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EXIT IN DEVELOPING COUNTRIES: ECONOMIC REFORMS AND PLANT HETEROGENEITY

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EXIT IN DEVELOPING COUNTRIES: ECONOMIC REFORMS AND PLANT HETEROGENEITY

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Resumen

Diversos estudios han mostrado que la rotación de plantas contribuye al crecimiento de la productividad. Esta evidencia es coherente con la idea de que, si se redujera la protección otorgada a empresas ineficientes, la liberalización económica generaría ganancias de productividad asociadas con una redistribución de recursos desde las empresas menos productivas hacia las más productivas. Sin embargo, se ha realizado escaso trabajo empírico para relacionar directamente la liberalización económica con la salida de plantas. Este trabajo hace uso de las reformas chilenas para esclarecer los efectos sobre la salida de plantas. Nuestro análisis econométrico muestra que las plantas más grandes y productivas son menos propensas a salir. Luego de controlar por estas características, encontramos que la salida es más probable en industrias orientadas a las exportaciones. Más aún, encontramos un impacto diferencial de la liberalización económica y de las fluctuaciones del tipo de cambio. Los cambios en estas variables tienen un impacto más significativo sobre las plantas menos productivas o más pequeñas. Por industria, encontramos que las plantas más afectadas son aquellas en sectores orientados a exportaciones.

Abstract

Several studies have found that plant turnover contributes to productivity growth. This evidence seems to be consistent with the idea that, by reducing protection granted to inefficient firms, economic liberalization would generate productivity gains associated with resource reallocation from less productive to more productive firms. However, little empirical work has been done directly linking economic liberalization and plant exit. This paper uses Chilean reforms to shed light on their effects on plant exit. Our econometric analysis shows that larger and more productive plants are less likely to exit. After controlling for these characteristics, we also find that exit is more likely in export-oriented industries. Moreover, we find a differential impact of economic liberalization and exchange rate fluctuations. Changes in these variables have a more significant impact on less productive and smaller plants. By industry, we find that the plants that are most affected are those in export-oriented sectors.

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1. Introduction

Recent research has shown that plant turnover contributes positively and greatly to productivity increases. Disney, Haskel and Heden (2003) have found that, in the U.K., 80 to 90 percent of an industry's total factor productivity growth is attributable to reallocation from less productive to more productive firms. Similar findings are reported for the Colombian manufacturing industry by Eslava et al. (2004). In the case of Chile, evidence of this source of productivity growth has been provided by Pavcnik (2002), Levinsohn and Petrin (2005), and Bergoeing, Hernando and Repetto (2006).

This evidence is consistent with one of the microeconomic mechanisms through which economic liberalization increases productivity. By reducing the protection granted to inefficient firms, economic liberalization could generate productivity gains associated with resource reallocation from less productive to more productive firms.[1] In the case of trade liberalization, several recent theoretical papers highlight this mechanism. Melitz (2003) and Bernard, Schott and Redding (2007) develop models where a reduction in trade costs boosts aggregate productivity by increasing the exit of less productive firms. However, with the exception of Bernard, Jensen and Schott (2006) who study the impact of trade costs on industry dynamics in the U.S., there is little empirical evidence of the implications provided by these models.

Studying this phenomenon in developing countries is interesting for two major reasons. First, as discussed by Tybout (2003), it is widely believed that firm turnover in developing countries is constrained by government intervention, protectionist policies and capital market failures. Second, the literature for developed countries that emphasizes domestic industry characteristics, such as market structure and entry barriers, misses one important element concerning the effect

[1] Aghion, et al. (2004) explore a potential indirect mechanism by showing that higher entry rates increase the productivity of incumbent firms.

of globalization on national economies. It may be argued that, particularly for developing countries, economic liberalization could be an important determinant of plant turnover and productivity growth.

Roberts and Tybout (1996), summarizing a pioneer study for five developing countries that focuses on trade liberalization, however argue that "the link between trade-related variables and turnover is not well established." In their empirical work, trade orientation does not seem to affect entry and exit rates with the exception of Morocco, where the entry rate is higher in export-oriented industries. However, by basing their study on aggregate entry and exit rates of 3-digit ISIC industries, they do not consider that plant responses may be very different even within narrowly defined industries. In other words, plant heterogeneity may be responsible for this apparent non-relationship between trade liberalization and turnover. It is possible that most of the effects of changes in protection are concentrated within industries, with resources moving from less productive to more productive firms, and not necessarily across industries.[2]

Identifying the effects of specific components of economic liberalization is, however, no easy task. Most trade liberalization episodes, for example, have been accompanied by overall economic reforms and macroeconomic fluctuations that could also affect plant turnover. Thus, in this paper, we use data from several reforms undertaken in Chile over the previous decades, specifically reforms in trade policy, domestic financial markets, the capital account, privatization and taxes. Although it is difficult to disentangle the effects of all of these reforms, this work aims to give some evidence for analyzing how reforms could affect exit decisions.

The objective of this paper is to empirically study the effects of economic reforms on plant exit. To do so, we use data for Chilean manufacturing plants during the period 1979 to 2000. We are

[2] This seems to be the case in most of the recent liberalization episodes studied by Wacziarg and Seddon Wallak (2004). They do not find that trade liberalization generates significant labor reallocation across industries.

particularly interested in studying how plant and industry characteristics determine different responses to economic liberalization. Our two main concerns are: how do the effects of liberalization differ across plants and how do these effects differ across industries. Is there more plant exit in import-substituting industries or in export-oriented industries? Although the answers may seem trivial, recent theoretical models show, for example, that as a result of reductions in trade costs, exit might indeed be more likely in export-oriented industries (Bernard et al., 2007). The same differential effect may be argued for other reforms. In fact, financial liberalization and privatizations may be effective ways to reallocate resources towards comparative advantage industries, increasing exit of low-productivity plants in these sectors.

Other papers have explored similar questions. Antelius and Lundberg (2003) study the impact of increased openness on job turnover, but they do not explore how plant exit responds to changes in trade policy. Bernard and Jensen (2001) use insights from Heckscher-Ohlin and industry dynamic models to explain patterns of entry and exit across U.S. industries. For Canadian manufacturing industries, Gu, Sawchuk and Whewell (2003) study the relationship between changes in tariffs and plant size, entry and exit. Similarly and also for Canadian industries, Head and Ries (1999) analyze how bilateral tariff reductions under NAFTA are related to changes in number and scale of plants. All these studies, however, focus on industry-level data.

