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Trade with China and India and Manufacturing Labour Demand in Argentina

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Abstract

For many in Latin America, the increasing participation of China and India in international markets is seen as a looming shadow of two 'mighty giants' on the region's manufacturing sector. Are they really mighty giants when it comes to their impact on manufacturing employment? This paper attempts to answer this question by estimating the effects of trade with China and India on Argentina's industrial employment. We use a dynamic econometric model and industry level data to estimate the effects of trade with China and India on the level of employment in Argentina's manufacturing sector. Results suggest that trade with China and India only had a small negative effect on industrial employment, even during the swift trade liberalization of the 1990s.

Keywords: China, Latin America, trade, import competition, trade and labour market interactions, employment

JEL classification: F14, F15, F16, F17, L60

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Tables and Figures appear at the end of the paper.

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'*China and India are seen by many as two mighty giants threatening the jobs of the manufacturing industry*'

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1 Introduction

For many in Latin America, the increasing participation of China and India in international markets is seen as a looming shadow of two 'mighty giants' on the region's industrial sector, and one of the major causes behind the significant reduction of employment in the manufacturing industry in the last decade. Are these claims justified? Are China and India, the 'mighty giants' driving the secular fall in manufacturing jobs in Latin America?

This paper attempts to provide answers to these questions with a focus on Argentina, which experienced a 31 per cent decline in industrial employment over the last decade, while the share of imports from China and India increased six fold. We apply a dynamic econometric model where labour demand in each industry is a function of wages, the capital stock, prices and productivity. The last two (prices and productivity) are a function of import and export penetration, and will allow us to identify the impact that trade with China and India is having through these two channels on labour demand in Argentina's manufacturing sector.

In principle, trade should affect the level of employment across and within sectors. Empirical research on the impact of trade on employment has found little evidence either way, particularly in developing countries.[1] Using plant level data for Morocco, Currie and Harrison (1997) find only a small impact of trade liberalization on the level of employment. Revenga (1997) did not find any statistically significant relation between the level of employment and tariffs liberalization in the case of Mexico. Márquez and Pages-Serra (1998) examined the relationship between trade liberalization and employment in Latin America and the Caribbean (LAC) and could not find any substantial effect. A comprehensive study by the IADB (2004), using household survey data for 10 LAC countries, did not find a statistically significant association between the two phenomena. De Ferranti et al. (2003) confirm this result for several countries in LAC. In a similar study, that also contemplates the effects of exchange rate appreciations, Haltiwanger et al. (2004) did not find robust results on the relationship between trade liberalization and changes in net employment in the region. In their paper on the impact of trade liberalization on income distribution in Colombia, Attanasio et al. (2004) found no evidence of labour reallocation across sectors. Similarly small employment effects in Latin America are reported in Levinsohn (1999) for Chile, Moreira and Najberg (2000) for Brazil and Gandelman et al. (2005) for Uruguay.[2]

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1 See Hoekman and Winters (2005) for a comprehensive survey on the recent empirical evidence on the effects of trade on employment.

2 See Goldberg and Pavcnik (2004) for a survey of empirical evindence on the effects of trade on poverty and inequality.

For Argentina, in particular, Galiani and Sanguinetti (2003) only found a small correlation between trade liberalization and the rate of employment in the 1990s. Pessino and Andres (2005) attribute the negative effects of trade liberalization on employment to the distortions and rigidities of Argentina's labour market rather than to trade liberalization. Sánchez and Butler (2004) point to other explicative factors beyond trade liberalization, such as labour costs, access to credit finance, financial and real shocks, informality, etc.[3]

Other studies, such as Altimir and Beccaria (1999), and Damill et al. (2002), point to the accelerated process of trade liberalization combined with exchange rate appreciation, as the main culprits of the net employment loss suffered by the Argentinean manufacturing sector in the last decade. In sum, the evidence presented in these studies is not conclusive. In this paper, we are not concerned about which policies may have been the cause of that decline, but rather on whether imports from the two rapidly growing Asian economies can explain part of this trend.

Results suggest that increased trade with China can only explain a negligible share of the decline in manufacturing labour demand. Moreover, the increase in overall import penetration during the period could only explain a relatively small share of the decline in manufacturing employment. To be more precise, a 1 per cent increase in import penetration leads to a 0.07 per cent decline in labour demand. Given that import penetration increased by 79 per cent over the sample period (1991-2003), the decline in labour demand that can be attributed to the increase in import penetration is around 6 per cent. Given that manufacturing employment declined by 31 per cent over the sample period, the increase in import penetration can at most explain 20 per cent of the observed loss in manufacturing employment. The other 80 per cent had other causes. The increased importance of China as a source of imports had an almost negligible marginal impact on the decline in labour demand associated with the increase on overall imports. A 1 percentage point increase in the share of imports from China, leads to an additional 0.02 per cent decline in the growth of Argentina's labour demand. Thus, the six-fold increase in the share of imports from China over the period (from 1 to 6 per cent) could only explain an additional 0.1 to 0.2 per cent decline in labour demand. Moreover, an increase in the share of imports from Brazil of 1 percentage point would have a marginal impact that is twice as large, which arguably is still very small. Perhaps more worrisome, the small negative impact on employment of increased imports from China and Brazil is concentrated in unskilled labour-intensive sectors. Results for India, the European Union and the United States suggest that an increase in the share of imports from these countries do not have an impact on labour demand (beyond the overall impact of import penetration on labour demand). Increases in exports do not seem to have an impact on manufacturing employment regardless of their destination, with the exception of the Indian market.

The remainder of the paper is organized as follows. Section 2 presents some stylized facts of Argentina's trade liberalization and trade with China and India, as well as the evolution of manufacturing employment. Section 3 presents the theoretical model and the empirical strategy. Section 4 presents the results. Section 5 concludes.

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3 See also Acosta and Gasparini (2004) for an estimation of skill-biased trade liberalization and its impact on wages in Argentina.

2 Stylized facts

There has been a continuous decline in manufacturing employment in Argentina since the early 1980s. Between 1991 and 2003 industrial employment declined by 31 per cent (see Figure 1).[4] Losses in industrial employment were only partially compensated by an increase in employment in the services sector. The net change on overall employment was negative, resulting in two-digit unemployment rates over most of the period. It is only from 2003 onwards that manufacturing employment has experienced a recovery.

Simultaneously, the aggregate productivity of the industrial sector increased by an average of 6.8 per cent for 1991-99. Productivity increased most in capital-intensive sectors such as iron and steel, electric machinery and transport equipment and least in natural resources and labour-intensive sub-sectors.[5]

In parallel to these changes in the aggregate level of industrial employment, Argentina experienced a deep and fast process of trade liberalization.[6] The trade-openness coefficient (exports plus imports as a percentage of GDP) went from 6 per cent in 1993 to 23.4 per cent in 2001, falling to 21.7 per cent in 2003 as a result of the economic collapse of Argentina in 2002. Imports as per cent of GDP increased from 9 per cent in 1990 to 11 per cent in 2001, and fell to 8 per cent in 2003. Exports as percentage of GDP rose from 7 per cent to 12 per cent over the period.[7] For the manufacturing industry, in particular, import penetration increased by almost 79 per cent from 1991 to 2003.

