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DAVID VERSUS GOLIATH: THE IMPACT OF CHINESE COMPETITION ON DEVELOPING COUNTRIES

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Resumen

Este trabajo utiliza información de plantas manufactureras en chilenas durante el período 1990 -2000 para analizar los efectos de la mayor penetración de importaciones desde China. Se estudia si las importaciones desde China han estado asociadas a una contracción de las plantas o si éstas han respondido a la mayor competencia modificando el tipo de productos, incrementando la productividad o exportando. Los resultados muestran que la penetración de importaciones chinas ha incidido negativamente en el crecimiento del empleo y aumentado la probabilidad de la salida de las plantas manufactureras. En contraste con la evidencia para Estados Unidos, no se encuentra que las plantas se hayan ajustado produciendo bienes más sofisticados o cambiando su intensidad de uso de factores

Abstract

We use detailed Chilean plant-level data from 1990 to 2000 to study the impact of Chinese import competition in manufacturing industries. We study whether China's imports have been associated with a downsizing of manufacturing plants or whether firms have escaped Chinese competition through changes in output mix, productivity catch-up or increased exports. Our results show that imports from China have negatively affected employment growth on surviving plants and increased the probability of exit. In contrast to previous evidence for the United States, we do not find evidence that manufacturing plants have adjusted by producing more sophisticated goods or by exporting.

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1. MOTIVATION

The huge increase in Chinese exports is a worldwide phenomenon. After several decades of autarky, Chinese exports have soared from US$ 63 billion in 1990 to US$ 762 billion in 2005, which represents an annual rate of growth of 18%. This phenomenon generates important questions on its impact on the rest of the world, especially in labor-intensive industries where China is believed to concentrate its comparative advantage. Although there are some descriptive and illustrative works discussing the expected impact of the growing importance of China in other countries (Devlin et al., 2006; Blásquez-Lidoy et al., 2007), few papers have examined it in detail. Some scholars have studied the impact of Chinese exports on other Asian countries' exports (Eichengreen et al., 2004) and others have analyzed the effects on Latin American exports in a third market (López Córdova et al., 2006 and 2008). In general, however, not much empirical evidence exists on how Chinese imports affect manufacturing plants in developing countries.[1]

In this paper, we try to fill this gap in the literature by studying empirically how the Chilean manufacturing sector has responded to increasing import competition from China. For that, we use Chilean plant-level manufacturing data between 1990 and 2000. We follow the empirical approach of Bernard et al. (2006), who estimate the impact of import penetration from low-wage countries in U.S. manufacturing industries in two dimensions. First, we analyze whether import competition from China and other low-wage economies have caused a shrinkage in manufacturing plants. In particular, we focus our attention on employment growth and the probability of exiting. Second, we analyze

[1] An exception is Castro et al. (2007) analyzing the impact of Chinese and Indian imports on manufacturing employment in Argentina. However, their paper analyzes the evolution of aggregate employment and it does not explore other potential adjustment margins across and within manufacturing plants.

whether plants have been able to adjust to Chinese competition by changing their output mix or by shifting toward export markets. In this case, we study the effects on productivity growth, capital intensity —both physical and human—, and on the probability of exporting.

Our distinction of China from other low-wage countries is determined by two factors. First, we are not aware of other large and labor-abundant country becoming so dominant in world trade flows in such a short period of time. Therefore, it is possible that competition from China might have a significant effect on production patterns of small developing economies. In addition, there is some evidence showing that China's export pattern differs from that of countries with similar characteristics. Álvarez and Claro (2006) and Schott (2008) show that the export prices of Chinese products are low relative to countries with similar income per capita. Also, Rodrik (2006) and Schott (2008) argue that Chinese exports are more sophisticated than is suggested by its income level, measured either by the share of exports that products also exported by OECD countries represent in China's export bundle or in terms of the range of products exported. This suggests that the competitive pressures of Chinese imports may differ from those of imports from countries with similar income.

Our analysis is based on a variant of the traditional Hecksher-Ohlin model, which emphasizes industry-level rather than plant-level adjustment in response to changes in world market conditions (Leamer, 1995). However, recent papers suggest the existence of some degree of factor-driven specialization within sectors (Schott, 2004). Following Bernard et al. (2005) and Bernard et al. (2006), we assume that plants produce different bundles of products, and therefore Chinese import competition is more intense for plants producing close substitutes to Chinese goods, which are presumably low-productivity, labor-intensive plants. This approach has interesting implications for the consequences of Chinese competition in domestic markets: a higher competition from China should not only affect labor-intensive sectors but it should also impact more those firms that produce labor-intensive products within each industry. Whether this means shrinkage in labor-intensive, low-productivity firms' employment and output, or whether these firms are able to adjust their output mix in order to escape low-wage import competition is an empirical matter. The objective of this paper is to provide evidence on these adjustment margins in a small, open and developing economy.

Bernard et al. (2006) find evidence for the United States of a negative impact of import penetration of low-income countries in manufacturing plants' employment, and they also show that this effect is smaller for high-productivity and capital-intensive plants. They interpret their results as evidence that these plants produce goods that are different from those imported from low-wages countries. Furthermore, they also show that manufacturing firms may escape from low-wage competition by changing production techniques or moving to more capital-intensive products. Our results broadly confirm the first set of results but do not corroborate the second results. In other words, we do find evidence that import competition from China affects negatively plant-level employment growth and the probability of surviving. These effects, however, do not differ significantly across plants. We also find evidence that Chilean manufacturing plants have been unable to adjust their output mix in response to competition from China. Specifically, import penetration from China is not accompanied with increase in plant-level productivity or capital/skill usage. Neither has it affected the probability of exporting. We interpret these results as evidence that human and capital scarcity limit significantly the ability of plants in developing countries to shift toward more sophisticated products.

In contrast, we find some evidence that although import competition from other low-income economies has also deteriorated domestic employment growth , domestic plants have shifted toward more labor-intensive techniques with an increase in the probability of surviving. Overall, these results are consistent with the evidence that Chinese products are significantly lower-priced than those of countries with similar income per capita. The scarcity of physical and human capital makes product upgrading very costly, meaning that competition from low-income countries can be partially avoided through product downgrading and shifting to more labor-intensive unsophisticated products. In contrast, import competition from China affects the bulk of manufacturing plants in Chile, meaning that room for maneuvering is much smaller.

We mainly focus on within-industry plant-level effects of China's competition, differing from the approach followed by Blazquez-Lidoy et al. (2007) and Jenkins and Dussel (2007), who discuss the effects of China's growth on trade and FDI flows in Latin America. These papers compare trade structures in China and Latin American countries in order to measure the impact of China's trade competition at the industry level. Our approach complements theirs by focusing on the response of plants within each sector. Although some emerging markets —like Chile— do not export intensively labor-abundant manufacturing goods or other products that represent a high share in China's export bundle, there are either import-competing firms or exporters of manufacturing goods that do compete with China's exports. We therefore analyze the relevance of these plant-level effects and the ability of these firms to escape competition by upgrading their output mix. In any case, in the next section we provide some evidence of cross-industry reallocation associated with China's import competition.

