Universidad de SanAndrés

Departamento de Economía
Ciclo de Seminarios

Trade Reform, Technological Change and Inequality: The Case of Mexico and Argentina in the 1990s.

Pablo Acosta (University of Illinois at Urbana-Champaign)

Gabriel Montes Rojas (The World Bank y University of Illinois at Urbana-Champaign)

Martes 16 de julio de 2002
Sala de reuniones - CEDI

Trade Reform, Technological Change and Inequality: The Case of Mexico and Argentina in the 1990s[1]

Pablo Acosta
University of Illinois at Urbana-Champaign
pacosta@uiuc.edu

Gabriel V. Montes Rojas
The World Bank and University of Illinois at Urbana-Champaign
gmontesrojas@worldbank.org

May, 2002

ABSTRACT

This paper provides empirical assessments of two of the leading explanations for the increase in skill premium: (1) international trade, and (2) technological change. We summarize the existing evidence for Argentina and Mexico, and present some stylized facts for other Latin American countries. We provide evidence that shows that trade is not the principal cause, and that increase technological change could be more important. We also quote that an export boom is a necessary condition for a decline of skill premium in the long run, and suggest that the effect of trade liberalization is temporary.

JEL Classification: J31, O33

[1] The authors would like to thank to Leonardo Gasparini (UNLP) and William F. Maloney (World Bank) for helpful comments.

I. Introduction

The evolution of inequality is an important topic for Latin American countries (LACs). During the nineties many of these countries experienced a great increase in inequality. In this paper we will explore the effects of trade and technological change as possibly explanations.

In the last decade, several LACs countries had significant changes in their trade policies by increasing openness, although many of their characteristics differ across countries. Mexico began it in the middle of the 1980's and arrived to the North American Trade Agreement (NAFTA) in 1994. Argentina began a massive liberalization in the 1990's, but in a lower degree and tied to the MERCOSUR. The changes in trade regimes of the biggest countries in the region are exposed in Figure 1.

What is the main cause of the increase in the relative wage of high skill workers (HSW)? The most popular explanation of the increase in inequality uses the movements in the relative demand. This hypothesis is consistent with the empirical evidence, as the supply side is growing at the same rate as the skill premium, accompanied by an increase on the demand for high skill workers or in an unequal evolution of workers' productivity.

The literature mentions two sources for these changes: international trade and technological change.

1) Technological Change hypothesis. A great number of papers like Acemoglu (2000) and Krusell et al. (2000) stated that the source of changes in SP came from skill biased technological changes, that is, changes in the production function which raises the relative productivity of HSW. This hypothesis uses the facts of the telecommunication revolution and computers adoption as the principal causes. For example, Berman, Bound and Griliches (1994) and Autor, Katz and Krueger (1998), find evidence that computer use requires more skill, and more computerized industries pay relatively more to more educated workers. However this hypothesis was applied only for the OECD countries, and in particular for the United States.

Many of the theoretical models explaining changes in inequality use assumptions valid for OECD countries, but they are not always valid for LACs countries. For instance, high skill biased technology adoption is used for explaining the increase in the wage premium of the last two decades. If we assume that LACs are relative abundant in low skill workers, we may expect *low* skill biased technology adoption. LACs do not produce a considerable mass of capital goods, and they have to be imported. For this reason, it is difficult to distinguish among the effects of trade and technological change. Besides, after several years of a closed economy, openness produces a massive transformation of the economic structure.

Nevertheless, this approach has the disadvantage that it can not explain the fall in the wages of low skill workers (LSW) that happened in Argentina.

2) Trade Openness hypothesis. International Trade theory suggests that we must take care of the factor content of imports. If imports were intensive in non-qualified workers, following Stolper-Samuelson, the result would be a relative decrease of the wages of that kind of workers. This hypothesis is sustained by Porto (2000) for Argentina and Cragg and Eppelbaum (1995) for the Mexican case. Galiani and Sanguinetti (2000) used a microeconometric specification for proving this effect.

The topics described above are a sufficient motivation for using an empirical model that evaluates the effect of trade and/or technological change as separate effects. For Mexico, we are going to concentrate only on trade, while for Argentina, given the available data, we can investigate more about technological change.

The issue is important for comparing the Mexican experience as a pattern for the ALCA. The NAFTA can be seen as a changing partner option that is (possibly) available for the rest of Latin America, and the changes in the Mexican economy are an interesting laboratory for predicting the necessary adjustment for the integration. On the other hand, we can compare this experience with the questioned MERCOSUR.