As shown in Table 1, changes in import penetration and share in the industry's total employment varied significantly across manufacturing sub-sectors in the 1990s. However, a clear pattern does not seem to emerge by simply looking at the evolution of these two variables. For instance, sectors such as textiles, apparel and footwear experienced similar increases in import penetration over the period, but the first two sectors saw their share of total manufacturing employment decline, whereas footwear experienced an above-average increase in its share of manufacturing employment. More generally, while import penetration increased for all manufacturing sub-sectors in 1991-2003 relative to 1980-1991, only half of these sub-sectors experienced a contraction in their share in total industrial employment.[8] This prima-facie evidence suggests that disentangling the impact of imports on employment may not be straightforward.

The growing importance of China and India as a trading partner is a relatively new phenomenon for Argentina. Figure 2 shows that imports from China, and to a lesser

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4 More dramatically, the manufacturing employment level in 2003 was only 47 per cent of its level in 1980.

5 For a comprehensive analysis of the changes in the Argentine industrial employment see Altimir and Beccaria (1999). Dussel Peters (2004) offers a comparative analysis with Mexico and Brazil.

6 See Berlinski (2004) for a detailed account of the Argentinean trade liberalization process in the 1990s.

7 These indicators were calculated with data retrieved from ECLAC (2004).

8 In some sectors (i.e. miscellaneous petroleum products and fabricated metal products) the employment contraction is mostly explained by the radical process of privatization of Argentina's public sector in the 1990s.

extent India, have started representing a non-negligible share of Argentina's imports only in the mid-1990s. Though the share of China in Argentina's total imports remained relatively low, it increased almost six-fold between 1990 and 2003. Likewise India's share increased almost seven-fold. Figure 3 reports the same information for Argentina's main trade partners: Brazil, the European Union and the United States.[9]

The already small share of imports from China in total imports declined severely during Argentina's economic collapse in 2001 and only recovered after 2003. Imports from India were not an important share of total imports over the entire period. Imports from India amounted to more than 1 per cent of total imports only after 2002.

Nevertheless, trade with China and India is mostly inter-industry (that is, trade of goods between different industry classifications) highlighted by very low intra-industry trade indicators.[10] At the same time, both imports from and exports to these markets are extremely concentrated in a few products.[11] This suggests that the potential for inter-sector reallocation of labour could be important even when Argentine trade with these Asian economies is relatively small.

Thus, it is important to capture these trends at the industry level. Table 2 shows information on China's import penetration for 28 manufacturing industries between 1980 and 2003. In the 1990s, China's import penetration was concentrated in a few sectors, mostly capital-intensive, such as electric and non-electric machinery, scientific and professional instruments and other manufactures. These sub-sectors are the ones facing more competition from imports from all sources not only from China. Some labour-intensive sectors such as leather and furniture also faced relatively higher import competition from China.

Likewise Table 3 describes import competition from India. Although import competition from India increased slightly in the 1990s vis-à-vis previous decades, it remained at very low levels. In fact, with the exception of industrial chemicals, imports from India represented less than 1 per cent of Argentina's output.

To summarize, the prima-facie evidence regarding the impact of increases in import penetration on employment in Argentina is mixed. Moreover, the rapid growth in imports from China and India is even less likely to have had a significant impact given that they still represent a small share of Argentina's imports. However, this quick look at the data does not obviously imply causality, and can be misleading. It would be misleading if, for example, there is correlation between the evolution of import penetration and import shares from China and India with other forces that had a

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9 These three countries accounted for almost 70 per cent of Argentina's imports during the period 1980-2003.

10 For instance, Castro et al. (2005) report a Grubel-Lloyd (GL) Coefficient of 0.01 for Argentina-China trade in 2003 (and similar or lower figures for previous years). India displays similar values. The GL coefficient is a statistical indicator of the extent of intra-industry trade (IIT) with the world or a partner within an industry or the whole. The GL coefficient ranges from 1 to 0. A GL coefficient equal to 1 means that all trade in that trade flow is of on intra-industry nature; a GL equal to 0 that trade is purely inter-industry. See Fontagne and Freudenberg (1997) for a complete explanation of the GL coefficient and its variants.

11 Castro et al. (2005), op. cit.

significant impact on manufacturing employment in Argentina. It would also be misleading in the presence of reverse causality: import penetration might be increasing because employment is declining. To try to identify the role-played by trade and the growth of Argentina's trade with China and India we turn to a more formal empirical model that will help us address these issues.

3 The model and the empirical strategy

In order to estimate the impact of changes on import penetration on labour demand, we follow Greenaway et al. (1998) and assume a Cobb-Douglas production function across industry and time:

$$q_{it} = A_{it} k_{it}^{\alpha} l_{it}^{\beta} \tag{1}$$

where q is real output, k is capital stock, l are units of labour employed, and A is a Hicks-neutral productivity term; α and β are the share of each factor used in total output. We further assume that labour markets are perfectly competitive so that the bill wage equals the value of output times the labour share in output. Solving the first order condition for labour yields:

$$l_{it} = \beta p_{it} q_{it} / w_{it} \tag{2}$$

where p is the domestic price of the good i and w is the labour wage. By substituting (1) into (2) and rearranging, the equation yields the following expression:

$$l_{it} = \beta p_{it} \left[\; A k_{it}^{\alpha} l^{\beta} \; \right] \Big/ w_{it} \tag{3}$$

We then solve (3) for labour demand of industry i at time t:

$$l_{it} = \left\{ \; \left(p_{it} \beta \mathrm{A} \mathrm{k}_{\mathrm{it}}^{\alpha} \right) \Big/ w_{it} \; \right\}^{(1/1-\beta)} \tag{4}$$

In contrast to Greenaway et al. (1998) output-constrained model, equation (4) conditions labour demand not on output but on the capital stock. Thus, we allow output to vary according to changes in domestic prices associated with changes in trade liberalization. This may be an important channel through which trade affects the level of employment at the industry level. One would expect the impact of import penetration on labour demand to be larger when conditioning on capital rather than on output, as the former allows for the adjustment of output as import penetration changes. By conditioning labour demand on output, the only channel left for changes in import penetration to affect employment is through its impact on total factor productivity (TFP). This is likely to be positive, as it reduces x-inefficiencies when less efficient firms exist and more efficient firms become larger in the industry. By conditioning on

capital, we allow imports to affect employment through changes in both TFP and domestic prices leading to changes in output.[12]

More formally, we assume that $A_{it}\, p_{it}$ is a function of import and export penetration:

$$Ap_{it} = e^{(\lambda_0 T_i)} M_{it}^{(\lambda_1 + (1/\eta^M))} X_{it}^{(\lambda_2 + (1/\eta^X))}, \quad \lambda_0, \lambda_1, \lambda_2 \rangle 0 \qquad (5)$$

where *T* is a time trend, *M* is a measure of import penetration, *X* is a measure of export penetration, η^M is the import demand elasticity, and η^X is the export supply elasticity.