The rest of the paper is structured as follows. In section 2 we present the data and show the main facts regarding the recent increase in Chinese import competition. In section 3 we study in detail how Chilean manufacturing plants have reacted to this increasing import competition. In section 4 we discuss the robustness of our results due to possible endogeneity problems. Finally, section 5 presents a summary of our findings and concludes.

2. DATA AND MAIN FACTS

We use information from two sources. Plant-level data are obtained from the Annual National Industrial Survey (ENIA) carried out by the National Institute of Statistics of Chile (INE), and sector-level import data are obtained from the UNIDO database provided by Nicita and Olarreaga (2007). We use annual data from 1990 to 2000 because export activity at the plant level is only available since 1990 and consistent information for imports is available from UNIDO dataset up to 2000.

The ENIA covers the universe of Chilean manufacturing plants with 10 or more workers. A plant is not necessarily a firm; however, a significant percentage of firms in the survey are actually single-plant firms. The INE updates the survey annually by incorporating plants that started operating during the year and deleting those plants that stopped operating for any reason. For each plant and year, the ENIA collects data on production, value added, sales, employment and wages (production and non-production), exports, investment, depreciation, energy usage, foreign licenses, and other plant characteristics. In addition, plants are classified according to the International Standard Industrial Classification (ISIC) rev 2. Using industry-level price deflators, all monetary variables were translated into constant pesos of 1985. Plants do not report information on capital stock and we construct this variable using the perpetual inventory method for each plant. To measure TFP we estimate a Cobb-Douglas production function for each 3-digit-level industry using the method proposed by Olley and Pakes (1996) and later modified by Levinsohn and Petrin (2003a, 2003b), which corrects the simultaneity bias associated with the fact that productivity is not observed by the econometrician but may be observed by the firm.

Import penetration is computed as the ratio of sectoral imports from China (*Pen_China*), other low-wage countries (*Pen_Low*) and the rest of the World (*Pen_Others*) to apparent sector-specific consumption in each year. Analytically:

$$Pen\_China_{jt} = \frac{M_{jt}^{Ch}}{(M_{jt} + Q_{jt} - X_{jt})}, \qquad (1)$$

$$Pen\_Low_{jt} = \frac{M_{jt}^{L}}{(M_{jt} + Q_{jt} - X_{jt})}, \text{ and} \qquad (2)$$

$$Pen\_Others_{jt} = \frac{M_{jt} - M_{jt}^{Ch} - M_{jt}^{L}}{(M_{jt} + Q_{jt} - X_{jt})} \qquad (3)$$

where M_{jt}^{Ch} denotes imports from China in sector j in year t, M_{jt} is the value of total imports (including China) in sector j in year t, Q_{jt} is domestic production, and X_{jt}

represents Chile's exports. Finally, M_{jt}^{L} denotes imports from low-income countries other than China, i.e., with per-capita income lower than 5% of the U.S. income.[2]

Table 1 presents some patterns of cross-industry and cross-time import penetration. In particular, we present the share of China's imports in apparent consumption in 1990 and 2000 for each 28 three-digit ISIC manufacturing industries. We observe that the increase in Chinese import penetration is not equally distributed across manufacturing industries. It is much more important in labor-intensive sectors such as apparel (322), other manufactured products (390), leather products (323), and footwear (324), where the growth of China's share in apparent consumption is significantly higher than the growth in market share of other low-income economies. In contrast, in resources-intensive sectors, such as food (311), wood products (331) and petroleum (353 and 354), import penetration from China is practically inexistent. Also, the penetration of non-low-wage countries (Rest) is high in all sectors, and there is no evident time trend. Import penetration is higher in capital-intensive industries, such as machinery (382), electric machinery (383), and transport equipment (385), and this bias has remained relatively constant over time.

The pattern of higher import penetration of China in labor-intensive sectors is confirmed when we analyze the relationship between input intensity and China's market share. We compute the change in import penetration between 1990 and 2000 and capital per worker and skill intensity for 28 manufacturing industries in 1990.[3] According to factor-endowment-driven specialization, we expect lower import penetration from China

[2] To compare our results to these obtained for the U.S, we use the same income threshold than Bernard et al. (2006). During the period 1990-2000, China per capita GDP is below the threshold of 5%, increasing from 1.4 to 3.6 per cent of the U.S. per capita GDP in the decade.

[3] Skill-intensity is measured as the total plant wages paid to non-production workers divided by total plants wages paid to production workers.

in more capital- and skill-intensive industries.[4] Figure 1 suggests that this is the case. There is a negative and non-linear relationship between the change in China's market share and capital per worker and skill intensity across manufacturing industries. In other words, the larger increase in imports from China is concentrated in industries with low intensity of physical and human capital.[5] We do not observe within-industry import patterns, but based on Bernard et al. (2006) and Bernard et al. (2005) we conjecture that China's import penetration is also higher for unskilled-labor-intensive products within each sector. Figure 2 shows a similar evidence for other low-income countries. There is also a negative relationship between the change in import penetration and physical and human capital intensity of the industries. Note, however, that changes in import penetration for these countries are of lower magnitude than the increase in China's import penetration.

A natural consequence of these patterns of import penetration is a shift in factor utilization out of labor-intensive sectors. This reallocation is the prediction of traditional endowment-based trade model as a consequence of the fall in the relative price of labor-intensive products. Although it is not the objective of this paper to look in detail into this issue, in Table 2 we report a very simple evidence of factor reallocation associated to China's import penetration. We split the 28 manufacturing sectors into four groups depending upon China's market share in 1990, where group 1 comprises those industries within the top 25th percentile of China's import penetration, and group 4 comprises those industries where China's market share is smallest. We look at 2 main indicators: the share

[4] See Schott (2008) for a comparison on relative endowments between China and other regions of the world.

[5] The slope for these relationships is estimated to be -0.04 and -0.025, respectively. Both are significant at 10%.

of each sector in total employment and value-added. There is evidence that manufacturing sectors with the highest increases in China's market share were those with the greatest reduction in their share in total employment and value-added. In particular, we observe a reduction in the share in manufacturing employment from 24.5 to 17.4 percent and a reduction in the share in value-added from 11.6 to 7.8 percent. It is important to mention, however, that because China's import penetration is concentrated in few sectors, as evident in Table 1, the distinction between the Medium-low and Low categories in Table 2 is marginal.

3. ESTIMATING WITHIN-SECTOR EFFECTS OF CHINESE IMPORT PENETRATION

In this section we study two categories of margins of adjustments in Chilean manufacturing plants to China's import penetration. On the one hand, we explore whether Chinese competition has generated a negative impact on domestic plants, either affecting their employment decisions or their probability of closing down. We also study whether these effects differ across plants depending upon how similar their products are to Chinese imports. On the other hand, we explore to what extent Chilean manufacturing plants have been able to escape Chinese competition by upgrading their product mix toward more capital- and skill-intensive products. Specifically, we test five different hypotheses:

(1) Employment growth for surviving plants decreases with Chinese import penetration.

(2) Plant survival decreases with Chinese import penetration.

(3) TFP growth for surviving plants increases with Chinese import penetration.

