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ABSTRACT

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Cross sectional evidence shows that foreign firms have a more educated workforce and pay higher wages than domestic firms. These results do not necessarily imply that foreign direct investment translates into higher demand for educated workers or higher wages, however, since foreign investment may be guided by unobservable firm-characteristics correlated with the demand for educated workers or wages. Using firm-level panel data for Portugal, I seek to isolate the effect of foreign direct investment on the demand for educated workers and wages by observing labor demand and wages of different education groups before and after the foreign acquisition. I find that foreigners 'cherry pick' domestic firms to be acquired, choosing those firms with a more educated workforce. Moreover, these firms are already very similar to the group of existing foreign firms and, following the foreign acquisition, there are no significant changes in the workforce educational composition. There is evidence that average wages increase following the foreign acquisition but changes are smaller than in cross sectional estimates.

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1. Introduction

Regions and countries in the world compete for foreign investment as this investment is perceived to have several benefits for the host economy (Caves [5]). For example, foreign firms often are associated with a better technology that may "spill" to domestic firms[1]. Moreover, their jobs are perceived to be "good" in the sense that they require more qualifications, offer more training or pay higher wages. These reasons have been used to justify regional or national industrial policy in order to secure this investment.

Existing empirical work comparing foreign and domestic firms has shown that foreign firms have a more educated workforce and pay higher wages than domestic firms. But these findings may at least in part be driven by selection of foreign investment into certain firms or sectors. For example, consider the finding that foreign ownership is associated with higher wages. This may be driven by wages increasing after the foreign acquisition, or by foreigners buying domestic firms that pay above-average wages. In this paper I use data on Portuguese firms to provide evidence on the type of domestic firms bought by foreigners on the one hand, and on the effect of foreign acquisitions on labor demand and wages on the other.

The positive wage premium for foreign firms is a stylized fact in European economies as well as in the US. Feliciano and Lipsey [8], using industry-level data for the US for 1987-1992, find a differential in favor of foreign firms that is larger for services (9-10 percent) than for manufacturing (5-7 percent). For UK manufacturing establishments, Girma *et al* [10] find that foreign firms pay, on average, about 5 percent higher wages than domestic firms, even when sector, establishment size and productivity are controlled for. For Mexico and Venezuela, Aitken *et al* [3] also find higher wages for foreign firms. Conyon *et al* [6] analyze the impact on wages of a foreign acquisition using data at the firm level. They find that after a foreign acquisition average wages increase by more than 3 percent, which suggests that part of the cross section wage premium is due to a causal effect of foreign investment on wages.

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[1]E.g., Dimelis and Louri [7], Haskel *et al* [12] and Aitken *et al* [3] find evidence consistent with positive spillovers to the host economy.

With competitive labor markets, there is no reason for a positive foreign wage premium unless workers or jobs differ in some observable or unobservable characteristics. Observable characteristics may include higher levels of education and more experience or schooling within occupations. An alternative explanation for the foreign wage premium is based on imperfect labor markets. For example, if foreigners incur in higher search costs they may pay more to workers in order to discourage turnover. If foreign firms offer more training[2], have less power with the unions or are more likely to adhere to minimum wages, they may also pay higher wages. Moreover, foreigners could pay higher wages simply because they have higher profitability than domestic firms (rent sharing theories).

In this paper I analyze the Portuguese case as it combines two important features. First, Portugal had a permissive legal framework for the operation of foreign firms that translated into generous amounts of foreign direct investment (FDI) in the late 1980s and 90s[3]. Before becoming an EU member in 1986, the amount of FDI in Portugal had never reached 1 percent of GDP (3.2 percent of total investment) and in the beginning of the 90s this influx had tripled to 3.2 percent (12 percent of total investment in 1990). Second, a comprehensive firm level data set covering the 90s is available. In particular, the firm and its foreign participation can be traced over time, making this data particularly suited for the analysis of FDI on labor demand and wages[4].

One of the relevant topics in the policy debate is the impact of FDI on labor markets and, in particular, on employment and wages of the different educational groups. Recently Mata and Portugal [19] documented that, in Portugal during the 80s, foreign start-ups and foreign acquisitions[5] had a more educated labor force than domestic start-ups. They also find that foreign start-ups and foreign acquisitions pay, on average, higher wages than domestic

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[2]Görg *et al* [11] show that, if foreign firms have a technology intensive in capital goods and requiring more training, workers receive higher wage growth than in domestic firms.

[3]The importance of European Union and OECD as sources of FDI is clear: in 1992, 76% of the FDI came from the EU and 89% from OECD countries.

[4]Abowd *et al* [1] use a matched employer-employee data set for France, very similar to the data used in this paper. They find that firm effects, while important, are not as important as unobservable individual effects in explaining wage variation.

[5]Foreigners may start operating in a country by two different ways: greenfield entry (start-ups) or acquisition of an ongoing firm.

start-ups. However, one of the reasons for this finding might be exactly different workforce educational composition of newly foreign and domestic firms[6]. The most important difference between their work and my paper is that I am interested in identifying the effect of foreign acquisitions on labor demand and wages. Morever, I am also interested in identifying how firms acquired by foreigners differ from the typical domestic firm.

Using data for the period 1991-1998, I start by analyzing differences in workforce educational composition and wage structure between foreign and domestic firms, without making any distinction between foreign acquisitions and existing foreign firms. A large part of the differences are explained by the sector and region composition of foreign firms and, to a lower extent, by other firm and worker characteristics usually unaccounted for due to the lack of data. But even after controlling for these characteristics, significant differences remain in wages and labor demand. For example, in manufacturing, foreign firms have a proportion of low educated workers 7 percentage points lower than domestic firms and pay 15 percent higher wages, even after controlling for region and sector composition as well as size and age of the firm.

My data allows me to identify the group of firms that switch from domestic to foreign ownership during the nineties. Therefore, I can make two contributions to the literature on the effects of foreign firms on the labor market. First, comparing outcomes before and after the foreign acquisitions one can control for firm heterogeneity as it seems likely that some of the unobservable characteristics of the firm do not change over time. Second, comparing the group of acquired firms with the typical domestic firm in the pre-acquisition period, I can assess the extent to which firms acquired by foreigners differ from the typical domestic firm.

One of my main findings is that there exists an important selection effect as foreigners "cherry pick" the domestic firms with a more educated workforce. For example, looking at manufacturing firms that are acquired by foreigners between 1993 and 1996, I find that, two years before the acquisition, they have a proportion of low educated workers 9 percentage points lower than that of domestic firms in the same sector of activity and pay higher wages to

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[6]Machado and Mata [16] using data for Portugal, between 1982 and 1994, found also that foreign firms pay higher wages and that this premium was larger for higher wages.

all education groups (differentials range from 17 percent for the low educated to 39 percent to the high educated). In fact, domestic firms that are acquired between 1993 and 1996, alredy look very similar to existing foreign firms in workforce composition and wage structure. I also find that there are no significant changes in the firm's workforce composition following a foreign acquisition. Wages increase for most of the education groups after the acquisition, even though this increase is smaller than in cross sectional comparisons of domestic and foreign firms.

The plan of the paper is as follows. In the next section, I describe the data used and present some descriptive statistics. Section 3 explains the econometric methodology, presents and discusses the results for the workforce composition. Section 4 presents and discusses the results for the wage structure. Section 5 concludes.

2. Data

2.1. Sample characteristics

The data set used is a survey conducted every year by the Portuguese Ministry of Employment, "Quadros do Pessoal". It is a longitudinal data file matching firms and workers. The data is based on a questionnaire that every firm with wage-earners is legally obliged to fill out[7]. Records are available at the firm and plant level, and have a detailed description of the labor force characteristics.

Among other firm characteristics, the share of equity owned by non-residents is reported. Therefore, for every firm I am able to identify whether the foreign investment is (1) an acquisition of an existing domestic firm, (2) a fully owned subsidiary or (3) a minority or majority holding. I use a 10% threshold of foreign participation to classify a firm as foreign and also to identify ownership changes[8]. Ownership is related to those who make decisions about resources, but the relevant concept for policy purposes is that of control. Measuring

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[7]Public Administration is not included.

