Firm Entry and Exit, Labor Demand, and Trade Reform
Evidence from Chile and Colombia[1]

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I. Introduction

There are increasing fears that trade reform -- and globalization more generally -- will increase the uncertainty faced by the average worker, particularly those with fewer skills. Rodrik (1997) suggests that the increased competitiveness of product markets and the greater access to foreign inputs may lead to a more elastic demand for workers among existing firms. This leads to greater volatility in the labor market since bad shocks to output translate to larger impacts on wages and employment than formerly was the case.

To date, the literature has focused virtually entirely on movements in labor demand within *continuing* firms with both theory and empirical specifications derived from neo-classical profit or cost functions. However, as has now been documented extensively, a large fraction of movements in the stock of jobs arise from the entry and exit of firms. Dunne, Roberts and Samuelson (1989) and Davis and Haltiwanger (1990), for instance, show that up to 25% overall job changes in the US were due to firm births and deaths. Roberts (1996) finds that in Chile (1979-86), Colombia (1977-91), Morocco (1984-89) and the US (1973-86) entry and exit contributed more to the net change in positions than did the expansion of continuing plants although the contribution varied greatly across business cycle and period of adjustment.

What this suggests is that an understanding of the overall labor demand elasticities that workers face requires not only understanding how own wage elasticities in continuing plants change, but also how the own wage elasticities of exit and entrance may change. As Hamermesh (1993) notes, this is relatively unexplored territory empirically with only a handful of estimates of dubious comparability available. His survey of the literature reveals only Carleton (1979) as generating elasticity of firm birth rate with the respect to the wage rate ranging from 1 to 1.5. His own calculations for the US generate elasticities of exit between .86 and .37. Only Berger and

Garen (1990) estimate the elasticity of entry/exit related employment change, .94. All of these estimates are at the high end of those standard within firm reallocation elasticities and suggest that, given the potentially large contribution to employment changes, this may be the more important elasticity to understand and quantify.[2]

This paper attempts to make four contributions. First, using establishment level data from Chile and Colombia, it documents patterns of job creation, destruction, net job creation and turnover and establishes the share of employment changes due to within-firm vs entry and exit effects. Second, it sketches some possible channels through which liberalization might alter these elasticities and turnover more generally. Third, it offers among the first estimates of own wage elasticities of employment due to entry and exit and the first that are comparable among countries. Fourth, it attempts to link any observed changes to measures of openness and liberalization.

II. Conceptual Issues

Identifying any links between firm turnover and labor demand and trade liberalization requires entering the complex theoretical literature on firm dynamics which, unfortunately, enjoys nowhere near the consensus of that of the neo-classical model of the firm. Only Hamermesh (1988), using a fairly traditional model of the firm, has focused specifically on the issue of how wage changes may induce exit, and nowhere does the literature make the linkage to openness. Jovanovic (1982), Pakes and Ericson (1990) and Hopenhayn (1992) have offered the most sophisticated, although distinct, models of firm entry and exit but none preoccupies itself

[2] A related literature examines what variables, including wages may affect firm location but, as Hamermesh notes, this is not strictly comparable since the elasticity of firm location is almost certainly larger than that of the decision to open the firm in the first place.

especially with entry/exit response to factor price changes. What generally does emerge is that reductions in the fixed cost of entry and exit will make firms more sensitive to changes in costs.

The lessons from the by now vast literature on irreversible investment under uncertainty also offer some insights. (See Dixit and Pindyck, 1994). The inability of investors to predict the future path of returns to investments with certainty, and the fact that much of an investment, whether in plant and equipment, marketing, information collection etc. is not recoupable if the firm goes bankrupt, makes firms react far more sluggishly to changes in expected profitability than they would in the absence of any uncertainty. The analytics are sufficiently complicated as to make closed form solutions for entry and exit elasticities difficult. But both simulations and empirical evidence suggest that the elasticity of the response of investment to price or cost changes varies greatly dependent on the degree of uncertainty faced.[3] Further, there need not be a symmetric impact on entry and exit.

Caballero (1991) has introduced an important caveat to these findings noting that implicit in the literature is the assumption of imperfect competition. As market structure becomes more competitive, he finds that uncertainty begins to *increase* investment (see also the models of Abel 1983). Consistent with this, Guiso and Parigi (1999) find the negative effect of uncertainty is stronger in Italian industries where firms have more market power. Since one presumed impact of trade liberalization is to increase overall competition, the potential sign switch makes theoretical inference even more difficult.

Below, therefore, are several possible impacts of reform measures and potential impacts on own wage net job growth elasticities for entering and exiting firms with only tentative assertions about what the effects might be.

1. Reduction of barriers to imported capital may lower its price and thereby reduce the irreversible component of costs. More generally, freer trade may improve the secondary market for machinery and have the same effect.

2. Increased labor intensity of production with trade liberalization, as predicted by standard Heckscher-Ohlin-Samuelson models of international trade, may lead to lower irreversible fixed costs in capital and perhaps lower investment in human capital that would be lost should the firm go out of business.

3. Lower barriers to foreign investment might lead to lower fixed costs of entry for foreign firms. Taken as a global phenomenon, this also leads to a possible "substitution" effect where firms will shift, for instance maquila production, to other countries quickly in response to small changes in the wage. This may be compounded if higher labor intensity lowers irreversible capital costs.

4. Inflation reduction that is both requisite and result of trade reform may lead to less variance in predicted returns to investment. In particular, the reduction in level and variance of inflation may lead to a reduction in the variance of real wages which are frequently nominally sluggish. In a lower inflation environment, a given rise in real wages may be seen as more persistent than in high inflation environments and therefore have greater impact on entry and exit decisions.

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[3] As examples, Hasset and Metcalf (1992) show that investment in household energy saving technologies in response to a 15% tax credit almost doubles from their base case in the absence of uncertainty. Servén and

5. Privatization and fiscal reform may lead LDC governments cease to be willing to finance inefficient public firms (preventing exit) and eliminate barriers to investment (preventing entrance) (Roberts 1996). It may also signal greater commitment to market friendly policies and hence reduce uncertainty.

However, other effects could lead to the reverse results.

6. Greater exposure to global shocks may lead to a more uncertain business environment and less predictability about output prices. However, with Caballero in mind, the combined impact of higher variance and greater competition might lead to increased investment and sensitivity to cost movements. Servén (2000) finds that in the aggregate there is no increase in uncertainty after trade reform in Latin America.

7. Shifts in trade regime may lead to greater uncertainty about the permanence of the new set of relative prices faced, regardless of the direction of movement. Bernanke (1983) shows that such uncertainty leads to waiting and overall lower responsiveness to return changes. In the present case, it is unclear whether entrepreneurs interpreted the return to protectionism in both Colombia and Chile as more credible than the subsequent attempts to re-open the economies.

8. *Exchange rate realignments* designed to provide some offset to tariff reductions may not be credible. As Chilean entrepreneurs expressed, it is exchange rate stability over the

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Solimano (1993) find investment in LDCs to be unresponsive to changes in profitability in the face of uncertainty.

medium term rather than the short term that is important to investors.[4] In both countries, very large movements of the real exchange rate would be followed by extreme movements in the opposite direction in under five years.

In addition to influencing demand elasticities, these changes may also affect overall job reallocation. Hopenhayn, for example, shows that turnover increases with a fall in entry costs. Again, however, there is no systematic theoretical treatment of the relationship with liberalization. The empirical evidence is limited. Dunne, Roberts, and Samuelson (1989) found no strong trend in plant-level turnover in US manufacturing from 1963-1982, a period of substantial tariff reduction and technological progress. Davis, Haltiwanger and Schuh (1996) find no relationship between US job flows and either import penetration or export share although Klein, Schuh and Triest (2000) find that the responsiveness of job flows to the real exchange rate varies with the industries openness to international trade.