(4) Skill and capital deepening increase with Chinese import penetration.

(5) The probability of exporting increases with China's import penetration.

We analyze these effects controlling for penetration rates from other low-wage countries and the rest of the world. This allows us to check whether China is different from other low-income economies as well as to evaluate how import competition from medium-to-high income countries affects domestic plants.

It can be argued that import penetration is an endogenous variable. For example, unobserved industry-specific shocks may affect both the dependent variables and import penetration. It is not easy, however, to find good instruments for industry import penetration. Bernard et al. (2006) deal with this endogeneity problem using trade costs — tariffs and transport costs— as instruments for import penetration. Unfortunately, these data are not available for Chile. As a robustness check, in section 4, we discuss results using lagged values of import penetration as instrumental variables and controlling for other industry and region variables to minimize the endogeneity problem associated to omitted variables.

(a) Employment Growth

Using a standard equation for firm's employment growth,[6] we test the hypothesis that employment growth for surviving plants decreases with Chinese import penetration and that this impact is larger for less productive labor-intensive plants. We estimate the following empirical model:

$$\Delta Log(Employment)_i^{t;t+1} = \alpha + \beta_0 Pen\_China_{jt} + Z_{it}^{'}\delta + \lambda_i + \lambda_t + \varepsilon_{it} \qquad (4)$$

[6] See, for example, Evans (1987a, b), Hall (1987), McPherson (1996) and Sleuwaegen and Goedhuys (2002)

The dependent variable $\Delta Log(Employment)_i^{t;t+1}$ is the rate of employment growth (in logs) between t and t+1 of plant i belonging to sector j, while λ_i and λ_t are plant- and year-specific fixed effects, respectively. Pen_China_{jt} is China's share in consumption in sector j as defined above. Following previous literature, the vector Z includes plant-specific characteristics that have been shown to affect employment growth, like age, size, productivity and input intensities. We also control for import penetration from other countries and we include interaction terms between China's import penetration and three plant-specific variables: productivity, capital per worker, and human capital intensity, computed as the ratio of non-production to production workers' total wage bill.[7]

Results are shown in Table 3 for alternative specifications. In terms of plant characteristics, the results are as expected. We find that more productive, younger and smaller plants have higher employment growth. Also, employment growth is higher in capital-intensive plants, but we do not find any significant relationship between skill intensity and employment growth.

Chinese import penetration is negatively related to employment growth in all specifications, revealing that employment growth has been negatively affected by higher import penetration of Chinese products. The interaction terms with productivity and factor intensity are not significant, revealing that the impact on employment growth does not depend upon plant characteristics. This contrasts with the evidence for the United States, where the impact on employment is significantly higher in labor-intensive low-productivity plants. We discuss in more detail possible explanations for this phenomenon below. The negative impact of Chinese imports is also significant from an economic

[7] We also include interactions between plant characteristics and Pen_Low and Pen_Others. The results (not reported) are very similar. The same qualification applies to the other empirical estimations.

point of view. A one-standard-deviation increase in Chinese penetration (approximately 4.6 percentage points) reduces annual employment growth between 2 and 3 percentage points, similar to the average plant-level employment growth during the period.[8]

Note also that imports from other low-wage countries have a negative and significant effect on employment growth, and we cannot reject the hypothesis that both effects are equal. At least in this dimension, these results suggest that China is similar to the rest of low-income countries except for the fact that China's import penetration is significantly higher. Standard trade models of comparative advantage imply that import competition would decrease employment in import-competing industries: our results also suggest that import competition decrease employment in import-competing plants within industries. Finally, we find that import penetration for medium- to high-income countries has no impact on employment growth.

(b) Plant Exit

Other adjustment margin for foreign competition is the demise of domestic manufacturing plants. This is motivated by previous literature finding that trade liberalization has a significant impact on plant survival. For example, Baggs (2005) finds that a tariff reduction decreases the probability of survival of Canadian plants, but U.S. tariff reduction increases the probability of exit.[9] Greenaway et al. (2005) show evidence that international competition decreases plant survival in Sweden. Differentiating by type of industry and country of origin of imports, they find that negative effects of import competition are mitigated by intra-industry trade and that the effects are strongest when trade is with OECD countries. Bernard et al. (2006) find evidence that low-wage

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[8] The simple average plant employment growth was -2.3 percent between 1990 and 2000.
[9] Interestingly, she finds that plant vulnerability is mitigated by scale and leverage.

countries' import penetration increases plants' death in the U.S. manufacturing industry. They also show that this impact is larger than the impact of import penetration from other countries. Moreover, they find that the negative effect of import penetration is higher in labor-intensive plants, which are likely to produce a mix of products similar to those imported from low-wage countries. Our approach is more in line with that in Bernard et al. (2006). For that, we estimate a linear probability model for the probability of exit:

$$\Pr(Exit = 1)_i^{t;t+1} = \beta_0 + \beta_1 Pen\_China_{jt} + Z_{it}^{'}\delta + \lambda_i + \lambda_t \qquad (5)$$

We use a linear probability model, and not more conventional discrete choice models as Probit or Logit, to allow for firm-specific effects that may affect probability of exit.[10] Our dependent variable takes the value 1 for firms operating in *t* but not operating in *t*+1, and 0 for firms operating in both periods.[11] *Z* denotes the same vector of plant-specific characteristics defined for the employment growth estimations. We expect plant productivity to increase the probability of surviving (Baily et al. 1992). Factor intensities —capital per worker and skill ratio— are included to control for differences in the unobserved plant-specific output mix. The inclusion of age is explained by theoretical models in which firms learn about its efficiency (Jovanovic, 1982). In such a case, older firms have more accumulated knowledge and are more likely to survive.

The results are shown in Table 4, and they are fairly consistent with previous empirical evidence for productivity and size. Plant exit is negatively associated to plant size and total factor productivity. Our variable for plant age, however, is positive and significant. This, in contrast to learning models, suggests that older plants are more likely

[10] We also estimate a Probit model without fixed effects and get very similar results.
[11] Given that plants are surveyed when employment is larger that 10 workers, some exits cannot be considers necessarily a plant death. The results are similar if we consider only firms either with more than 20 or 30 workers.

to die. Finally, higher capital per worker reduces the probability of exit, but the skilled labor ratio does not affect plant exit.

In all the specifications, China's import penetration has a positive and significant sign, meaning that imports from China increase the probability of exit of manufacturing plants. This effect is economically significant. An increase of one standard deviation in China's market share increases the probability of exit between 0.8 and 1.6 percentage points. This is a relevant magnitude considering that the unconditional exit rate is 8 percent per year. In contrast to the evidence for employment growth, the opposite effect is found for import competition from other low-income economies: an increase in market share from low-income countries increases the probability of surviving. The interpretation of this result is not trivial, and we postpone its discussion for the end of section 3. Finally, the interaction between import penetration and plant characteristics reveals that imports from China are associated with a higher exit probability for low-productivity plants, but there is no evidence of an uneven impact on plants with different factor intensities.

