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SKILL UPGRADING AND THE REAL EXCHANGE RATE

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Resumen

Este trabajo analiza empíricamente la relación entre tipo de cambio real y el uso de trabajo calificado en Chile. Utilizando datos a nivel de plantas manufactureras, se encuentra que una depreciación real aumenta la participación del pago a trabajadores calificados en los salarios totales en plantas exportadoras, pero no así en aquellas que no exportan. Este resultado sugiere una depreciación cambiaria y, en general, aumentos en la rentabilidad de las exportaciones inducirían a los exportadores a adoptar tecnologías más intensivas en capital humano. Este hallazgo es consistente con modelos recientes de comercio internacional que destacan los posibles efectos de las fluctuaciones cambiarias en el uso de tecnologías más intensivas en capital humano y la desigualdad salarial.

Abstract

This paper examines the effect of changes in the real exchange rate on skill upgrading in the case of Chile. Using plant-level data from the manufacturing sector we find that a real depreciation increases the share of skilled workers in the total wage bill in exporters but not in non-exporters. This result suggests that depreciations or, more generally, increases in export profitability, may induce exporters to adopt more skilled-intensive technologies. This finding gives support to recent models of trade that highlight the possible effect of the real exchange rate on skill upgrading and wage inequality. This paper also finds that real depreciations increase plants' export intensity, suggesting that skill upgrading for already exporters is the channel through which real exchange depreciations affect wage inequality.

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1. INTRODUCTION

One of the salient characteristics of many developing countries, especially those from Latin America and Africa, is the high degree of income inequality between skilled and unskilled workers. Recent changes in trade orientation among these countries have provided interesting cases for studying how inequality responds to trade liberalization. Most of the empirical evidence in this area shows that trade liberalization is usually accompanied by increases in wage inequality (Goldberg and Pavcnik, 2004, 2007).[1] This phenomenon is puzzling because developing countries are likely to be unskilled-labor abundant. According to the Stolper-Samuelson theorem, once these countries open to trade the returns to unskilled workers should increase in absolute terms as well as relative to the returns of skilled workers. Scholars have tried to explain this counterintuitive result from different angles. Some have argued that this pattern is consistent with the idea that developing countries are relatively abundant in natural resources rather than in unskilled labor (Leamer et al., 1999). Others have claimed that trade liberalization has been accompanied by skilled-biased technological change, which has increased the demand for skilled workers relative to unskilled workers (Robbins, 1996; Tokarick, 2005; Gallego, 2006).[2]

[1] One exception is the case of Brazil, where wage inequality decreased during the trade liberalization (Gonzaga, Menezes-Filho and Terra, 2006). For other country-specific studies on this relationship see Beyer, Rojas and Vergara (1999), Hanson and Harrison (1999), Galiani and Sanguinetti (2003), Attanasio, Goldberg and Pavcnik (2004), and Acosta and Montes-Rojas (2008).

[2] The idea is that liberalizing developing countries may adopt skill-biased technologies developed in industrialized nations and this technology adoption may be motivated by tariff reductions in developing countries (as shown by Attanasio, Goldberg and Pavcnik (2004) for the case of Colombia). Zhu (2004, 2005) provides an alternative explanation based on product cycles. She argues that the reallocation of product-cycle goods from developed countries to developing countries increases the relative demand for skilled workers in developing countries, which raises wage inequality.