For LDCs, Roberts and Tybout (1996) find high turnover in Chile, Colombia and Morocco relative to the US (Davis and Haltiwanger 1990), but no obvious relation with trade reform. Tybout (1996) finds very high exit rates following the Chilean liberalization. However, Roberts (1996) finds that average entry and exit actually rose with trade restrictions in Colombia 1983-1985 relative to the previous period of relative openness. Levinsohn (1999) confirms Tybout's results for Chile using the same data, and also establishes that turnover is somewhat higher among tradeables than non-tradeables. This suggests that, to the degree that trade liberalization expands the share of tradeables in total output, it may lead to more churning in the job market.

[4] See Maloney (1999).

IV. Definitions

We follow Davis and Haltiwanger (1992) and others in defining the relevant variables. Let n_{it} be the employment stock of firm i at period t. We define employment growth of firm i as

$$g_{it}=(n_{it} - n_{it-1})/x_{it},$$

where $x_{it}=(n_{it}-n_{it-1})/2$. It is clear that g_{it} Î $[-2,2]$, with the lower bound indicating that a firm exited and the upper bound that a firm entered the industry (or sample).

Job Creation (JC) is defined as the size-weighted sum of the firm employment, or job, growth rates summing over the firms ($i=1,...,N$) that experienced non-negative employment growth:

$$JC_t = \Sigma_{i=1}^{N} g_{it}\, w_{it}\, I(g_{it}>0),$$

where $w_{it}=x_{it}/(\Sigma_{i=1}^{N} x_{it})=x_{it}/X_t$ is the firm weight and $I(\ )$ is the indicator function.

Conversely, Job Destruction (JD) can be defined as the size-weighted sum of firm employment growth, summing over the firms that experienced negative employment growth:

$$JD_t = \Sigma_{i=1}^{N} |g_{it}|\, w_{it}\, I(g_{it}<0),$$

where w_{it} and $I(\ )$ are as above. Both measures can also be defined for a specific sector, firm type or over a range of years.

Net employment growth (NEG) for year t is the aggregate employment change that is,

$$NEG_t = \Sigma_{i=1}^{N} g_{it}\, w_{it} = JC_t - JD_t.$$

Gross Job Reallocation (GJR), or turnover, for year t is measured as the sum of the two components of net job creation:

$$\mathrm{GJR}_t = JC_t + JD_t.$$

JC (JD) may each be divided in two, respectively, separating the part due to starting or entering (exiting) firms, that is firm entry (exit), and the part due to continuing firms, that is firms that have positive employment over the years *t* and *t-1:*

$$JC_t = \Sigma_{i=1}^{N} g_{it}\, w_{it}\, I(g_{it}>0)I(g_{it} \neq 2) + \Sigma_{i=1}^{N} g_{it}\, w_{it}\, I(g_{it}>0)I(g_{it}=2) = E + B,$$

where E stands for firm expansion and B for firm birth, and

$$JD_t = \Sigma_{i=1}^{N} |g_{it}|\, w_{it}\, I(g_{it}<0)I(g_{it} \neq -2) + \Sigma_{i=1}^{N} |g_{it}|\, w_{it}\, I(g_{it}<0)I(g_{it}=-2) = C + D,$$

where C stands for firm contraction and D for firm death.

V. Evolution of Reforms

Chile: 1979-1995*:*

In the context of wide ranging and profound structural reforms, Chile gradually reduced tariffs to a uniform 10% across industries by 1979. From 1976 to 1982, the industrial sector was thoroughly restructured both in terms of product mix, and shedding of labor. The period we analyze ranges from 1982 to 1995, a period in which the restructuring was largely complete, but which saw dramatic reversal in the protection that domestic firms would face. First, with the collapse of the currency peg in July of 1982, the currency depreciated almost 60% by 1985. Second, in March of 1983 tariffs were doubled to 20% and then raised to 35% in September 1984. They were eased back to 30% in March of 1985 then to 20% three months later where they stayed for two years until January 1988 when they were reduced to 15%.

The final reduction to 11% in June 1991 came on top of a rapid appreciation of the exchange rate of 22% from 1989-95. Arguably, the period of 1983-1988 was a period of relatively high protection compared either to the period that came before, or to that after 1990.

Colombia: 1977-1990

The 1970s were characterized by a fairly liberal trade environment. Quota restrictions were steadily reduced reaching their low point in 1980 when 69% of all commodities did not require import licenses. Nominal tariffs fell from an average of 46% in 1973 to 26.9% in 1980.

An appreciating real exchange rate and a worsening trade deficit led to a tendency to reverse trade liberalization in 1981 that sharply accelerated between 1983-1985. The share of commodities in the free import category fell from 69% in 1980 to 5% in 1984. 83% required licenses and 16.5% were prohibited. Nominal tariffs rose to over 55% in 1983.

A gradual process of liberalization began in 1985. The Plan Vallejo liberalized imports of intermediate and capital goods and 1988 saw again a sharp reduction in overall tariffs. 1990 saw even stronger measures with the virtual elimination of the licensing regime and a cutting of average tariffs also by roughly half. However the actual reduction in protection to Colombian industry is difficult to measure. From 1983 to 1991, the exchange rate depreciated by roughly 50%, arguably leaving the level of protection in 1990 similar to that previous. Looking at a crude measure of nominal tariff and exchange rate movements, substantial lowering of protection only occurs in 1990 and 1991 (Roberts 1996 p 228, Ocampo and Villar 1992).

VI. Data

The analysis uses plant-level data sets for Colombia (1977-91) and Chile (1979-95), covering all manufacturing plants in Colombia and those with 10 or more workers in Chile, and containing detailed information on firm characteristics.[5] Both the Colombian data and the Chilean data set for the years 1979-1986 were prepared by Roberts and Tybout (1996) for the

World Bank financed project "Industrial Competition, Productivity, and Their Relation to Trade Regimes" and we extended the Chilean data to 1995 with the help of the Chilean *Instituto Nacional de Estadistica*. This allows us to generate descriptive statistics and results based on 10 additional years of data, covering from 1979 to 1995. Continuing firm (conventional) labor demand equations using the same data set were estimated by Fajnzylber and Maloney (2000a, 2000b).

These data have several advantages. First, they have broad micro-level coverage, including most manufacturing establishments with at least ten employees, and have been "cleaned" on a consistent basis. Second, each plant has a single identifying number that allows the construction of panels that follow firms over time and permit studying the dynamics of firm entry and exit. Part of the analysis on exit uses probit estimates at the firm level, and part works at the industry level by generating continuous measures of job creation, destruction, net creation and turnover. The panels also provide lagged values to serve as instruments for potentially endogenous variables. [6]

One important issue has to do with the truncation of the Chilean survey at 10 workers. This implies that we cannot know for certain if a firm that disappears from the survey in fact is dying, or simply has contracted below our lower threshold. Fortunately, the Colombian data from 1987-1990 maintains the complete sample so we can measure what fraction of firms that disappear at arbitrary thresholds of 10, 15, and 20 workers really did. At 10, 36% of those falling below the threshold were "false" exits; at 15, 9% ; and at 20, 4%. This suggests that

[5] The Colombian data set also contains information on plants with less than 10 workers during the periods 1977-82 and 1985-91.

[6] We do not combine individual aggregate plants in firms, since it is impossible for us to identify them with complete confidence as belonging to a particular firm.

our final choice of treating only firms who before dropping out of the sample had 20 or above workers, as "dying," we include only a very small fraction who in fact were not.

VII. Empirical Overview

Figures 1-4 for Chile and 5-8 for Colombia as well as Tables 1 and 2 give a broad overview of trends in employment dynamics in the two countries. The vertical lines broadly demark distinct periods of NEG behavior. Each graph plots the total variable and the contribution of both continuing firms (cont.) and firms being born and dying (BD).