This paper has more in common with recent studies using plant-level data to shed light on the impact of economic reforms on exit. Baggs (2005), who studies plant exit in Canada as a result of the Canada-U.S. free trade agreement, finds a positive net effect of changes in tariffs on survival probability.[3] Gibson and Harris (1996) study the effect of Turkish trade liberalization and find that lower protection increases the probability of exit. Muendler (2002) analyzes the

[3] This net effect comes from a positive effect of the preferential access to the U.S. markets and a negative effect for reducing tariffs to U.S. imports.

impact of tariff reduction in Brazilian firms and also finds that trade liberalization increases the probability of exit. Fernandes (2007) also estimates the impact of trade liberalization on exit for Colombian firms and shows that tariff reductions affect exit with little impact on aggregate productivity. Eslava et al. (2006) study the effect of structural reforms in Colombia in a way that is similar to our work. They find that these reforms have increased the importance of fundamentals in driving plant exit.

This paper has three main advantages over these recent contributions. First, by using Chilean data, we minimize the endogeneity problems arising from the fact that changes in tariffs generally depend on industry characteristics. In Chile, the same tariff has been applied to every industry since 1979. Thus, we need not look for instrumental variables or other sophisticated methods for estimating the impact of changes in tariffs on plant exit. Second, we study the differential impact of economic liberalization across industries and according to plant characteristics. Third, we use information not only from trade reforms, but also from other reforms implemented in Chile. Thus, we take advantage of the Chilean experience as a type of natural experiment for studying the impact of economic liberalization.

This paper is structured as follows. In the second section we describe the evolution of economic reforms and show the main entry and exit patterns over the period 1979 to 2000. There are interesting changes in trade policy during this period which motivates our empirical exercise. During this period the Chilean economy also experienced important changes in other dimensions, so we present the evolution of one reforms index created by Escaith and Paunovic (2004). In the third section, we present the empirical approach. Given that the Chilean tariffs and the index of structural reforms (excluding trade reforms) varies over time and not across industries, we control for other time-varying factors by including the rate of economic growth-to control for changes in exit probability attributable to business cycles-and the real exchange rate to control for changes in relative prices than can affect profitability in the tradable sector. In the fourth section we show our results. In general, the evidence is consistent with resource reallocation occurring within and across industries. We find that larger and more productive plants are less likely to exit. After controlling for those characteristics, we find that exit is more likely in export-oriented industries. Moreover, we find a differential impact of economic liberalization and exchange rate fluctuations. Changes in these variables have a more significant impact on less productive and smaller plants. By industry, we find that the most affected plants are those in export-oriented sectors. The fifth section concludes.

2. Data and Basic Results

Our empirical analysis is based on the Annual National Industrial Survey (ENIA) carried out by Chile's National Institute of Statistics (INE) for 1979 through 2000. This survey covers all 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-plants. The INE updates the survey annually by incorporating plants that began operating during the year and deleting those plants that stopped operating.

Each plant has a unique identification number which allows us to identify entry and exit. For each plant and year, 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 4-digit industry level price deflators, all monetary variables were converted to constant pesos of base year 1985. Plants do not report information on capital stock, thus, it was necessary to construct this variable for each plant using the perpetual inventory method.

To measure productivity at the plant level, we estimate a Cobb-Douglas production function for each 3-digit industry using the method proposed by Olley and Pakes (1996) and later modified by Levinsohn and Petrin (2003), which corrects for the simultaneity bias because productivity is not observed by the econometrician but may be observed by the firm.[4] The production function is a Cobb-Douglas with three factors: capital, skilled labor and unskilled labor.[5] The measure of output is value-added. All nominal values (capital and value added) were deflated using the producer price indexes.

Given the panel nature of the data, we are able to identify plant exit for each year. However, as evidenced by Benavente and Ferrada (2003), plant exit and entry may be due to reasons other than birth and death. Misleading entries and exits may be associated with plants that reach employment levels above or below the threshold of 10 workers. In addition, “deaths” may also be the result of plants that were not located at the time of the survey, had no movement of capital, had their operations paralyzed, were under investigation by the Internal Tax Service (SII), or had merged with another plant. We use two procedures to minimize the effect of measurement error in exit. First, when a plant exits the sample in some given year but re-enters in the following year, we count neither the first event as exit nor the second event as entry. Second, we drop those plants that enter and exit in the same year from the sample. Finally, as a robustness check, jointly with the two procedures described above, we estimate our model only

[4] Petrin, et. al. (2004) describe the Stata commands to estimate the production function and to obtain measures of total factor productivity.

[5] See Appendix A for details on the methodology.

using plants with an employment threshold larger than 10 workers to minimize the measurement error attributable to plants reducing employment below this threshold.[6]

2.1 Chilean Reforms

One interesting feature of the period under study is that there are several changes in tariff policy that can be used to analyze plant responses to variations in protection. Immediately after the military coup in 1973, Chile moved toward a market economy. One of the deepest reforms conducted over that period was trade liberalization. In less than six years, almost every trade restriction was lifted. By June 1979, all the remaining non-tariff barriers (NTBs) were eliminated and an across-the-board 10% tariff was imposed.

In Figure 1, we show the evolution of tariffs during the period 1979 to 2000. In the first years of the 1980s, the across-the-board tariff was maintained at a relatively low 10%. A lack of external funding combined with low world economic growth rates induced a deep recession in 1982. Given the situation at the time, the government decided to increase tariffs from 10 to 20% in 1983 and to 35% in 1985 (always across the board). In 1985, a second trade liberalization process was implemented. Tariffs were reduced to 20% in 1985 and then to 15% in 1988. Finally, in 1991, a newly elected government implemented a further tariff reduction to 11%. Since that year, the average tariff has been steadily reduced, down to 9% in 2000.

In Figure 1, we also show the evolution of export-output and import-output ratios for the manufacturing industry. At the beginning of the period, exports and imports already comprised a high proportion of total output (approximately 25%). In the period of trade barrier increases, both export and import ratios fell. After this time of macroeconomic turbulence and higher trade protection, trade flow increased steadily throughout the 1990s. In the 2000s, the export-output ratio has tended to decline, but imports have continued to increase as a proportion of output.

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[6] The results with this restricted sample are similar to those presented in the paper. See Appendix B.

The changes in trade protection were not the only reforms undertaken during this period. In fact, Chile was one of the pioneer reformers in Latin America, initiating several changes in diverse economic areas. In this paper, we use an economic liberalization index developed by Escaith and Paunovic (2004) that is based on five aspects: trade policy, domestic financial markets, capital account, taxes and privatizations. Each component is an average of different indicators and the general index is an average of these subcomponents standardized between 0 (less market oriented) and 1 (more market oriented).[7]

The domestic financial reform index is the average of three components: the reserves to deposits ratio, and control of borrowing and lending rates at banks.[8] The capital account index is the average of four components: sector-specific controls for foreign investment, limits on profit and interest repatriation, controls on external credits to national borrowers and controls to capital outflows. The index for each component was derived from the description contained in the IMF's *Balance of Payments Arrangements*. The tax reform index uses the average for four components: maximal marginal tax rate on corporate and personal incomes, value added tax rate, and the efficiency of the valued added tax (measured as the ratio of value-added tax rate to the receipts from this tax expressed as a ratio of GDP). Finally, the privatization index is equal to one minus the ratio of value added in state-owned enterprises to non-agricultural GDP.