Whilst η^M is negative and therefore an increase in imports will decrease p_{it} (and therefore employment) through this channel, η^X is positive and therefore an increase in exports will increase p_{it} (and consequently employment) through this conduit.

Substituting equation (5) into (4) and taking logs, yields:

$$\ln l_{it} = \alpha_0 + \alpha_1 \ln K_{it} + \alpha_2 \ln w_{it} + \alpha_3 \ln M_{it} + \alpha_4 \ln X_{it} + \alpha_5 T + \alpha_6 I + \varepsilon \qquad (6)$$

Equation (6) is the basis for our empirical model using both industry and time dummies. Time dummies (*T*) capture not only the time trend of the productivity parameter, but also any general liberalization programme that would have occurred (an overall 10 per cent cut in tariffs) or increase in tariffs for that matter, as well as the impact of changes in the exchange rate or any other macroeconomic shock, such as the 2001 crisis. Industry dummies (*I*) capture industry particularities, such as the fact that some of the industries (e.g. petroleum products) were subject to significant privatization during the 1990s. So the estimates refer to the within-industry impact of trade liberalization on industry employment, controlling for macroeconomic shocks and the general equilibrium effects of a general trade liberalization with year dummies.

Because we are interested in the impact that Argentina's trade with China and India had on manufacturing employment, we also add to equation (6) their share of total imports and exports, as well as the import and export share of Argentina's three main trading partners (Brazil, the European Union, and the United States) to capture the marginal impact associated with trade with different partners.

It is well known that in an imperfect competition market structure, wage setting and labour demand determination are more complex than in the simple perfect competition case presented above in our theoretical model. Wages prevailing in *industry i* in *time t* can differ from the alternative wage in the rest of the manufacturing sector as a result of the presence of unionization, market power, and/or rent-sharing schemes, dampening the adjustment of labour demand to trade.[13] To investigate the importance of these factors, we also incorporate to equation (6) a term representing the available wage in

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12 A more refined version of this model can be found in Castro (forthcoming), featuring imperfect competition and adjustment costs effects on labour demand.

13 Currie and Harrison (1997), for instance, provide empirical evidence on the importance of imperfect competition in determining labour response to trade liberalization for the case of Morocco.

other industries of the manufacturing sector.[14] We also examine whether unskilled labour tends to be relatively more affected by interacting unskilled and skilled labour dummies with the trade shares.

3.1 Empirical strategy

There are two problems with the estimation of equation (6) that can bias our estimates. First, labour demand is likely to show inertia, and this may lead to first-order serial correlation in the errors. Second, wages and capital stocks are potentially endogenous variables (although theoretically we have treated them as exogenous).

We address the potential serial correlation of the error term by including lagged employment as an explanatory variable, and testing for first and second order correlation of the error term after introducing the lagged dependent variable. This also provides us with long run elasticity estimates.[15] However, as shown in the mainstream literature (see Kiviet 1995), the inclusion of a lagged dependent variable in a panel setting also leads to biased and inconsistent estimates when using ordinary-least-squares. We address the second problem by using the first, second and third lagged values of wage and capital, as instruments for wages and capital stocks; and the first, second and third lagged values of our additional instruments: a proxy for transportation costs, sector value added, and the share of low-skilled labour in each industry.[16]

4 Results

Table 6 reports the estimates of equation (6) using the System GMM estimator, but also the output-constrained model as in Greenaway et al. (1998).[17] The capital-constrained model results reported in the first column of Table 6 has the expected signs; wages and capital are statistically significant at 1 per cent, as well as the lagged dependent variable.[18] Capital seems to have a complementary effect on employment, as indicated by the positive sign of its coefficient.[19] Import penetration is significant at the 5 per cent level. According to these results, a 1-percentage point increase in import penetration

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14 See Revenga (1997). Castro (forthcoming) formally extends our theoretical model to incorporate the implications of imperfect competition for labour demand determination in response to increased trade flows.

15 See Fajnzylber and Maloney (2000, 2001)

16 See Data Appendix for a description of the methodology and statistical information used for the construction of each variable.

17 See Arellano and Bond (1991), Blundell and Bond (1998) for a review of GMM estimators. In order to compute System GMM estimations we use Roodman's xtabond2 command in Stata (see Roodman 2005).

18 Our estimates for wages and lagged employment are within the range of estimates obtained for other countries in the region using similar specifications. Hamermesh (2004) provides a summary of the results of the existing econometric studies on trade and changes in the derived static and dynamic labour demand in Latin America.

19 See Hamermesh (1993).

tends to reduce employment by 0.084 per cent in the short run and 0.15 per cent in the long run. Export penetration has a positive, but statistically insignificant coefficient.

The second column reports the results of the model where estimates are conditional on output, and again all coefficients have the expected signs. Interestingly, the estimated coefficient on import penetration is 60 per cent smaller than in the case of the model conditional on capital. Note, however, that they are not statistically different from each other.

Note that the null hypothesis of no second order serial correlation of the error term cannot be rejected in both regressions, and the HO hypothesis of no over-identification is rejected. This suggests that there is no evidence that our estimates are biased due to either serial correlation of the error term or lack of identification in our regressions.

Table 7 reports the System GMM estimations only for the capital-constrained specification, but including trade shares by partner, in order to assess the marginal impact of imports and exports with different trading partners. The coefficients on lagged employment, wage and capital stock show the expected signs and are highly significant and stable across specifications. The total import penetration coefficient is always negative and significant around the 1 to 5 per cent threshold. As shown, an increase of 1 percentage point in total import penetration generates a job loss of around 0.07 per cent. Given that import penetration increased by 79 per cent over the sample period (1991-2003), the decline in labour demand that can be attributed to the increase in import penetration is around 6 per cent in the short run and 10 per cent in the long run. Given that manufacturing employment declined by 31 per cent over the sample period (1980-2003), the increase in import penetration can at most explain 32 per cent of the observed loss in manufacturing employment. The coefficient on total exports/consumption shows the expected sign, but it is not statistically significant, thus supporting the specification of the models.

The last two columns explore the marginal impact on employment of imports and exports with China, India and Argentina's three main trading partners. In the case of China, the coefficient on imports is negative and significant at the 5 per cent level in both columns. This implies that, *ceteris paribus*, an increase of 1 percentage point in the share of Chinese imports generates a decrease in labour demand of around 0.02 per cent (and around 0.04 per cent in the long run). Thus, the six-fold increase in the share of imports from China over the period (from 1 to six per cent) could explain an almost negligible 0.1 to 0.2 per cent additional decline in labour demand. Interestingly, an increase in the share of imports from Brazil of 1 percentage point would have an impact that is twice as large, which arguably is still very small. Imports from India, or the European Union and the United States do not appear to have any additional impact on employment levels. Exports to different trading partners do not seem to have any additional impact on employment, except for exports to India, but its economic significance is negligible.

Year dummies reported in Table 7 indicate that unobserved effects had negative and significative effects on sectoral employment, as in 1991 and 1992. In fact, those years marked the beginning of a sweep and profound structural reform package implemented in Argentina. Amongst other things, these measures included – as mentioned – privatization and downsizing of state-owned companies in the services and manufacturing sector, and an aggressive unilateral tariff cut programme. The other

coefficient found negative and significative was reported for the year 2002, where the financial and currency crisis took place. Again, all four regressions in Table 7 cannot reject the null hypothesis of no second order serial correlation in the error term and reject the null hypothesis of no over-identification.