Several important points emerge from the graphs and tables:

1. It would be difficult to identify periods of more or less job creation with periods of reform or counter-reform and in fact "cyclical" effects largely overshadow secular movements. Chilean job creation is dominated by the 1982 collapse and subsequent recovery which make drawing conclusions about the "steady state" difficult.[7] In Colombia, as well, the 1985-87 Coffee boom that may partially drive the second period of high net job growth probably is unrelated to reform initiatives. In neither country would it be obvious to conclude that the variance of net job creation is rising over time.

2. In both countries roughly 40% of job creation and destruction occurs by entering and exiting firms. The magnitudes are such as to justify the present investigation into the response of entering and exiting firms to wages, and turnover more generally. During several periods, particularly in Chile over 1990-1995, the contributions of entry and exit are roughly equal.

3. As noted earlier by Roberts (1996) turnover rates at around 25% are higher than US levels of around 20%. In neither country is there an obvious cyclical pattern[8] and there is no

[7] Net employment growth (NEG) is broadly correlated with output (Pearson correlation = 0.57).

[8] The correlation coefficients between net employment growth and gross job reallocation are −0.21 and 0.06, respectively for Chile and Colombia, both not significant at the 10% significance level. This is in contrast to the US

clear rising trend in gross job reallocations with time or with liberalization. In Chile, 1980 was still a period of industrial restructuring and this may generate exceptionally high turnover in the first period. However, the low tariff, appreciated exchange rate 1990-1995 period has lower rates of turnover than even the more protected second period. In Colombia as well, since turnover shows a brief rise (deviating from its secular decline across time) precisely in the period of high protection and depreciated real exchange rate (RER), it would again be difficult to argue that liberalization creates more turnover. The jump in 1991, in the period of new liberalization may represent a new tendency with the re-liberalization, but the data do not permit establishing this with more confidence.

VIII. Entry/Exit Elasticities.

GMM Estimates at the Industry Level.

As section II suggests, no obvious or unique specification is dictated by theory for net employment growth, its components or even less for gross job reallocation. Because we wish to generate results broadly comparable to standard demand elasticities we estimate:

$$NEG_{jt} = b + b_W DW_{jt} + S_t b_t D_t + e_{jt} \qquad \text{For cont. firms}$$

$$NEG_{jt} = a + a_W DW_{jt-1} + S_t a_t D_t + u_{jt} \qquad \text{For BD firms}$$

The rate of growth of employment in sector *j* in period *t* is a function of the log of wages, time varying levels effects that affect all sectors equally – captured by year dummy variables D_t – and a random error term. In the case of entry and exit, we assume that the relevant wages are those that prevailed in *t-1*. As explained above, *NEGjt* is the rate of growth of employment, either due to the expansion and contraction of incumbent firms, or to firm birth and death. Thus,

(Davis and Haltiwanger, 1992) and the UK (Konings, 1995), where GRJ is countercyclical, and similar to Canada, Denmark, Norway and Italy (Garibaldi, 1999).

it can be argued that even if the stock of employment is affected by unobserved heterogeneity, the latter does not affect NEG.

We omit industry output for two reasons. The first is conceptual. For continuing firms, the constant output own wage elasticity has a clear meaning as the measure of ease of substitution among factors, for a given level of production. However, for entering and exiting firms this interpretation makes no sense since, by definition, output is changing with birth and death in a discrete way. The second is that the discussion about increasing elasticities with trade reform is fundamentally about total elasticites, including the effect on scale of production, not just substitution.

Since our units of analysis are industries, there are reasons to believe that wages may be endogenous due to simultaneity and/or to the existence of measurement error. We control for these problems by using a Generalized Method of Moments (GMM) estimator using wages lagged two or more periods as instruments (three or more lags in the case of entry/exit).

For employment growth and wages, three digit industry level averages are employed (86 industries in Chile and 93 in Colombia). Although the Chilean data covers 1979-95, industry identifiers are not available after 1986 so we focus on the earlier period. Because of the need to calculate rates of growth, we lose the first year of data in the two countries. In addition, the two initial years are used only to provide instruments for the potentially endogenous variables.

Tables 3 and 4 present the results. As references, the estimates for continuing firms are consistent with those estimated at the firm level in Fajnzylber and Maloney (2000a): for Chile .30 compared to .37 for blue collars and .21 for white collars; for Colombia .19 compared to .49 for blue collars and .26 for white collars. For entering and exiting firms, Chile shows a wage elasticity of .35 and Colombia .42. Given the fact that perhaps 40% of net job creation is

attributable to entering and exiting firms, the slightly higher own wage elasticities suggest that the impact on workers through this channel is probably of equal importance to the conventionally estimated continuing firm elasticities.

Probit Estimates

A second set of probit regressions on firm exit determinants can be run that exploits the individual firm data. Our interest is to calculate a form of exit-wage elasticity, that is, the impact of 1% cost increase (by means of a wage increase) on the likelihood of a firm going out of business.

$$Prob(g_{it+1}=-2)= d + d_{Wi}DW_{it} + d_{Wj}DW_{jt} + S_t d_t D_t + S_t d_j D_j + e_{it}$$

Where *i* and *j* refer to plants and industries, respectively. We model our dependent variable again in a labor demand framework so as to generate comparable results with other estimates. Time and industry effects are added to control for economy wide and sectoral shocks, and, in the spirit of Davis and Haltiwanger (1992), to isolate idiosyncratic wage effects on firm behavior. Note that since previous wage evidence is not available for new firms and using aggregate wages would simply collapse the problem to the previous industry level exercise, we cannot run the same probit for firm entrance.

The results are presented in tables 5 (Chile) and 6 (Colombia). In general, while time effects are significant, as Davis and Haltiwanger found, they do not explain all exit movements,. The first column of both tables includes only growth rates of plant wage plus the usual time and industry dummies, and the industry wage, W_{jt}. The reason for including the industry wage is that in both cases (with similar coefficients) the individual wage enters *negatively*, counter to what might be predicted, while the industry wage enters of the predicted positive sign. The

reason is suggested by an examination of figures 9 to 12, which follow Troske's (1996) analysis of U.S. firm entry and exit and which show the relationship between relative employment, wages, production and growth across the lifecycle.[9] While firms are growing, their wages tend to grow more rapidly than the industry average while firms approaching death show relative wage declines. This suggests that the individual wage is, in some sense, capturing the nearness to exit of a firm. The industry wage may therefore be the more relevant.

Quantitatively, the estimated elasticities are relatively small. A 10% increase in industry wages causes a 12.2% increase in the exit probability in Chile [10] and a 2.5% increase in Colombia.

IX. Impact of Trade Liberalization on Elasticities

To test for the impact of trade liberalization over time, we interact the wage variable with two types of proxies for openness:

1. *Changes in Regime: (Tariff Rate, Real Exchange Rate)* Using changing tariff or quota regimes has some advantages. As the proliferation of anti-dumping cases testifies, these may still understate the true degree of protection. Since real exchange rate movements also constitute protection, we include them as "regime" variables

[9] Firms characteristics, relative to industries', are regressed on a set of age, or years to exit, year and industry dummy variables. It is worth noting that Chilean and Colombian firms exit manufacturing in these countries at a much larger relative size than American firms (around 0.6 compared to 0.10) and start up relatively larger than their American counterparts (around 0.55 in Colombia, 0.7 in Chile vs. 0.4 in the U.S. In terms of Troske's interpretation, this suggests that the exit process is faster and less severe in Latin America, where sunk capital is apparently less important (so the value of the option of waiting to exit is lower.