The overall economic liberalization index is shown in Figure 2. Although the liberalization reforms partially reverted during the crisis of the early 1980s, they were reinforced since 1985 and during the 1990s. Figure 3 presents the evolution of the components of the economic liberalization index. The financial reform adopted in 1974 was characterized by the liberalization of interest rates and the elimination of selectivity in credit allocation. However, the domestic

[7] Naturally, as we used data of tariffs for trade reforms, we exclude the trade component from the economic liberalization index.
[8] Control of interest rates is codified as zero-one variable; one if the rate is market determined and zero if it is controlled.

financial markets index showed a strong decline in the early 1980s. In fact, the financial collapse in 1982 forced the implementation of a number of policies aimed at strengthening the banking sector.[9] Moreover, several restrictions were also imposed to the capital account, explaining the reduction in the financial account index. After the economic crises, both the financial market and capital account indexes increased.

The privatization process was initiated in 1974, but the reasons behind the process evolved over time. In the 1970s, privatization was implemented to downsize the role of the State in the economy. After 1983, privatizations were a key factor in consolidating the new economic model and they were widely applied to different public services (utilities). Since the 1990s, successive privatizations were implemented by new mechanisms—like concessions—ensuring investment plans for public companies with financial constraints. As shown in Figure 3, the privatization index decreased in the first half of the eighties, but since 1985 it has increased, mainly due to privatizations in the energy and telecommunication sectors.

Finally, the tax index evidenced a stable pattern during most of the period. However, there was significant change in the mid-1980s, due to a tax reform adopted in 1984, which mainly affected the earnings tax system.

The overall picture is that, despite some disparity in the evolution and sequencing of different reforms, the Chilean economy experienced a widespread economic liberalization over the period.

2.2 Patterns of Entry and Exit

In this subsection we document how entry and exit rates have varied across industries and over time. The main patterns of annual entry and exit are shown in Table 1. During the period 1979 to 2000, the average entry rate (6.4 %) was slightly lower than the exit rate (7.5%). There are,

[9] Among these, the bankruptcy and liquidation of several banking institutions, acquisition of private assets by the Central Bank, support system's debtors and recapitalization of the financial sector. In 1986 there was also a profound reform to the financial institutions' regulation (*Ley de Bancos*).

however, significant differences over time. In general, the patterns of entry and exit are consistent with aggregate macroeconomic performance. During the “belle époque” of high economic growth (1985 to 1997), the entry rate (7.5%) was larger than the exit rate (6.1%). In contrast, when the country faced economic crises (1982 to 1983 and 1998 to 2000) the exit rate rose above the entry rate.

In Table 2, we show evidence that entry and exit rates differ substantially across 3-digit industries. Consistent with some stylized facts on industry dynamics, entry and exit rates are positively correlated across industries. Geroski (1995) discusses how this positive correlation is a prevalent phenomenon in most studies on developed countries.[10] Such evidence is consistent with theoretical models of industry dynamics where entry and exit depend on characteristics such as the presence of entry barriers (Hopenhayn, 1992). These differences may be also consistent with the fact that changes in trade protection, as shown theoretically by Bernard et al., 2007, could have different effects depending on comparative advantages in the economy. In a seminal paper, Melitz (2003) presents a model with one factor of production and one sector with constant markups and shows that, in the presence of firm productivity heterogeneity, a reduction in trade costs generates important within-industry reallocation effects. In particular, higher exposure to trade reduces the mass of firms and increases average firm size and industry aggregate productivity. Bernard et al. (2007) extend the Melitz model by considering two-factors and two-goods and show that these reallocation effects are proportionally larger in comparative advantage industries. The key explanation for these differences across industries is the asymmetric export opportunities determined by comparative advantages. A reduction in trade costs increases the profitability of exporting, but the expected gains of exporting are larger for industries where the

[10] Indeed, the coefficient of correlation of 0.6 is in the range of typical estimates reported by Geroski (1995). For industries at 4-digit ISIC, the coefficient is 0.7.

economy has a comparative advantage. Thus trade liberalization, by increasing more the productivity cutoff for survival in comparative advantage industries, increases relatively more the exit of plants.

How important are plant turnover and exit for productivity growth? There are several articles analyzing this issue in the Chilean context. Pavcnik (2002) studies the period 1979 to1986 and decomposes productivity growth into two terms. One is the unweighted productivity resulting from averaging productivity across plants. The second is a covariance term representing the contribution from the reallocation of market share across plants of different productivity. For the entire manufacturing industry, she finds that this reallocation effect accounts for 65.8 percent of the productivity growth in these years.[11] The magnitude of this reallocation differs across industries. In the export-oriented and import-competing sectors, the contribution is similar (65.4 and 66.8 percent). In contrast, for non-tradable sectors, reallocation contributes with 39 percent of the productivity growth.[12]

However, this reallocation effect considers not only the exit of plants, but also entry of new ones and changes in the market share of plants with different productivity. Bergoeing et al. (2006) have carried out a productivity decomposition procedure identifying these effects for the longer period 1980 to 2001. According to their calculations, productivity growth in the Chilean manufacturing industry was 42.8 percent between 1980 and 2001. They find that almost all of this growth is attributable to reallocation effects. Among the different components of reallocation, exit of plants contributes 12.4 percent. Interestingly, during the most recent period 1988-2001 when productivity increased 80.1 percent, exit contributed 51.8 percent of this growth.

[11] Productivity grew 19.3 percent between 1979 and 1986.
[12] In these industries, productivity grew at 25.4, 31.9 and 6.2 percent, respectively.

Thus based on these previous works, it can be concluded that exit - and reallocation in general - is an important contributor to productivity growth. In the rest of the paper, we focus on the determinants of exit.

3. Empirical Approach

In this section we analyze which factors affect plant exit, particularly in determining how economic liberalization has had unequal effects on different industries and plants. Does economic liberalization have a larger effect in comparative-advantage industries? Does it have a larger impact on low or high productivity plants? Is this effect different for larger or smaller plants? We estimate a probit model that includes three groups of variables as regressors: industry characteristics, plant characteristics, and period-specific variables (among them, tariffs and the reforms index). We estimate the following equation:

$$\Pr(\mathrm{Exit}_{ijt+1}) = f\,(\alpha + \beta X_{it} + \gamma Z_{jt} + \delta T_t + \lambda W_t + \eta_j + \varepsilon_{ijt}) \qquad (1),$$

where $\Pr(\mathrm{Exit}_{ijt+1})$ is the probability of exit of plant *i* located in industry *j* between *t* and *t*+1, X_{it} is a vector of plant characteristics, Z_{jt} is a vector of industry characteristics, T_t is the tariff level (in logs), and W_t is a vector of period-specific variables capturing the effect of other structural reforms and economic fluctuations. Specifically, we include the index of structural reforms developed by Escaith and Paunovic (2004), the GDP growth rate of the period, and the real effective exchange rate. η_j is an industry-specific effect for sectors classified according to their 4-digit ISIC.