The paper is organized as follows. Section II describes the stylized facts about SP and inequality. Section III analyzes the explanatory power of trade and technological change in the increase of inequality. Section IV has the main conclusions.

II. Stylized facts for Mexico and Argentina

These countries have a similar pattern in many ways. First, they have a great increase of skill premium (SP) after trade liberalization. SP is interpreted as the wage ratio of HSW, or equivalently, the relationship between the labor remunerations to people with superior degree studies comparing to workers without a degree (LSW). Figure 2 plot the SP for the period 1987-1999. Mexico had a constant increase for the period 1987-1996 with different trade regimes. Argentina experienced high values of SP for the inflation period (1987-1991) and a constant increase after the trade liberalization of MERCOSUR. Inflation raises premium because HSW may have more power in negotiation and more facilities for indexing wages. Furthermore, we can see a decrease for both countries after several years of trade openness. This is clearer in Mexico after 1996.

Second, these countries also show the same trend in inequality. Figure 3 plots the ratio of the 90th and the 10th percentile for these countries. Mexico shows an identical pattern that SP. Besides, the absolute level of wages increases before NAFTA, and it has a permanent decline of 30% after the Tequila Crisis. Argentina has high values for the inflation period and a constant increase after trade liberalization, with a decrease in the absolute level of wages between 1985 and 1999 (wages perceived by the workers at the top of the distribution fell 25%, while the poorest ones faced a fall in their labor incomes of about 40%). But the effect is noticeable after 1994: while the 90 percentile wages were lowered in 10%, the 10 percentile income was reduced in 25% by 1999.

As we will explain later, we believe that the effect of trade liberalization on inequality is not permanent. This happened in Chile, considering the period 1974-1999 (Grill and Montenegro, 2001).

This paper uses only the demand side of the phenomenon, which could not be valid in other cases. In Brazil, for instance, Blom *et al.* (2001) find evidence that the domestic relative supply explain the increase in SP. That is, if we consider that the relative wage is determined by the relative sizes of the different types of workers. This is not the case of Argentina and Mexico. As Figure 4 shows, the share of HSW increases as a percentage of the total labor force during the period. Thus, the domestic relative supply could not be used as a way for explaining the facts.

III. Measuring the effect of trade on skill premium

A. Mexico

Two periods must be distinguished for Mexico. The first one, 1987-1993, was characterized by a constant increase on SP. Cragg and Epelbaum (1995) attribute this increase to higher imports of low-skill goods, which has intensified the adoption of high-skill techniques. We will not reject that hypothesis, but we believe that imports are not the complete story. We should not expect high-skill biased adoption of techniques while low-skill techniques are still profitable and, as we will show, during this period the exports have a positive effects on low skill workers, and this effect is grater than the competition effect from low skill intensive countries. During the second period 1994-1999, it is showed a deceleration in SP and a decline after 1997. It can be seen that "who" and "what" matters, as Lovely and Richardson (1998) suggested, specially for a country like Mexico and a partner like U.S.A.

First, we will describe the main changes on trade. The proportion of NAFTA vs. Rest of the World increases during the period, converging to a 90% and 75% ratio in exports and imports respectively. Exports and Imports to and from NAFTA are relatively stable but increasing as an aggregate since 1991.

Manufactured exports show a significant increase (in 1999 it account for the 90%). On the other hand, manufactured imports started at an upper level but arrived at the same percentage. If we want to see interesting numbers, we must go deeper inside the manufactured sector. We can compare two different years, 1992 and 1998. The first one is a "steady state" of

the first trade liberalization process, while the second is the culmination of the NAFTA. (See Figure 5)

If in 1992 Mexico imported many manufactured goods, in 1998 it exported many of them. There is not only a big increase in final goods exports, but also more imports for intermediate and capital goods (See Figure 5). Those changes should shift productivity of the whole economy but we can not suspect *a priori* if those changes are biased.

Those facts could result in technological changes that may affect SP in different ways. However, we may expect that changes in the relative productivity, different from those of the supply and trade effects, would vanish, and productivity should growth at the level of the state of the US (productivity of labor force in manufacturing increases 45% between 1993 and 2000, at the same rate that USA).