An alternative specification was estimated in Table 8 to test for the possibility of wages diverging from market-clearing rates in some industries due to the presence of unionization, rent-sharing schemes or other market imperfections. The coefficient for the alternative wage is negative but not statistically different from zero, suggesting that rent-sharing between firms and workers did not exert a significant effect on the adjustment of labour demand to increased trade flows, from China, India or any other partner. As before, the second-order serial correlation and over-identification test cannot discard the null hypothesis.

Table 9 reports the results for the third column in Table 7, but exploring for heterogeneity across industries' labour-skill intensity. Results suggest that the marginal (and small) additional impact of imports from both China and Brazil is concentrated in low-skill intensive industries, which are depicted in Table 4. In the case of China, an increase of 1 percentage point in its import share leads to a decline in the employment of unskilled-intensive sectors of around 0.02 per cent. The effect is again twice as large for Brazil. In contrast, high-skilled sectors seem not to be affected by imports sourced from either China or Brazil. Again, the over-identification and the second order serial correlation tests do not suggest that there are problems with this regression.

5 Conclusions

Over the last decade, import penetration in Argentina's manufacturing sector increased by 79 per cent, while imports from China and India increased six-fold, and manufacturing employment declined by 33 per cent. Many believed that the sharp decline in employment was mainly due to the rapidly growing imports from the two Asian economies. A more careful look suggests that the evidence is mixed at best. Total import competition increased significantly across sectors but manufacturing employment (measured as a share of total employment in the industry) decline for some sub-sectors and increased for others. With the exception of apparel and footwear, employment did not decline in sectors where China and India had a significant and growing share of Argentina's imports. Moreover, the two Asian economies still only account for less than 6 per cent of Argentina's import bundle.

In order to take a more careful look at whether imports from China and India are responsible for the decline in manufacturing employment in Argentina, we develop a dynamic econometric model, where import penetration and export penetration can affect the level of employment through their impact on domestic prices and productivity, while controlling for industry and time effects.

Results suggest that the rapid increase in import penetration in Argentina's manufacturing employment can only explain a small fraction (20 per cent) of the large decline in manufacturing employment observed during the period. Imports from China had a slightly larger impact on manufacturing employment than imports from the rest of the world, probably due to the fact that China is a relatively labour abundant country. However, the marginal impact of imports from Brazil is twice as large as imports from

China, although economically still insignificant. Imports from India or Argentina's other two main trading partners (the European Union and the United States) do not seem to have any additional marginal impact (beyond the impact of import penetration) on manufacturing employment.

Imports from both China and India tend to impose larger declines on the level of employment in unskilled-intensive sectors, although again the marginal effect on unskilled employment of imports from Brazil is twice as large as imports from China. Again, imports from other sources do not have a statistically significant impact when exploring the heterogeneity across skilled and unskilled intensive industries.

Perhaps surprisingly, exports do not seem to contribute to manufacturing employment. The coefficient on export penetration is always positive, but never statistically so. Moreover, even if they were statistically significant, the magnitude of the impact is rather small, given the estimated coefficients. This holds regardless of the export destination, with the exception of India, but again the magnitude is negligible. This suggests that increases in exports are not accompanied by increases in manufacturing employment.

Similarly, the presence of rent – sharing between firms and workers do not seem to exert a significant influence on the response of labour demand to increased import or export penetration, with disregard of country of origin or destination. The sharp reduction in the unionization rates and the parallel aggressive deregulation of many manufacturing industries over the 1990s may be explaining this result for the case of Argentina.

To conclude, the decline in Argentina's manufacturing employment can only marginally be attributed to import competition from China and India, or from any other source for that matter. The 'mighty giants' that could explain this decline are to be found somewhere else.

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Data appendix: sources and variable construction

Our main source is the UNIDO INDSTAT Database of Industrial Statistics at the 3-digit, ISIC Revision 2 nomenclature. It comprises output, wages, employment and value added data for 28 manufacturing sectors, covering the years 1980-2003. The latter was used as an instrument in our estimations. All variables (except for the number of employed people) were converted to 1976 constant dollars using a GDP deflator retrieved from the US BEA (Bureau of Economic Analysis).

In addition, we computed an initial capital stock using the ECLAC-PADI database, adjusted later using (scarce) gross fixed investment data found in the UNIDO database, applying the permanent inventory method. Trade data was gathered from UN COMTRADE and then converted to 1976 constant dollars, except for transport costs, later used as an additional instrument in our econometric estimations. We calculated freight costs per mile using US Imports data from Argentina, gathered from US ITC and BLS sources. Then, we computed total freight costs multiplying freight costs per mile by each trading partner's distance to Argentina using the CEPII distance database. Finally, we applied a simple average in order to avoid collinearity issues with other explanatory variables.

Another variable of interest used as instrument in our estimations is the share of unskilled workers by industrial sector. This was gathered from INDEC (National Institute of Statistics and Census), using all household surveys (EPH) available for Greater Buenos Aires. Any person with unfinished secondary education or less was considered low skilled throughout the whole sample. Since we found some gaps in the data, missing years were filled with the averages of immediate passed and future observations, since it is highly unlikely to encounter sudden structural changes in the skill intensity of each industry from one year to another. Summary statistics are provided in Table 5, along with a brief description of available years and sources of information in the next table.

Summary of data: available years and sources

Variable	Years	Data sources
Output Employment Wages Value added	1980-2003	UNIDO INDSTAT database
Capital stock	1980-2003	ECLAC-PADI / UNIDO INDSTAT
Transport cost	1991-2003	US ITC (International Trade Commission), BLS (Bureau of Labour Statistics), CEPII distance database, UN COMTRADE
Imports and exports	1980-2003	UN COMTRADE
Share of low skill workers	1980,1982,1985,1987,1988, 1990-2003	INDEC (National Institute of Statistics and Census) – EPH – Greater Buenos Aires

Variables

1. **Total import penetration**: Total Import penetration for sector *i* in year *t* is defined by the ratio between Imports (*M*) from a specific partner *p* (in our case the World) and apparent consumption, calculated as:

$$Penetration^{p}{}_{it} = \frac{M^{p}{}_{it}}{Q_{it} - X_{it} + M_{it}}$$

   Where Consumption is the expression found in the denominator. Accordingly, Consumption equals Output (*Q*) plus Total Imports (*M*) minus Total Exports (*X*) for each manufacturing sector *i* and year *t*.