[8]If the foreign participation is below 10% it does not give any controlling rights. In majority holdings, foreign parties have the majority of the votes and, therefore, the control of the firm. However, statistics in Table 2 Section 5 show that the choice of a 10% threshold is not restrictive as most of the observations have more than 50% of foreign investment.

control is difficult and, even if a firm acquires more than 50% of the shares of another, it may choose not to exercise its controlling rights. On the other hand, even without majority an owner may have the effective control (McGuckin [21] discusses this issue).

At the worker level, I use information on the education level, sex, age, tenure and hours worked. This information is then aggregated, by education groups, at the firm level. The three education groups used are: low (up to 6 years of schooling), medium (high school and technical courses) and high (bachelor and college degrees). Gross monthly wages are computed summing up monthly earnings as well as other regular and irregular payments. Hourly wages are gross wages divided by total monthly hours worked (including overtime). Firm average wages are computed excluding the extreme values for hourly wages[9]. Throughout the paper I use hourly real wages[10]. The consumer price index comes from National Department of Statistics.

In the regression analysis, the level of aggregation used for region and sector composition was *Nuts*1-region [11] and three digits sector classification[12]. The sample is divided into manufacturing and non-manufacturing.

The selection of firms is done according to the following criteria. First, I identified all the firms that have operated for two consecutive years with 100% domestic capital and that for the next three years register at least 10% of foreign capital. Therefore, while these firms are newly foreign, they existed before under domestic ownership. Second, I restrict the analysis to firms that operated for at least five consecutive years. If the analysis is to be based on the change in ownership, it is important to have information on the firm two years before the acquisition in order to analyze the firm's choices before the ownership change, while the use of the following two years ensure that the firm does not exit immediately after. Even

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[9]Workers with implausibly low earnings (hourly wage lower than 50% of the minimum wage) or implausibly high earnings (irregular payments -like dismissal payments- exceeding twice the other monthly wage components) were excluded from the sample. There were few of these cases.

[10]By using hourly wages I control for differences that may exist beteen foreign and domestic firms with part-time and temporary wokers.

[11]Eurostat divides the european countries into Nuts (Nomenclature of Territorial Units for Statistics). These can vary between Nut 1 to Nut 3, according to the disagregation level. The Nut 1 classification divides Portugal into 5 regions: North, Center, Lisbon Area, Alentejo and Algarve.

[12]Because the national sector classification changed in 1994, I assumed that, between 1991 and 1995, there is no change in sector classification at three digit level by using the firm sector classification in 1995.

though the sample period for identifying foreign acquisitions is 1993-1996, it stretches to 1991-1998, due to these requirements[13]. Third, the sample is restricted to firms with more than 30 employees in every surveyed year. Fourth, the firm must be located in continental Portugal and cannot operate in the primary sector in any surveyed year.

I also selected two groups more: those that remain always under domestic ownership and those that remain always under foreign ownership. They are chosen in such a way that they are as similar as possible to the sample of acquisitions. The group of domestic firms must fulfill the following criteria. First, must operate for at least five consecutive years. Second, during that period can never be foreign participated. Third, must have at least 30 employees in every sampled year. Fourth must be located in continental Portugal and cannot operate in the primary sector[14]. I have also selected firms that throughout the period have always at least 10% of foreign ownership and that satisfy the same requirements as the domestic firms.

In the context of this paper, the usual problem of the non-random exit from the sample (attrition) does not seem to be severe. In Mata and Portugal [19] there is evidence that the survival rates for acquired firms are very high.[15].

2.2. Descriptive statistics

The original data has information for an average of 180 199 firms and of 2 248 076 employees per year, during 1991-1998. The final sample was selected using the criteria explained above, and is an unbalanced panel of 3410 domestic firms, 194 foreign firms and 103 foreign acquisitions of domestic firms. The balance of the panel is given in Table 1[16].

Table 2 characterizes the sample used in several dimensions. Panel 1 analyses the regional

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[13]There are only two firms that fill these requirements and that experienced more than one ownership change.

[14]Sectors with only domestic firms that fill these requirements were excuded from the sample.

[15]They find that after five years of operation more than two thirds and more than four fifths of the foreign greenfield and acquisition entrants are still in operation. This is not the case for the UK, where Girma and Görg [9] find that foreign acquisitions reduce the probability of survival of the plant in the electronics industry.

[16]For some firms the number of observations is less than five years because there are less than 30 workers in the worker's files during that year.

composition of the firms in the sample: more than half of foreign and acquired firms are located in the Lisbon area, 66% and 59%, respectively. The second most preferred region for these two groups is the North of Portugal with shares of 20% and 29%, respectively. These choices resemble those of domestic firms, even though this group is more concentrated in the North than in Lisbon (46% vs 31%). Panel 2 analyses the sector composition of the firms in the sample. More than 50% of the three groups in the sample operate in manufacturing and, within this, the largest concentration of firms is in textiles with 20%, 11% and 16% of domestic, foreign and acquired firms. A significant number of foreign firms are manufactures of chemical products and electrical equipment and manufactures of food, beverages and tobacco. All together, these account for more than 20% of foreign firms. Following textiles, acquired firms are mostly manufactures of food products but they are also quite evenly distributed in all the other manufacturing sectors. Within non-manufacturing, 16% of domestic firms and approximately 22% of foreigners and acquired firms operate in wholesale and retail trade. The remaining foreign firms in non-manufacturing are distributed amongst hotels and restaurants, transport communications, financial intermediation and real estate activities.

Panel 3 presents the distribution of firm size in the sample. Domestic firms have higher proportions in the lowest intervals (30-49 and 50-99 workers) than foreign and acquired firms. As can be seen in Panel 4, most of the firms have more than 15 years old (using as reference 1995). This is in part due to the size constraint that is used in the construction of the sample. Panel 5 characterizes the foreign participation into minority, majority and full control. In manufacturing, more than half of the foreign acquisitions have the full control of the firm, while foreign firms prefer majority stakes. In non-manufacturing, the foreign participation, in both foreign and acquired firms, is preferentially one of full control. Finally, Panel 6 suggests that sector composition explains part of the foreign wage differentials: proportions of firms located in the top highest paid sectors are at least two times larger in foreign owned firms than in domestic firms.

Table 3 computes the means and standard deviations for the proportions of low and high educated workers within each sector of activity for domestic firms in the sample. This

evidence shows that, at the time of the acquisition, foreigners may choose among domestic firms with very different workforce compositions, even within a given region and sector of activity[17].

Table 4 presents the sample means for differences in employment and wage, by education groups, among the three types of firms. All the comparisons refer to firms operating in the same two-digit sector of activity. Column (1) compares foreign and domestic firms. In manufacturing, the share of low educated workers is 9 percentage points lower than that of domestic firms, while the groups of medium and high educated workers have shares 7 percentage points and 3 percentage points higher than those of domestic firms. In non-manufacturing, these differences are even bigger with the share of low educated workers 25 percentage points below, and of medium and high educated workers 13 percentage points and 12 percentage points above that of domestic firms, respectively[18]. This is the first evidence showing that foreign firms have a more educated workforce, both in manufacturing and non-manufacturing, and that these differences are quantitatively important. Also, foreign firms employ on average, 3.5 times and 2.2 times more employees than domestic firms in manufacturing and non-manufacturing, respectively. Given the differences in the educational composition, it is not surprising to find differences in the average wages among domestic and foreign firms. In manufacturing foreign firms pay wages 26 percent higher than domestic firms and in non-manufacturing 55 percent higher. Wage differences by education categories do not vanish, though. Also, the foreign wage premium increases with education. This finding is important, as it shows that the wage differential cannot be entirely explained by differences in the educational workforce composition nor by sector composition of foreign firms, even though region and sector location are important in explaining the wage differentials[19].

Columns (2) and (3) of Table 4, compare acquired with domestic firms two years before and one year after the foreign acquisition, respectively. For example, firms in manufacturing

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[17]For simplicity Table 3 presents the standard deviations within sectors but results also hold within region and sectors.

[18]Statistics in Table A1 in the Appendix show that manufacturing has a less educated workforce and pay, on average, lower wages than non-manufacturing. These wage differences prevail within education groups.