Summarizing, the evidence on employment growth and probability of exiting provide support to the hypothesis that China's import competition has negatively affected domestic plants. There is no significant evidence, however, that this effect is larger in labor-intensive or low-productivity plants (with the exception of low productivity in the case of plant exit). In contrast, there is mixed evidence on the effect on employment and the survival probability of import competition from other low-income economies. The evidence that the impact of China's competition does not differ across plants with different characteristics contrasts with the results of Bernard et al. (2006) for the United

States. We conjecture that our results reflect that the mix of products produced by Chilean manufacturing plants is not significantly different from the one embedded in China's imports, meaning that import competition from low-wage economies in general and China in particular directly affect the bulk of manufacturing plants. In contrast, imports from low-income countries affect mainly the low end of the plants' distribution in the United States, so there is a distinguishable impact between labor-intensive low-productivity plants and other plants. We now move to evaluate whether manufacturing plants have upgraded their product mix or search for other export markets in response to China's import penetration.

(c) TFP growth

One adjustment mechanism to escape foreign competition from low-income economies is by changing the product mix. According to Bernard et al. (2006), the evidence for the United States support the hypothesis that firms have escaped low-income countries' import competition through product upgrading. A first measure of upgrading is productivity growth. It has been extensively argued in the literature that imports may act as a disciplinary mechanism for low-productivity firms (MacDonald, 1994, Levinsohn, 1993). Our basic estimation follows the approach developed by Griffith et al. (2006), where productivity growth for plant *i* in industry *j* between *t*-1 and *t* ($\Delta \ln A_{ijt}$) depends on two main factors: the industry-specific frontier productivity growth denoted by $\Delta \ln A_{jt}^{F}$, and the initial plant-specific productivity gap denoted by $\ln\left(A_j^F / A_{ij}\right)_{t-1}$, where A_j^F is the frontier total-factor-productivity level in industry j, and A_{ij} is the total-factor-productivity level of firm i in industry j. Hence, the basic model is given by:

$$\Delta \ln A_{ijt} = \beta \Delta \ln A_{jt}^F + \delta \ln\left(A_j^F / A_{ij}\right)_{t-1} + u_{it} \quad (6)$$

In this model, δ is a parameter measuring technological catching-up. In the case of $\delta > 0$, low-productivity plants are able to increase productivity faster than the most productive plants. Sector- and industry-specific frontier productivity growth $(\Delta \ln A_{jt}^F)$ is computed as the mean productivity growth in plants with productivity levels in the highest 5% of the TFP distribution.[12]

Using this empirical model, we analyze how productivity catching-up depends on import competition by incorporating an interactive term between the productivity gap and Chinese import penetration. To analyze whether import penetration also affects productivity growth directly, we include Chinese and rest of the world import penetration as a control variables in our regressions.[13] The model is given by:

$$\Delta \ln A_{it} = \beta \Delta \ln A_{it}^F + \delta_0 \ln\left(A_j^F / A_i\right)_{t-1} + \delta_1 \ln\left(A_j^F / A_i\right)_{t-1} \cdot Pen\_China_{jt} + \delta_2 \cdot Pen\_China_{jt} + u_{it} \quad (7)$$

The evidence in Table 5 shows that import penetration from China has generated no impact on the dynamics of productivity growth. Both the individual impact of China's import penetration and the interaction term with lagged productivity gap are non–significant.[14] The inclusion of import penetration rates from low-wage countries and the rest of the world does not affect the results regarding import penetration from China. Interestingly, import penetration from medium- to high-income countries has a negative and significant impact on productivity growth. One interpretation, whose empirical

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[12] We also use 90% as threshold, and the results are robust to this specification. Naturally, we only estimate the model for non-frontier plants.

[13] As is Griffith et al. (2006), we also include age and plant-specific effects as an additional control variable.

[14] One concern with this estimation is that lagged productivity is included as regressor in the denominator of the gap variables, biasing the results when plant fixed effects are included. We follow Griffith et al. (2006) and estimate this equation using a dummy for gap deciles instead of the direct measures of the gap. We also use lagged values of the gap as instruments for this gap. In both cases, the results show that Chinese import penetration has not been associated to productivity catch-up.

validity is beyond the scope of this paper, is that import penetration of medium- to high-income economies may lower the incentives for domestic plants to upgrade their production processes (through productivity catch-up) to produce goods where competition of more sophisticated products is indeed stronger. Finally, a negative relationship may reflect foreign competition in products where economies of scale are relevant, meaning that a reduction in production is accompanied by an increase in average costs.[15]

(d) Changes in Human and Physical Capital Intensity

Another adjustment mechanism at the plant level outlined by Bernard et al. (2006) is changes in output mix. They test this effect directly by using information on changes in industry affiliation. In the case that a plant is classified in a different 4-digit industry, they assume that it is manufacturing a different product. The 3-digit industry classification used in this paper is too broad to capture cross-industry reallocation, so we focus on changes in factor intensities. Arguably, capital and skill deepening at the plant level reflects a change in output mix away from labor-intensive products, which are presumably imported from China and other low-wage economies.[16]

We use as dependent variables the change in the skill ratio and the change in capital per worker (measured in logs) and as explanatory variables the same vector *Z* used in the previous estimations. This is:

$$\Delta II_i^{t,t+1} = \alpha + \beta_0 Pen\_China_{jt} + Z_{it}^{'}\delta + \lambda_t + \varepsilon_{it} \qquad (8)$$

[15] This argument has been also used to explain why a large concentration of multinationals firms reduces the productivity of domestic firms in the same industry (Aitken and Harrison, 1999).
[16] This phenomenon has been called “defensive innovation” by Wood (1995).

where $\Delta II_i^{t,t+1}$ is the change in input intensities between t and t+1. For capital per worker, this is given by $\log(K/L)_{t+1} - \log(K/L)_t$. For the skill ratio, it is S_{t+1}-S_t, where S denotes total plant wages paid to non-production workers divided by total plant wages paid to production workers. This definition of skill intensity is identical to the one used by Bernard et al. (2006), and it assumes that non-production workers are more qualified than production workers.[17] The use of this variable has obvious shortcomings that should be taken into account for the interpretations of the results, and the regressions using capital intensity help us confirm the robustness of the results obtained using skill intensity.

Results are shown in tables 6 and 7 for the skill ratio and capital per worker, respectively. In both cases, the impact of Chinese penetration is almost negligible. It is only positive and significant for the first estimation of changes in skill intensity (first column of Table 6). However, it becomes non-significant when other controls are included. In sum, we do not find strong evidence that Chilean firms have changed their production techniques from low- to high-capital intensity in response to import competition from China.

The results show, however, that increases in import penetration from low-income economies other than China are associated with reductions in physical capital intensity. Together with the evidence that import competition from other low-income economies increases the probability of surviving, this result is consistent with the evidence that Chinese products are cheaper than those of countries with similar income per capital.

[17] To check this claim, we compute schooling years for the same categories of white-collar and blue-collar workers using the employment household survey carried out by the University of Chile. The difference in schooling is more that 4 year for white-collar workers in manufacturing industries during the period under study.