We used the Encuesta Nacional de Empleo Urbano (ENEU) for the period 1987-1999, trade data from IADB and value added data from the INEGI Mexican Statistics Office for tradable sectors. We applied two different ways of estimating trade effects. In the first model, SP is directly determined by trade. We only used quarter of each year, since the trade data is annual. We consider J=59 sectors of the tradable sector (4 agriculture, 6 mining and 49 of the manufacturing industries) and H=5 types of skill (primary incomplete, primary complete, secondary incomplete, secondary complete and high education). We excluded non tradable sectors in order to focus only on direct trade effects. We also took women out of the sample. The model is:

$$\ln wage_{it} = f_1(age_{it}; school_{it}) + \sum_{j=1}^{J}\sum_{h=1}^{H} \alpha_h^x (exports_{jt}/VA_{jt}) ds_h + \sum_{j=1}^{j}\sum_{h=1}^{H} \alpha_h^m (imports_{jt}/VA_{jt}) ds_h + u_{it}$$

where $wage_{ijt}$ is the real wage, $school_{it}$ is the number of years of education, $f(.)$ is a non linear function of the individual characteristics[2] and *ds* are dummies for the H types of skills depending on education. Trade data is standardized by value added, reflecting the significance on each sector of trade. In the case of imports, it reflects the "penetration effect", while on exports it could be called "orientation effect". In this case, α_h^x gives the increase in wage of the h skill group for being in a sector which increases the ratio Exports/Value Added from 0 to 1, while α_h^m gives the effect of Imports/Value Added of the sector.

We run regressions for the whole period and for two sub-periods separately (1987-1993 and 1994-1999). The results are summarized in Table 1. The exports coefficients are significant with a decreasing impact on the level of skill. This tells a story of comparative advantages, where Mexico is relative abundant on low skill labor relative to its partners. Imports have an ambiguous effect, showing a concave "penetration effect". Hence, competition from abroad decreases wages of medium skill workers relative to the extremes.

The coefficient can be interpreted as follows. Suppose a high skill worker in an industry with a constant ratio of exports over VA equals to 1 for the period 1987-1999. Then for the whole period that worker experienced an average increase of 3.7% in wage (see row (1) column 1987-1999) comparing to another worker in an industry with an exports ratio of zero. On the other hand a low skill worker in the same sector would experience an average increase of 5.8% (see row (9) column 1987-1999). That is, for that industry on average, SP interpreted as the ratio of high skill wages and low skill workers decrease by 2.1% (see row (11) column 1987-1999) compared to a sector with a zero ratio.

High skill workers benefit less for exports but they also suffer less from competition. Those workers may have an unmeasured ability for adapting to changes on the economic environment or a strong complementarily with low skill workers. Using new technologies by low

[2] For this particular case, we used $f_1(age,school)=school+experience+experience^2$, where $experience=age-school-6$ as is usual in the literature. That is, we are assuming that all individuals have a common return to human capital, but wages may also be changing because of trade.

skill workers requires a strong supervision and a correct interpretation of blueprints. Another hypothesis is that Mexico is relative abundant of high skill workers comparing to medium skill.

For the subperiod 1987-1993, it can be noted that imports are significant and positive for high skill workers, negative for the medium skill workers, but not significant for the low skill workers. On the other hand, the effect of an increase in exports over value added has a positive impact on wages, but decreasing with education. This pattern is different for the other subperiod, where the export effect is convex on education and positive, while the import-effect is convex but negative. In sum, the tails of the distribution of worker's education benefits more from trade, while the mean worker has a negative net impact.

Trade effects on skill premium can be showed in an interesting way running the following regression for different years separately and for dummies for each level of education (without interacting with years of schooling)[3]:

$$\ln wage_{it} = f_2(age_{it}; school_{it}) + \sum_{h=1}^{H-1} \varphi_{ht} ds_h + \sum_{j=1}^{J} \sum_{h=1}^{H} \alpha_{ht}^{x} (exports_{jt}/VA_{jt}) ds_h + \sum_{j=1}^{j} \sum_{h=1}^{H} \alpha_{ht}^{m} (imports_{jt}/VA_{jt}) ds_h + u_{it}$$

t = 1987-1999

Then, computing the trade effects within the year, it can be showed how they affect SP. For the first sub period, there is a great volatility that can be interpreted as reaccomodation or movements due to competition. Imports penetration reduces SP in a significant way. But for the next sub period, the trade effect is constant. Figure 6 plots the effects for high skill workers. Figure 7 plot the net effect of trade[4]. As can be seen, after NAFTA the net effect is negative.

The model exposed before give us the effect of trade together with industry specific movements. That is, it accounts for the effect of being in an industry with a given import or export ratio. However it cannot account for the net effect of trade, that is, the effect orthogonal to

[3] In this case f_2 *does not have* years of schooling.
[4] In Figure 6, the series Higher plot the skill premium for high skill workers net of trade effects, while the H+x and H+m add the effects of exports and imports respectively.

the industry specific shocks. The next model has dummies for year and for sector for accounting for variations which not came from trade.