[19]These are unweighted means.

two years before becoming foreign owned have, on average, a share of low educated workers 8 percentage points below that of domestic firms in the same sector. This difference increases to 10 percentage points one year after the acquisition. Differences in non-manufacturing are even larger with the share of low educated workers 21 percentage points below that of domestic firms in the same sector. The magnitude of the wage differences is also large and quantitatively very similar to the ones in column (1). This shows that acquired domestic firms were already very different from the average domestic firm in the same sector of activity before the acquisition both in manufacturing and non-manufacturing. Therefore, acquired firms have a more educated workforce and pay higher wages than domestic firms to all the education groups[20]. The comparison of columns (2) and (3), shows the evolution following the foreign acquisition. Differences in the workforce educational composition increase both in manufacturing and in non-manufacturing. Also, acquired firms in manufacturing do not register any change relatively to the average wages of domestic firms while they increase after the acquisition in non-manufacturing.

Columns (4) and (5) present the comparisons between acquired and foreign firms two years before and one year after the foreign acquisition, respectively. Differences in workforce composition and wages are now much smaller and not statistically significant in manufacturing and non-manufacturing[21]. Relatively to foreign firms, acquired domestic firms have a very similar size in manufacturing and are 50 percent larger in non-manufacturing.

Caves [5] argues that foreign firms have a technological advantage over domestic firms, either generated by the ownership of some intangible assets (e.g. specific technological knowledge, a brand name or superior organizational capabilities) or by a privileged access to external capital markets. If this is the case, we would expect this advantage of foreign over domestic firms to translate into a higher demand for skilled workers on the one hand, and into higher productivity, and therefore higher wages on the other. Descriptive statistics in

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[20]The hypothesis that acquired firms have lower shares of low educated workers and higher shares of medium and high educated workers cannot be rejected in columns (1) to (3). The hypothesis of a positive wage differential for all the education groups is also not rejected.

[21]The hypothesis that acquired firms do not differ from foreign firms in the workforce composition and wages paid is not rejected in columns (4) and (5).

this Section have shown that foreign firms have a more educated workforce and pay higher average wages. The wage premium is in part explained by the higher human capital of foreign firms but that is not all, as differences are still prevalent within each education category. Furthermore, firms that will become acquired in the following two years, have already a more educated workforce and pay higher wages than domestic firms in the same sector of activity. During this period, they already look much more like foreign firms. But, as seen in Table 2, foreign firms tend to be located in the Lisbon area where average wage are higher, and tend to be larger than domestic firms. Worker characteristics may also differ between foreign and domestic firms causing average wages to differ. I turn next to regression analysis where these and other firm and worker characteristics will be taken into account.

3. Labor Demand in Foreign Firms

To analyze the demand of skilled labor, I estimate the following model as a system of seemingly unrelated equations for the three education groups:

$$y_{jt} = \alpha + \beta for_{jt} + Z_{jt}\lambda + \alpha_t + \alpha_r + \alpha_s + \epsilon_{jt} \tag{3.1}$$

y_{jt} is firm j share of workers of one education group at time t. for_{jt} is a dummy variable if firm is foreign owned, therefore, at this stage I do not take into account if a domestic firm will become foreign owned latter on. Z_{jt} a vector of firm characteristics including both a set of dummy variables for the size of firm j at time t (<49 workers, 50-99, 100-499, >500) and a set of dummy variables for the firm age (<5 years, 5-15, >15). Finally, α_t, α_r and α_s are time, region and sector dummy variables, respectively. Because the impact of the explanatory variables on the three education groups (low, medium and high) has to sum up to zero, these restrictions are imposed in the estimation[22]. The year dummies control for economy wide shocks that affect one education group the same in all firms. Differences due to regional location are captured by α_r and differences due to sector composition are captured by α_s.

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[22]This procedure is standard in the literature estimating demand equations as the shares of expenditure in different goods must sum up to one.

Table 5 presents the results of estimating equation (3.1) by least squares. Reported standard errors assume that disturbances are independently distributed across firms. Estimates show significant differences in workforce educational composition. In manufacturing, the share of medium and high educated workers are 5 percentage points and 2 percentage points above that in domestic firms, respectively. These differences are larger in non-manufacturing, with the shares of medium educated and high educated workers 6 percentage points and 9 percentage points above that in domestic firms[23].

But these cross sectional findings may at least in part be driven by selection of foreign investment into certain firms or sectors with a more skilled workforce. By estimating the same model within two-digit sectors of activity I rule out the second hypothesis of sector selection. Table A2 in the Appendix shows that foreign firms have a more educated workforce in all two-digit sectors and, in the few exceptions, differences in the workforce composition of foreign and domestic firms are not statistically significant[24].

However, findings in Table 4 had already suggested that part of the positive correlation between foreign ownership and demand for skills is driven by foreigners buying domestic firms with a more educated workforce. To test this argument I reestimate equation (3.1) on the sample of acquired and existing foreign firms. Results in Table 6 show that in manufacturing, the workforce composition in the sample of acquired firms does not differ from the group of existing foreign firms. In non-manufacturing acquired firms have a workforce composition slightly less educated than existing foreign firms[25] but still magnitudes are much smaller than in Table 5.

In sum, the workforce composition of acquired domestic firms is very different from the typical domestic firm in the same region and sector of activity and is very similar to that of existing foreign firms. Together this evidence demonstrates the selection in the group of

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[23]To allow for differentiated impacts on the labor market outcomes according to the percentage of foreign capital, I also estimate a different specification with dummy variables for minority, majority and full foreign ownership. Still, foreign firms have a more educated workforce at for all groups and results are not statistically different between majority and full ownership.

[24]Sectors where the differences between foreign and domestic firms are highest include the wholesale and retail trade, transport and communication as well as real estate (all non-manufacturing sectors).

[25]Share of low educated workers is, on average, 3 percentage points higher and share of high educated workers 4 percenatge points lower in acquired firms that in existing foreign firms.

acquired domestic firms.

3.1. The Sample of Foreign Acquisitions

One way to control for the unobservable characteristics that might explain the differences between foreign and domestic firms is by comparing the period before and after the acquisition for those firms that are acquired by foreigners. This sample, by construction, controls for part of the firm heterogeneity as it is the same firm changing ownership, and several things remain constant before and after the acquisition. For example, with information on acquisitions it is possible to know if the foreigners increase the demand for education or if they already buy firms with the closest structure possible to theirs. To disentangle these effects, the following model is estimated for the sample of acquisitions and foreign owned firms:

$$y_{jt} = \eta_j + \beta for_{jt} + Z_{jt}\lambda + \alpha_t + \alpha_r + \alpha_s + \epsilon_{jt} \tag{3.2}$$

where for_{jt}, is a dummy variable if firm j is foreign owned. The fixed effect, η_j, summarizes the impact of permanent differences among firms in observed and unobserved characteristics affecting the outcome y_{jt}. The remaining variables have the same notation as above[26]. Finally, the error term, ϵ_{jt}, is assumed to be uncorrelated across firms and time. The parameters in equation (3.2) are estimated, including the fixed effects, by least squares. Thus, no matter how the firm's permanent characteristics are related to the acquisition, the estimates of this effect are unbiased.

This estimation approach generalizes the differences in differences technique. The need for including another group of firms in the regression is made clear in Meyer [20]. Comparing an outcome before and after the acquisition is not sufficient because it could also be affected by other factors which are contemporaneous with the acquisition. Assuming that shocks contemporaneous to the acquisition affect acquired and the control firms in the same way, the coefficient on foreign ownership variable would be an unbiased estimator of the impact

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[26]Region and sector dummies are identified because there are switchers in these categories. However, empirical findings do not depend upon their inclusion.

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of ownership change.

The main problem of applying this research design in this sample, is that it is not appropriate when the two groups being compared are very different already during the pre-acquisition period. As suggested by the descriptive statistics of Table 4 in Section 2.2 and also by regression results in Table 6, acquired and foreign firms are very similar with respect to their workforce composition. Therefore, to analyze changes in labor market outcomes following the foreign acquisition, I compare acquired firms with other foreign owned firms, as these are a better counterfactual than domestic firms. The important issue is to establish what would have happened to the firm had it not been acquired by foreigners. By using this group it is less likely that estimates are biased due to the selection.