Competition from China affects the lowest end of manufacturing firms, and the scarcity of physical and human capital makes upgrading too expensive. In consequence, we observe a lower rate of employment growth, a higher probability of exiting and no product upgrading. However, import competition from other low-income economies with higher-priced products than Chinese ones can be partially avoided with product downgrading, i.e., a shift toward unsophisticated labor-intensive techniques. Apparently, this does not avoid a fall in employment growth but it does provide a shield from import competition that is economically viable.

(e) Probability of Exporting

We finally study whether import competition from China has generated some impact on firms' export decisions. It may be the case that firms look for new markets to compensate for the loss in domestic market share. Because Chile is a relatively open economy, the lack of restrictions on exports as well as a broad set of export destinations reveals the absence of policy barriers limiting the ability of plants to search for foreign markets as an escape valve for foreign competition.

Following the estimation of the probability of exit, we use a linear probability model for the probability of exporting. Consistently with previous literature, we control for typical firms' characteristics such as productivity and size, as well as for previous exporter experience. The empirical evidence suggests that, in the presence of sunk costs, having exported previously increases the probability of exporting.[18] The results are shown in Table 8. As expected, exporting depends positively of previous export status, productivity, size, and capital intensity. However, in all of our specifications, the effect of

[18] See evidence provided by Bernard and Jensen (2004) for the U.S., and Alvarez and López (2005) for Chile.

imports form China is not significant, meaning that there is no evidence that domestic firms have been able to elude Chinese competition by exporting.[19] Neither is there evidence that import competition from other low-income economies affects the probability of exporting.

4. ROBUSTNESS ANALYSIS

Our measures of import penetration can be argued to be endogenous. There is an expected relationship between aggregate variables at the industry level (such as productivity growth and exit) and import penetration. For example, an industry affected by a negative productivity shock that increases exit can induce a rise in imports to satisfy domestic demand. We can, however, argue in favor of exogeneity of Chinese imports because this is a worldwide phenomenon, and the most important determinant of the increase in imports from this country seems to be determined by domestic factors in China (reforms, exchange rates, etc) rather than changes in the importer country.

Nevertheless, one way to face this potential drawback is to use instrumental variables. Bernard et al. (2006) use trade costs as instruments for changes in China's import penetration. Note, however, that their results are very similar when they use import penetration directly as when they instrument with trade costs. Unfortunately, that data are not available for Chile. We have used as instrumental variables one-year and three-year lags of China's import penetration and these IV estimations confirm our main results. The results, which are not reported here but are available upon request to the authors, show similar results to those using OLS; employment growth is lower and the probability of

[19] Using lags of the dependent variable as explanatory variable and fixed effects introduce a downward bias in the estimated parameter of the lagged variable. Nevertheless, we also estimate the equation using GMM in first difference and we find a similar evidence for the null impact of Chinese on the probability of exporting.

exiting is higher in Chilean manufacturing plants in response to Chinese competition, while there is no evidence of product upgrading using any of the measures mentioned above.

A shortcoming of this instrument is that as long as the firms react with a lag to import penetration, these IVs may not solve the endogeneity problem convincingly. In the absence of good instruments, an alternative way to minimize the endogeneity problem is to control for additional sector- and year-specific controls than can be driving the relationship between Chinese import penetration and outcome variables. To control for industry-specific productivity shocks, we include a measure of industry total factor productivity. An additional source of shocks during this period is the increase in minimum wages that can affect the ability of competing against Chinese imports by increasing domestic labor costs.[20] Given that the minimum wage is common to all regions of the country, the effect cannot be identified from year-specific effects, but the effect on different industries and plants can be captured by the interaction between minimum wage and industry/plant characteristics. If larger and/or more capital-intensive plants and more productive industries are less affected by a rise in labor costs, these interaction terms should capture the differential effect of minimum wages on plant performance. Finally, we introduce a full set of region- and year-specific dummy variables to control for potential shocks to specific locations over time. This may be especially important for those Chilean regions where exports of natural resources intensive goods have been increasing strongly —for example, salmon and wine—, and can have a significant effect on the cost structure of import-competing industries.

[20] In real term, the increase of minimum wage was 72 percent between 1990 and 2000. Beyer (2008) shows that this increase in the minimum wage is larger than that experienced by the median wage of low-skilled workers in the same period.

The last two columns of tables 3 to 7 report the results of regressions that control for industry measures of total factor productivity, their interaction with minimum wages, as well as regional and year dummies. The results remain the same, although most of the coefficients for Chinese imports are reduced in magnitude, meaning that some of the effects of these shocks had been potentially captured by import penetration.

5. CONCLUSIONS

The increase in imports from China is a global phenomenon. Among the many dimensions through which it affects other countries, it is important to study how domestic firms respond to increasing competition from low-income countries in general and China in particular. Research for developed countries has documented some ability of firms to disengage from direct competition from China by upgrading their output mix and moving toward more sophisticated products. This paper evaluates the impact of China's import penetration on manufacturing plants in Chile. Why China? Because China is large, its domination of world markets of labor-intensive products has been very rapid, and there is evidence that its exports differ from those of countries with a similar level of development, both in terms of export unit prices and the bundle of products exported. Why a developing country? Because we want to evaluate whether the ability of firms in capital- and skilled-labor scarce countries to reshuffle their output mix differs from that of more developed economies.

We find evidence that this is indeed the case. Within industries, we find that increases in China's market share has negatively affected employment growth and the probability of surviving of manufacturing plants, although we do not observe significant differences across firms with different characteristics. Also, we find no evidence of changes in factor intensities, productivity gains or export performance that would suggest significant output upgrading. These results reveal that in Chile —and we think this conclusion might also apply for other developing countries— the ability of firms to escape China's import competition is limited. We conjecture that this is the consequence of low levels of capital and skilled labor, which impede or make extremely costly product upgrading. However, there is some evidence that competition from low-income economies has generated a shift in domestic plants toward more labor-intensive products, lowering their rate of employment growth but increasing their probability of surviving. These results are consistent with the evidence that Chinese products are lower-priced than those of similar countries. Although there is room for survival by shifting toward more unsophisticated products, this is apparently part of the response to competition from low-income economies while it is not the case for competition from China.