This model is similar to Galiani and Sanguinetti (2000). We are going to run using only the manufacture sector:

$$\ln wage_{it} = f_2(age_{it}; school_{it}) + \sum_{t=0}^{T} \sum_{h=1}^{H-1} \varphi_{ht} ds_h + \sum_{j=1}^{J} \sum_{h=1}^{H} \alpha_h^x (\text{exports}_{jt}/VA_{jt}) ds_h + \\ + \sum_{j=1}^{j} \sum_{h=1}^{H} \alpha_h^m (imports_{jt}/VA_{jt}) ds_h + c_t + \mu_j + u_{it}$$

where we also have a fixed effect by year and by sector. It can be noted the effect of each type of skill varies in time for allowing changes in the return to schooling.

We believe that these results isolate the effect of trade of the changes by industries and unexplained changes in the returns to skills[5]. The coefficients are interpreted in a similar way to the first model with a difference. In this case, the coefficients give the effect of an increase in the expors/import ratio, conditional on being in a determined sector. Thus, for instance, the negative coefficient of *xvahi* in column (1) of Table 2 states that on average high skill workers experienced a decrease in their wages with an increase in exports/VA.

We can see how much the trade effects can explain. The wage premium can be written as

$$SP_{jht} = \left(e^{\left[\varphi_{ht} + \left(\alpha_h^m - \alpha_b^m\right)(imports_{jt}/VA_{jt}) + (\alpha_h^x - \alpha_b^x)(\text{exports}_{jt}/VA_{jt})\right]} - 1\right)$$

where *b* denotes the low skill sector and *h* the high one. We can simulate what part can be explained only by imports, only by exports and by changes in the returns different from trade. In Table 3 we simulate these changes for two subperiods: 1987-1993 and 1994-1999. The first

column has the changes considering changes in all variables; the second maintain the 1987/1994 unexplained return to school φ and the level of exports of 1987; finally the third column changes only the exports variable letting the others at the 1987/1994 level.

For the first period, imports explain 21% of the increase in SP, as was noted by Cragg and Epelbaum (1995), but exports also decrease the SP. In sum, the SP is explained in a 6% by trade data. On the other hand, for the next period trade explain 40%, with exports oversetting the SP and imports moving in the wrong direction. The unexplained SP could be interpreted as produced by technological change and/or changes in the relative supply. As was predicted in the theoretical model, the trade explanatory power increases after the first stages of the trade reform.

At this point, we can investigate some of the causes of the increase in inequality. During the period 1987-1993 the industries that will become leaders in exports were still with negative trade balances. As Figure 10 shows, imports industries had higher SP for high skill workers. This effect is the same that the coefficient of the *import coefficient on high skill workers* (*mvahi*) in Table 1, that says that being in an industry that imports an amount similar to the value added will pay 5% more to high skill workers relatively to low workers and 8% relatively to medium skill workers, who accounts for the larger part of the labor force. The same figure plots the SP for export industries, which shows a significant increment during the subperiod and catches up the average SP. For the next subperiod, the positive sign of *mvahi* turns to be negative. The leader industries now become exporters and low skill workers benefits more than high skill workers. That is, the rise was caused by the forces of foreign competition intensive in non-qualified labor, while the decrease was caused by exports.

We may attribute the rest of the increase in SP to technological change in an environment of low skill technology adoption. Hanson and Harrison (1995) also found evidence of increasing SP due to internal changes in industries and plants for the period 1985-1988 that can not be

[5] However the evolution of certain sectors should not be isolated of trade. For example, the evolution of the Road Vehicles Industry is strongly correlated with trade, and we may think that its growth is constrained by the changes in trade data.

accounted by the Stolper-Samulson-type effects theory. However, these authors find no strong evidence to support the technology hypothesis[6].

As was noted in other papers about SP in Latin America, trade *per se* can account only a part of the increase in inequality. In sum, trade does not seem to explain the whole increase in the SP. On the contrary, it explains mostly the decline after 1995/1996.