[10] Results for the 1980-94 period are reported in table A1: a 10% wage increase causes a 7.1% increase in the exit probability. Note, however, that since we did not have access to industry identifiers after 1986, all plants that entered after this year are excluded from the analysis.

2. *Realized trade flows: (Import Penetration Index, Export content of Production.)* Though seemingly logical measures of increased integration, these measures have two disadvantages. First, theoretically, it is not necessary for trade to actually occur for the domestic agent's behavior to change, the threat is enough (Bhagwati). Hence very small or no observed imports may nonetheless be associated with large changes in industrial structure. Second, customary measures of competition are extremely noisy.

With the exception of the variables that do not have cross-sectional variation (the real exchange rate and Chilean tariffs), the openness variables are included both free standing and as interactive variables on the relevant elasticity.

Industry Results:

In Chile, realized trade flows do not have a significant effect on the wage-elasticity of entering and exiting firms, but they do lead to larger elasticities for incumbent firms. Although the latter evidence is consistent with the hypothesis advanced by Rodrik, the same cannot be said of the impact of exchange rates and tariffs increases. Indeed, these are associated with greater wage elasticities of, respectively, incumbent and entering/exiting firms. In the case of the latter, however, real exchange protection does decrease the responsiveness of employment to wages. As for the effects of the free standing import penetration and export coefficients, only the former appear to be significant, but they have opposite signs in the two samples: imports reduce employment in entering and dying firms but they increase employment by incumbents.

In Colombia the effects of trade openness are relatively similar across the two sets of regressions, but results vary considerably with each specific indicator. Exports increase both the

employment level and, counterintuitively, its wage elasticity. Import penetration has the reverse effect for entering and exiting plants and is not significant in the case of continuing plants. There is also evidence that for continuing firms real exchange rate protection reduces the sensitivity of employment changes to the wage rate, as Rodrik might predict.

Probit Results:

The impacts of the trade related variables on both the firm and industry wage elasticities are ambiguous, although very similar in the two countries. The interactive terms on the industry variables are those relevant for our discussion but they show no clear pattern. In Colombia, raising tariffs does decrease the exit elasticity as predicted although there is no effect in Chile. Neither export share nor import penetration have any effect in either country. In both countries, a depreciation of the exchange rate counterintuitively leads to an increase in exit elasticity. Particularly in this case, however, the movements in real exchange rate, and industry wages may be related through other general equilibrium effects and we may not be measuring protection per se. In sum, there is little evidence that exit elasticities with respect to industry wages are affected by the trade variables.

X. Conclusion

This paper has established that the employment contribution of entering and exiting firms is almost as important as that of continuing firms. Understanding its sensitivity to wage changes therefore merits attention equal to that given to continuing firm wage elasticities. The estimates presented here for Colombia and Chile are surprisingly similar and somewhat higher than

continuing firm elasticities. The effect of trade liberalization offers only ambiguous lessons on the probable impact of trade reform on these elasticities. The data suggest that in Chile higher exchange rate protection does reduce the wage-employment elasticity of entering and exiting plants. However, the opposite effect is found for continuing plants and results are reversed in the case of Colombia. Moreover, in this country, higher import penetration leads to lower elasticities and in Chile, higher tariffs increase it. These findings, combined with very ambiguous results from the probit regressions, suggest that circumspection is warranted in asserting that trade liberalization will lead to higher elasticities.

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Table 1 – Chile (1979-86): Net Employment Growth and Turnover Components

YEAR	Plant Birth (1)	Plant Expansion (2)	Plant Contraction (3)	Plant Death (4)	Total Job Creation (1+2)	Total Job Destruction (3+4)	Net Empl. Growth (1+2-3-4)	Gross Job Reallocation (1+2+3+4)	Share of Jobs in (1+4)	Share GJR due to B+D (1+4)/(1+2+3+4)
1980	2.25	8.85	8.68	8.83	11.10	17.50	-6.40	28.60	5.54	38.73
1981	3.32	6.90	9.45	7.94	10.22	17.40	-7.17	27.62	5.63	40.79
1982	2.29	3.66	17.74	7.14	5.95	24.88	-18.92	30.83	4.71	30.58
1983	4.31	7.89	7.76	6.42	12.21	14.18	-1.97	26.39	5.37	40.69
1984	7.29	11.67	5.27	3.78	18.96	9.04	9.92	28.01	5.53	39.52
1985	2.49	10.81	4.89	1.98	13.30	6.88	6.42	20.18	2.24	22.17
1986	4.48	13.11	4.51	5.04	17.59	9.56	8.03	27.15	4.76	35.09
1987	8.73	13.51	4.44	4.81	22.24	9.24	12.99	31.48	6.77	43.00
1988	4.98	11.04	5.49	4.19	16.02	9.67	6.34	25.69	4.58	35.66
1989	6.01	11.56	5.63	3.75	17.57	9.37	8.20	26.95	4.88	36.21
1990	4.61	8.15	7.26	3.70	12.76	10.96	1.81	23.72	4.16	35.04
1991	4.51	8.80	7.18	2.56	13.31	9.74	3.57	23.05	3.53	30.65
1992	6.12	8.64	5.63	3.54	14.76	9.17	5.58	23.93	4.83	40.35
1993	4.79	7.77	7.03	3.59	12.56	10.62	1.94	23.17	4.19	36.15
1994	3.81	7.29	7.04	3.53	11.10	10.58	0.53	21.68	3.67	33.86
1995	5.54	6.55	7.79	3.89	12.09	11.68	0.41	23.77	4.71	39.66

Source: Authors'calculations based on Chilean Industrial Survey.

Table 2 – Colombia (1977-91): Net Employment Growth and Turnover Components

YEAR	Plant Birth (1)	Plant Expansion (2)	Plant Contraction (3)	Plant Death (4)	Total Job Creation (1+2)	Total Job Destruction (3+4)	Net Empl. Growth (1+2-3-4)	Gross Job Reallocation (1+2+3+4)	Share of Jobs in (1+4)	Share GJR due to B+D (1+4)/(1+2+3+4)
1978	7.86	8.08	5.57	7.68	15.93	13.26	2.68	29.19	7.77	53.23
1979	9.17	7.90	5.48	8.25	17.07	13.73	3.35	30.80	8.71	56.56
1980	6.81	6.14	6.50	6.57	12.96	13.07	-0.11	26.02	6.69	51.42
1981	6.33	5.38	7.67	7.06	11.71	14.72	-3.01	26.44	6.69	50.63
1982	5.16	5.81	9.34	4.17	10.98	13.51	-2.53	24.49	4.67	38.10
1983	4.47	5.62	8.05	5.43	10.09	13.48	-3.39	23.57	4.95	42.03
1984	3.92	6.16	7.17	4.77	10.08	11.94	-1.85	22.02	4.35	39.48
1985	4.85	5.14	9.21	4.66	9.99	13.87	-3.88	23.86	4.75	39.85
1986	6.44	6.67	5.47	5.25	13.11	10.73	2.38	23.84	5.84	49.04
1987	5.19	8.57	4.84	3.11	13.76	7.95	5.81	21.71	4.15	38.25
1988	3.97	6.71	6.76	4.12	10.68	10.88	-0.21	21.56	4.04	37.52
1989	4.32	6.65	5.87	3.25	10.97	9.13	1.85	20.10	3.79	37.70
1990	2.68	6.80	5.77	2.89	9.47	8.65	0.82	18.12	2.78	30.69
1991	3.69	7.39	6.02	4.87	11.08	10.88	0.20	21.96	4.28	38.97

Source: Authors' calculations based on Colombian Industrial Survey.