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Table1: **IMPORT PENETRATION BY INDUSTRIES**
(Percentage)

Industry	*China*		*Other Low Wage Countries*		*Rest*	
	1990	2000	1990	2000	1990	2000
Food	0.1	0.0	0.6	1.4	5.2	9.4
Beverages	0.0	0.0	0.0	0.0	1.6	2.8
Tobacco	0.0	0.0	0.0	0.0	0.3	0.3
Textiles	0.5	5.9	0.3	8.1	21.5	34.7
Wearing	2.3	25.7	0.7	4.7	8.6	15.8
Leather	0.3	21.2	0.2	4.8	11.7	23.3
Footwear	0.1	15.8	0.0	4.5	2.7	10.3
Wood	0.0	0.4	0.4	1.0	2.9	10.9
Furniture	0.1	3.6	0.0	1.1	4.3	20.5
Paper	0.0	0.2	0.0	0.5	11.0	30.7
Printing & Pub.	0.0	0.3	0.0	0.0	7.3	12.8
Industrial chemicals	0.4	1.0	0.2	0.9	73.2	54.4
Other chemicals	0.1	0.3	0.0	0.3	13.9	24.1
Petroleum refineries	0.0	0.0	0.1	0.2	6.8	16.5
Petroleum & coal	0.0	0.0	0.0	0.0	3.8	6.7
Rubber	0.0	0.9	0.1	1.1	44.4	47.9
Plastic	0.3	4.2	0.0	0.3	9.7	10.1
Pottery	14.7	26.3	2.2	2.9	68.4	23.7
Glass	0.2	1.6	0.2	2.5	31.1	23.8
Other non-metallic	0.0	0.0	0.0	0.1	9.3	11.1
Iron & steel	0.0	0.3	0.0	1.4	30.0	30.7
Non-ferrous	0.0	0.3	0.1	0.1	3.5	15.5
Fabricated metal	0.6	3.2	0.0	0.4	23.1	25.3
Machinery	0.3	2.7	0.0	0.2	77.4	77.8
Machinery elec.	0.6	6.6	0.2	1.6	73.4	77.8
Transport equip.	0.1	1.1	0.1	0.5	64.7	70.3
Prof. & scientific equip.	1.8	7.4	0.2	0.7	87.7	83.3
Other manufactures	6.9	29.5	0.3	1.7	78.2	66.4
All	1.1	5.7	0.2	1.5	27.7	29.9

Source: Authors´s elaboration based on data from Nicita and Olarreaga (2007).

Table 2: **INDUSTRY EXPOSURE AND REALLOCATION**

Chinese Import Penetration, 1999	*Employment Share (%)*		*Value-Added Share (%)*	
	1990	2000	1990	2000
High	24.5	17.4	11.6	7.8
Medium-high	16.9	18.7	10.9	15.8
Medium-low	46.1	49.4	35.0	38.2
Low	12.4	14.5	42.5	38.2

Industry exposure is measured as the import penetration in 1990 with data form Nicita and Olarreaga (2007). Employment, value-added, export and imports is also taken from that dataset.

Table 3: **CHINESE IMPORT PENETRATION AND EMPLOYMENT GROWTH**

	(1)	*(2)*	*(3)*	*(4)*	*(5)*
Log(L)	-0.424	-0.424	-0.424	-0.424	-0.425
	(13.45)***	(13.63)***	(13.62)***	(13.16)***	(13.31)***
Age	-0.016	-0.017	-0.017	-0.015	-0.016
	(2.08)**	(2.13)**	(2.15)**	(1.75)*	(1.87)*
Log(TFP)	0.047	0.047	0.045	0.048	0.046
	(9.40)***	(9.54)***	(10.53)***	(10.22)***	(12.14)***
Log(K/L)	0.053	0.053	0.052	0.053	0.051
	(7.43)***	(7.55)***	(7.99)***	(7.16)***	(7.61)***
Skilled ratio	0.000	0.000	0.000	0.000	0.000
	(0.61)	(0.58)	(0.67)	(0.57)	(0.64)
Pen_China	-0.593	-0.424	-1.254	-0.430	-1.133
	(2.89)***	(2.11)**	(1.83)*	(2.34)**	(1.61)
Pen_Low		-0.921	-0.916		-1.095
		(2.16)**	(2.09)**		(3.27)***
Pen_Rest		-0.104	-0.101		-0.070
		(0.97)	(0.94)		(0.78)
Pen_China*TFP			0.152		0.134
			(0.67)		(0.60)
Pen_China*Skilled			-0.008		-0.008
			(0.83)		(0.80)
Pen_China*KL			0.077		0.093
			(1.37)		(1.64)
Industry TFP				-0.228	-0.222
				(2.21)**	(1.97)*
Industry TFP*Min. Wage				0.019	0.018
				(2.03)*	(1.82)*
Constant	1.153	1.179	1.193	1.216	1.251
	(7.23)***	(7.33)***	(7.87)***	(7.18)***	(7.73)***
Observations	37919	37919	37919	37919	37919
R-squared	0.24	0.24	0.24	0.24	0.24
Pen_China=Pen_Low	--	0.37	0.69	--	0.96

Robust t statistics clustered at 3-digit industries in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%. Columns (1) through (3) include year dummy variables. Columns (4) and (5) include year and region dummy variables.

Table 4: **CHINESE IMPORT PENETRATION AND PLANT EXIT**

	(1)	*(2)*	*(3)*	*(4)*	*(5)*
Log(L)	-0.138	-0.138	-0.138	-0.139	-0.139
	(7.63)***	(7.53)***	(7.54)***	(7.41)***	(7.33)***
Age	0.136	0.135	0.135	0.137	0.136
	(18.38)***	(18.89)***	(19.73)***	(18.85)***	(20.09)***
Log(TFP)	-0.039	-0.040	-0.036	-0.041	-0.037
	(6.73)***	(6.61)***	(7.47)***	(6.73)***	(7.37)***
Log(K/L)	-0.043	-0.043	-0.042	-0.044	-0.043
	(13.96)***	(14.01)***	(13.57)***	(13.76)***	(13.68)***
Skilled ratio	0.000	0.000	0.000	0.000	0.000
	(1.17)	(1.14)	(1.09)	(1.07)	(0.98)
Pen_China	0.101	0.208	1.325	0.211	1.503
	(1.40)	(1.85)*	(2.69)**	(2.01)*	(3.10)***
Pen_Low		-0.840	-0.824		-0.888
		(2.37)**	(2.72)**		(3.62)***
Pen_Rest		0.087	0.085		0.105
		(1.56)	(1.43)		(1.93)*
Pen_China*TFP			-0.267		-0.287
			(3.19)***		(3.56)***
Pen_China*Skilled			0.000		0.001
			(0.10)		(0.23)
Pen_China*KL			-0.081		-0.078
			(1.34)		(1.29)
Industry TFP				-0.103	-0.211
				(1.23)	(2.51)**
Industry TFP*Min. Wage				0.011	0.021
				(1.39)	(2.63)**
Constant	0.678	0.669	0.647	0.635	0.606
	(6.89)***	(6.83)***	(7.21)***	(6.33)***	(6.79)***
Observations	41217	41217	41217	41217	41217
R-squared	0.12	0.12	0.12	0.13	0.13
Pen_China=Pen_Low	--	0.02	0.00	--	0.00

Robust t statistics clustered at 3-digit industries in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%. Columns (1) through (3) include year dummy variables. Columns (4) and (5) include year and region dummy variables.