2. **Total exports/consumption**: Total Exports/Consumption ratio for sector *i* in year *t* is defined by the ratio between Exports (*X*) from a specific partner *p* (in our case the World) and Consumption

$$Export/Consumption^{p}{}_{it} = \frac{X^{p}{}_{it}}{Q_{it} - X_{it} + M_{it}}$$

3. **Share of imports by trading partner**: is the ratio of imports *M* from partner *p* and Total Imports for each manufacturing sector *i* and year *t*.

$$s^{I,p}{}_{it} = \frac{M^{p}{}_{it}}{\sum_{p} M^{p}_{it}}$$

4. **Share of exports by trading partner**: is the ratio of exports *X* to partner *p* and Total Exports for each manufacturing sector *i* and year *t*.

$$s^{X,p}{}_{it} = \frac{X^{p}{}_{it}}{\sum_{p} X^{p}_{it}}$$

5. **Low/high skill**: Low (High) Skill is a dichotomous variable that takes a value of 1 when a particular sector *i* in year *t* has a lower (higher) share of Low (High) Skilled workers compared to the industry average.

Tables and figures

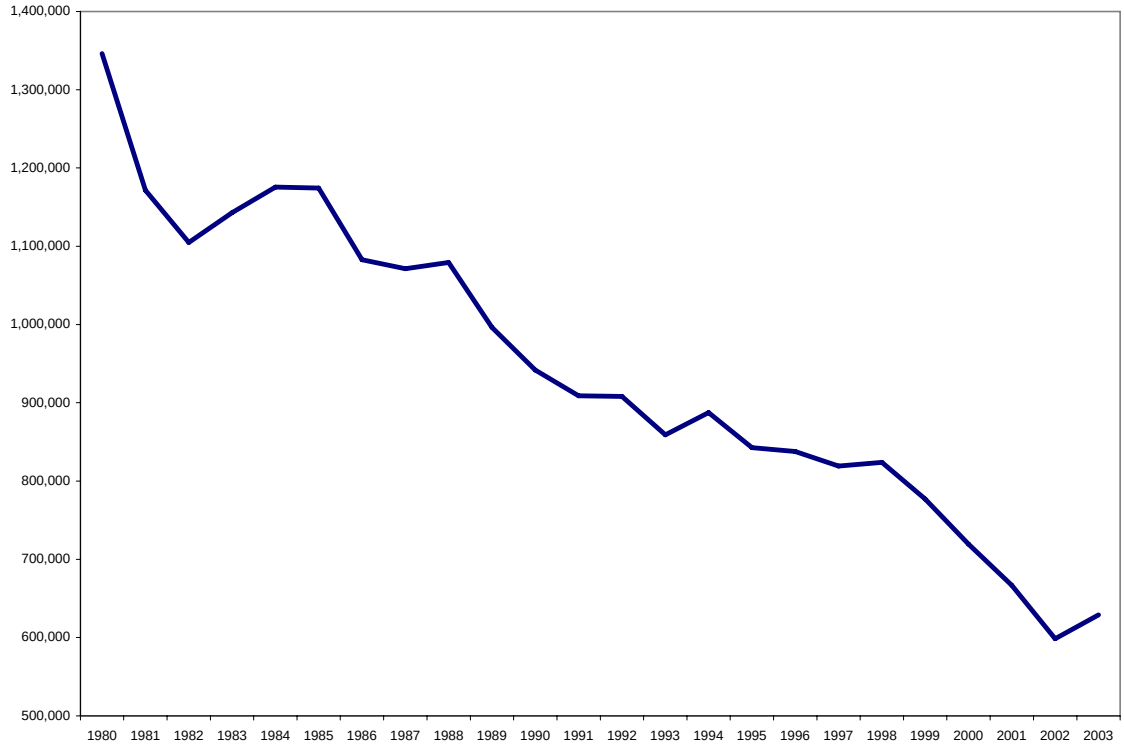
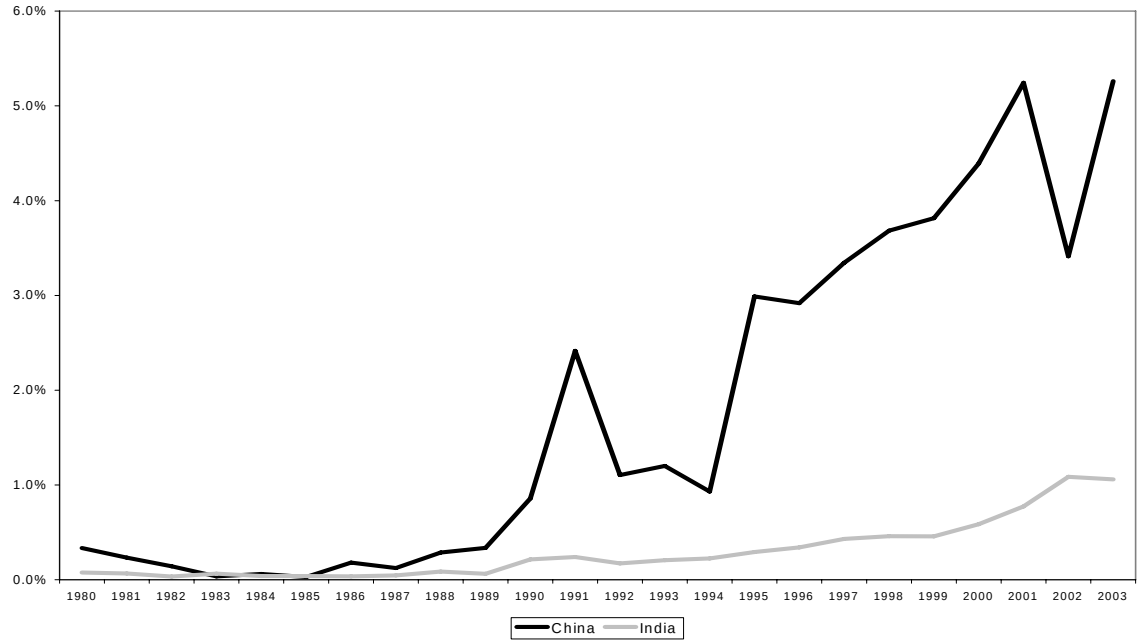