While most of the empirical studies focus on the inequality effects of trade liberalization, little work exists examining the effects of changes in export profitability on wage inequality.[3] In particular, no much attention has been given to exchange rate fluctuations and their impact on skill upgrading and wage inequality.[4] The purpose of this study is to fill this gap. This paper complements previous evidence on trade and inequality by studying how changes in the real exchange rate (RER) affect wage inequality using plant-level data. We use information on Chilean manufacturing plants for the period 1990-1999 and compute 3-digit level industry-specific RERs. Thus, we extend Verhoogen (2008) paper that uses aggregate exchange rate fluctuations in Mexico.[5] We also try to identify one possible mechanism by which the RER and wages are related.[6]

This question is important for several reasons. First, episodes of significant trade reforms are becoming less common as many countries already liberalized their economies. But as countries trade more with one another they are exposed to other aspects of globalization such as changes in exchange rates. Thus, an understanding of the impact of globalization requires an examination of the effects of exchange rate movements on skill upgrading. Second, changes in the exchange rate may have similar effects as changes in tariffs on the price of imports, as shown by Feenstra (1989).[7] Third,

[3] Changes in export profitability may be due to reductions in (fixed and variable) trade costs of exporting, such as free trade agreements or decreases in transport costs.

[4] One of the few papers examining the role of changes in the real exchange rate on income inequality is Guillaumont Jeanneney and Hua (2001), which shows that a real depreciation increased income inequality between urban and rural areas in China.

[5] Robertson (2003) also explores the relationship between aggregate exchange rate and relative wages in Mexico.

[6] Some scholars have used industry-specific exchange rates to examine the effect of exchange rate movements on labor-market outcomes (e.g., Goldberg, Tracy and Aaronson, 1999), but they have not given much attention to the impact on skill upgrading.

[7] This idea is called the "symmetry hypothesis."

recent models of international trade with heterogeneous firms suggest that a real depreciation may induce skill upgrading, and contribute to increase wage inequality, by inducing firms to adopt new technologies and upgrade the quality of their products (Yeaple, 2005; Verhoogen, 2008; López, 2009).

This paper shows that firms facing a RER depreciation experience an increase in the share of skilled labor in the total wage bill, which is consistent with models in which an increase in export profitability induce the use of more skilled-intensive techniques. Our findings indicate that RER-induced skill-biased technological change within firms may explain an important part of increases in wage inequality in developing countries. The paper also shows that the effect of the RER on skill upgrading occurs through the effect on exporters. Thus, we are able to identify one possible channel by which the RER affects skill upgrading. In particular, we show that exchange rate fluctuations have significant effects on the share of foreign sales in exporting firms but do not affect the probability of exporting. Our results suggest that the intensive margin of exports is relatively more important to evaluate how real depreciations increase exports and accelerate the adoption of new technologies and product quality upgrading.

The results of this paper have implications for policy. The growing participation of developing countries in the world trade challenges the view that they could be able to reduce their levels of income inequality, unless they implement specific policies to compensate those less favored with export opportunities for the lower earnings. This paper shows that exchange rate fluctuations may also constitute a variable that policy makers should take into account. An important issue –though not addressed directly in this paper– is where displaced unskilled labor is reallocated. In some cases the transition may not be dramatic whenever reallocation is rapid and not costly. Some countries, however, have more rigid labor markets and natural or policy-induced barriers to migration, and they may not be able to smooth this transition. In this case a rise in unemployment may occur.

This paper is structured as follows. In the next section we describe the data and the main patterns. The third section presents the methodology. In the fourth section we show and discuss our results. Finally, the conclusions are presented in the fifth section.

2. DATA AND BASIC PATTERNS

The plant-level data was obtained from the Annual National Industrial Survey (ENIA) carried out by the National Institute of Statistics of Chile. The ENIA contains information on sales, output, employment, wages, exports, foreign ownership, and other plant characteristics for each manufacturing plant with at least 10 employees. Each plant has a unique identification number which allows following them over time. In addition, plants are classified according to the International Standard Industrial Classification (ISIC) rev 2. This paper uses information for the years 1990 throughout 1999. All monetary variables were converted to constant *pesos* of 1985 using 4-digit ISIC level price deflators. Data on capital stock was not available so it was necessary to construct this variable using the perpetual inventory method for each plant.[8]

[8] For the majority of plants, an initial value of the capital stock was available. This initial value was used to construct the capital stock data by adding investment and subtracting depreciation for each type of capital (machinery and equipment; buildings; and vehicles). For a small group of plants it was not possible to construct the stock of capital, so they were dropped from the data set.

