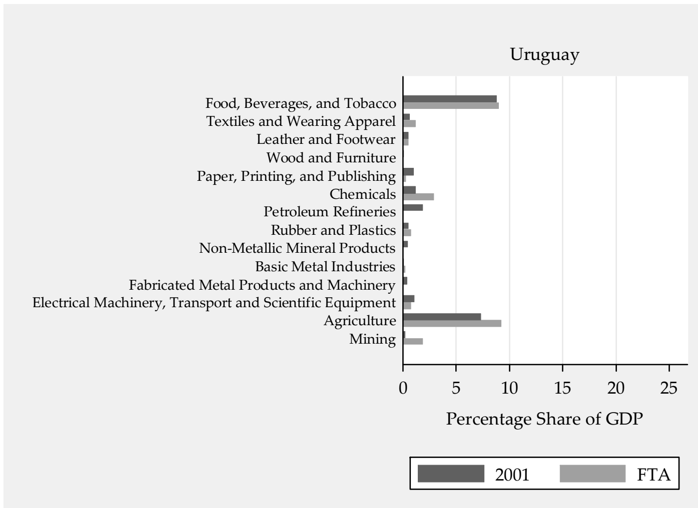
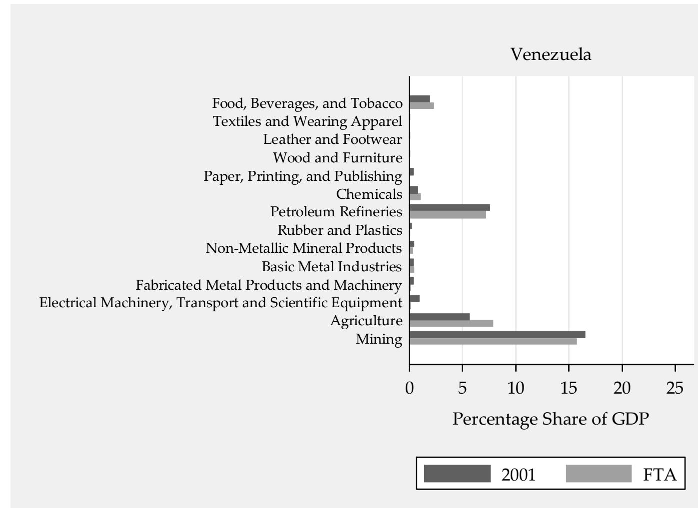


Figure 3 (cont.)





Pictures show share of each sector in each country's GDP in 2001 and under a trade agreement with the United States. Predicted shares are obtained as indicated in Equation (16).

Appendix A1

Table A1.1

Value Added: Countries, Sectors, Time Coverage, and Sources				
Country	Sectoral Coverage	Sectors	Time Coverage	Source
Argentina	Manufacturing, Agriculture, Mining	14	1990-2001	PADI (ECLAC)/Annual Statistical Yearbook (ECLAC)
Bolivia	Manufacturing, Agriculture, Mining	14	1990-2001	PADI (ECLAC)/Annual Statistical Yearbook (ECLAC)
Brazil	Manufacturing, Agriculture, Mining	14	1990-2001	PADI (ECLAC)/Annual Statistical Yearbook (ECLAC)
Chile	Manufacturing, Agriculture, Mining	14	1990-2001	PADI (ECLAC)/Annual Statistical Yearbook (ECLAC)
Colombia	Manufacturing, Agriculture, Mining	14	1990-2001	PADI (ECLAC)/Annual Statistical Yearbook (ECLAC)
Ecuador	Manufacturing, Agriculture, Mining	14	1990-2001	IIS (UNIDO)/WDI (WB)/Annual Statistical Yearbook (ECLAC)
Mexico	Manufacturing, Agriculture, Mining	14	1990-2001	PADI (ECLAC)/Annual Statistical Yearbook (ECLAC)
Peru	Manufacturing, Agriculture, Mining	14	1990-2001	PADI (ECLAC)/Annual Statistical Yearbook (ECLAC)
Uruguay	Manufacturing, Agriculture, Mining	14	1990-2001	PADI (ECLAC)/Annual Statistical Yearbook (ECLAC)
Venezuela	Manufacturing, Agriculture, Mining	14	1990-2001	PADI (ECLAC)/INE/Annual Statistical Yearbook (ECLAC)
United States	Manufacturing, Agriculture, Mining	14	1990-2001	PADI (ECLAC)/WDI (WB)/Bureau of Economic Analysis

Table A1.2

Sectors	
Code	Description
S1	**Food, Beverages, and Tobacco**
	Food products (311), Beverages (313), Tobacco (314)
S2	**Textiles and Wearing Apparel**
	Textiles (321), Wearing Apparel (322)
S3	**Leather and Footwear**
	Leather Products (323), Footwear (324)
S4	**Wood and Furniture**
	Wood Products (331), Furniture (332)
S5	**Paper, Printing and Publishing**
	Paper (341), Printing and Publishing (342)
S6	**Chemicals**
	Industrial Chemicals (351), Other Chemicals (352)
S7	**Petroleum Refineries**
	Petroleum Refineries (353), Miscellaneous Products of Petroleum and Coal (354)
S8	**Rubber and Plastics**
	Rubber Products (355), Plastic products not elsewhere classified (356)
S9	**Non-Metallic Mineral Products**
	Pottery, China, and Earthenware (361), Glass Products (362),
	Other Non-Metallic Mineral Products (369)
S10	**Basic Metal Industries**
	Iron and Steel (371), Non-Ferrous Metals (372)
S11	**Fabricated Metals and Machinery**
	Fabricated Metal Products (381), Machinery (382)
S12	**Electrical Machinery, Transport and Scientific Equipment**
	Electrical Machinery (383)
	Transport Equipment (384), Professional, Scientific and Measuring Equipment (385)

Note:
Other Manufacturing Industries (390) are a residual sector and are not explicitly considered.