We are particularly interested in evaluating the effect of economic liberalization on the probability of exit in different industries and for different plants. We report marginal effects at the sample mean of each regressor and, in Tables 4 and 6, we analyze how these marginal effects change with plant and industry characteristics. In particular, we evaluate the marginal effects for "small" and "large" plants, for "high" and "low" productivity plants, and also for plants classified by trade-orientation. For each group, the marginal effect is computed at the sample mean.

To answer these questions, we use a direct measure of trade orientation based in trade flows computed by Pavcnik (2002). Using export-output and import-output ratios, 4-digit ISIC industries are classified in three sectors: (i) non-tradable, (ii) export oriented, and (iii) import-competing.[13]

The vector *X* of plant-specific variables includes characteristics that are expected to affect exit. We consider the impact of total factor productivity (TFP), the capital-labor ratio, the skill ratio, size, and age. The capital-labor ratio is plant capital stock over total employment. The skilled-labor ratio is the share of non-production wages in total wages. Size is measured as total employment. Given that our dataset does not include date for plant foundation, we compute age as the number of years since the plant first appeared in the database. The vector *Z* of industry-specific variables includes dummy variables for export-oriented and import-competing sectors.[14]

In terms of economic reforms, we expect liberalization to increase plant exit. As has been argued in the literature, a reduction in tariff protection should increase the probability of exit. A similar

[13] Pavcnik (2002) classifies 4-digit industries as export-oriented if exports account for more than 15% of its total output. Import-competing industries are those whose ratio of imports to total output exceeds 15%. The rest are classified as non-tradable industries. Average data for the period 1980-1986 may be found as a paper supplement on the website http://www.restud.org.uk/pdf/pavcnik_supplement.pdf.

[14] In the robustness section we estimate the model including two market structure variables: a concentration index and the intensity in advertisement (as a proxy for product differentiation). We also estimate the model with factor intensities measured at the industry level and the main results are unchanged. Results are available upon request.

effect can be expected when taking into consideration the index of structural reforms. As long as the economy reduces restrictions protecting mainly inefficient plants, a higher exit rate should be observed.

In the case of other time-varying controls, we expect exit to be negatively correlated with the economic cycle, captured by GDP growth, and positively correlated with real exchange rate depreciations. For this last variable, the expected result is consistent with the idea that a depreciation of the RER protects domestic plants from international competition as long as it reflects an increase in the relative price of imported goods.

For all of these variables we test if the effects are different across plants and industries. Our hypothesis is that economic liberalization should have a larger effect on less productive and smaller plants because they were relatively more isolated from competition in a more protected economy.[15] We also evaluate if economic liberalization has different effects across industries. Following Bernard et al. (2007) we expect a large effect on export-oriented industries. Liberalization could increase the profitability of exporting, but the expected gains of exporting are larger for industries where the economy has a comparative advantage.

4. Results

In Table 3 we present the estimation results.[16] In column (1) we show our basic results considering only plant-specific characteristics and the tariff level. In columns (2), (3) and (4), we add the other period-specific variables to analyze the robustness of our results and the role of other macroeconomic determinants of plant exit.

[15] In Melitz (2003), for example, a reduction in trade costs increases exit of less productive firms.
[16] In appendix B we show these same results for plants with median employment greater than 20 workers.

To begin, let us consider plant-specific characteristics. A robust and expected finding across different specifications is that more productive plants are less likely to close. These results are consistent with the literature linking plant turnover and industry productivity, and confirm that there is substantial resource reallocation from less to more productive firms. We also find that larger, more capital-intensive, and less human-capital-intensive plants are less likely to exit. These results also show that the effect of age is positive and significant in the first regression, but this relationship turns out to be non-significant when other period-specific variables are controlled for.

In terms of period-specific variables, column (1) shows an expected and negative relationship between probability of exit and tariffs. This is, when tariffs are increased, the probability of exit is reduced. However, this result is not robust to the inclusion of the structural reforms index. In fact, as shown in columns (2) through (4), the coefficient for tariffs becomes non-significant when we include sequentially the index of economic reforms, economic growth rate and real exchange rate. Moreover, the sign for these variables are the expected ones. As discussed in the previous section, by reducing protection of inefficient plants and intensifying competition in domestic markets, we find that economic liberalization is associated with an increase in the probability of plant exit.

The non-significant impact of tariffs when the reform index is included suggests that wrong conclusions about the effect of trade reforms could be reached when other structural reforms are not included in the estimation. It is possible, however, that the non-significant effect of tariffs reflects the high collinearity between tariffs and other economic reforms, making it very difficult to estimate the effect of tariffs very precisely or separately from other reforms[17].

[17] The coefficient of correlation between the index of reforms and tariffs is -0.84.

Regarding economic growth, the results are consistent with the idea that expansions are associated with reductions in the probability of exit, although its significance is reduced when the real exchange rate (RER) is included in the estimation. The results show that a higher RER (in this case measuring a real depreciation of the local currency) reduces the probability of exit. This supports the idea that depreciations tend to reduce competition from international markets by increasing the relative price of imported goods.

Using the results of column 4 in Table 3, we explore differences across plants with dissimilar characteristics. First, we look at the impact based on the productivity and size of the plants. To illustrate both effects, we compute this effect for plants located at the bottom 10 percent and the top 10 percent of the productivity and size distribution, respectively.[18] For illustration purposes, we call these plants "low" and "high" productivity and "small" and "large" sized plants.

The results are shown in Table 4 for the four period-specific variables: tariffs, index of economic reforms, growth and real exchange rate. They show that the effect of tariffs and economic growth is not significant for plants with different characteristics, similarly to the marginal effect evaluated at the mean of all the covariates (Table 3). By contrast, we find that the effects of economic liberalization and the real exchange rate are significantly different depending on the productivity and size of the firms.[19] Note how the impact of these two variables is larger for less productive and smaller plants. In the case of the reforms index, the marginal change increases from 0.05 for "high-productivity" plants to 0.50 for "low-productivity" plants. In terms of economic significance, this is an increase in the probability of exit of 0.46 and 4.22 percentage points respectively, when the reform index is increased by one standard deviation.[20] For

[18] The rest of the explanatory variables are evaluated at the sample mean within the appropriate group.

[19] According to the t-test shown in Table 4, we can reject the hypothesis of equality of marginal changes.

[20] This is large number for small plants. Note that the unconditional exit probability for the entire sample is 7.5 percent (See Table 1).

exchange rate fluctuations, an appreciation of one standard deviation (9.5 percent) increases the probability of exit by 2.92 and 0.32 percentage points for “low productivity” and “high productivity” plants respectively.

The same exercise for “small” and “large” firms reveals an increase in the probability of exit of 3.32 and 0.72 percentage points in the case of augmenting the reform index by one standard deviation, and 2.30 and 0.50 percentage points in the case of real exchange rate appreciation of one standard deviation.