Although the ENIA distinguishes between non-production and production workers it does not have information about the educational level or the years of experience of each worker employed in each plant. In this paper we use non-production workers as a proxy for skilled labor. For unskilled labor we use information of production workers. As shown by Slaughter (2000), the results of using measures of production and non-production workers are comparable to those using levels of education as measures of skill, which gives us confidence that our results can be interpreted in the context of skill upgrading and wage inequality between skilled and unskilled workers.

The share of skilled labor in the total wage bill for the manufacturing sector of Chile increased from 51 per cent in 1990 to 57 per cent in 1999. The share stayed around 50 per cent between 1990 and 1995 but then it started to increase steadily from 1996. The importance of skilled labor in total wages differs across sectors. Sectors such as chemicals and machinery and equipment have average shares for 1990-1999 above 50 per cent and in some cases above 60 per cent (e.g., other chemical products). Sectors with low shares include footwear, wood products, furniture, and ceramics. The rate of change in the share of skilled labor also differs across sectors. Most sectors experienced an increase in the share of skilled labor between 1990 and 1999, with the highest increase occurring in professional equipment, apparel, non-ferrous metals, and printing. Sectors such as electrical machinery, food miscellaneous, plastics, and furniture experienced small decreases in the share of skilled labor.

The increase in the share of skilled labor in total wages suggests that plants may have experienced skill upgrading during the period. It is possible that external factors may have contributed to this either directly or indirectly. Factors such as foreign technology acquisition and links with multinational corporations constitute direct sources of technology and may induce skill upgrading of local plants. In the case of Chile these sources are present in a relatively low fraction of plants. During the period 1990-1999 an average of 5.6 per cent of plants purchased foreign technologies through licensing, while only 6 per cent of plants had some foreign ownership.

But indirect sources of foreign technology may also be important determinants of skill upgrading in Chilean manufacturing. Contacts with foreign customers through exporting, and with suppliers through importing intermediate inputs, may allow plants to acquire information about foreign technologies, which may induce skill upgrading. A significant fraction of Chilean manufacturing plants participate in international markets either through exporting or importing intermediate inputs. More than 22 per cent of the plants exported part of their output during 1990-1999, while more than 25 per cent imported intermediate inputs during the same period. The fraction of plants in both categories increased during the period, suggesting that foreign influences through exporting and importing may have become increasingly important.

3. METHODOLOGY

We follow the methodology used by Pavcnik (2003) where the share of skilled labor in the total wage bill is derived from a translog cost function. This approach assumes that capital is a quasi-fixed factor of production and that plants minimize the cost of skilled and unskilled labor. This cost minimization yields the following expression:

$$Share = \beta_0 + \beta_1 \ln(w^s / w^u) + \beta_2 \ln(K/Y) + \beta_3 \ln(Y) + \beta_4 Tech + \varepsilon \,, \qquad (1)$$

where *Share* is the share of skilled labor in the total wage bill, w^s is the skilled labor wage, w^u is the unskilled labor wage, *Y* is value added, *K* is capital, *Tech* represents the observed component of technology, and ε is the unobserved technological component.

We expand this equation in two main ways. First, we proxy the unobserved technological component not only by the value of foreign technology licenses as in Pavcnik (2003), but also by the value of imported intermediate inputs, and foreign ownership. Second, we explore how industry-specific changes in export profitability may affect skill upgrading. To do that, we compute 3-digit ISIC sector-level real exchange rates. The natural log of the real exchange rate for industry *j* at time *t* is calculated as:

$$Log(RER_{jt}) = Log\left(\sum_{c=1}^{C} \alpha_{cj} RER_{ct}\right),$$

where RER_{ct} is the bilateral real exchange rate between Chile and country *c*;[9] $C=15$ is the number of countries; and α_{cj} is defined as:

$$\alpha_{cj} = \frac{1}{T}\sum_{t=1}^{T} \frac{Exports_{cjt}}{Exports_{jt}} \,,$$

where $Exports_{cjt}$ is the value of exports from industry *j* to country *c* at time *t*; $Exports_{jt}$ is the value of exports from industry *j* at time *t*; and *T* is the number of periods (9 years).[10] In other words, the real exchange rate is a weighted average of bilateral real exchange rate indices between Chile and the 15 main countries of destination of Chilean exports for