B Argentina

In Argentina, total income (measured by GDP per capita) have been increasing throughout the decade in a significant way, to an annual average rate of 2.7% for period 1991-1999. Nevertheless, wages have not followed this path: industry wages have remained almost flat throughout the last decade, decreasing slightly to an annual rate of 0.1%. This fact, which affected a particular sector of the whole economy, the manufacturing industry, of a great historical weight in the productive structure of the country, without doubt has been motivated by the fall in the share of this sector in total GDP (from 19.2% in 1991 to 16.5% in 1999) which led to a great expulsion of labor (industrial employment fell to an annual average rate of 2.2% in this period) and concluded in an historical increase in labor productivity (annual rate of 6.5%). Trade liberalization demanded an reaccommodation of this sector in order to reach the world production frontier and to be able to compete with the rest of world, and this reform included technological change and a substitution between labor and capital.

Besides, there have been changes in the distribution of wages in Argentina throughout the 90s, together with an increase in the supply of human capital. While in 1985 total skilled employment (at least collage attendance) was less than 8%, this share was duplicated by the end of the '90s.

Two hypothesis were proposed as an explanation of this phenomenon: new technologies (or "technological change") incorporated in the new capital goods were intensive in the use of

[6] They use royalties paid for the use of patents and copyrights, machinery imports and productivity growth at plant level.

skilled labor), and that trade liberalization that took place in the country since the beginnings of the 90s has a relationship with the increasing inequality, in agreement with the idea that factor content of Argentinean imports are intensive in unskilled workers (see Porto, 2000).

For Argentina, we will employ the Encuesta Permanente de Hogares (EPH) for 1992-1999 from the INDEC; trade data from the IADB, value added from the Secretaría de Política Económica (Ministerio de Economía) and investment in machinery by sector from Secretaría de Industria (Ministerio de Economía).

We can use a more interesting dataset because we have a good proxy for gains in productivity by sector: imports of capital goods by sector. The assumption made is that capital goods can only be imported, that is the local production can be ignored. On the other hand, the lack of an export boom makes this variable not significant. Thus, we will employ the same methodology that we use for Mexico (second model) only for imports for accounting the trade effects, but we will also calculate the effect of capital goods imports. The following equation will be estimated:

$$\ln(wage_{it}) = \sum_{h=0}^{H-1} \alpha_{ht} ds_h + \sum_{h=0}^{H} imports_{jt} / VA_{jt} \alpha_h^m ds_h + \sum_{h=0}^{H} investment_{jt-1} / VA_{jt} \alpha_h^v ds_h +$$

$$+ \sum_{c=0}^{C} dl_{ct} \phi_{ct} + f_t(age_{ijt}) + dsex_{ijt} \varphi_t + ciu_t + c_t + \mu_j + u_{ijt}$$

where $wage_{it}$ is the real wage; ds_{ht} is a dummy variable of the h education group in period t and α_{ht} is the return to education in t; α_h^m is the effect of the imports penetration on wages of the skill group h; α_h^v is the coefficient of the investment ratio; dl_{ct} is a dummy variable for labor experience where cε{(0,1), [1,5), [5,10), [10,20) , [20. +20)} and ϕ_{ct} is the return to experience; $f_t(age_{it})$ is a non linear function of age ; $dsex_{ijt}$ is a dummy variable by sex and φ_t the coefficient; ciu is a fix effect by city ; θ_t is a fix effect by period; μ_j is a fix effect by sector and u_{it} is the error term. . In this case we are using three (H=3) skill groups: non-qualified (less than secondary

complete), semi-qualified (secondary complete and university incomplete) and qualified (graduated from university).

We estimate that equation using only workers of the age group 18-64 and of the manufacture industry, because we do not have capital goods imports for other sectors.[7] In this case, the evolution by sector is significant and should be separated from the trade data. The change in the textile industries, for example, reflects more the lack of competitiveness than the impact of foreign competition. The evolution of employment is not correlated with trade data. This was showed by many authors, and contradicts the idea that links unemployment and trade. For this reason we prefer the second model used in Mexico for Argentina.

In Table 4 we present the estimation of the parameter of interest. The coefficient for skilled workers is larger than for unskilled workers in the imports penetration and Investment/Value Added ratio.

What is more important is that the incorporation of new technologies takes the greater part of the explanation in the education premium of the 90's. We take the industry's average and make the same exercise that we did for Mexico: first, the evolution of the premium changing imports but keeping constant at the 1992 level the investment ratio and the unexplained SP; and in the second case we make the inverse exercise, changing only the investment ratio. Therefore we will have two effects: "trade effect" and "investment effect". In Table 5 we show that the impact of the first one explains only the 14.4% of the SP increase, while the latter explains a 68.4%.