Table 7 presents the results of estimating equation (3.2) using as control group foreign firms. Following the acquisition, there are no significant changes in the workforce educational composition of acquired domestic firms. The only significant change is for the group of low educated workers in manufacturing, whose share falls by 1 percentage point following the acquisition[27]. Table A4 in the Appendix shows that there is no evidence for significant changes following the acquisition in the size of acquired firms in manufacturing. Therefore, this decrease in the share of low educated workers is reflecting a decrease in the absolute number of low educated workers working in these firms. However, for non-manufacturing the number of employees increases by 25 percent and 27 percent, by the second and third year following the acquisition and, therefore, the number of low educated must increase accordingly.

However, specification (3.2) is restrictive as it estimates an average effect following the acquisition, and restricts the impact to be zero in the years before the acquisition. Figures 1 and 2 plot the coefficients of estimating equation (3.2), allowing for a more flexible specification of the impact of the acquisition. I allow the acquisition to affect the workforce composition up to four years before and after the acquisition year[28]. Because the panel is unbalanced and firm fixed effects are included, the acquisition year is the reference year and

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[27]The results would still hold with a less narrow sector classification.

[28]Jacobson *et al* [14] use a similar methodology to identify the earnings losses of displaced workers.

all the coefficients are interpreted as percentage points differences with respect to this year. This specification is informative as there might be anticipating effects that would not be captured by the previous specification. In manufacturing, there is a negative trend in the proportions of low educated workers and an increasing trend in the proportions of medium and high following the acquisition, even though coefficients are not significantly different from zero. Specially in the third year following the acquisition there is evidence of quantitatively important changes[29]. In non-manufacturing the share of low educated workers also has a negative trend that is accompanied by an increase in the share of the medium educated. These changes start three years before the acquisition and, again, are not statistically different from zero.

In sum, if foreigners choose to enter a market by acquiring an ongoing domestic firm, they may look for a firm where they need to make adjustments in the workforce composition or they may target a firm whose workforce composition is close to the desired level. Evidence in Table 3 has already shown that both strategies are possible. However, my findings show that, foreigners choose this second option as there is no significant adjustment in the workforce composition following the acquisition. This seems a reasonable strategy in the presence of important hiring and firing costs in the labor market.

But even though there is almost no change in the workforce composition of these firms, it might be that, relatively to the group of domestic firms, foreigners demand a more educated workforce. To evaluate this, I compare the group of acquired domestic firms with the group of domestic firms to see how the differences evolve over time. Again, for the workforce composition the model is estimated as a system of seemingly unrelated equations for the three education groups:

$$y_{jt} - \widetilde{y}_{st} = \eta_j + \beta for_{jt} + \alpha_r + \epsilon_{jt} \tag{3.3}$$

where $\widetilde{y}_{st}$ is the average proportion of each education group in sector s at time t, therefore the explained variable is now the difference between the workforce of a given education group

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[29]The share of low educated workers falls by 2.7 percentage points and the share of medium educated by 1.9 percentage points.

in firm j at time t and the corresponding average for the two-digit sector in the same year[30].

Table 8, presents the results of estimating equation (3.3) by least squares[31]. For the low educated workers in manufacturing the estimates imply that, the difference in the share of low educated workers between acquired and domestic firms falls by 2.6 percentage points following the acquisition. The gap in workforce composition between acquired and domestic firms increases, on average, following the acquisition for all the education groups. In manufacturing, part of this difference is explained by the decrease in the share of low educated workers in acquired firms, while the remaining effect is driven by the shift towards the low educated in domestic firms[32]. During this period, domestic firms also decrease their share of both medium and high educated leading to an increase in the gap of these two education groups by 1.5 and 1.1 percentage points, respectively. In non-manufacturing there is also an increase in the gap of low and high educated workers by 2.2 and 1.9 percentage points. This increase is also driven by the shift away from more educated workers in domestic firms.

Therefore, even though in the short run, foreigners do not contribute to an increase in the demand of education, at least they do not contribute to the "de-skilling" of the economy.

4. Wages in Foreign Firms

To analyze the differences in the wage structure the following model is estimated, pooling the three education groups:

$$w_{jtk} = \alpha + \beta_k for_{jt} + Z_{jt}\lambda + X_{jtk}\gamma + \alpha_t + \alpha_r + \alpha_s + \epsilon_{jtk} \qquad (4.1)$$

w stands for logarithm of real hourly wages. X_{jtk} is a vector of worker level characteristics including a set of dummy variables for the average experience with the firm (tenure) of workers in the kth group (<2 years, 2-5, 5-10, >10) and a set of dummy variables for the average age of workers in the kth group (<25 years, 25-34, 35-50, >50). The rationale for including the size of the firm on the wage equation is that foreign firms are, on average, larger, and some theories argue that larger firms pay more, either because efficiency wage

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[30]I use sectors at two-digit level because otherwise there would be few domestic firms on each cell.

[31]Again, the inclusion of the region effects does not affect the results.

[32]The results are robust to the inclusion of a control group of existing foreign firms as in Table 7.

theory is more effective when there is higher probability of long term relations, or because it is a compensating differential (a more dependable production process increases the cost of shirking). Whether one considers size as an explanation for wage differences depends on the propose of the analysis[33].

Table 9 presents the results of estimating equation (4.1) by least squares. Each observation is weighted by the number of workers in each education group. Foreign firms pay wages, on average, approximately 15 percent higher than domestic firms in manufacturing and non-manufacturing. The sector and region location of foreign firms are important in explaining these differentials. Without controlling for them, the wage differentials in foreign firms would have been 25 percent and 21 percent in manufacturing and non-manufacturing, respectively.

Table 9 also reports the coefficients for other variables of interest. In manufacturing, larger and younger firms pay higher wages. Wages also increase with the average age of the workforce and the number of years of experience in the firm. For non-manufacturing, wages are also higher in firms with more than 100 workers and where the workforce has more experience in the firm.

Firm size, measured by total employment, is important for explaining wage differences in manufacturing[34]. Large firms pay higher wages and because foreign firms are more than three times larger than domestic firms, the wage differential would have been 20 percent higher, not accounting for this characteristic. Worker's characteristics like age and tenure on the firm are important in explaining wage differences only in non-manufacturing. Not accounting for them would imply wage differentials 18 percent higher. Controlling for the age of the firm has a small effect on the wage differentials of non-manufacturing (3 percent increase) and no effect in manufacturing.

Table 10 allows the returns to education to vary by education groups. Results show that differences between foreign and domestic firms remain quantitatively important and

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[33]For a judgement about the labor market impacts of FDI, the relevance of size is not clear. If a host country wants to decide about the desirability of FDI it does not matter if the country benefits from size or foreignness.

[34]This finding has also been found in Feliciano and Lipsey[8] for US plants.

statistically significant for the education groups. The foreign wage premium is also higher for those workers with more than six years of schooling. In other words, results suggest that controlling for observable firm and worker's characteristics explains part of the wage differential but that they fail to explain fully the foreign wage premium.

By restricting the sample to the acquired and existing foreign firms I can assess the extent to which acquired firms differ from existent foreign firms. For example, in Table 11, the coefficient for low educated workers in manufactures means that, on average, acquired domestic firms pay 2 percent higher wages than existing foreign owned firms. Results show no significant differences between these two groups of firms for both manufacturing and non-manufacturing. Again, this finding reinforces what Table 4 had already suggested: the wage structure of acquired domestic firms is very different from the typical domestic firm operating in the same sector and is identical to that of existing foreign firms.

4.1. The Sample of Foreign Acquisitions

A similar methodology is applied to study the wage structure for the sample of acquired domestic firms:

$$w_{jtk} = \eta_j + \beta_k for_{jt} + Z_{jt}\lambda + X_{jtk}\gamma + \alpha_t + \alpha_r + \alpha_s + \epsilon_{jtk} \qquad (4.2)$$

where all the notation is as above.