[9] The bilateral real exchange rate between Chile and country *c* is: $RER_{ct}=NomER_{ct}*P_{ct}/P_{Chile,t}$. $NomER_{ct}$ is the nominal exchange rate between Chile and country *c* (Chilean pesos / country's *c* currency), while P_{ct} and $P_{Chile,t}$ are producer price level indices for country *c* and Chile, respectively. The nominal exchange rates and producer prices were obtained from the International Financial Statistics of the International Monetary Fund. In cases in which the producer price was not available the consumer price index was used.

[10] We use the average over time to isolate the effect of changes in relative prices rather than changes in export shares.

each industry. These countries represent between 81.2 per cent and 99.5 per cent of total exports in each sector. The average coverage across all sectors is 92 per cent. An increase in this variable represents a real depreciation of the Chilean currency.

Most of the manufacturing industries experienced a real depreciation between 1990 and 1999. The most important increases corresponded to printing and transport equipment. By contrast, some other industries, such as food and paper, saw reductions in their real exchange rates.

Using plant-level data, we estimate the following equation:

$$\begin{aligned} Share_{ijt} &= \delta_i + \delta_1 \ln(K_{ijt-1} / Y_{ijt}) + \delta_2 \ln(Y_{ijt}) + \delta_3 Lic_{ijt} + \delta_4 Imp_{ijt} + \delta_5 For_{ijt} \\ &\quad + \delta_6 \ln(RER_{jt}) + \gamma Year_t + \varepsilon_{ijt}, \end{aligned} \tag{2}$$

where *i* denotes a plant, *j* a 3-digit ISIC industry, *Year* is a vector of year-specific effects, and δ_i are plant-specific fixed effects. *Lic*, *Imp* and *For*, are measures of foreign technology licensing, imports of intermediate inputs, and foreign ownership, respectively (see next section for the exact way in which we measure them). Since the current capital stock may be affected by relative wages, the regressions use the lagged value of capital stock instead of the current value.

Note that equation (2) differs from equation (1) because it excludes relative wages. Pavcnik (2003) argues in favor of this practice because most of the variation in relative wages across plants is endogenous. We also try to avoid this problem by excluding this variable. As a robustness check, we estimate (2) including the relative wage between skilled and unskilled workers. The estimates for all other variables remain unchanged.[11]

4. RESULTS

Before presenting the estimation results of equation (2), we first investigate the relationship between the RER and exporting activity. Verhoogen (2008) and López (2009) argue that a real depreciation may potentially affect product quality, and skill upgrading, by increasing the probability of exporting and/or the export intensity of existing exporters.

a. The RER and Exporting Activity

We assume that plants make two decisions with respect to exporting. First, they decide whether to export or no. And second, they decide how much to export. Thus, plants must pass two hurdles before they are observed with a positive level of exports. We examine the role of RER on exporting by estimating the double-hurdle model developed by Cragg (1971). One advantage of this model is that it allows zero values for exports to be the result either of censoring, faulty reporting, or some random event. As explanatory variables we include the RER and a set of plant characteristics such as total factor productivity (the natural log), size (the log of the number of employees), age (in log), a dummy for plants with foreign ownership, a dummy for plants that use foreign

[11] We also estimate the equation by using the median of relative wages in the region where the plant is located instead of plant-specific relative wages. The results, which are available from the authors upon request, do not change.

technology licenses, and a dummy for plants that use imported intermediate inputs. The regressions also include sector and year fixed effects.