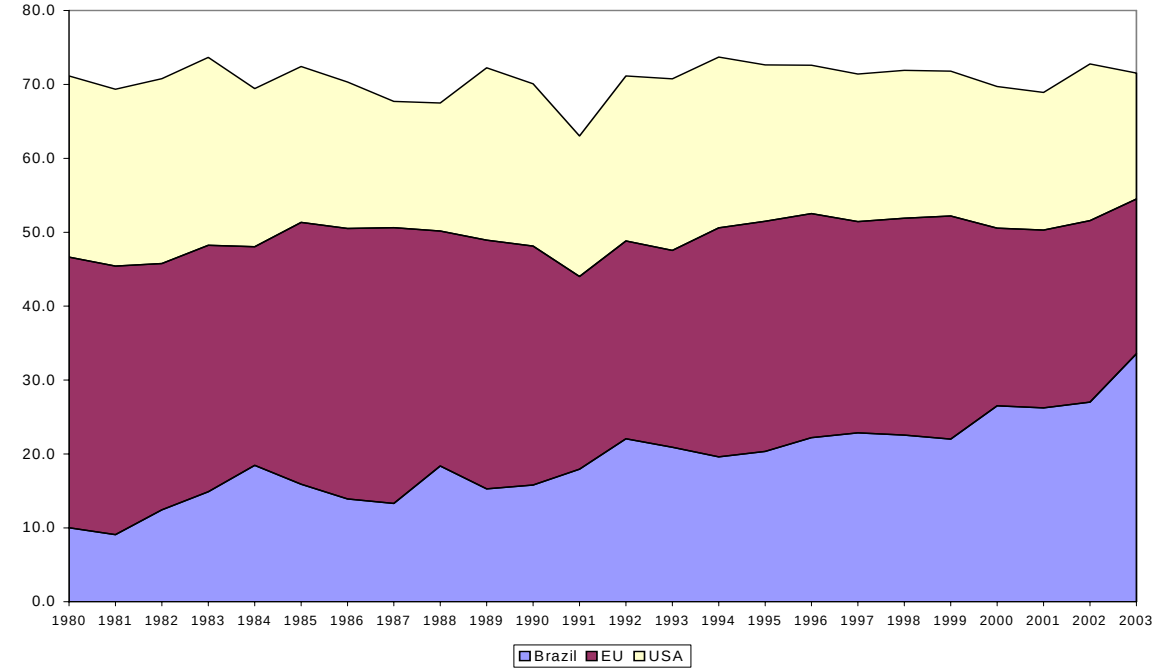
Figure 1: Employment in the Argentine industrial sector, 1980-2003 (thousands of workers)
Source: UNIDO (2004).

Figure 2: Share of Argentine imports from China and India, 1980-2003



Source: UN COMTRADE (2005).

Figure 3: Share of Argentine imports from Brazil, EU and USA, 1980-2003



Source: UN COMTRADE (2005).

Table 1: Total import penetration and changes in industry's share in total industrial employment, per cent and averages

ISIC	Industry description	1980-1990	1991-2000	2001-2003	Changes in industry's share in total industrial employment 1991-2003
311	Food products	1.0%	3.8%	2.7%	21.79%
313	Beverages	0.7%	1.6%	0.5%	57.26%
314	Tobacco	0.3%	0.1%	0.5%	25.58%
321	Textiles	1.7%	12.4%	11.7%	-24.83%
322	Wearing apparel, except footwear	1.2%	6.5%	4.2%	-3.18%
323	Leather products	0.9%	12.0%	11.3%	26.14%
324	Footwear, except rubber or plastic	0.8%	10.7%	6.0%	60.55%
331	Wood products, except furniture	8.2%	16.4%	12.3%	-21.45%
332	Furniture, except metal	0.2%	11.4%	18.0%	6.64%
341	Paper and products	8.2%	19.8%	15.9%	22.18%
342	Printing and publishing	1.9%	4.2%	2.8%	29.20%
351	Industrial chemicals	24.2%	40.0%	41.7%	-19.20%
352	Other chemicals	6.0%	12.4%	13.0%	31.87%
353	Petroleum refineries	1.7%	5.4%	4.9%	4.55%
354	Miscellaneous petroleum and coal products	5.8%	25.9%	28.0%	-92.83%
355	Rubber products	4.3%	28.8%	33.5%	1.69%
356	Plastic products	2.6%	12.5%	8.2%	64.30%
361	Pottery, china, earthenware	2.0%	13.8%	13.1%	-74.63%
362	Glass and products	5.0%	18.5%	15.5%	-8.14%
369	Other non-metallic mineral products	3.9%	5.3%	3.3%	-54.09%
371	Iron and steel	14.5%	16.2%	29.7%	-35.58%
372	Non-ferrous metals	19.7%	29.5%	33.1%	-16.16%
381	Fabricated metal products	3.8%	16.1%	14.6%	-37.68%
382	Machinery, except electrical	28.8%	55.3%	45.7%	21.46%
383	Machinery, electric	23.0%	49.0%	48.2%	5.96%
384	Transport equipment	7.6%	35.5%	44.2%	-27.54%
385	Professional and scientific equipment	43.7%	61.8%	70.9%	-4.52%
390	Other manufactured products	23.8%	60.3%	55.3%	-18.61%

Source: Own calculations based on UNIDO (2004) and UNCOMTRADE (2005).

Table 2: Import penetration from China, per cent and averages

ISIC	Industry description	1980-1990	1991-2000	2001-2003
311	Food products	0.00%	0.02%	0.02%
313	Beverages	0.00%	0.00%	0.00%
314	Tobacco	0.00%	0.00%	0.00%
321	Textiles	0.07%	0.65%	0.36%
322	Wearing apparel, except footwear	0.02%	**1.25%**	0.82%
323	Leather products	0.01%	**4.77%**	**5.30%**
324	Footwear, except rubber or plastic	0.01%	**1.85%**	0.56%
331	Wood products, except furniture	0.00%	0.22%	0.23%
332	Furniture, except metal	0.00%	0.36%	1.13%
341	Paper and products	0.00%	0.02%	0.03%
342	Printing and publishing	0.00%	0.09%	0.08%
351	Industrial chemicals	0.05%	0.63%	**1.50%**
352	Other chemicals	0.01%	0.15%	0.14%
353	Petroleum refineries	0.00%	0.00%	0.01%
354	Miscellaneous petroleum and coal products	0.00%	0.00%	0.01%
355	Rubber products	0.00%	0.45%	0.97%
356	Plastic products	0.01%	0.98%	0.71%
361	Pottery, china, earthenware	0.06%	**3.13%**	**2.95%**
362	Glass and products	0.00%	0.44%	0.76%
369	Other non-metallic mineral products	0.00%	0.05%	0.10%
371	Iron and steel	0.00%	0.14%	0.93%
372	Non-ferrous metals	0.00%	0.15%	0.57%
381	Fabricated metal products	0.02%	0.86%	**1.19%**
382	Machinery, except electrical	0.01%	**1.17%**	**2.94%**
383	Machinery, electric	0.02%	**2.21%**	**4.75%**
384	Transport equipment	0.02%	0.31%	0.64%
385	Professional and scientific equipment	0.14%	**2.10%**	**3.64%**
390	Other manufactured products	0.56%	**10.51%**	**13.88%**

Source: Own calculations based on UNIDO (2004) and UNCOMTRADE (2005).

Notes: in bold are import penetration coefficients higher than 1%.