Table 12 presents the results of estimating equation (4.2), including the firm fixed effects, by least squares. In manufacturing, low and high educated workers register increases in wages following the acquisition of 3.3 percent and 10 percent, respectively. In non-manufacturing, the low educated in non-manufacturing, register an increase in wages of 7 percent, while for the other groups estimates are not statistically significant. One possible reason for the observed increase in wages, is that the domestic firms are acquired because they have low productivity and, therefore, lower wages. If this happens to be the case, this increase in wages could be just signalling this improvement following the acquisition. A shortcome of the data set used is that it is not possible to identify changes in ownership among firms in the control group. If this happens to be the case, this increase in wages cannot be interpreted as

an effect of foreign ownership but instead it would be solely due to the change in ownership itself. So, if anything, this wage changes are still over estimated and provide an upper bound for the effect of the foreign acquisition. However, these estimates are smaller than the cross section estimates of Table 10.

Table 13 presents the results of the evolution in the wage gap between acquired and domestic firms following the acquisition. For example, for the low educated the difference in wages between acquired and domestic firms increases, on average, by 4 percentage points following the acquisition. Results show that the acquisition is associated with an increase in the wage gap between acquired and domestic firms, except for the high educated workers whose wage difference towards domestic firms becomes smaller both in manufacturing and non-manufacturing. The increase in the wage gap for low and medium educated workers varies between 3 percentage points and 6 percentage points.

Overall, evidence is consistent with acquired domestic firms in manufacturing paying higher wages than domestic firms in the years before the acquisition and, in this sense, workers are already being differently valued than in domestic firms in the same sector of activity. If the foreign valued the high educated more than domestic firms, we would expect their wage gap to increase further following the acquisition and this is not the case both in manufacturing and non-manufacturing.

5. Conclusion

This paper investigates the impact of foreign acquisitions on the labor market of the host economy using a unique data set for Portugal. Existing empirical evidence for European countries is scarce and, apart from evidence for the UK, not much is known about the impact of foreign acquisitions on the labor markets. Portugal is an interesting case, as in the late 1980s and 90s there was a permissive legal framework for the operation of foreign firms that translated into generous amounts of FDI.

My three main findings are the following. First, I show that foreign firms have a more educated workforce and pay higher wages for all education groups even after accounting for

the sector and region composition as well as other firm and worker level characteristics usually not accounted for due to lack of data. Second, I find evidence of an important selection effect as foreigners "cherry pick" domestic firms acquired. Regarding labor demand, foreigners buy domestic firms that look identical to the typical foreign owned firm in manufacturing; in non-manufacturing, firms bought by foreigners have a slightly less educated workforce than the typical foreign firm. Acquired domestic firms are identical to existing foreign firms in the wage structure, both in manufacturing and non-manufacturing. My third finding, related to the first and the second, is that heterogeneity at the firm level is very important for explaining differences in the labor market outcomes between foreign and domestic firms. In fact, there are no significant changes in the workforce composition following a foreign acquisition and, while wages increase for most of the education groups, these changes are smaller than the cross sectional estimates.

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Table1:
Balance of the Panel (by ownership type)

Number of time series	Domestic firms	Foreign firms	Acquisitions
3	22	0	0
4	15	1	0
5	32	3	2
6	24	3	9
7	29	1	40
8	3288	186	52
Total	**3410**	**194**	**103**
Manufactures	2490	113	60
Non-manufactures	920	81	43
# observations			
Manufacturing	59151	2661	1356
Non-manufacturing	21660	1935	924

Source: "Quadros de Pessoal"

Table 2: Characterization of the Panel (by ownership type)

	Domestic firms	Foreign firms	Acquisitions
2.1 Region			
North	46%	20%	29%
Center	20%	9%	10%
Lisbon Area	31%	66%	59%
Alentejo	2%	1%	2%
Algarve	2%	4%	0%

2.2 Sector	% by ownership type		
D. Manufacturing	63%	55%	52%
DA. Food products, beverages and tabacco	7%	6%	8%
DB. Textiles and textile products	20%	11%	16%
DC. Leather and leather products	5%	2%	4%
DD. Wood and wood products	3%	2%	2%
DE. Pulp, paper and paper products	3%	2%	3%
DG. Chemicals and chemical products	1%	9%	4%
DH. Rubber and plastic products	2%	1%	3%
DI. Other non-metallic mineral products	6%	4%	3%
DJ. Basic metals and fabricated metal products	6%	4%	4%
DK. Machinary and equipment n.e.c.	4%	5%	2%
DL. Electrical and optical equipment	1%	7%	3%
DM. Transport equipment	2%	3%	4%
DN. Miscellaneous manufacturing n.e.c	3%	2%	2%
E. Electricity, gas and water supply	0%	1%	0%
F. Construction	10%	3%	3%
G. Wholesale and retail trade Repair motor vehicles and personal goods	16%	22%	22%
H. Hotels and restaurants	4%	6%	3%
I. Transport, storage and communication	4%	4%	6%
J. Finantial Intermediation	1%	4%	5%
K. Real estate, renting and business activities	3%	7%	8%

2.3 Size (# workers)			
A. Manufacturing			
30-49	27%	7%	2%
50-99	41%	23%	22%
100-499	29%	52%	66%
>500	3%	18%	10%
B. Non-manufacturing			
30-49	31%	13%	16%
50-99	40%	25%	23%
100-499	25%	55%	54%
>500	3%	8%	7%

Note: Statistics are computed in year 1995.

Table 2 - Continued.

	Domestic firms	Foreign firms	Acquisitions
2.4 Age of the firm (years)			
A. Manufacturing			
<5	2%	2%	8%
5-15	33%	29%	34%
>15	65%	69%	58%
B. Non-manufacturing			
<5	3%	3%	7%
5-15	23%	35%	33%
>15	74%	63%	60%
2.5 Percentage foreign capital			
A. Manufacturing			
10%-50%	-	12%	15%
50%-99%	-	50%	25%
100%	-	37%	60%
B. Non-manufacturing			
10%-50%	-	2%	18%
50%-99%	-	43%	22%
100%	-	55%	59%
2.6 Firms in the Top 5 highest paid sectors			
A. Manufacturing*			
Low educated	8%	24%	12%
High educated	8%	23%	15%
B. Non-manufacturing**			
Low educated	6%	15%	19%
High educated	4%	8%	11%

Source: "Quadros de Pessoal"

Notes:

(1) Statistics are computed in year 1995.

(2) Ownership structure is an average over the period.

(*) The top 5 highest paid sectors for low educated workers are chemicals, electricity, paper products,

electrical equipment and machinery. The top 5 highest paid sectors for high educated workers are

chemicals, electrical equipment, basic metals and transport eq.

(**) The top 5 highest paid sectors for low and high educated workers are real estate, finantial intermediation

and transports

Table 3 : Diversity in Workforce Composition for Domestic Firms

	Mean		Standard Deviation	
	Low	High	Low	High
D. Manufacturing				
DA. Food products, beverages and tabacco	0.81	0.03	0.14	0.05
DB. Textiles and textile products	0.87	0.01	0.14	0.04
DC. Leather and leather products	0.88	0.01	0.14	0.02
DD. Wood and wood products	0.84	0.02	0.16	0.03
DE. Pulp, paper and paper products	0.66	0.05	0.22	0.08
DG. Chemicals and chemical products	0.58	0.09	0.20	0.08
DH. Rubber and plastic products	0.74	0.04	0.17	0.06
DI. Other non-metallic mineral products	0.81	0.02	0.17	0.05
DJ. Basic metals and fabricated metal products	0.78	0.03	0.16	0.06
DK. Machinary and equipment n.e.c.	0.68	0.04	0.20	0.05
DL. Electrical and optical equipment	0.62	0.05	0.15	0.04
DM. Transport equipment	0.80	0.03	0.11	0.03
DN. Miscellaneous manufacturing n.e.c	0.85	0.02	0.12	0.04
F. Construction	0.80	0.04	0.18	0.06
G. Wholesale and retail trade	0.59	0.04	0.21	0.07
Repair motor vehicles and personal goods				
H. Hotels and restaurants	0.74	0.02	0.17	0.04
I. Transport, storage and communication	0.73	0.03	0.26	0.05
J. Finantial Intermediation	0.15	0.19	0.12	0.16
K. Real estate, renting and business activities	0.52	0.12	0.35	0.19

Source: "Quadros de Pessoal"

Table 4:
Sample means, by education groups, of employment
and wage differences between acquired, domestic and foreign firms