The results are presented in Table 1. The first column shows the estimates for export participation, which is measured as a dummy variable equal to 1 if the plant exported at time *t*. The second column shows the estimates for export intensity (exports / total sales). We include all plant characteristics lagged one period and estimate both models (export participation and export intensity) simultaneously.

Consistent with previous studies, we find that more productive and larger plants are more likely to export.[12] Plants with foreign ownership, and the ones that use foreign licenses and imported intermediate inputs are also more likely to export. Age is negatively correlated with the probability of exporting, but this may be due to a non-linear relationship between age and the probability of exporting. In column (3) we add the square of age and also the squared of employment to see if there is a non-linear relationship for size and age. The estimate for employment is still positive but for the squared term it is negative, suggesting that larger plants are more likely to export but at some level of employment the probability starts to decrease. For age we observe a similar pattern. Older plants are more likely to export but at some point the probability of exporting decreases.

The estimate for the RER is positive but not statistically significant. This result is consistent with previous studies (e.g., Álvarez and López, 2008; López, 2009), and it is likely due to hysteresis in export markets. The hysteresis effect is based on the existence

[12] See, for example, Bernard and Jensen (2004).

of sunk-entry cost into foreign markets.[13] If these costs are significant, a small real depreciation may not induce entry into exporting. Only large and persistent fluctuations in real exchange rates should induce changes in entry and exit decisions.

Column 2 and 4 show the estimates for the export intensity. We find that larger plants, the ones with foreign ownership, and plants that use imported intermediate inputs export a larger fraction of their total sales. When adding squared terms for employment and age we see that the largest and oldest plants tend to have lower export intensity. The estimate for the RER is positive and statistically significant, implying that real depreciations increase export intensity among exporters. [14]

In summary, these results provide evidence that real depreciations increase export intensity but does not induce entry to export markets. If goods for export markets are relatively skill intensive, then a real depreciation that increases export intensity may induce firms to hire more skilled labor, so that the share of skilled wages in the total wage bill increases.

b. Skill Upgrading and the RER

The basic results for the effect of the RER on the share of skilled labor are presented in Table 2. We show estimates using the sample of all plants, as well as for non-exporters and exporters separately. If changes in RER induce exporters to upgrade the quality of their products, then it is likely that the RER affects the share of skilled labor mostly on exporters. We use two alternative ways to measure the influence of

[13] These sunk-entry costs of exporting have been documented by Bernard and Jensen (2004) and Das, Roberts and Tybout (2007).

[14] This result is consistent with Greenaway, Kneller and Zhang (2007), which shows that a one percentage point appreciation of the industry-specific RER in the UK reduces firms' export share by 1.28 per cent.

foreign technology licenses and imports of intermediate inputs. The first simply uses a dummy variable equal to one for plants that report the use of foreign technology licenses and imported inputs. The results of the estimations using these variables are shown in columns (1)-(3). The second alternative takes into account the intensity of foreign licenses and importing inputs in each plant. This is done by using the value of royalties and license fees divided by sales as a measure of the intensity foreign technology acquisition, and by using the ratio of imported intermediate inputs over total intermediate inputs purchased by the plant to measure the degree of reliance on foreign inputs in each plant.

As seen in the table, the estimates for the ratio capital-value added are never statistically significant suggesting that at least during this period capital is not complementary to skilled labor. In other words, within a plant and holding everything else constant, an increase in the amount of capital a plant employs does not increase the share of skilled labor in total wages. The estimates for value added are negative but not significant for the case of exporters.