Table 3: Net Employment Growth, Wages and Trade Openess in Chilean Industries (1982-86)
(standard errors in parenthesis)

	Continuing Plants			Entering and Exiting Plants		
Ln(Wages)	-0.297(*)	-0.166(*)	-0.184(*)	-0.353(***)	-0.296	-0.522
	(0.058)	(0.028)	(0.044)	(0.186)	(0.188)	(0.344)
Ln(Wages)*Real Exchange Rate		-0.0001	-0.001(*)		0.002(***)	0.003
		(0.0001)	(0.0002)		(0.001)	(0.002)
Ln(Wages)*Import Penetration		-0.001(*)			-0.001	
		(0.0002)			(0.001)	
Ln(Wages)*Export Coefficient		-0.001(*)			0.0001	
		(0.0002)			(0.001)	
Ln(Wages)*Tariff Rate			-0.0001			-0.007(***)
			(0.001)			(0.004)
Import penetration		0.006(*)			-0.011(*)	
		(0.001)			(0.004)	
Export Coefficient		-0.0003			0.002	
		(0.0004)			(0.002)	
Constant	-0.170(*)	-0.154(*)	-0.134(*)	0.001	-0.238(***)	-0.393
	(0.012)	(0.013)	(0.015)	(0.039)	(0.145)	(0.296)
Wald Test: p-value(a)		0.000	0.000		0.161	0.196
Sargan Test: p-value	0.107	0.556	0.216	0.606	0.407	0.726
Test for 2nd order Autocorrelation: p-value	0.220	0.314	0.403	0.714	0.499	0.644
No. Of Observations	421	421	421	421	421	421
(Industries)	(86)	(86)	(86)	(86)	(86)	(86)

Notes: GMM estimates with first-differenced data. For entering and exiting firms the log of wages is lagged one period. Time dummies were included but are here omitted. Instruments are second through fifth lags of wages for continuing plants, and third through sixth lags for entering and exiting plants. (*) Significant at the 1% level. (**) Significant at the 5% level. (***) Significant at the 10% level. (a) Wald Test of Joint Significance of the variables constructed as interactives of the log of wages with openness variables.

Table 4: Net Employment Growth, Wages and Trade Openness in Colombian Industries (1980-91)
(standard errors in parenthesis)

	Continuing Plants			Entering and Exiting Plants		
Ln(Wages)	-0.189(*)	-0.253(*)	-0.204(*)	-0.420(*)	-0.251(*)	-0.436(*)
	(0.059)	(0.047)	(0.061)	(0.127)	(0.080)	(0.150)
Ln(Wages)*Real Exchange Rate		0.001(*)	0.001(***)		-0.0004	-0.0003
		(0.0003)	(0.0006)		(0.0004)	(0.001)
Ln(Wages)*Import Penetration		0.0006			0.003(*)	
		(0.0004)			(0.001)	
Ln(Wages)*Export Coefficient		-0.004(*)			-0.002(*)	
		(0.0005)			(0.001)	
Ln(Wages)*Tariff Rate			0.00004			0.001
			(0.001)			(0.001)
Import penetration		-0.002			-0.011(*)	
		(0.001)			(0.003)	
Export Coefficient		0.015(*)			0.007(*)	
		(0.002)			(0.002)	
Tariff Rate			-0.0001			-0.003
			(0.002)			(0.003)
Constant	0.009	0.001	0.005	0.006	-0.009	0.011
	(0.009)	(0.004)	(0.008)	(0.015)	(0.008)	(0.014)
Wald Test: p-value(a)		0.000	0.231		0.000	0.512
Sargan Test: p-value	0.800	0.497	0.809	0.559	0.610	0.693
Test for 2nd order Autocorrelation: p-value	0.945	0.877	0.998	0.736	0.826	0.684
No. Of Observations	1084	1084	1084	1084	1084	1084
(Industries)	(93)	(93)	(93)	(93)	(93)	(93)

Notes: GMM estimates with first-differenced data. For entering and exiting firms the log of wages is lagged one period. Time dummies were included but are here omitted. Instruments are second and third lags of wages for continuing plants, and third and fourth lags for entering and exiting plants. (*) Significant at the 1% level. (**) Significant at the 5% level. (***) Significant at the 10% level. (a) Wald Test of Joint Significance of the variables constructed as interactives of the log of wages with openness variables.

Table 5: Exit Probability, Wages and Trade Openness in Chilean Plants (1980-86)
(marginal effects with standard errors in parenthesis)

Dependent variable: Exit during Following Year			
Ln(Plant Wages)	-0.018(*)	0.180(*)	0.201(*)
	(0.006)	(0.025)	(0.026)
Ln(Industry Wages)	0.113(*)	-0.120	-0.151(**)
	(0.022)	(0.077)	(0.077)
Ln(Plant Wages)*Real Exchange Rate		-0.002(*)	-0.002(*)
		(0.0002)	(0.0002)
Ln(Plant Wages)*Import Penetration		-0.0001	
		(0.0002)	
Ln(Plant Wages)*Export Coefficient		0.0001	
		(0.0002)	
Ln(Plant Wages)*Tariff Rate			0.002(*)
			(0.001)
Ln(Industry Wages)*Real Exchange Rate		0.001(**)	0.002(*)
		(0.0006)	(0.001)
Ln(Industry Wages)*Import Penetration		0.001	
		(0.0004)	
Ln(Industry Wages)*Export Coefficient		0.0001	
		(0.0004)	
Ln(Industry Wages)*Tariff Rate			-0.003 (***)
			(0.002)
Real Exchange Rate		0.008(*)	0.0004
		(0.003)	(0.003)
Import penetration		-0.003	
		(0.002)	
Export Coefficient		-0.001	
		(0.002)	
Tariff Rate			0.009
			(0.007)
Pseudo R^2	0.024	0.031	0.030
Observed Exit Probability	0.093	0.093	0.093
Wald Test: p-value(a)	--	0.096	0.008
No. Of Observations	24694	24694	24694

Notes: Probit estimates with first-differenced data. Heteroskedasticity-robust standard errors (observations assumed independent across plants but not whithin plants). Time and industry dummies were included but are here omitted. (*) Significant at the 1% level. (**) Significant at the 5% level. (***) Significant at the 10% level. (a) Wald Test of Joint Significance of the variables constructed as interactives of the log of industry wages with openness variables.

Table 6: Exit Probability, Wages and Trade Openness in Colombian Plants (1978-90)
(marginal effects with standard errors in parenthesis)

Dependent variable: Exit during Following Year			
Ln(Plant Wages)	-0.034(*)	0.096(*)	0.091(*)
	(0.005)	(0.028)	(0.028)
Ln(Industry Wages)	0.020(***)	-0.073	-0.041
	(0.011)	(0.052)	(0.049)
Ln(Plant Wages)*Real Exchange Rate		-0.001(*)	-0.001(*)
		(0.0002)	(0.0002)
Ln(Plant Wages)*Import Penetration		0.00003	
		(0.0003)	
Ln(Plant Wages)*Export Coefficient		-0.00002	
		(0.0004)	
Ln(Plant Wages)*Tariff Rate			0.0002
			(0.0002)
Ln(Industry Wages)*Real Exchange Rate		0.001(***)	0.001(*)
		(0.0004)	(0.0004)
Ln(Industry Wages)*Import Penetration		0.0001	
		(0.0005)	
Ln(Industry Wages)*Export Coefficient		-0.0001	
		(0.001)	
Ln(Industry Wages)*Tariff Rate			-0.001(*)
			(0.0003)
Real Exchange Rate		-0.0004	-0.001
		(0.001)	(0.001)
Import penetration		-0.0003	
		(0.002)	
Export Coefficient		0.0003	
		(0.002)	
Tariff Rate			0.003(*)
			(0.001)
Pseudo R^2	0.020	0.021	0.021
Observed Exit Probability	0.079	0.079	0.079
Wald Test: p-value(a)	--	0.284	0.001
No. Of Observations	60893	60828	60828

Notes: Probit estimates with first-differenced data. Heteroskedasticity-robust standard errors (observations assumed independent across plants but not whithin plants). Time and industry dummies were included but are here omitted. (*) Significant at the 1% level. (**) Significant at the 5% level. (***) Significant at the 10% level. (a) Wald Test of Joint Significance of the variables constructed as interactives of the log of industry wages with openness variables.