The greater gap in relative wages for educational group appeared in firms of sectors that invested more during the period. This experience is similar to advanced countries, where the capital goods come from. The principal effect of trade comes from adoption of new technologies. Because of trade liberalization, the price of the capital goods should follow the international trend. For instance, personal computers decrease 20 % in the period 1995-2000. Nevertheless,

[7] The sectors that are not incorporated, services and agriculture, could have a significant technological change, specially after the privatization process of the public services.

during the same period the price in the United States did by 50%. The gap could be explained by the MERCOSUR agreement, because of preferential tariffs for Brazilian goods.

IV. Conclusions

Mexico shows a pattern similar to other countries (e.g. Chile) after a massive liberalization. That is, a significant increase during the first years, but a posterior decline. The former may be caused by *between* industries differences. The latter is interpreted as standard trade theory, because USA is relatively abundant in high skill workers. The Argentine case, where SP did not decline after 8 years of trade liberalization, could be explained by a different trade partner: Brazil.

The present paper approached to the SP's changes mostly using the demand side. The supply side does not affect the premium in the expected way as other papers noted. There is a positive relation between the relative size and the relative wages.

Trade is not the direct cause of its changes, and SP appears to be determined by technological change due perhaps to pressure from trade. That is, the effect of trade seems to be indirect, generating incentives to technology adoption. The Argentine case directly shows that technological effect explains a greater part of the increase in SP during the 90's, while the trade effect is relatively small.

References

Acemoglu, D. (2000). "Technological change, Inequality, and the Labor Market". *NBER Working Paper N° 7800.*

Autor, D., Katz, L. and Krueger, A. (1998). "Computing Inequality: Have Computers Changed the Labor Market?". *Quarterly Journal of Economics,* November 1998, 1169-1213.

Autor, D., Levy, F. and Murnane, R. (2001). "The Skill Content of Recent Technological Change: An Empirical Exploration". *NBER Working Paper N° 8337.*

Blom, A., Holm-Nielsen, L. and Verner, D. (2001) "Education, Earnings and Inequality in Brazil 1982-1998; Implications for Education Policy", *The World Bank*, mimeo.

Cragg, M.I. and Epelbaum, M. (1995) "Why is Wage Dispersion Growing in Mexico? Is it the Incidence of Reforms or the Growing Demand for Skills", Discussion Paper 9506, *Instituto Tecnológico Autónomo de México, Centro de Investigación Económica*, México.

Davis, D. (1996). "Technology, Unemployment, and Relative Wages in a Global Economy". *NBER Working Paper N° 5636.*

DiNardo, J., Fortín, N. and Lemieux, T. (1995). "Labor Market Institutions, and the distribution of wages, 1973-1992: A Semiparametric Approach". *Econometrica*, 64, 1001-1044.

Feenstra, R. and Hanson, G. (1999). "The impact of outsourcing and high-technology capital on wages: estimates for the United States, 1979-1990". *Quarterly Journal of Economics*, August 1999, 114 (3), 907-940.

Galiani, S. (1999). "The differential evolution of wages, job stability and unemployment". *Mimeo.*

Galiani, S. and Sanguinetti, P. (2000). "Wage Inequality and Trade Liberalization: Evidence from Argentina". *Universidad Torcuato Di Tella,* mimeo.

Gibbons, R., Katz, L. and Lemieux, T. (1997). "Learning, comparative advantage, and the inter-industry wage structure". *Universite de Montreal.*

Gill I. and Montenegro C.E. (2001) "Responding to earnings differentials in Chile", *Mimeo*

Hanson, G.H. and Harrison, J. (1995). "Trade, Technology and Wage Inequality". *NBER Working Paper N° 5110.*

Katz, L. and Murphy, K. (1992). "Changes in relative wages in the United States: Supply and demand factors". *Quarterly Journal of Economics,* 1992.

Krueger, A. (1993). "How Computers Have Changed the Wage Structure: Evidence from Microdata, 1984-1989". *Quarterly Journal of Economics,* February 1993, 33-60.

Krusell, P., Ohanian, L., Rios-Rull, J. and Violante, G. (2000). "Capital-Skill Complementarity and Inequality: A Macroeconomic Analysis". *Econometrica,* September 2000, 68, 1029-1053.