A. Manufacturing

	Foreign vs Domestic	Acquisitions vs Domestic		Acquisitions vs Foreign	
		Before	After	Before	After
	(1)	(2)	(3)	(4)	(5)
Share Low	-0.09	-0.08	-0.10	0.01	-0.02
	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)
Share Medium	0.07	0.08	0.08	0.01	0.02
	(0.00)	(0.02)	(0.02)	(0.01)	(0.01)
Share High	0.03	0.02	0.03	0.00	0.00
	(0.00)	(0.01)	(0.01)	(0.05)	(0.04)
Emplyment (Ratio)	3.54	0.96	2.04	0.96	1.02
	(0.24)	(0.25)	(0.25)	(0.14)	(0.14)
Av. Wage	0.30	0.26	0.26	-0.03	0.01
	(0.01)	(0.05)	(0.04)	(0.04)	(0.04)
Wage Low	0.24	0.18	0.18	-0.04	-0.01
	(0.01)	(0.05)	(0.04)	(0.04)	(0.04)
Wage Medium	0.24	0.24	0.24	0.03	0.05
	(0.01)	(0.05)	(0.04)	(0.05)	(0.06)
Wage High	0.46	0.43	0.50	-0.04	0.11
	(0.01)	(0.08)	(0.05)	(0.04)	(0.04)

B. Non-manufacturing

	Foreign vs Domestic	Acquisitions vs Domestic		Acquisitions vs Foreign	
		Before	After	Before	After
	(1)	(2)	(3)	(4)	(5)
Share Low	-0.25	-0.21	-0.24	0.02	0.02
	(0.01)	(0.04)	(0.04)	(0.03)	(0.03)
Share Medium	0.13	0.18	0.17	0.03	0.04
	(0.01)	(0.03)	(0.03)	(0.03)	(0.03)
Share High	0.12	0.05	0.07	-0.04	-0.05
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Emplyment (Ratio)	2.27	1.89	1.82	1.44	1.49
	(0.15)	(0.62)	(0.44)	(0.74)	(0.77)
Av. Wage	0.55	0.41	0.45	-0.09	-0.09
	(0.02)	(0.06)	(0.06)	(0.05)	(0.06)
Wage Low	0.39	0.33	0.39	-0.02	0.01
	(0.02)	(0.07)	(0.06)	(0.06)	(0.05)
Wage Medium	0.47	0.33	0.34	-0.10	-0.10
	(0.01)	(0.06)	(0.06)	(0.05)	(0.05)
Wage High	0.48	0.49	0.42	0.04	-0.04
	(0.02)	(0.08)	(0.10)	(0.07)	(0.10)

Source: "Quadros de Pessoal"

Notes:

1. Wage refers to log of real hourly wage and labor productivity to log of sales per employee.

2. Standard Errors in parenthesis.

3. Statistics are computed relatively to the 2-digit sector means.

4. "Before" and "After" refer to two years before and one year after the acquisition year, respectively.

5. Wage statistics are not weighted.

Table 5: Differences in Workforce
Composition Between Foreign and Domestic Firms

	Manufacturing			Non-Manufacturing		
	Low	Medium	High	Low	Medium	High
Foreign ownership	-0.07	0.05	0.02	-0.15	0.06	0.09
	[0.004]***	[0.003]***	[0.002]***	[0.01]***	[0.01]***	[0.00]***
Firm size:						
50-99	-0.01	0.01	0.00	-0.03	0.03	0.00
	[0.002]***	[0.002]***	[0.001]***	[0.00]***	[0.00]***	[0.00]
100-499	-0.02	0.01	0.01	-0.04	0.03	0.01
	[0.002]***	[0.002]***	[0.001]***	[0.01]***	[0.00]***	[0.00]***
>500	-0.02	0.02	0.01	-0.05	0.05	0.00
	[0.005]***	[0.004]***	[0.002]***	[0.01]***	[0.01]***	[0.01]
Age firm:						
5-15 years	0.02	-0.01	-0.01	0.01	0.00	-0.01
	[0.004]***	[0.003]***	[0.002]***	[0.01]	[0.01]	[0.00]***
>15years	0.04	-0.03	-0.01	0.07	-0.05	-0.02
	[0.004]***	[0.003]***	[0.002]***	[0.01]***	[0.01]***	[0.00]***
Region Controls	Y	Y	Y	Y	Y	Y
Sector Controls	Y	Y	Y	Y	Y	Y
Year Controls	Y	Y	Y	Y	Y	Y
Adj. R square	0.32	0.40	0.21	0.59	0.49	0.48
Observations	21249	21249	21249	8344	8344	8344

Notes:

(1) Standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%

(2) The coefficients are obtained by estimating the three equations as a system of seemgly unrelated equations.

(3) The test that coefficients of size, cohort , region and year are the same for Manufacturing

and Non-manufacturing is not acepted .

Table 6 : Differences in Workforce Composition
Between Acquired and Foreign Firms

	Manufacturing			Non-Manufacturing		
	Low	Medium	High	Low	Medium	High
Foreign ownership	-0.003	0.004	-0.001	0.027	0.014	-0.041
	[0.008]	[0.007]	[0.004]	[0.012]**	[0.011]	[0.009]***
Region Controls	Y	Y	Y	Y	Y	Y
Sector Controls	Y	Y	Y	Y	Y	Y
Year Controls	Y	Y	Y	Y	Y	Y
Adj. R square	0.67	0.67	0.51	0.62	0.55	0.56
Observations	1345	1345	1345	967	967	967

Notes:

(1) Standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%

(2) The coefficients are obtained by estimating the three equations as a system of seemgly unrelated equations.

(3) Age Cohort and Size of the firm included.

(4) The test that coefficients of size, cohort , region and year are the same for Manufacturing

and Non-manufacturing is not acepted.

Table 7: Evolution of the Workforce Educational
Composition Following the Acquisition

	Manufacturing			Non-Manufacturing		
	Low	Medium	High	Low	Medium	High
Foreign ownership	-0.012	0.006	0.007	-0.010	0.010	0.000
	[0.007]*	[0.006]	[0.004]	[0.01]	[0.01]	[0.01]
Region Controls	Y	Y	Y	Y	Y	Y
Sector Controls	Y	Y	Y	Y	Y	Y
Year Controls	Y	Y	Y	Y	Y	Y
Adj. R square	0.85	0.86	0.74	0.94	0.88	0.88
Observations	1345	1345	1345	967	967	967

Notes:

(1) Standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%

(2) The coefficients are obtained by estimating the three equations as a system of seemgly unrelated equations.

(3) Age Cohort and Size of the firm included.

(4) Firm fixed effects included.

(5) The test that models are the same for Manufacturing and Non-manufacturing is not acepted.

Table 8: Change in Worforce Composition
Between Acquired and Domestic Firms Following the Acquisition

	Manufacturing			Non-Manufacturing		
	Low	Medium	High	Low	Medium	High
Foreign ownership	-0.026	0.015	0.011	-0.022	0.003	0.019
	[0.008]***	[0.007]**	[0.003]***	[0.008]***	[0.010]	[0.009]**
Region Controls	Y	Y	Y	Y	Y	Y
Sector Controls	N	N	N	N	N	N
Year Controls	N	N	N	N	Y	Y
Adj-R square	0.83	0.77	0.78	0.92	0.84	0.8
Observations	454	454	454	285	285	285

Notes:

(1) Standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%

(2) The coefficients are obtained by estimating the three equations as a system of seemgly unrelated equations.

(3) Age Cohort and Size of the firm included.

(4) Firm fixed effects included.

(5) The test that models are the same for Manufacturing and Non-manufacturing is not acepted.