In terms of the technology variables, we can see in column (1), which uses data on all plants, that the use of foreign technology licenses and imported intermediate inputs increases the share of skilled labor in total wages. The dummy for foreign ownership is positive but not significant. These results suggest that foreign technology licenses and importing inputs make plants more skilled intensive. When distinguishing between non-exporters (column 2) and exporters (column 3) we see that the dummy for foreign ownership is negative in the case of non-exporters but positive for exporters, implying that links with multinational corporations increase skill intensity only if the plant participates in export markets. The estimates for the foreign technology licenses dummy and the importer dummy are not significant for non-exporters, while only the dummy for foreign licenses is significant in the case of exporters. When we use the intensity of licensing as well as the intensity of importing inputs we get a similar picture. Both technology variables are correlated with skill upgrading, while foreign licenses appear to be more important for exporting plants. Now, however, import intensity is significant for the case of non-exporting plants.

Some of these results contrast the findings of Pavcnik (2003) for the case of Chile during the period 1979-1986. Using the same type of data she finds no significant effect of several technology variables, including imported inputs, on skilled wages when using plant fixed effects. It is possible that the different results are due to the different sample periods we study. Pavcnik (2003) studies a period in which most of the trade reform was already completed and in which the economy started to specialize in natural-resource intensive activities closely linked to the comparative advantages of the country. Thus, although foreign technologies may be important determinants of skill upgrading they may not have been so important during this previous period.

In order to investigate if different time periods can explain the different results, we estimate the regressions using the same sample period used by Pavcnik (2003). Using an older version of the Annual Survey of Manufactures covering the period 1979-1998,[15] we find for the period 1979-1986 results that are very similar to what Pavcnik (2003) finds. But for the period 1990-1998, we find estimates that are consistent with what we find in Table 2 (see Appendix).

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[15] We thank Gustavo Crespi for providing us this version of the dataset.

Our main variable of interest is the RER. As seen in columns (1) and (4) the estimate for this variable is positive and statistically significant when all plants are included in the regressions. But a closer look reveals that this significant effect is explained by the positive and significant impact of the RER on skilled wages in exporting plants. Given that increases in the RER reflect real depreciations of the Chilean currency, we can say that a real depreciation increases skill intensity, as measured by the share of skilled wages. This result is consistent with Verhoogen (2008) model and implies that increases in RER may induce exporting plants to upgrade product quality and become more skilled intensive. Since the RER is included in logs, its estimate suggests that a 1 per cent increase in the RER increases the share of skilled workers in total wages in exporters by 0.07 percentage points. This significant increase implies that changes in the RER are likely to have important effects on skill upgrading and wage inequality.

As a robustness check we also include the change in the RER as an explanatory variable. It is possible that changes in the RER are also important in explaining skill upgrading. The results are presented in Table 3. The estimates for all the technology variables do not change significantly when the change in the RER is included. The estimate for the RER remains positive and significant for the sample of exporters but not significant for non-exporters. Finally, the estimates for the change in the RER are always negative but never significant, confirming the robustness of our basic set of results. We also estimate regressions with the change in the RER but excluding the level of the RER. The results, not reported here, show that the estimate for the change in the RER is never statistically significant, while the estimates for the other control variables do not change.

As a final robustness check we estimate the basic regressions excluding two sectors for which the RER increased over 100 per cent between 1990 and 1999.[16] It is possible that our results are driven by the influence of these two outliers. The results, not presented here, show that the estimate for the RER continues to be positive and statistically significant for exporters while it is not significant for non-exporters, confirming that our basic results are robust to the exclusion of these two sectors.

5. CONCLUSIONS

Recent models of international trade show that changes in export profitability affect firm decisions on the use of technologies and quality upgrading. This may change plants composition of employment toward more skilled labor, thus increasing income inequality. Complementing the previous literature this paper examines changes in industry-specific real exchange rates rather than trade liberalization episodes.

In general, the results are consistent with the idea that a real depreciation may be accompanied by an increase in the share of skilled labor in total wages. We also try to look at some of the mechanisms behind these results. We find that depreciations increase the export intensity of exporters but not the probability of exporting. Then, our results suggest that the intensive margin of exports is relatively more important to evaluate how real depreciations increase exports and accelerate the adoption of new technologies and product quality upgrading.