Chile:

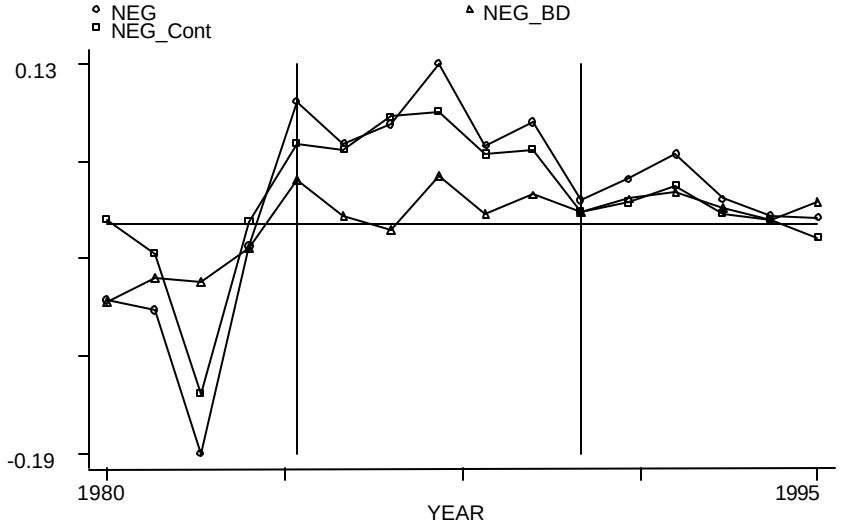


Figure 1: Net Employment Growth

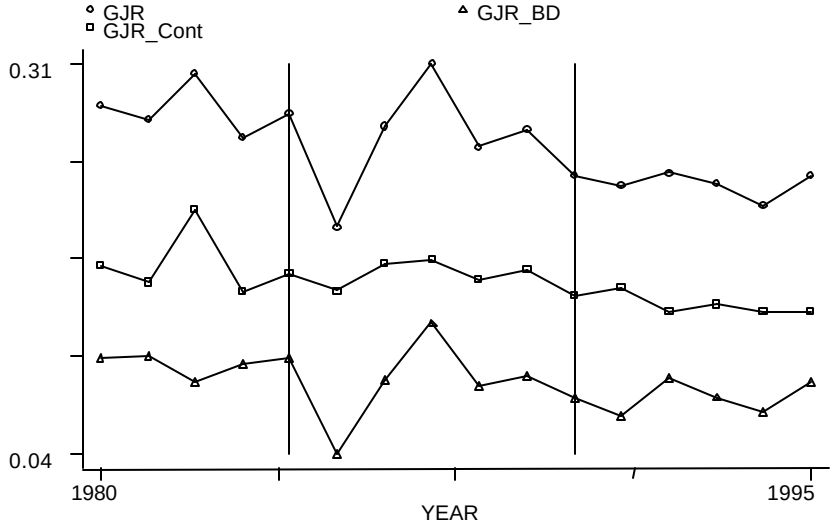


Figure 2: Gross Job Reallocation

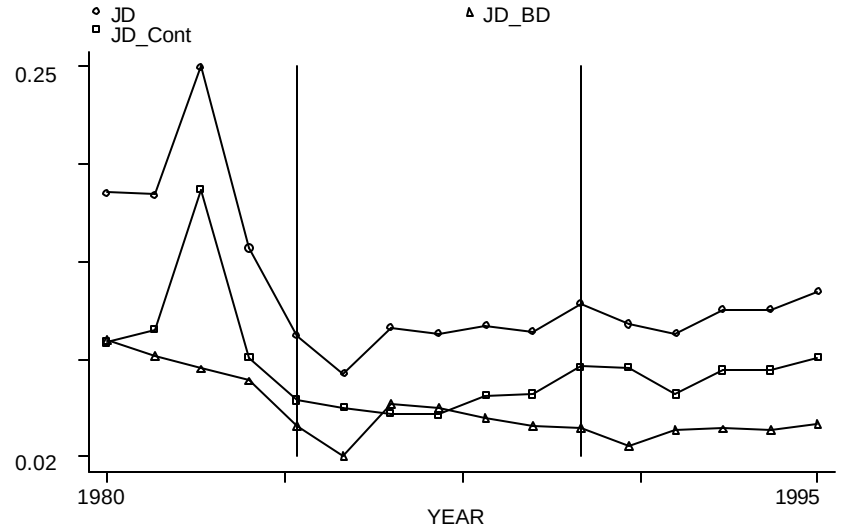


Figure 3: Job Destruction

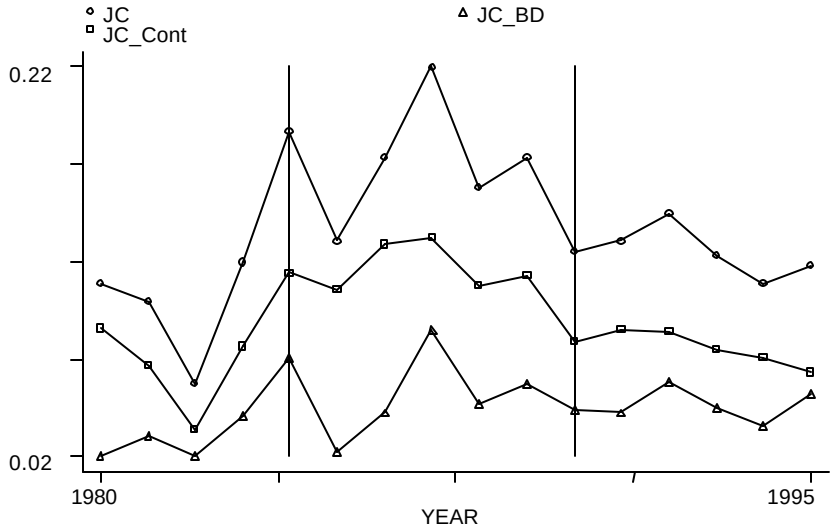


Figure 4: Job Creation

Colombia:

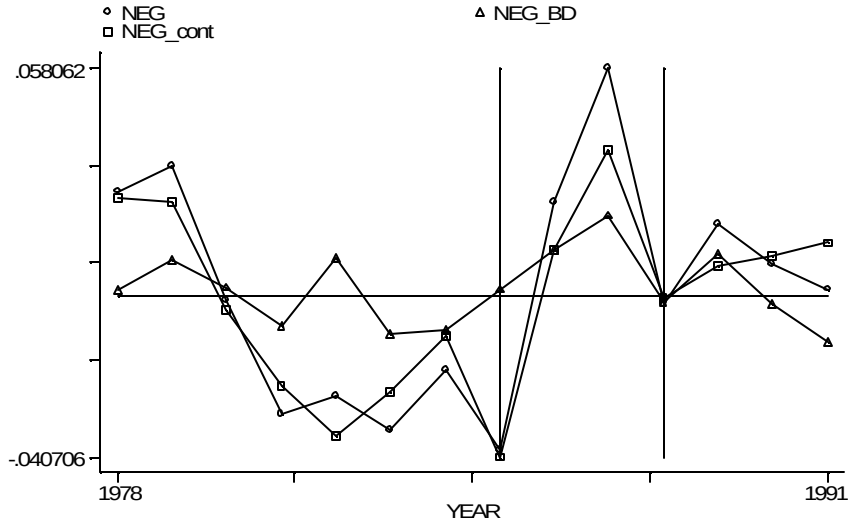


Figure 5: Net Employment Growth

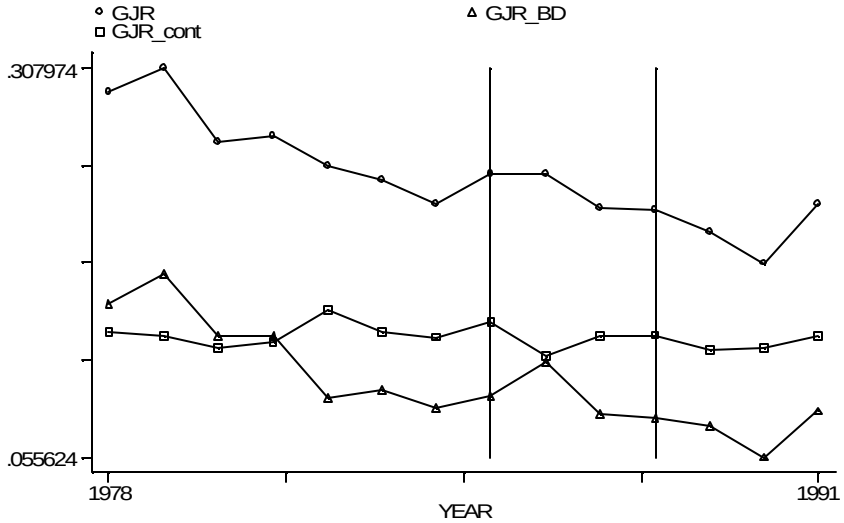


Figure 6: Gross Job Reallocation

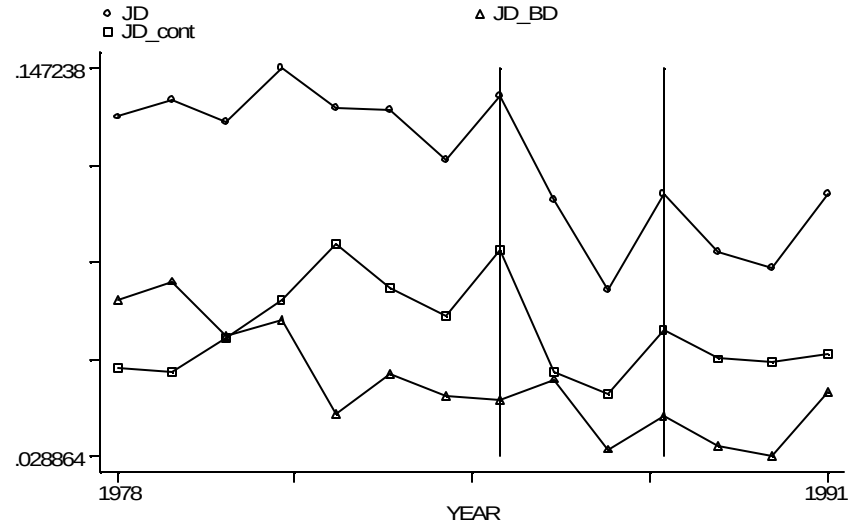


Figure 7: Job Destruction

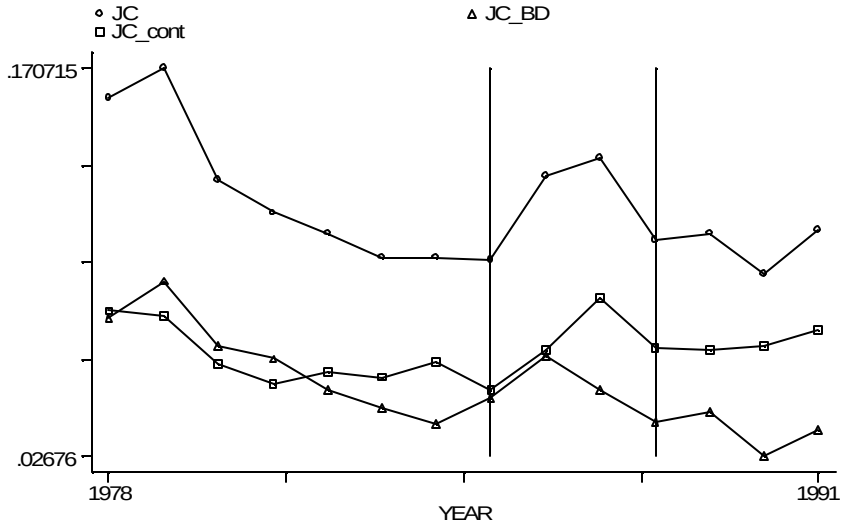
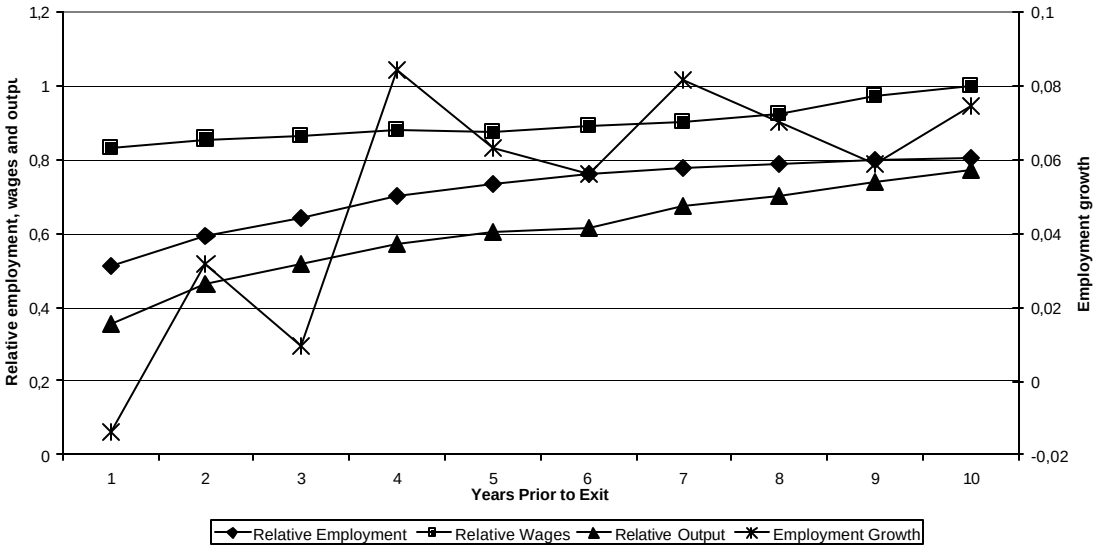


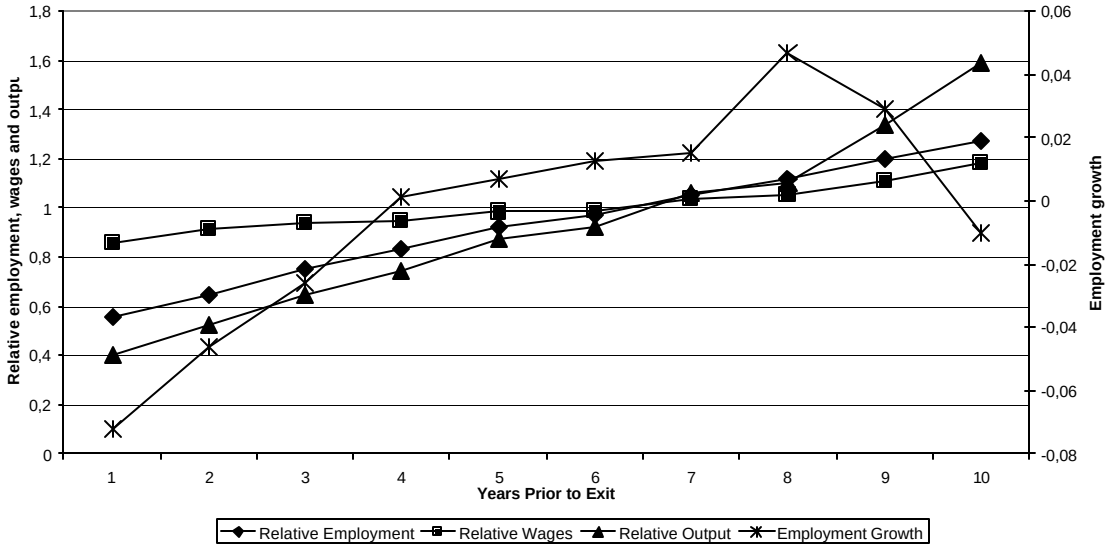
Figure 8: Job Creation

Figure 9: Estimated Relative Employment, Wages, Output and Growth by Years Prior to Exit - Chile (1983-86) (*)