In sum, the evidence presented shows that economic liberalization and real exchange fluctuations would be associated with larger effects on less productive and smaller firms. The results suggest that the biggest differences are found in the case of economic liberalization. Nevertheless, these findings on the link between economic liberalization and exit should be taken with caution. Even though we have controlled for other macroeconomic conditions, there are many time-varying shocks that can have some influence on plant exit.

Another concern with the results is that larger and highly productive plants are also affected by economic liberalization. This contradicts the idea that liberalization only affects less productive plants. There are several potential reasons for this finding. First, there is unobserved plant heterogeneity that we cannot control for. Productivity and other plant characteristics can be imperfect proxies of these unobserved plant-specific variables. Second, economic liberalization can have indirect effects that we are not capturing properly. Structural reforms can also affect the responsiveness of plants to demand shocks. In fact, Eslava et al. (2006) show evidence that reforms may increase the role of fundamentals (productivity and size for example) in explaining plant exit.

In Table 5, we expand the main results to study the role of industry characteristics in explaining the exit of plants in Chilean manufacturing sectors by including two dummy variables. One variable is for export-oriented and other for import-competing sectors classified according to the importance of trade flows in output (Pavcnik, 2002).[21] The dummy variable is significant for plants producing in export-oriented industries, but not for those in import-competing industries. The magnitude of the coefficient indicates that plants in export-oriented industries are approximately five percent more likely to exit than plants in other industries. Note that, with some minor exceptions, the main results shown in Table 4 remain when we include these two dummy variables. In fact, as expected, more productive and larger plants are more likely to survive. The signs for factor intensities-physical and human capital-remain the same, but have a lower significance. In terms of aggregate variables, the results are very similar. Tariffs and economic growth are not significant and the reforms index and the real exchange rate affect exit significantly in the expected manner.

We evaluate then the marginal effects for plants producing in different industries. In Table 6, we present the results of the impact of aggregate variables on the probability of exit for export-oriented, import-competing and non-tradable sectors corresponding to the estimation results in column 4 of Table 5. Similarly to the main results in Table 4, these findings reveal non-significant effects for tariffs and growth on these three sectors. In the case of reforms, the increase in the probability of exit is larger for export-oriented sectors. The marginal effects of 0.26, 0.24, and 0.20 correspond to increases in the probability of exit by 2.20, 1.98 and 1.67 percentage points when the reforms index is increased by one standard deviation. In the case of the real exchange rate, the marginal effect for export-oriented industries is larger in absolute value than for import-competing and non-tradable industries. However, these differences are

[21] Note that the base category corresponds to plants in non-tradable industries.

very low in magnitude and are not statistically significant. The corresponding increases in the probability of exit when the RER appreciates one standard deviation are 1.59, 1.43, and 1.20 percentage points, respectively.[22]

In the last columns of Table 6, we present the marginal effects for plants differing in productivity and size. The results are very similar to those obtained previously: less productive and smaller plants would be more affected by exchange rate fluctuations and economic liberalization.

In general, our results show the potential benefits of economic liberalization on productivity. In fact, we find that less productive plants are more likely to exit. Moreover, our results suggest that economic liberalization has a greater effect on the exit of less productive plants. Both effects contribute to raise productivity by reallocating resources to more productive plants. However, a less benign interpretation of these results is that economic liberalization can be accompanied by increases in unemployment because there would not be a rapid reallocation of resources within and across industries. This can increase welfare costs in the short run. The net effect on employment, however, will depend on the loss of jobs generated by exit of plants and the job creation produced by expanding plants and the entry of new ones. In the case of Chile, it seems that this potentially negative effect of reforms was not overly severe. The period of more intensive economic liberalization was not accompanied by increases in unemployment. For example, between 1986 and 1993, the unemployment rate fell from 10.4 to 6.4 percent (Cowan et al. 2005).

[22] The finding that RER changes can also have a significant and negative effect on non-tradable industries could be contradictory. In fact, if the RER is considered as the relative price of tradable over non-tradable goods, an appreciation should reduce exit in non-tradable industries. Note, however, that we are using information from manufacturing industries. The products of non-tradable industries should be thought of as goods with lower propensity to be traded with the rest of the world, not strictly as never traded goods.

5. Robustness Checks

This section presents a robustness analysis of our main results. First, we ask whether our findings are robust to the introduction of the impact of industry specific shocks. To address this issue, we exclude GDP growth and introduce as an explanatory variable a measure of economic activity at the industry level. This is the employment growth rate at 4-digit industries. Next, we include sequentially other plant and industry characteristics that other studies have found to affect the probability of exit.[23] These variables are a proxy for the leverage of the plant (measured as the payment of interests over sales), a proxy for the technological activity of the plants (a dummy for plants acquiring foreign technical licenses) and two variables for the market structure of the industry (a Herfindahl index computed using data on sales and the advertisement-to-sales ratio). The results suggest that most of these variables are non-significant. However, we find a negative and significant effect of foreign licenses, suggesting that technology adoption may increase the probability of survival.

The main results based on plant characteristics remain unaltered. Confirming previous findings, there is evidence that more productive and larger plants are less likely to exit. In terms of industry characteristics, we find that plants located in export-oriented sectors are still more likely to exit and that there are no differences in the exit probability for plants in import-competing and non-tradable industries. The positive effect on exit of economic liberalization and the negative effect of real exchange rate are robust in all five specifications. Moreover, we confirm that tariffs are not associated to changes in the probability of exit. In sum, we find that our results are generally robust to incorporating other plant and industry characteristics.

[23] For example, see Baggs (2005), López (2006), Görg and Strobl (2003).

6. Conclusions

This paper builds on recent research that has shown that plant turnover contributes positively to productivity growth. As a complement to these studies, we ask if economic liberalization effectively promotes resource reallocation. While several recent theoretical papers have highlighted this mechanism, there is little empirical evidence on the implications that these models provide. In this paper we have studied two different adjustment margins, both across and within industries. We did so by estimating the effects of economic liberalization across industries and plants with different characteristics.

In terms of plant characteristics, this paper finds robust evidence that larger and more productive plants are less likely to exit. Consistent with the literature linking plant turnover and industry productivity, these results confirm that there is a within-industry reallocation from less productive to more productive firms. This reallocation is linked significantly to economic liberalization, but not to changes in tariffs. The impact of reforms is especially important for less productive and smaller plants which are more sensitive to overall economic liberalization.

In terms of industry-specific characteristics, we find evidence that plants in export-oriented industries are more likely to exit than plants in import-competing and non-tradable sectors. This is consistent with the idea that economic liberalization imposes competitive pressures on the tradable sectors and generates a reallocation of resources across industries. In addition, our results show also that-once economic reforms are introduced-the probability of exit increases more for plants producing goods in export-oriented industries.