[16] These sectors are printing and transport equipment. The reason why these sectors experienced such a big increase in their RER is that the destination countries of their products during this period consisted mostly of Latin American countries that experienced episodes of extremely high inflation, such as Brazil, Peru and Argentina.

The higher wage inequality attributable to changes in export profitability generates important questions for policy makers in developing countries. First, it gives some evidence to evaluate the distributional effect of real exchange rate fluctuations. This is very relevant for some countries that have liberalized their trade and do not face significant trade restrictions in export markets, but they still face inequality pressures coming from variations in the real exchange rate. Second, the growing participation of these countries in the world trade challenges the view that they could reduce their levels of income inequality, unless they implement specific policies to compensate those less favored with export opportunities for their lower earnings. A third issue –though not addressed directly in this paper– is where displaced unskilled labor is reallocated. In some cases the transition may not be dramatic whenever reallocation is rapid and not costly. Some countries, however, have more rigid labor markets and natural or policy induced barriers to migration, and they may not be able to smooth this transition. In this case a rise in unemployment may occur.

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TABLE 1

The RER and Exporting Activity – Double Hurdle Model

	(1) *Export Dummy*	*(2)* *Exports/Sales*	*(3)* *Export Dummy*	*(4)* *Exports/Sales*
Log(TFP)	0.105	0.000	0.087	0.005
	(4.86)**	(0.06)	(4.24)**	(0.92)
Log(Employment)	0.872	0.078	1.924	0.309
	(36.59)**	(8.15)**	(12.14)**	(8.89)**
Log(Employment) Squared			-0.127	-0.024
			(7.30)**	(6.12)**
Foreign Ownership	0.480	0.089	0.383	0.087
	(4.42)**	(8.14)**	(4.43)**	(8.85)**
Foreign Technology Licenses	0.255	0.017	0.208	0.027
	(3.16)**	(1.47)	(3.11)**	(2.41)*
Importer Intermediate Inputs	0.405	0.082	0.392	0.091
	(4.32)**	(4.66)**	(5.70)**	(7.95)**
Log (Age)	-0.336	-0.027	0.289	0.008
	(7.44)**	(4.72)**	(2.45)*	(0.51)
Log(Age) Squared			-0.206	-0.013
			(5.99)**	(2.80)**
Log(RER)	0.326	0.086	0.329	0.096
	(1.07)	(2.25)*	(0.75)	(2.71)**
Observations	32,126		32,126	
Log Likelihood	-9,305.292		-9,150.862	

Notes:

Robust *z* statistics in parentheses. * significant at 5%; ** significant at 1%. Standard errors clustered at the 3-digit ISIC sector and year. Regressions include sector and year fixed effects.

TABLE 2
Share of Skilled Wages in Total Wage Bill – Basic Regressions

	(1) All Plants	*(2) Non-Exporters*	*(3) Exporters*	*(4) All Plants*	*(5) Non-Exporters*	*(6) Exporters*
Log(Capital / Value Added)	-0.002	-0.002	-0.001	-0.002	-0.002	-0.001
	(1.41)	(1.25)	(0.18)	(1.29)	(1.25)	(0.20)
Log (Value Added)	-0.005	-0.005	-0.006	-0.005	-0.005	-0.006
	(2.60)**	(2.27)*	(1.36)	(2.42)*	(2.36)*	(1.33)
Foreign Ownership	0.007	-0.027	0.025	0.008	-0.027	0.025
	(0.98)	(2.21)*	(2.93)**	(1.07)	(2.20)*	(2.94)**
Foreign Technology Licenses	0.008	0.001	0.013			
	(2.08)*	(0.17)	(1.98)*			
Importer Intermediate Inputs	0.006	0.003	0.003			
	(2.08)*	(0.91)	(0.56)			
Log (RER)	0.025	0.017	0.072	0.026	0.017	0.071
	(2.31)*	(1.27)	(4.49)**	(2.37)*	(1.27)	(4.44)**
Foreign Licenses / Sales				0.263	0.106	0.616
				(2.09)*	(0.65)	(3.17)**
Imported Inputs / Total Inputs				0.018	0.014	0.012
				(3.98)**	(2.17)*	(1.56)
Constant	0.353	0.310	0.243	0.349	0.310	0.247
	(6.84)**	(5.20)**	(2.53)*	(6.82)**	(5.19)**	(2.59)*
Observations	31958	24024	7934	31958	24024	7934
R-squared (within)	0.030	0.028	0.033	0.030	0.028	0.033