Table 5: **CHINESE IMPORT PENETRATION AND TFP GROWTH**

	(1)	(2)	(3)	(4)	(5)	(6)
Age	-0.006	-0.004	-0.006	-0.008	-0.010	-0.012
	(0.23)	(0.15)	(0.21)	(0.28)	(0.39)	(0.47)
TFP frontier	0.027	0.027	0.026	0.035	0.032	0.039
	(1.47)	(1.42)	(1.39)	(2.44)**	(1.57)	(2.40)**
Gap	0.085	0.084	0.080	0.049	0.083	0.047
	(1.56)	(1.53)	(1.43)	(0.87)	(1.61)	(0.89)
Pen_China	-0.051	0.132	-0.788	0.612	-0.486	-0.025
	(0.12)	(0.22)	(0.84)	(0.79)	(0.90)	(0.04)
Pen_Low		-0.493	-0.377	-3.743		-3.439
		(0.22)	(0.18)	(0.86)		(0.90)
Pen_Rest		-0.571	-0.521	-0.933		-1.103
		(3.45)***	(2.81)***	(3.60)***		(4.08)***
Pen_China*Gap			0.603	-0.306		-0.391
			(0.99)	(0.73)		(0.94)
Pen_Low*Gap				2.427		3.070
				(1.20)		(1.49)
Pen_Rest*Gap				0.259		0.255
				(2.30)**		(2.42)**
Industry TFP						1.484
						(3.00)***
Industry TFP*Min. Wage						-0.139
						(3.10)***
Constant	0.878	1.007	1.010	0.996	1.000	1.195
	(5.75)***	(6.59)***	(6.65)***	(7.33)***	(4.69)***	(6.69)***
Observations	26245	26245	26245	26245	26245	26245
R-squared	0.17	0.17	0.17	0.17	0.17	0.18
Pen_China=Pen_Low	--	0.82	0.86	0.40	--	0.69
Pen_China*Gap=Pen_Low*Gap	--	--	--	0.24	--	0.14

Robust t statistics clustered at 3-digit industries in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%. Columns (1) through (4) include year dummy variables. Columns (5) and (6) include year and region dummy variables.

Table 6: **CHINESE IMPORT PENETRATION AND CHANGES IN SKILL INTENSITY**

	(1)	*(2)*	*(3)*	*(4)*	*(5)*
Log(L)	-0.001	-0.001	-0.001	-0.001	-0.001
	(0.81)	(0.80)	(0.87)	(1.02)	(1.03)
Age	-0.004	-0.005	-0.005	-0.004	-0.004
	(4.09)***	(3.95)***	(3.90)***	(3.89)***	(3.74)***
Log(TFP)	0.000	0.000	0.001	0.006	0.007
	(0.20)	(0.73)	(0.91)	(6.82)***	(6.86)***
Log(K/L)	-0.001	-0.001	-0.001	-0.000	-0.001
	(1.11)	(1.37)	(1.64)	(0.31)	(0.81)
Skilled ratio	-0.004	-0.004	-0.004	-0.004	-0.004
	(7.64)***	(7.62)***	(6.76)***	(7.80)***	(7.07)***
Pen_China	0.086	0.065	0.032	0.043	-0.096
	(1.74)*	(0.97)	(0.17)	(0.97)	(0.45)
Pen_Low		0.020	0.004		0.164
		(0.07)	(0.01)		(0.74)
Pen_Rest		0.016	0.016		0.008
		(2.24)**	(2.18)**		(1.35)
Pen_China*TFP			-0.010		-0.004
			(0.34)		(0.13)
Pen_China*Skilled			-0.008		-0.008
			(1.08)		(1.00)
Pen_China*KL			0.012		0.021
			(0.49)		(0.87)
Industry TFP				0.150	0.153
				(3.18)***	(3.33)***
Industry TFP*Min. Wage				-0.014	-0.014
				(3.29)***	(3.46)***
Constant	0.022	0.020	0.021	0.006	0.005
	(3.76)***	(3.15)***	(3.07)***	(0.30)	(0.25)
Observations	37371	37371	37371	37371	37371
R-squared	0.03	0.03	0.03	0.04	0.04
Pen_China=Pen_Low	--	0.89	0.94	--	0.32

Robust t statistics clustered at 3-digit industries in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%. Columns (1) through (3) include year dummy variables. Columns (4) and (5) include year and region dummy variables.

Table 7: **CHINESE IMPORT PENETRATION AND CHANGES IN CAPITAL INTENSITY**

	(1)	*(2)*	*(3)*	*(4)*	*(5)*
Log(L)	0.077	0.077	0.077	0.077	0.077
	(9.31)***	(9.55)***	(9.50)***	(9.73)***	(9.73)***
Age	-0.042	-0.042	-0.041	-0.042	-0.042
	(6.30)***	(6.32)***	(6.17)***	(6.51)***	(6.44)***
Log(TFP)	0.001	0.002	0.003	0.005	0.005
	(0.61)	(1.17)	(1.17)	(0.96)	(0.88)
Log(K/L)	-0.052	-0.053	-0.054	-0.052	-0.054
	(14.39)***	(14.44)***	(14.16)***	(14.62)***	(14.43)***
Skilled ratio	0.001	0.001	0.001	0.001	0.001
	(1.88)*	(1.68)	(2.33)**	(1.88)*	(2.47)**
Pen_China	-0.200	-0.098	-0.448	-0.242	-0.585
	(1.28)	(0.89)	(0.73)	(1.51)	(0.94)
Pen_Low		-1.194	-1.327		-1.188
		(1.97)*	(1.84)*		(1.81)*
Pen_Rest		0.031	0.034		0.030
		(1.07)	(1.09)		(1.02)
Pen_China*TFP			-0.052		-0.026
			(0.43)		(0.22)
Pen_China*Skilled			-0.009		-0.010
			(0.70)		(0.76)
Pen_China*KL			0.082		0.086
			(1.18)		(1.21)
Industry TFP				0.167	0.111
				(2.08)**	(1.53)
Industry TFP*Min. Wage				-0.015	-0.010
				(2.17)**	(1.58)
Constant	0.146	0.144	0.149	0.165	0.172
	(4.29)***	(4.01)***	(3.84)***	(3.95)***	(4.03)***
Observations	37256	37256	37256	37256	37256
R-squared	0.07	0.07	0.07	0.08	0.08
Pen_China=Pen_Low	--	0.12	0.46	--	0.59

Robust t statistics clustered at 3-digit industries in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%. Columns (1) through (3) include year dummy variables. Columns (4) and (5) include year and region dummy variables.

Table 8: **CHINESE IMPORT PENETRATION AND PROBABILITY OF EXPORTING**

	(1)	(3)	(4)	(5)	(6)
Lagged Exporter	0.230	0.230	0.229	0.229	0.227
	(20.57)***	(20.60)***	(20.85)***	(20.49)***	(20.81)***
Log(L)	0.068	0.067	0.067	0.069	0.068
	(4.39)***	(4.39)***	(4.37)***	(4.66)***	(4.65)***
Age	0.000	0.001	0.001	-0.004	-0.006
	(0.27)	(0.71)	(0.59)	(0.64)	(0.86)
Log(TFP)	0.009	0.009	0.012	0.009	0.013
	(3.35)***	(3.36)***	(4.11)***	(3.51)***	(4.41)***
Log(K/L)	0.021	0.020	0.020	0.021	0.020
	(4.35)***	(4.37)***	(4.27)***	(4.42)***	(4.36)***
Skilled ratio	-0.000	-0.000	0.000	-0.000	0.000
	(0.34)	(0.35)	(0.07)	(0.39)	(0.02)
Pen_China	0.086	0.179	0.224	0.003	0.289
	(0.38)	(0.80)	(0.48)	(0.02)	(0.67)
Pen_Low		-0.601	-0.519		-0.562
		(1.84)*	(1.47)		(1.58)
Pen_Rest		-0.008	0.005		0.015
		(0.12)	(0.08)		(0.27)
Pen_China*TFP			-0.184		-0.206
			(1.53)		(1.74)*
Pen_China*Skilled			-0.016		-0.015
			(1.60)		(1.54)
Pen_China*KL			0.057		0.047
			(1.40)		(1.32)
Industry TFP				0.003	-0.094
				(0.02)	(0.71)
Industry TFP*Min. Wage				-0.001	0.008
				(0.10)	(0.64)
Constant	-0.260	-0.258	-0.265	-0.194	-0.185
	(3.05)***	(3.17)***	(3.14)***	(2.48)**	(2.34)**
Observations	34470	34470	34470	34470	34470
R-squared	0.07	0.07	0.07	0.07	0.07
Pen_China=Pen_Low	--	0.09	0.18	--	0.09