In sum, this paper's findings uncover an explicit link between economic liberalization and plant turnover, but not necessarily for trade liberalization. Our results are consistent with the idea that the adoption of economic liberalization could have important effects on resource reallocation both within and across industries.

Appendix A

Estimation of TFP

To compute TFP we estimate a Cobb-Douglas production function separately for each industry. Specifically, for each 3-digit sector, we estimate the following equation:

$$y_{it} = \beta_0 + \beta_1 k_{it} + \beta_2 l_{it}^S + \beta_3 l_{it}^U + \varepsilon_{it}, \qquad \text{(A1)}$$

where y_{it} is the log of value added of plant *i* at time *t*; k_{it} is the log of plant's capital stock, while l_{it}^S and l_{it}^U are the logs of skilled and unskilled labor respectively. TFP is defined as:

$$TFP = \exp\left(y_{it} - \widehat{\beta}_1 k_{it} - \widehat{\beta}_2 l_{it}^S - \widehat{\beta}_3 l_{it}^U \right).$$

If ε_{it} is uncorrelated with the right-hand side variables in equation (A1), then the production function could be estimated using OLS. However, although productivity is not observed by the econometrician it may be observed by the firm, thus ε_{it} is likely to be correlated with the regressors. Following Olley and Pakes (1996) and Levinsohn and Petrin (2003), we explicitly consider this endogeneity problem by writing $\varepsilon_{it} = \omega_{it} + \eta_{it}$, where ω_{it} is the transmitted productivity component and η_{it} is an error term that is uncorrelated with input choices, and assuming that $m_{it} = m_{it}(k_{it}, \omega_{it})$, where m_{it} is the intermediate input. Levinsohn and Petrin (2003) show that this relationship is monotonically increasing in ω_{it}, so the intermediate input function can be inverted to obtain $\omega_{it} = \omega_{it}(k_{it}, m_{it})$. Then, equation (A1) becomes:

$$y_{it} = \beta_2 l_{it}^S + \beta_3 l_{it}^U + \phi(k_{it}, m_{it}) + \eta_{it}, \qquad \text{(A2)}$$

where $\phi(k_{it}, m_{it}) = \beta_0 + \beta_1 k_{it} + \omega_{it}(k_{it}, m_{it})$.

Equation (A2) is estimated using the Stata procedures discussed in Petrin, Poi, and Levinsohn (2004). As in Levinsohn and Petrin (2003), we use consumption of electricity as the intermediate input that allows the identification of the elasticity of capital.

Appendix B

Probit Regressions with Employment Threshold of 20 Workers

	(1)	*(2)*	*(3)*	*(4)*
TFP	-0.019	-0.020	-0.020	-0.020
	(9.43)**	(13.14)**	(13.33)**	(13.49)**
KL	-0.005	-0.005	-0.006	-0.006
	(3.83)**	(4.69)**	(4.88)**	(5.15)**
Skill	0.016	0.017	0.016	0.017
	(2.31)*	(2.72)**	(2.56)*	(2.56)*
Size	-0.019	-0.019	-0.018	-0.018
	(9.71)**	(10.02)**	(9.82)**	(9.45)**
Age	0.008	-0.002	-0.002	0.001
	(4.17)**	(1.21)	(1.43)	(0.41)
Tariff	-0.068	0.014	0.020	0.034
	(12.51)**	(0.87)	(1.17)	(2.27)*
Reform		0.351	0.368	0.368
		(4.89)**	(4.98)**	(5.23)**
Growth			-0.001	-0.000
			(4.04)**	(1.19)
RER				-0.054
				(8.43)**
Observations	42969	42969	42969	42969

Notes: Dependent variable equal to 1 if plant is in year *t*, but not in *t*+1. All explanatory variables are measured in the first year of the interval. TFP is log of total factor productivity. K/L is log of capital per worker. Skill is white-collar wages over total wages. Size is log of total employment. Age is log of (1+year-first year a plant is observed). Tariff is the tariff level (in logs), Reform is an index of structural reforms, Growth is the GDP growth rate, RER is the real effective exchange rate (in logs). Industry-specific effects at 4-digit ISIC are included but not reported. z statistics with robust standard errors adjusted by clustering at 4-digit ISIC industries in parentheses. *significant at 5%; **significant at 1%.

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Table 1: **Plant Entry and Exit Rates in Chilean Industry**

Period	*Entry Rate*[a] *(1)*	*Exit Rate*[b] *(2)*	*Turnover Rate (1) + (2)*	*Net Entry Rate (1) – (2)*
1979-80	4.6	10.3	14.9	-5.7
1980-81	2.4	9.7	12.1	-7.3
1981-82	2.3	9.4	11.7	-7.1
1982-83	4.4	9.8	14.2	-5.4
1983-84	8.7	7.6	16.3	1.1
1984-85	3.4	4.6	8.0	-1.2
1979-85	**4.3**	**8.6**	**12.9**	**-4.3**
1985-86	5.6	6.6	12.2	-1.0
1986-87	12.6	5.4	18.0	7.2
1987-88	4.6	5.4	10.0	-0.8
1988-89	5.2	5.1	10.3	0.1
1989-90	4.6	5.0	9.6	-0.4
1990-91	7.5	3.7	11.2	3.8
1991-92	7.0	4.4	11.4	2.6
1992-93	7.1	5.4	12.5	1.7
1993-94	5.8	5.6	11.4	0.2
1994-95	7.2	7.3	14.5	-0.1
1995-96	13.7	8.1	21.8	5.6
1996-97	8.9	11.0	19.9	-2.1
1985-97	**7.5**	**6.1**	**13.6**	**1.4**
1997-98	5.7	12.9	18.6	-7.2
1998-99	6.7	14.8	21.5	-8.1
1999-00	17.1	18.6	35.7	-1.5
Period Average	**6.4**	**7.5**	**13.9**	**-1.2**

Source: Authors' calculations based on ENIA 1979-2000.
[a] Entry rate is defined as the number of existing plants in *t*+1 but not in *t* over the average number of plants in *t* and *t*+1;
[b] Exit rate is defined as the number of existing plants in *t*+1 but not in *t* over the average number of plants in *t* and *t*+1.

Table 2: **Entry and Exit Rates by Sector**

Average 1979-2000

Sector	Entry Rate	Exit Rate
311 –Food	6.0	6.5
312 –Other food	6.3	6.5
313 –Beverage	3.9	8.6
314 –Tobacco	3.5	7.9
321 –Textiles	5.3	7.7
322 –Wearing apparel, except footwear	7.5	9.8
323 –Leather and products	4.5	9.3
324 –Footwear	6.6	8.8
331 –Wood and wood products	7.9	10.4
332 –Furniture	8.1	10.1
341 –Paper and paper products	7.1	6.6
342 –Printing	5.5	6.4
351 –Chemicals	6.4	6.2
352 –Other chemicals	5.4	5.0
353 –Petroleum refineries	0.5	0.6
354 –Petroleum products	4.7	4.6
355 –Rubber products	5.1	5.4
356 –Plastic products	7.9	5.7
361 –Pottery, china and earthenware	6.0	7.4
362 –Glass and products	2.5	5.2
369 –Other non-metallic mineral products	7.2	6.4
371 –Iron and steel basic industries	6.7	5.2
372 –Non-ferrous metal basic industries	5.6	7.0
381 –Metal products, except machinery and equipment	6.7	6.9
382 –Manufacture of machinery, except electrical	6.5	6.8
383 –Manufacture of electrical machinery apparatus	5.3	5.9
384 –Transport equipment	5.8	8.0
385 –Professional and scientific controlling equipment	4.4	4.9
390 –Other manufacturing industries	4.9	6.9

Source: Authors' calculations based on ENIA 1979-2000.