Lovely M. E. and Richardson J.D. (1998) "Trade Flows and Wage Premiums: Does Who or What Matter?", NBER Working Paper 6668

Revenga, A.(1995) "Employment and Wage Effects of Trade Liberalization: The Case of Mexican Manufacturing", Policy Research Working Paper 1524, The World Bank

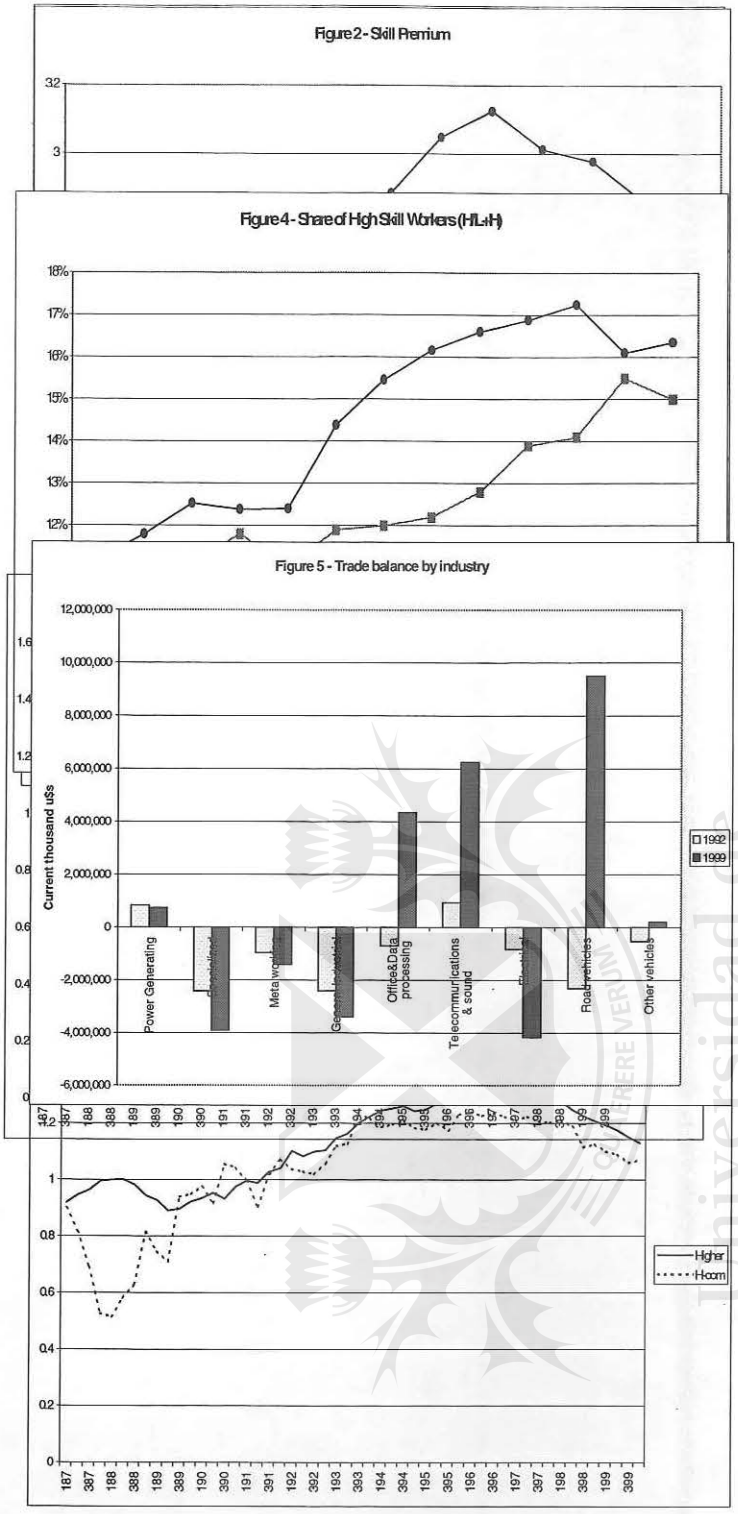

Table 1 - Mexico

	Period		
	1987-1999	1987-1993	1994-1999
Export coeff. for hi	0.037	0.027	0.044
	(23.8)	(9.1)	(24.7)
Import coeff. for hi	-0.014	0.050	-0.021
	-(9.1)	(13.0)	-(12.2)
Export coeff. for sc	0.025	0.037	0.031
	(12.5)	(8.5)	(14.0)
Import coeff. for sc	-0.037	-0.031	-0.034
	-(18.4)	-(6.2)	-(15.7)
Export coeff. for si	0.035	0.053	0.041
	(28.0)	(21.2)	(28.3)
Import coeff. for si	-0.038	-0.042	-0.033
	-(34.8)	-(16.1)	-(27.0)
Export coeff. for pc	0.044	0.060	0.049
	(24.3)	(17.4)	(23.5)
Import coeff. for pc	-0.032	-0.028	-0.026
	-(21.3)	-(8.0)	-(15.3)
Export coeff. for pi	0.058	0.066	0.064
	(21.0)	(13.9)	(19.3)
Import coeff. for pi	-0.019	0.005	-0.013
	-(8.1)	(0.9)	-(4.7)
SP(exports) Hi-Pi (1)-(9)	-0.021	-0.039	-0.019
SP(imports) Hi-Pi (2)-(10)	0.005	0.045	-0.009
SP(exports) Hi-Pc (1)-(7)	-0.007	-0.032	-0.005
SP(imports) Hi-Pc (2)-(8)	0.018	0.078	0.005

(t-Student values)

Skill groups: hi: more than 12 years of ed. ; sc: complete secondary school; si: incomplete secondary school; pc: complete primary school, pi: incomplete primary school.

Table 2 - Mexico

	Period		
	1987-1999	1987-1993	1994-1999
Export coeff. for hi	-0.026	-0.096	-0.011
	-(3.3)	-(4.6)	-(0.1)
Import coeff. for hi	0.025	0.085	0.022
	(3.8)	(4.0)	(1.9)
Export coeff. for sc	0.019	-0.028	0.023
	(2.3)	-(1.2)	(1.8)
Import coeff. for sc	-0.022	-0.007	-0.017
	-(2.9)	-(0.3)	-(1.4)
Export coeff. for si	0.038	0.020	0.036
	(5.3)	(1.0)	(2.9)
Import coeff. for si	-0.029	-0.031	-0.209
	-(5.1)	-(1.7)	-(1.9)