Table 9: Wage Differentials Between
Foreign and Domestic Firms

	Manufacturing	Non-Manufacturing
"Medium" Education	0.30	0.25
	[0.01]***	[0.02]***
"High" Education	0.96	0.78
	[0.02]***	[0.04]***
Foreign ownership	0.15	0.16
	[0.02]***	[0.03]***
Firm size:		
50-99	0.03	0.05
	[0.01]***	[0.01]***
100-499	0.08	0.12
	[0.01]***	[0.02]***
>500	0.14	0.11
	[0.02]***	[0.04]***
Age firm:		
5-15 years	-0.04	0.03
	[0.02]**	[0.03]
>15years	-0.05	-0.01
	[0.02]**	[0.04]
Age workers:		
25-34 years	0.02	0.00
	[0.01]	[0.02]
35-50 years	0.02	-0.02
	[0.02]	[0.03]
>50 years	0.04	0.02
	[0.02]**	[0.03]
Tenure:		
2-5 years	0.04	0.00
	[0.01]***	[0.02]
5-10 years	0.11	0.05
	[0.02]***	[0.03]*
>10 years	0.13	0.14
	[0.02]***	[0.03]***
Region Controls	Y	Y
Sector Controls	Y	Y
Year Controls	Y	Y
Adj-R square	0.69	0.72
Observations	52,470	21,451

Notes:

(1) Standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%

(2) The group of low educated workers with less than 25 years and less than 2 years of tenure

working in firms with less than 5 years and with up to 49 employees is the reference group

(3) Regressions are weighted by the number of employees on each education group.

(4) Standard errors are corrected for clustering at the firm level .

(5) The test that models are the same for Manufacturing and Non-Manufacturing is not acepted.

Table 10: Wage Differentials Between
Foreign and Domestic Firms, by education groups

	Manufacturing	Non-Manufacturing
Low	0.14	0.08
	[0.02]***	[0.03]***
Medium	0.14	0.21
	[0.02]***	[0.03]***
High	0.22	0.16
	[0.04]***	[0.05]***
Region Controls	Y	Y
Sector Controls	Y	Y
Year Controls	Y	Y
Test Low=Med=High :		
P- value	0.11	0.00
Test Low=Med :		
P- value	0.95	0.00
Test Med=High :		
P- value	0.04	0.32
Adj-R square	0.71	0.75
Observations	52,470	21,451

Notes:

(1) Standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%

(2) The group of low educated workers with less than 25 years and less than 2 years of tenure

working in firms with less than 5 years and with up to 49 employees is the reference group

(3) Regressions are weighted by the number of employees on each education group.

(4) Standard errors are corrected for clustering at the firm level .

(5) The test that coefficients of size, cohort , region and year are the same for Manufacturing

and Non-manufacturing is not acepted.

**Table 11: Wage Differentials Between
Acquired and Foreign Firms, by education groups**

	Manufacturing	Non-Manufacturing
Low	0.02	-0.06
	[0.03]	[0.05]
Medium	-0.03	0.03
	[0.03]	[0.04]
High	0.03	-0.06
	[0.05]	[0.05]
Region Controls	Y	Y
Sector Controls	Y	Y
Year Controls	Y	Y
Adj-R square	0.79	0.63
Observations	3,721	2,778

Notes:

(1) Standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%

(2) The group of low educated workers with less than 25 years and less than 2 years of tenure

working in firms with less than 5 years and with up to 49 employees is the reference group

(3) Regressions are weighted by the number of employees on each education group.

(4) Standard errors are corrected for clustering at the firm level .

(5) The test that coefficients of size, cohort , region and year are the same for Manufacturing

and Non-manufacturing is not acepted.

Table 12 : Evolution in Wages Following the
Acquisition, by Education Groups

	Manufacturing	Non-Manufacturing
Low	0.033	0.07
	[0.011]***	[0.022]***
Medium	0.031	0.01
	[0.020]	[0.016]
High	0.100	-0.04
	[0.042]**	[0.034]
Region Controls	Y	Y
Sector Controls	Y	Y
Year Controls	Y	Y
Adj-R square	0.94	0.95
Observations	3721	2778

Notes:

(1) Standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%

(2) Regression includes controls for size, cohort of the firm, age and experience of workers.

(3) The regressions use as weights the number of employees on each educational group.

(4) The joint test that there are no difference between Manufacturing and Non-Manufacturing is not acepted.

Table 13: Change in Wages between Acquired
and Domestic Firms Following the Acquisition

	Manufacturing	Non-Manufacturing
Low	0.04	0.06
	[0.01]***	[0.02]***
Medium	0.04	0.03
	[0.01]***	[0.02]**
High	-0.08	-0.13
	[0.03]***	[0.04]***
Region Controls	Y	Y
Sector Controls	N	N
Year Controls	N	N
Adj-R square	0.80	0.78
Observations	2067	822

Notes:

(1) Standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%

(2) Regression includes controls for size, cohort of the firm, age and experience of workers.

(3) The regressions use as weights the number of employees on each educational group.

(4) The test that models are the same for Manufacturing and Non-manufacturing not acepted.

Figure 1:
Evolution in Workforce Compostion in Acquired Firms:
Manufactures

Years since ownership change

◆ low   ■ medium   ▲ high
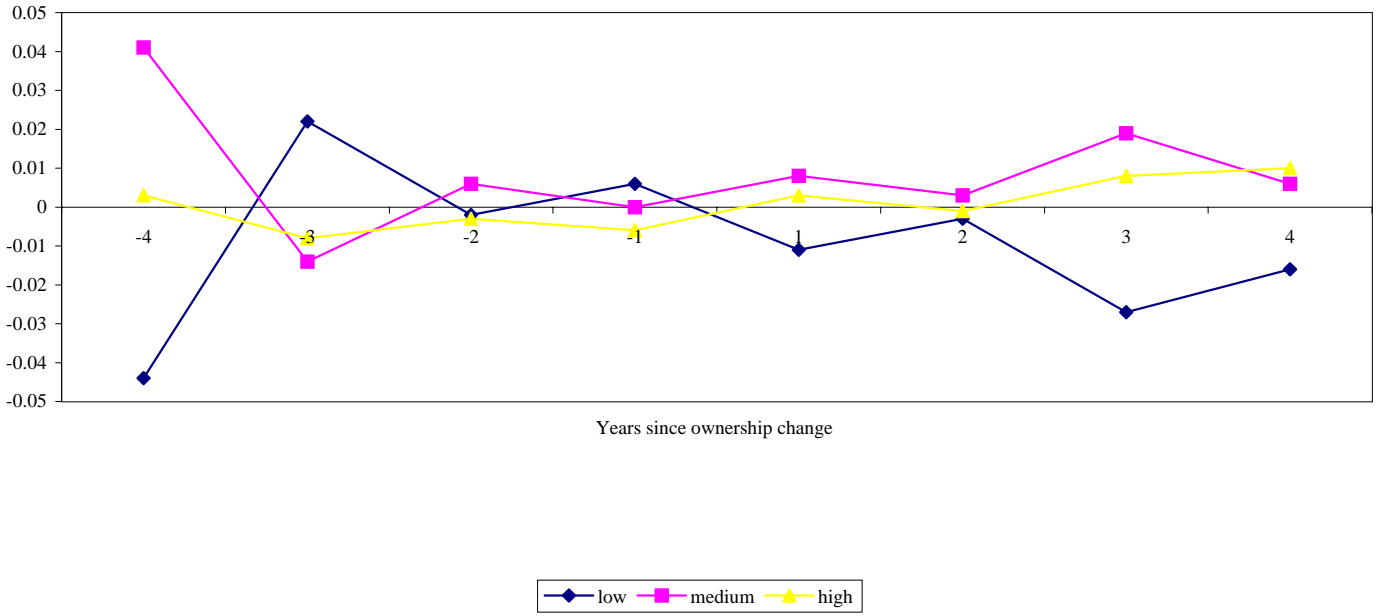
Figure 2:
Evolution in Workforce Compostion in Acquired Foreign Firms:
Non-Manufactures