Appendix A2
Table A2.1

Trade Policy, Factor Endowments, and Specialization Patterns - 8 Manufacturing Sectors	Sector M1	Sector M2	Sector M3	Sector M4	Sector M5	Sector M6	Sector M7	Sector M8
Tariff Sector M1	-0.015	0.003	-0.317	0.458	-0.014	0.616	0.520	-0.183
	-0.131	*0.019*	*-0.957*	*1.478*	*-0.054*	*1.700*	*1.289*	*-2.501*
Tariff Sector M2	0.002	-0.065	0.595	-0.412	0.190	-0.531	-0.335	0.134
	0.019	*-0.323*	*1.958*	*-1.177*	*0.832*	*-1.315*	*-1.025*	*2.030*
Tariff Sector M3	-0.084	0.318	0.135	-0.698	-0.085	0.185	-0.004	-0.023
	-0.957	*1.958*	*0.275*	*-1.559*	*-0.363*	*0.429*	*-0.013*	*-0.335*
Tariff Sector M4	0.099	-0.180	-0.574	1.247	-0.345	-0.051	0.110	0.120
	1.478	*-1.177*	*-1.559*	*2.199*	*-1.763*	*-0.128*	*0.425*	*2.123*
Tariff Sector M5	-0.009	0.253	-0.213	-1.030	0.303	-1.399	-0.605	0.342
	-0.054	*0.832*	*-0.363*	*-1.763*	*0.567*	*-1.924*	*-0.822*	*2.575*
Tariff Sector M6	0.120	-0.216	0.141	-0.047	-0.427	0.560	0.853	-0.056
	1.700	*-1.315*	*0.429*	*-0.128*	*-1.924*	*1.010*	*2.627*	*-0.946*
Tariff Sector M7	0.163	-0.213	-0.005	0.159	-0.285	1.320	0.059	-0.221
	1.289	*-1.025*	*-0.013*	*0.425*	*-0.822*	*2.627*	*0.104*	*-2.377*
Tariff Sector M8	-0.169	0.248	-0.080	0.511	0.491	-0.263	-0.652	-0.073
	-2.501	*2.030*	*-0.335*	*2.123*	*2.575*	*-0.946*	*-2.377*	*-0.815*
Capital	0.308	-0.147	-0.175	0.070	-0.464	0.395	-0.145	0.195
	2.250	-1.029	-0.893	0.375	-1.933	1.554	-0.664	2.311
Arable Land	0.442	0.302	0.053	1.396	-0.995	2.058	1.195	0.150
	1.584	*0.735*	*0.090*	*2.555*	*-1.583*	*2.881*	*1.981*	*0.694*
Forest and Woodland	-0.064	-0.862	-0.601	-0.573	0.231	0.441	-0.568	-0.250
	-0.192	*-4.791*	*-2.313*	*-1.880*	*0.574*	*1.149*	*-2.113*	*-1.640*
Oil Reserves	0.160	-0.845	-0.519	0.499	0.384	-1.198	0.030	-0.352
	0.631	*-4.317*	*-1.593*	*1.128*	*0.898*	*-2.468*	*0.091*	*-2.373*
Primary Education	0.165	0.343	0.460	-0.357	0.263	-0.755	-0.043	0.142
	2.030	*2.349*	*2.124*	*-1.582*	*1.334*	*-3.021*	*-0.176*	*2.264*
Secondary Education	-0.159	0.090	0.322	-0.047	0.003	-0.311	-0.063	0.183
	-1.446	*0.504*	*1.160*	*-0.164*	*0.011*	*-0.906*	*-0.194*	*2.325*
Post-Secondary Education	-0.662	-0.542	-1.211	0.206	0.051	0.854	-0.365	-0.602
	-2.494	*-1.113*	*-1.533*	*0.266*	*0.077*	*0.977*	*-0.422*	*-3.002*
Country Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	120	120	120	120	120	120	120	120

Specification Tests

Restrictions	Distribution (D. of Freedom)	Statistics (p-value)
Linear Homogeneity in Factors	$X^2(8)$	16.870 (0.003)
Symmetry of Cross-Price Effects	$X^2(28)$	24.910 (0.633)
Linear Homogeneity and Symmetry of Cross-Price Effects	$X^2(36)$	48.340 (0.082)
Overindentifying Restrictions	$X^2(76)$	109.571 (0.007)

Notes: The table reports standardized 3SLS estimates on eight manufacturing sectors: M1 (food products, beverages, and tobacco), M2 (textiles, wearing apparel, leather products, and footwear), M3 (woods and furniture), M4 (paper, printing, and publishing), M5 (chemicals, petroleum refineries, rubber, and plastics), M6 (non-metallic mineral products), M7 (basic metal industries), and M8 (fabricated metals, machinery, electrical machinery, transport equipment, and scientific equipment).. Standardized coefficients are obtained by multiplying the slope by the standard deviation of the explanatory variable and dividing by the standard deviation of the GDP share. Tariff Sector k = ln(1+Tariff Sector k), calculated according to Equation (13). All endowments are expressed as log of share of labor (i.e., economically active population). Tariffs are instrumented with 10 years-lagged sectoral shares in total manufacturing employment and 10 years-lagged inverse import penetration ratios. 10 years-lagged values of relative endowments of capital, workers with primary education, workers with secondary education, and workers with post-secondary education are also used as instruments. t-statistics in below coefficients in bold.