Table 3: Indian imports penetration, per cent and averages

ISIC	Industry description	1980-1990	1991-2000	2001-2003
311	Food products	0.0%	0.0%	0.0%
313	Beverages	0.0%	0.0%	0.0%
314	Tobacco	0.0%	0.0%	0.0%
321	Textiles	0.0%	0.2%	0.2%
322	Wearing apparel, except footwear	0.0%	0.2%	0.2%
323	Leather products	0.0%	0.1%	0.1%
324	Footwear, except rubber or plastic	0.0%	0.0%	0.0%
331	Wood products, except furniture	0.0%	0.0%	0.0%
332	Furniture, except metal	0.0%	0.0%	0.0%
341	Paper and products	0.0%	0.0%	0.0%
342	Printing and publishing	0.0%	0.0%	0.0%
351	Industrial chemicals	0.0%	0.4%	**1.3%**
352	Other chemicals	0.0%	0.1%	0.1%
353	Petroleum refineries	0.0%	0.0%	0.1%
354	Miscellaneous petroleum and coal products	0.0%	0.0%	0.0%
355	Rubber products	0.0%	0.2%	0.3%
356	Plastic products	0.0%	0.0%	0.0%
361	Pottery, china, earthenware	0.0%	0.0%	0.0%
362	Glass and products	0.0%	0.0%	0.0%
369	Other non-metallic mineral products	0.0%	0.0%	0.0%
371	Iron and steel	0.0%	0.0%	0.2%
372	Non-ferrous metals	0.0%	0.0%	0.0%
381	Fabricated metal products	0.0%	0.1%	0.1%
382	Machinery, except electrical	0.0%	0.0%	0.0%
383	Machinery, electric	0.0%	0.0%	0.0%
384	Transport equipment	0.0%	0.2%	0.1%
385	Professional and scientific equipment	0.0%	0.1%	0.1%
390	Other manufactured products	0.0%	0.1%	0.2%

Source: Own calculations based on UNIDO (2004) and UNCOMTRADE (2005).

Notes: in bold are import penetration coefficients higher than 1%.

Table 4: Unskilled labour share in sectoral employment

ISIC	Industry description	1980-1990	1991-2000	2001-2003
311	Food products	0.840	0.745	0.593
		(0.036)	(0.027)	(0.032)
313	Beverages	0.750	0.650	0.558
		(0.037)	(0.112)	(0.109)
314	Tobacco	0.653	0.732	0.630
		(0.171)	(0.057)	(0.073)
321	Textiles	0.810	0.753	0.824
		(0.017)	(0.069)	(0.025)
322	Wearing apparel, except footwear	0.815	0.708	0.708
		(0.037)	(0.055)	(0.090)
323	Leather products	0.794	0.788	0.536
		(0.067)	(0.093)	(0.134)
324	Footwear, except rubber or plastic	0.882	0.814	0.785
		(0.031)	(0.087)	(0.015)
331	Wood products, except furniture	0.842	0.809	0.617
		(0.077)	(0.109)	(0)
332	Furniture, except metal	0.886	0.801	0.666
		(0.015)	(0.075)	(0.147)
341	Paper and products	0.720	0.676	0.514
		(0.023)	(0.178)	(0.063)
342	Printing and publishing	0.582	0.482	0.336
		(0.032)	(0.087)	(0.072)
351	Industrial chemicals	0.470	0.444	0.242
		(0.098)	(0.171)	(0.070)
352	Other chemicals	0.536	0.426	0.421
		(0.018)	(0.060)	(0.075)
353	Petroleum refineries	0.668	0.346	0.433
		(0.214)	(0.083)	(0)
354	Miscellaneous petroleum and coal products	n.a.	n.a.	n.a.
		n.a.	n.a.	n.a.
355	Rubber products	0.833	0.662	0.732
		(0.048)	(0.112)	(0.010)
356	Plastic products	0.726	0.631	0.390
		(0.092)	(0.128)	(0.143)
361	Pottery, china, earthenware	0.713	0.543	0.543
		(0.075)	(7.024)	(0)
362	Glass and products	0.878	0.691	0.600
		(0.088)	(0.155)	(0)
369	Other non-metallic mineral products	0.717	0.724	0.348
		(0.209)	(0.169)	(0.272)
371	Iron and steel	0.799	0.696	0.427
		(0.147)	(0.143)	(0.242)
372	Non-ferrous metals	0.731	0.647	0.735
		(0.070)	(0.110)	(0)
381	Fabricated metal products	0.768	0.691	0.598
		(0.039)	(0.072)	(0.035)
382	Machinery, except electrical	0.709	0.563	0.559
		(0.087)	(0.078)	(0.031)
383	Machinery, electric	0.676	0.518	0.286
		(0.046)	(0.074)	(0.119)
384	Transport equipment	0.757	0.564	0.610
		(0.029)	(0.110)	(0.095)
385	Professional and scientific equipment	0.583	0.407	0.490
		(0.116)	(0.070)	(7.450)
390	Other manufactured products	0.739	0.587	0.539
		(0.069)	(0.102)	(0.113)
	Total manufacturing sector	0.736	0.633	0.545
		(0.136)	(0.163)	(0.170)

Source: Own calculations based on INDEC.

Notes: Averages for each period, standard error in parenthesis.

Table 5: Summary statistics

Variables	Mean	Std. Dev.	Min	Max
Employment	28,621	34,681	87	198,670
Wages	2,737	1,523	529	11,271
Capital stock (logs)	36.55	1.99	32.35	43.39
Value added (logs)	23.21	1.14	19.95	25.72
Unskilled labour share	0.603	0.173	0.148	0.950
Import penetration	0.199	0.189	0.001	0.739
Export penetration	0.160	0.300	0.000	2.225
Share of imports from China	0.054	0.092	0.000	0.558
Share of imports from India	0.004	0.007	0.000	0.046
Share of imports from Brasil	0.233	0.151	0.001	0.821
Share of imports from EU and USA	0.695	0.310	0.032	1.531
Share of exports to China	0.012	0.030	0.000	0.192
Share of exports to India	0.004	0.009	0.000	0.067
Share of exports to Brasil	0.221	0.178	0.000	0.882
Share of exports to EU and USA	0.428	0.297	0.000	1.980

Table 6: Regression results from base model

Dependent variable: employment	(1) Capital constrained	(2) Output constrained
Employment (-1)	0.456	0.187
	(0.052)***	(0.037)***
Wage	-0.279	-0.28
	(0.040)***	(0.024)***
Capital or output	0.222	0.624
	(0.039)***	(0.059)***
Total import penetration	-0.084	-0.050
	(0.033)**	(0.022)**
Total export penetration	0.007	0.029
	(0.019)	(0.013)**
Constant	3.397	1.424
	(1.390)**	(1.051)
Hansen J-Statistic / Sargan	0.0	0.07
2nd Order AC Test (p-value)	0.63	0.80

Time and sector dummies included in all regressions but not reported. Robust standard error in parenthesis. (***): Significant at 1%; (**): Significant at 5%; (*): Significant at 10% System GMM correspond to one step estimation. All continuous variables are expressed in logs.