Years since ownership change

◆ low   ■ med   ▲ hig
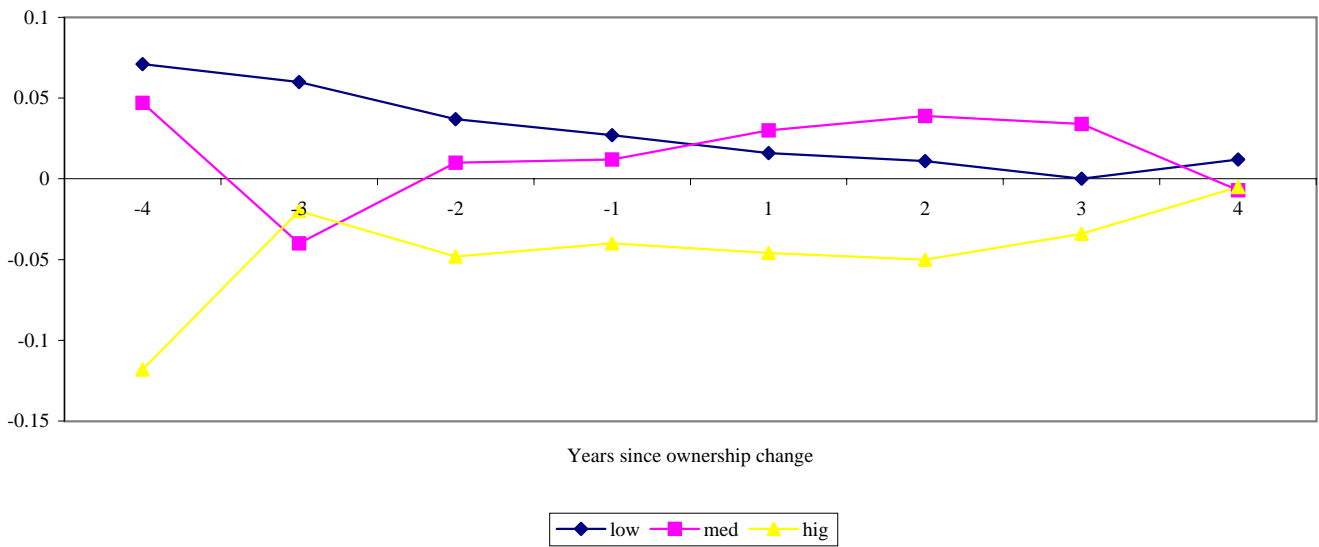
Table A1: Sample Means of Domestic Firms:
Employment, Workforce Composition and Wages

	Manufactures	Non-manufactures
Share low	0.81	0.62
	(0.17)	(0.25)
Share Medium	0.14	0.31
	(0.12)	(0.20)
Share High	0.03	0.05
	(0.05)	(0.09)
Employment	117	111
	(164)	(164)
Av. Wage	1.39	1.64
	(0.31)	(0.45)
Wage Low	1.33	1.55
	(0.28)	(0.45)
Wage Medium	1.59	1.70
	(0.37)	(0.42)
Wage High	2.15	2.21
	(0.50)	(0.53)

Note:

1. Wage refers to log of real hourly wage.

2. Standard deviations in parenthesis.

Table A 2. Cross Section Differences in Workforce
Composition Between Foreign and Domestic Firms, by Sector of Activity

	Low	Medium	High
D. Manufacturing			
DA. Food products, beverages and tabacco	-0.147	0.112	0.035
	[0.012]***	[0.010]***	[0.005]***
DB. Textiles and textile products	-0.037	0.029	0.008
	[0.007]***	[0.006]***	[0.003]***
DC. Leather and leather products	-0.021	0.027	-0.006
	[0.011]**	[0.010]***	[0.003]*
DD. Wood and wood products	-0.034	0.026	0.008
	[0.018]*	[0.015]*	[0.006]
DE. Pulp, paper and paper products	-0.061	0.056	0.005
	[0.032]*	[0.025]**	[0.014]
DG. Chemicals and chemical products	-0.16	0.1	0.06
	[0.017]***	[0.014]***	[0.007]***
DH. Rubber and plastic products	-0.089	0.063	0.026
	[0.023]***	[0.020]***	[0.011]**
DI. Other non-metallic mineral products	-0.181	0.143	0.037
	[0.012]***	[0.010]***	[0.006]***
DJ. Basic metals and fabricated metal products	0.017	-0.016	-0.001
	[0.017]	[0.014]	[0.007]
DK. Machinary and equipment n.e.c.	0.002	-0.019	0.017
	[0.020]	[0.018]	[0.007]**
DL. Electrical and optical equipment	-0.018	0.004	0.014
	[0.024]	[0.020]	[0.010]
DM. Transport equipment	-0.147	0.105	0.042
	[0.018]***	[0.016]***	[0.005]***
DN. Miscellaneous manufacturing n.e.c	-0.045	0.019	0.026
	[0.017]***	[0.015]	[0.007]***
F. Construction	-0.108	0.063	0.046
	[0.018]***	[0.015]***	[0.008]***
G. Wholesale and retail trade	-0.281	0.152	0.129
Repair motor vehicles and personal goods	[0.010]***	[0.009]***	[0.004]***
H. Hotels and restaurants	-0.074	0.058	0.017
	[0.017]***	[0.015]***	[0.005]***
I. Transport, storage and communication	-0.403	0.329	0.074
	[0.026]***	[0.023]***	[0.006]***
J. Finantial Intermediation	-0.013	-0.017	0.03
	[0.013]	[0.021]	[0.020]
K. Real estate, renting and business activities	-0.256	0.06	0.196
	[0.029]***	[0.022]***	[0.018]***

Notes:

(1) Standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%

(2) Standard errors are corrected for clustering at the firm level and heterosckedasticity.

Table A 3. Cross Section Differences in Wages
Between Foreign and Domestic Firms , by Sector of Activity

	Low	Medium	High
D. Manufacturing			
DA. Food products, beverages and tabacco	0.187	0.264	0.222
	[0.064]***	[0.061]***	[0.060]***
DB. Textiles and textile products	0.123	0.088	0.415
	[0.040]***	[0.051]*	[0.088]***
DC. Leather and leather products	0.04	0.079	0.494
	[0.027]	[0.078]	[0.140]***
DD. Wood and wood products	0.003	-0.098	0.144
	[0.043]	[0.071]	[0.140]
DE. Pulp, paper and paper products	0.098	0.065	0.138
	[0.051]*	[0.166]	[0.149]
DG. Chemicals and chemical products	0.281	0.267	0.193
	[0.057]***	[0.045]***	[0.041]***
DH. Rubber and plastic products	0.025	0.054	0.034
	[0.043]	[0.069]	[0.139]
DI. Other non-metallic mineral products	0.261	0.183	0.257
	[0.054]***	[0.034]***	[0.076]***
DJ. Basic metals and fabricated metal products	0.013	0.073	0.1
	[0.035]	[0.049]	[0.100]
DK. Machinary and equipment n.e.c.	0.087	0.049	0.227
	[0.058]	[0.080]	[0.107]**
DL. Electrical and optical equipment	-0.01	0.047	0.002
	[0.095]	[0.065]	[0.095]
DM. Transport equipment	0.219	0.161	0.302
	[0.068]***	[0.076]**	[0.079]***
DN. Miscellaneous manufacturing n.e.c	0.034	0.141	0.517
	[0.070]	[0.094]	[0.181]***
F. Construction	0.183	0.228	0.393
	[0.070]***	[0.104]**	[0.148]***
G. Wholesale and retail trade	0.198	0.394	0.287
Repair motor vehicles and personal goods	[0.066]***	[0.052]***	[0.066]***
H. Hotels and restaurants	0.052	0.115	0.263
	[0.045]	[0.049]**	[0.105]**
I. Transport, storage and communication	0.096	0.138	0.207
	[0.052]*	[0.058]**	[0.072]***
J. Finantial Intermediation	0.153	0.088	0.062
	[0.033]***	[0.037]**	[0.068]
K. Real estate, renting and business activities	0.004	0.125	0.18
	[0.017]	[0.047]***	[0.047]***

Notes:

(1) Standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%

(2) Regressions are weighted by the number of employees on each education group.

(3) Standard errors are corrected for clustering at the firm level .

Table A4: Employment Evolution in Acquired Firms

	Manufacturing	Non-Manufacturing
4 years before	4.4	-37.6
	[20.9]	[74.7]
3 years before	18.2	-35.2
	[16.4]	[56.6]
2 years before	-3.3	-17.9
	[13.5]	[42.4]
1 year before	-4.2	-16.1
	[12.6]	[31.5]
1 year after	-1.7	35.0
	[12.5]	[24.7]
2 years after	-11.9	69.1
	[13.5]	[26.0]***
3 years after	-14.6	75.8
	[15.4]	[27.6]***
4 years after	-22.5	-
	[17.9]	
Adj-R square	0.93	0.99
Observations	437	302

Notes:

(1) Standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%

(2) Firm effects included; Year of the acquisition is the omited category

(3) Average size of the firm is 223 employees in manufacturing and 273 in non-manufacturing.

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