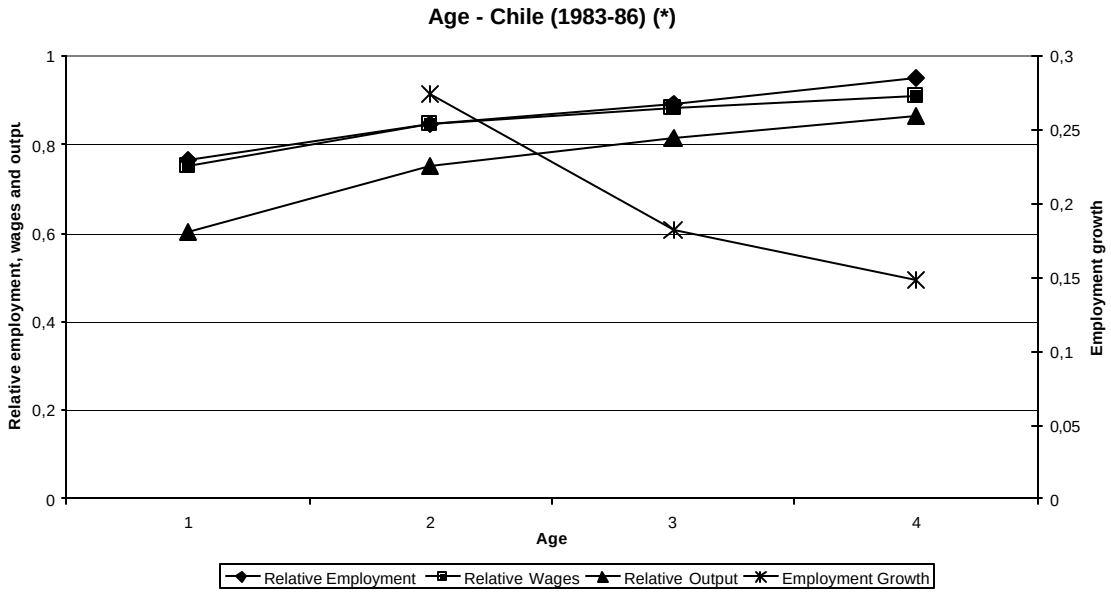


(*) Firms with 10 or more employees that have been in business for at least 4 years.

Figure 10: Estimated Relative Employment, Wages, Output and Growth by Years Prior to Exit - Colombia (1981-90) (*)

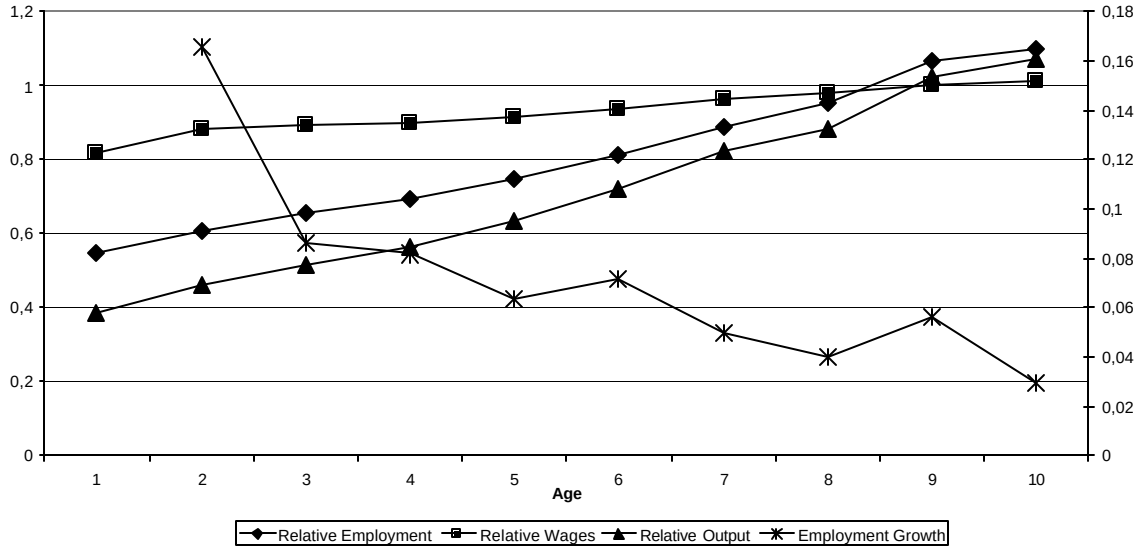


(*) Firms with 10 or more employees that have been in business for at least 4 years.



(*) Continuing firms with 10 or more employees.

Figure 12: Estimated Relative Employment, Wages, Output and Employment Growth by Age - Colombia (1987-90) (*)



(*) Continuing firms with 10 or more employees.

Table A1: Exit Probability, Wages and Trade Openness in Chilean Plants (1980-94)
(marginal effects with standard errors in parenthesis)

Dependent variable: Exit during Following Year			
Ln(Plant Wages)	-0.017(*)	0.109(*)	0.104(*)
	(0.004)	(0.018)	(0.018)
Ln(Industry Wages)	0.052(*)	-0.052	-0.083
	(0.021)	(0.053)	(0.055)
Ln(Plant Wages)*Real Exchange Rate		-0.001(*)	-0.001(*)
		(0.0001)	(0.0001)
Ln(Plant Wages)*Import Penetration		-0.0001	
		(0.0001)	
Ln(Plant Wages)*Export Coefficient		-0.0001	
		(0.0001)	
Ln(Plant Wages)*Tariff Rate			0.002(*)
			(0.0005)
Ln(Industry Wages)*Real Exchange Rate		0.001(**)	0.001(*)
		(0.0004)	(0.0004)
Ln(Industry Wages)*Import Penetration		0.00001	
		(0.0003)	
Ln(Industry Wages)*Export Coefficient		0.0003	
		(0.0003)	
Ln(Industry Wages)*Tariff Rate			0.00004
			(0.001)
Real Exchange Rate		0.001	0.001
		(0.002)	(0.002)
Import penetration		0.001	
		(0.001)	
Export Coefficient		-0.001	
		(0.001)	
Tariff Rate			-0.014(**)
			(0.006)
Pseudo R^2	0.027	0.029	0.030
Observed Exit Probability	0.073	0.073	0.073
Wald Test: p-value(a)	--	0.123	0.033
No. Of Observations	52012	52012	52012

Notes: Probit estimates with first-differenced data. Heteroskedasticity-robust standard errors (observations assumed independent across plants but not whithin plants). Time and industry dummies were included but are here omitted. (*) Significant at the 1% level. (**) Significant at the 5% level. (***) Significant at the 10% level. (a) Wald Test of Joint Significance of the variables constructed as interactives of the log of industry wages with openness variables. Plants whose first entry occurred after 1986 are excluded.