Table 3: **Probability of Exit**

(Marginal Changes)

	(1)	*(2)*	*(3)*	*(4)*
TFP	-0.023	-0.024	-0.023	-0.024
	(13.69)**	(17.22)**	(17.46)**	(17.29)**
KL	-0.004	-0.005	-0.005	-0.005
	(2.88)**	(3.46)**	(3.61)**	(3.97)**
Skill	0.018	0.017	0.017	0.019
	(2.44)*	(2.70)**	(2.51)*	(2.74)**
Size	-0.031	-0.031	-0.030	-0.030
	(10.34)**	(10.39)**	(10.22)**	(10.07)**
Age	0.007	0.001	0.001	0.005
	(3.36)**	(0.87)	(0.41)	(3.55)**
Tariff	-0.058	-0.008	-0.002	0.016
	(9.86)**	(0.51)	(0.13)	(1.17)
Reform		0.217	0.239	0.248
		(3.61)**	(3.95)**	(4.54)**
Growth			-0.001	-0.000
			(4.95)**	(0.60)
RER				-0.070
				(10.96)**
Observations	66197	66197	66197	66197

Notes: Dependent variable equal to 1 if plant is in year *t*, but not in *t*+1. All explanatory variables are measured in the first year of the interval. TFP is log of total factor productivity. K/L is log of capital per worker. Skill is white-collar wages over total wages. Size is log of total employment. Age is log of (1+year-first year a plant is observed). Tariff is the tariff level (in logs), Reform is an index of structural reforms, Growth is the GDP growth rate, RER is the real effective exchange rate (in logs). Industry-specific effects at 4-digit ISIC are included but not reported. z statistics with robust standard errors adjusted by clustering at 4-digit ISIC industries in parentheses. * significant at 5%; ** significant at 1%.

Table 4: **Marginal Effects and Plant Characteristics**

Variable	*Productivity*			*Size*		
	Low	High	Low=High*	Small	Large	Small=Large*
Tariff	0.03	0.04	1.04	0.03	0.01	0.88
	(1.17)	(1.16)		(1.14)	(1.22)	
Reform	0.50	0.05	4.11	0.40	0.09	3.21
	(4.64)	(4.19)		(4.15)	(5.53)	
Growth	-0.00	-0.00	0.53	-0.00	-0.00	0.46
	(0.61)	(0.60)		(0.60)	(0.60)	
RER	-0.14	-0.02	9.04	-0.11	-0.02	7.67
	(10.20)	(9.46)		(10.14)	(8.00)	

Absolute Value of z-statistics in parentheses. The marginal effect is evaluated at the sample within the appropriate group mean. *Indicate the absolute value of *t*-test for the difference of parameters.

Table 5: **Probability of Exit: Plant and Industry Characteristics**

(Marginal Changes)+

	(1)	*(2)*	*(3)*	*(4)*
TFP	-0.009	-0.009	-0.009	-0.009
	(4.78)**	(4.84)**	(4.81)**	(4.83)**
KL	-0.001	-0.001	-0.001	-0.002
	(0.68)	(0.96)	(1.20)	(1.71)
Skill	0.016	0.015	0.014	0.017
	(1.68)	(1.76)	(1.61)	(1.82)
Size	-0.028	-0.028	-0.028	-0.027
	(8.34)**	(8.41)**	(8.26)**	(8.05)**
Age	0.005	-0.000	-0.001	0.003
	(2.12)*	(0.19)	(0.75)	(2.26)*
Tariff	-0.051	-0.010	-0.003	0.014
	(9.00)**	(0.62)	(0.20)	(1.07)
Reform		0.182	0.206	0.215
		(3.17)**	(3.62)**	(4.25)**
Growth			-0.001	-0.000
			(5.32)**	(1.58)
RER				-0.063
				(8.49)**
Exporter	0.049	0.047	0.047	0.048
	(2.96)**	(3.02)**	(3.01)**	(2.91)**
Importer	0.002	0.001	0.002	0.001
	(0.21)	(0.20)	(0.23)	(0.17)
Observations	66197	66197	66197	66197

Notes: Dependent variable equal to 1 if plant is in year *t*, but not in *t*+1. All explanatory variables are measured in the first year of the interval. TFP is log of total factor productivity. K/L is log of capital per worker. Skill is white-collar wages over total wages. Size is log of total employment. Age is log of (1+year-first year a plant is observed). Tariff is the tariff level (in logs), Reform is an index of structural reforms, Growth is the GDP growth rate, RER is the real effective exchange rate (in logfs). Exporter is a dummy for plants located in an export-oriented industry. Importer is a dummy for plants located in an import-competing industry. z statistics with robust standard errors adjusted by clustering at 4-digit ISIC industries in parentheses. * significant at 5%; ** significant at 1%. + For dummy variables (Exporter and Importer) corresponds to the discrete change of varying the dummy from zero to one.

Table 6: **Marginal Effects: Industry and Plant Characteristics**

Variable	*Export Oriented*	*Import Competing*	*Non Tradable*	*Productivity*		*Size*	
				Low	High	Small	Large
Tariff	0.02	0.02	0.01	0.02	0.01	0.02	0.01
	(1.04)	(1.08)	(1.10)	(1.05)	(1.13)	(1.06)	(1.13)
Reform	0.26	0.24	0.20	0.28	0.11	0.32	0.09
	(3.33)	(4.20)	(4.73)	(3.87)	(4.86)	(4.07)	(4.73)
Growth	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
	(1.54)	(1.65)	(1.62)	(1.63)	(1.58)	(1.63)	(1.59)
RER	-0.08	-0.07	-0.06	-0.08	-0.03	-0.09	-0.03
	(6.00)	(7.16)	(7.19)	(8.23)	(5.61)	(7.47)	(6.00)

Absolute value of z-statistics in parentheses. The marginal effect is evaluated at the sample within the appropriate group mean.