Notes:
Robust *t* statistics in parentheses. * significant at 5%; ** significant at 1%. Standard errors were clustered at the 3-digit ISIC sector and year. Regressions include plant and year fixed effects.

TABLE 3
Share of Skilled Wages in Total Wage Bill – Regressions with Changes in RER

	(1) *All Plants*	*(2)* *Non-Exporters*	*(3)* *Exporters*	*(4)* *All Plants*	*(5)* *Non-Exporters*	*(6)* *Exporters*
Log(Capital / Value Added)	-0.002	-0.002	-0.001	-0.002	-0.002	-0.001
	(1.43)	(1.27)	(0.19)	(1.31)	(1.27)	(0.22)
Log(Value Added)	-0.005	-0.005	-0.006	-0.005	-0.005	-0.006
	(2.61)**	(2.29)*	(1.36)	(2.43)*	(2.37)*	(1.33)
Foreign Ownership	0.007	-0.027	0.025	0.008	-0.027	0.025
	(0.97)	(2.20)*	(2.91)**	(1.07)	(2.20)*	(2.92)**
Foreign Technology Licenses	0.008	0.001	0.013			
	(2.06)*	(0.15)	(1.97)*			
Importer Intermediate Inputs	0.006	0.003	0.003			
	(2.09)*	(0.92)	(0.56)			
Log(RER)	0.028	0.020	0.077	0.029	0.020	0.076
	(2.40)*	(1.42)	(4.03)**	(2.47)*	(1.43)	(3.98)**
Change Log(RER)	-0.012	-0.013	-0.018	-0.012	-0.013	-0.018
	(0.92)	(0.83)	(0.64)	(0.96)	(0.84)	(0.66)
Foreign Licenses / Sales				0.261	0.104	0.615
				(2.08)*	(0.63)	(3.16)**
Imported Inputs / Total Inputs				0.018	0.014	0.012
				(3.99)**	(2.17)*	(1.56)
Constant	0.341	0.300	0.222	0.337	0.296	0.226
	(6.20)**	(4.69)**	(2.05)*	(6.19)**	(4.68)**	(2.10)*
Observations	31,958	24,024	7,934	31,958	24,024	7,934
R-squared (within)	0.030	0.028	0.033	0.030	0.029	0.033

Notes:
Robust *t* statistics in parentheses. * significant at 5%; ** significant at 1%. Standard errors were clustered at the 3-digit ISIC sector and year. Regressions include plant and year fixed effects.

APPENDIX

Pavcnik Regressions: Comparison 1979-1986 and 1990-1998

	1979-1986	*1990-1998*
Log(Capital / Value Added)	0.007	-0.008
	(2.57)*	(3.07)**
Log(Value Added)	0.005	-0.016
	(1.62)	(5.03)**
Foreign Technology Licenses	0.005	0.003
	(1.06)	(0.48)
Importer Intermediate Inputs	-0.003	0.005
	(0.92)	(1.38)
Constant	0.247	0.612
	(8.34)**	(17.05)**
Observations	35,867	42,893

Notes:
Robust *t* statistics in parentheses. * significant at 5%; ** significant at 1%. Regressions include plant and year fixed effects.

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