Robust t statistics clustered at 3-digit industries in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%. Columns (1) through (3) include year dummy variables. Columns (4) and (5) include year and region dummy variables.

Figure 1: **IMPORT PENETRATION FROM CHINA AND INDUSTRY FACTOR INTENSITIES**

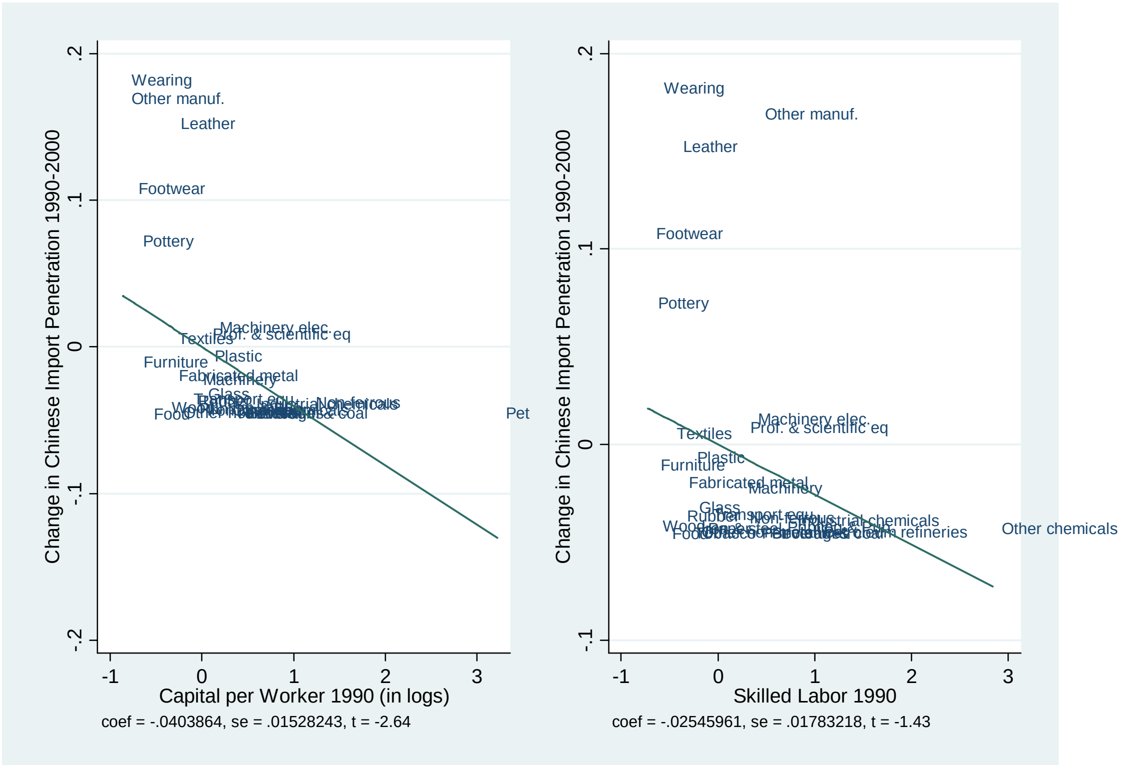
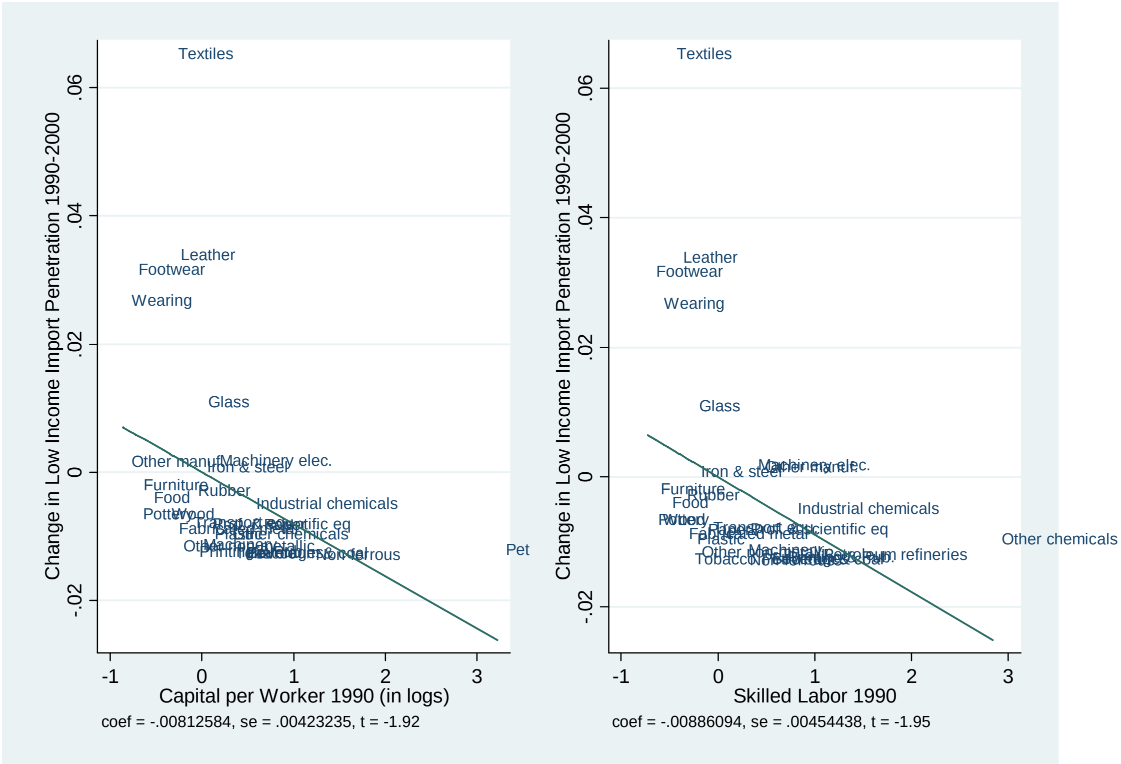


Figure 2: **IMPORT PENETRATION FROM OTHER LOW WAGE COUNTRIES AND INDUSTRY FACTOR INTENSITIES**



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