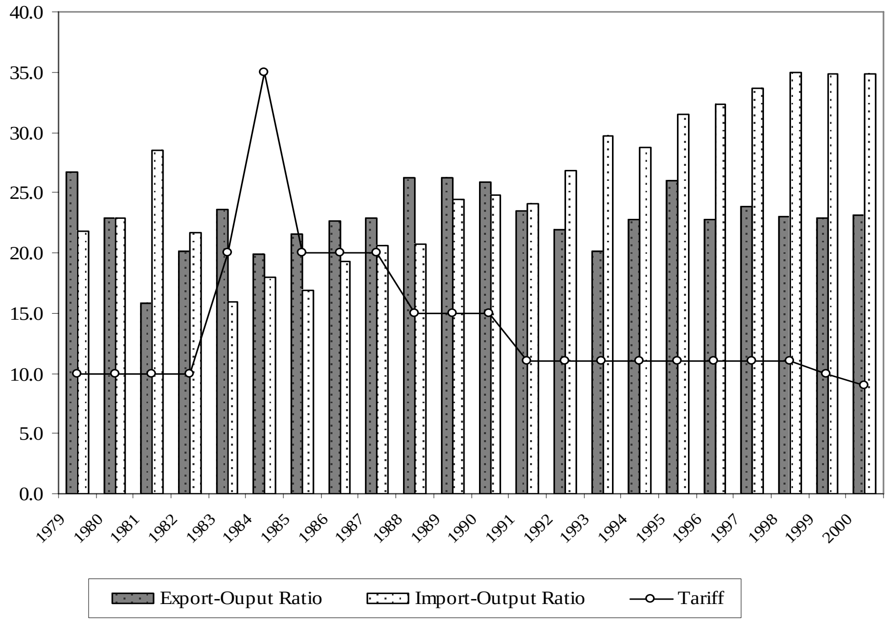
Table 7: **Probability of Exit, Robustness**

(Marginal Changes)+

	(1)	*(2)*	*(3)*	*(4)*	*(5)*
TFP	-0.009	-0.010	-0.010	-0.010	-0.010
	(4.84)**	(4.88)**	(4.85)**	(5.15)**	(5.15)**
KL	-0.002	-0.002	-0.002	-0.002	-0.002
	(1.69)	(1.96)	(1.91)	(1.90)	(1.89)
Skill	0.017	0.019	0.020	0.020	0.020
	(1.86)	(1.44)	(1.50)	(1.51)	(1.51)
Size	-0.027	-0.028	-0.027	-0.027	-0.027
	(8.07)**	(7.88)**	(7.73)**	(7.78)**	(7.78)**
Age	0.004	0.003	0.003	0.003	0.003
	(2.40)*	(2.07)*	(2.08)*	(2.08)*	(2.08)*
Tariff	0.013	0.015	0.015	0.015	0.015
	(1.05)	(1.14)	(1.15)	(1.18)	(1.17)
Reform	0.210	0.216	0.216	0.219	0.219
	(4.22)**	(4.66)**	(4.69)**	(4.79)**	(4.70)**
Industry Growth	-0.005	-0.030	-0.031	-0.032	-0.032
	(0.06)	(0.43)	(0.44)	(0.46)	(0.46)
RER	-0.067	-0.067	-0.067	-0.068	-0.068
	(8.29)**	(7.31)**	(7.32)**	(7.37)**	(7.27)**
Exporter	0.048	0.048	0.048	0.048	0.048
	(2.91)**	(2.85)**	(2.85)**	(2.86)**	(2.87)**
Importer	0.001	0.001	0.001	0.001	0.001
	(0.15)	(0.15)	(0.17)	(0.16)	(0.16)
Interests		0.001	0.001	0.001	0.001
		(1.21)	(1.21)	(1.21)	(1.21)
Licenses			-0.012	-0.012	-0.012
			(2.43)*	(2.44)*	(2.49)*
Herfindahl				-0.036	-0.036
				(0.45)	(0.44)
Advertisement					-0.077
					(0.03)
Observations	66197	63159	63159	63159	63159

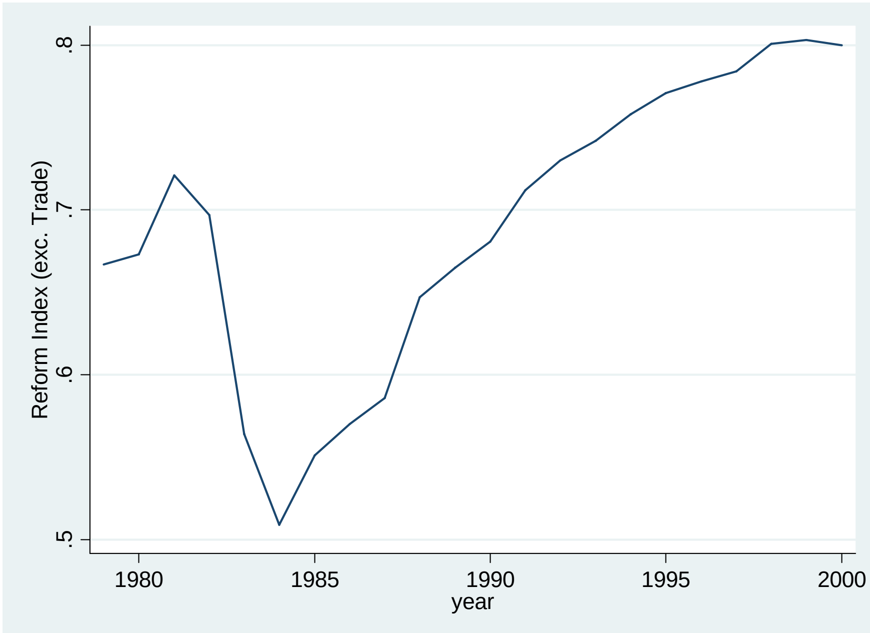
Notes: Dependent variable equal to 1 if plant is in year *t*, but not in *t*+1. All explanatory variables are measured in the first year of the interval. TFP is log of total factor productivity. K/L is log of capital per worker. Skill is white-collar wages over total wages. Size is log of total employment. Age is log of (1+year-first year a plant is observed). Tariff is the tariff level (in logs), Reform is an index of structural reforms, Industry Growth is the employment growth rate for industries at 4-digit ISIC. RER is the real effective exchange rate (in logs). Exporter is a dummy for plants located in an export-oriented industry. Importer is a dummy for plants located in an import-competing industry. Interests is the payment of interest over sales. Licenses is a dummy for plants acquiring foreign technical licenses. Herfindahl is index computed using sales at 4-digit industries. Advertisement is the industry mean of advertisement over sales. z statistics with robust standard errors adjusted by clustering at 4-digit ISIC industries in parentheses. * significant at 5%; ** significant at 1%. + For dummy variables (Exporter and Importer) corresponds to the discrete change of varying the dummy from zero to one.

Figure 1: **Tariffs, import-output and export-output ratios**



Source: Industrial Dynamics Analysis Program (ECLAC)

Figure 2: **Reform Index**



Source: Escaith and Paunovic (2004)

Figure 3: **Components of the Reform Index**

Source: Escaith and Paunovic (2004)

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