Table 7: Regression results from augmented model

Dependent variable: employment				
	(1)	(2)	(3)	(4)
Employment (-1)	0.493	0.459	0.453	0.457
	(0.054)***	(0.056)***	(0.051)***	(0.049)***
Wage	-0.276	-0.276	-0.281	-0.296
	(0.039)***	(0.039)***	(0.045)***	(0.047)***
Capital	0.238	0.218	0.230	0.256
	(0.041)***	(0.036)***	(0.042)***	(0.047)***
Total import penetration		-0.082	-0.072	-0.068
		(0.032)**	(0.033)**	(0.033)**
Share of imports from China			-0.018	-0.017
			(0.010)*	(0.008)**
Share of imports from Brazil			-0.040	-0.039
			(0.012)***	(0.014)**
Share of imports from EU+USA			-0.048	-0.047
			(0.028)	(0.034)
Share of imports from India			0.004	0.002
			(0.008)	(0.007)
Total export penetration				0.027
				(0.023)
Share of exports to China				0.001
				(0.003)
Share of exports to Brazil				0.009
				(0.011)
Share of exports to EU + USA				0.006
				(0.006)
Share of exports to India				0.017
				(0.008)**
Constant	2.491	3.440	3.034	2.550
	(1.524)	(1.251)**	(1.274)**	(1.450)*
Year dummy 1991	-0.004	-0.088	-0.141	-0.195
	(0.113)	(0.096)	(0.112)	(0.095)**
Year dummy 1992	-0.051	-0.098	-0.148	-0.191
	(0.106)	(0.096)	(0.115)	(0.099)*
Year dummy 1993	0.244	0.209	0.159	0.115
	(0.109)**	(0.094)**	(0.102)	(0.088)
Year dummy 1994	0.259	0.233	0.186	0.137
	(0.090)***	(0.082)***	(0.094)*	(0.079)*
Year dummy 1995	0.221	0.197	0.169	0.105
	(0.096)**	(0.085)**	(0.093)*	(0.081)
Year dummy 1996	0.236	0.218	0.193	0.128
	(0.091)**	(0.083)**	(0.092)**	(0.080)
Year dummy 1997	0.117	0.115	0.085	0.013
	(0.094)	(0.082)	(0.097)	(0.083)
Year dummy 1998	0.184	0.186	0.157	0.099
	(0.088)**	(0.082)**	(0.095)	(0.079)
Year dummy 1999	0.161	0.158	0.140	0.080
	(0.091)*	(0.084)*	(0.093)	(0.076)
Year dummy 2000	0.155	0.147	0.133	0.072
	(0.088)*	(0.082)*	(0.091)	(0.076)
Year dummy 2001	0.140	0.130	0.114	0.041
	(0.090)	(0.087)	(0.094)	(0.080)
Year dummy 2002	-0.039	-0.073	-0.068	-0.094
	(0.034)	(0.033)**	(0.036)*	(0.033)***
Year dummy 2003	0.098	0.056	0.052	0.006
	(0.059)	(0.057)	(0.063)	(0.056)
Hansen J-Statistic / Sargan	0.02	0.01	0.00	0.00
2nd Order AC	0.78	0.66	0.77	0.54
Sample: 1990-2003, Observations: 364				

Notes: Sector dummies included in all regressions but not reported. Robust standard error in parenthesis. (***): Significant at 1%; (**): Significant at 5%; (*): Significant at 10% System GMM correspond to one step estimation. All continuous variables are expressed in logs.

Table 8: Regression results from augmented model with alternative wage

Dependent variable: employment				
	(1)	(2)	(3)	(4)
Employment (-1)	0.503	0.468	0.465	0.470
	(0.050)***	(0.052)***	(0.049)***	(0.051)***
Wage	-0.235	-0.219	-0.210	-0.189
	(0.063)***	(0.068)***	(0.067)***	(0.065)***
Alternative wage	-0.051	-0.073	-0.082	-0.114
	(0.083)	(0.079)	(0.079)	(0.085)
Capital	0.237	0.223	0.233	0.243
	(0.041)***	(0.034)***	(0.040)***	(0.044)***
Total import penetration		-0.085	-0.076	-0.074
		(0.031)**	(0.034)**	(0.035)**
Share of imports from China			-0.015	-0.015
			(0.007)**	(0.006)**
Share of imports from Brazil			-0.041	-0.038
			(0.014)***	(0.015)**
Share of imports from EU + USA			-0.053	-0.059
			(0.027)*	(0.032)*
Share of imports from India			-0.002	-0.003
			(0.008)	(0.008)
Total export penetration				0.008
				(0.020)
Share of exports to China				0.003
				(0.003)
Share of exports to Brazil				0.006
				(0.011)
Share of exports to EU + USA				0.012
				(0.005)**
Share of exports to India				0.006
				(0.004)
Constant	3.290	4.259	3.829	3.940
	(1.827)*	(1.623)**	(1.743)**	(2.003)*
Hansen J-Statistic / Sargan	0.02	0.01	0.00	0.00
2nd Order AC	0.80	0.69	0.85	0.82
Sample: 1990-2003, Observations: 364				

Notes: Time and sector dummies included in all regressions but not reported. Robust standard error in parenthesis. (***): Significant at 1%; (**): Significant at 5%; (*): Significant at 10% System GMM correspond to one step estimation. All continuous variables are expressed in logs.

Table 9: Regression results from augmented model with interacted skill intensity

Dependent variable: employment			
	(1)	(2)	(3)
Employment (-1)	0.461	0.463	0.494
	(0.062)***	(0.062)***	(0.078)***
Wage	-0.279	-0.277	-0.282
	(0.043)***	(0.042)***	(0.043)***
Capital	0.230	0.228	0.251
	(0.040)***	(0.039)***	(0.045)***
Low skill dummy		0.070	0.133
		(0.117)	(0.123)
Total import penetration	-0.071	-0.073	-0.077
	(0.033)**	(0.033)**	(0.032)**
Share of imports from China * low skill dummy	-0.018	-0.017	-0.017
	(0.011)*	(0.011)*	(0.012)*
Share of imports from China * high skill dummy	-0.016	-0.019	-0.025
	(0.011)	(0.012)	(0.013)*
Share of imports from Brazil * low skill dummy	-0.038	-0.038	-0.033
	(0.012)***	(0.012)***	(0.016)**
Share of imports from Brazil * high skill dummy	-0.030	-0.042	-0.079
	(0.035)	(0.041)	(0.040)*
Share of imports from EU + USA * low skill dummy	-0.044	-0.044	-0.051
	(0.028)	(0.028)	(0.033)
Share of imports from EU + USA * high skill dummy	-0.049	-0.074	-0.171
	(0.045)	(0.070)	(0.082)**
Share of imports from India * low skill dummy	0.005	0.005	0.005
	(0.006)	(0.007)	(0.007)
Share of imports from India * high skill dummy	0.005	0.004	0.003
	(0.013)	(0.013)	(0.013)
Total export penetration			0.035
			(0.025)
Share of exports to China * low skill dummy			-0.001
			(0.005)
Share of exports to China * high skill dummy			0.003
			(0.006)
Share of exports to Brazil * low skill dummy			0.001
			(0.008)
Share of exports to Brazil * high skill dummy			0.052
			(0.016)***
Share of exports to EU + USA * low skill dummy			0.007
			(0.006)
Share of exports to EU + USA * high skill dummy			0.002
			(0.022)
Share of exports to India * low skill dummy			0.021
			(0.012)
Share of exports to India * high skill dummy			0.021
			(0.008)**
Constant	3.013	2.973	1.752
	(1.246)**	(1.261)**	(1.656)
Hansen J-Statistic / Sargan	0.0	0.0	0.0
2nd Order AC	0.83	0.77	0.95
Sample 1990-2003, Observations: 364			

Notes: Time and sector dummies included in all regressions but not reported. Robust standard error in parenthesis. (***): Significant at 1%; (**): Significant at 5%; (*): Significant at 10% System GMM correspond to one step estimation. All continuous variables are expressed in logs.