Export coeff. for pc	0.045	0.029	0.043
	(5.5)	(1.4)	(3.2)
Import coeff. for pc	-0.031	-0.034	-0.023
	-(4.6)	-(1.8)	-(1.9)
Export coeff. for pi	0.042	0.037	0.038
	(4.0)	(1.6)	(2.4)
Import coeff. for pi	-0.025	-0.054	-0.012
	-(2.8)	-(2.4)	-(0.9)
SP(exports) Hi-Pi (1)-(9)	-0.068	-0.133	-0.049
SP(imports) Hi-Pi (2)-(10)	0.050	0.139	0.034
SP(exports) Hi-Pc (1)-(7)	-0.070	-0.126	-0.054
SP(imports) Hi-Pc (2)-(8)	0.056	0.119	0.044

(t-Student values)

Skill groups: hi: more than 12 years of ed. ; sc: complete secondary school; si: incomplete secondary school; pc: complete primary school, pi: incomplete primary school.

Table 3 - Explanatory power of Trade Effects - Mexico

Year	Wage Premium (%)	Imports Effect (%)	Export Effect (%)
1987	99.3	99.3	99.3
1988	102.8	100.0	98.7
1989	110.4	100.8	98.2
1990	115.1	101.7	97.6
1991	115.0	102.6	97.0
1992	108.7	103.5	96.4
1993	124.5	104.6	95.8
hange 87-9	25%	5% (21.%)	-4% -(13.8%)
1994	121.3	121.3	121.3
1995	126.3	121.7	119.6
1996	133.9	122.7	118.2
1997	127.9	123.7	117.9
1998	123.3	124.4	118.0
1999	117.5	124.4	116.7
hange 94-9	-3%	3% -(81.4%)	-4% (120.5%)

Table 4: Argentina - Trade and investment effects by skill groups

Variable	Total Country 1992-1999
Import coeff. for Unskilled	0.0435 (1.3)
Import coeff. for Semi-Skilled	0.0444 (1.4)
Import coeff. for Skilled	0.0760 (2.2)
Investment coeff. for Unskilled	-0.0089 -(2.2)
Investment coeff. for Semi-Skilled	-0.0006 -(0.1)
Investment coeff. for Skilled	0.0204 (2.8)

(t-Student values)

Table 5 - Explanatory power of Trade and Investment Effects - Argentina

Year	Wage Premium (%)	Trade Effect (%)	Investment Effect (%)
1992	125.9	125.9	125.9
1993	152.0	126.7	127.8
1994	163.6	128.2	132.8
1995	197.7	128.1	136.8
1996	173.9	128.9	138.0
1997	146.2	130.0	138.8
1998	157.8	130.2	141.5
1999	149.6	129.3	142.1
Change 94-99	18.8%	2.7% (14.4%)	12.9% (68.6%)