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Abstract

We study the effect of foreign takeovers on firm organization. Using a comprehensive data set of Portuguese firms and workers spanning two decades, we find that foreign acquisitions lead to: (1) an expansion in the scale of operations; (2) a higher number of hierarchical layers; and (3) higher wage inequality between the top and bottom layers. These results accord with a theory of knowledge-based hierarchies in which foreign takeovers lead to improved productivity, higher demand, or reduced internal communication costs, and thereby induce the acquired firms to reorganize. Evidence from auxiliary survey data reveals that acquired firms are more likely to use information technologies that reduce internal communication costs.

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1 Introduction

Recent theories of knowledge-based hierarchies suggest that the decision of how to organize the acquisition, use, and communication of knowledge is central to understand issues such as the evolution of wage inequality, the growth and productivity of firms, and the gains from international trade (Garicano and Rossi-Hansberg, 2015). Drawing on a comprehensive data set of French manufacturing firms, Caliendo, Monte and Rossi-Hansberg (2015) show that reorganization, through changes in hierarchical layers of workers, is key to understand how firms expand and contract and the evolution of pay in each layer.

While this evidence establishes the basic empirical credibility of organization-based theories, relatively little is known about whether and how different economic or policy shocks can lead to firm reorganization and thereby impact labor market outcomes (Garicano and Rossi-Hansberg, 2015). In this paper, we exploit comprehensive data on Portuguese firms and their workers for the period 1991–2009 to study the effect of foreign takeovers on firm organization and pay structure. The focus on Portugal is well-suited for this purpose: following accession to the European Union in 1986, the country received sizable inflows of foreign investment from higher-income nations, where firms tend to have higher productivity, better management practices and make more extensive use of information technologies.¹

Our empirical analysis proceeds in several steps. Following Caliendo, Monte and Rossi-Hansberg (2015), we first divide the employees of each firm into four hierarchical layers using occupational categories. Focusing on firms that were domestically-owned in the first year of observation, we then examine if and how foreign takeovers impact their scale of operations, internal organization and wage structure. An important challenge in identifying the effects of foreign acquisitions is selection. If acquired firms constitute a selected subset of the universe of firms that were initially domestic, subsequent heterogeneity in the evolution of firm performance and organization across acquired and non-acquired firms might not be attributable to the change in ownership (Arnold and Javorcik, 2009; Guadalupe, Kuzmina and Thomas, 2012; Hijzen et al., 2013). To mitigate this threat to identification, we follow the leading approach in this literature and examine the effects of foreign acquisitions using a difference-in-differences matching estimator.

We find that foreign acquisitions lead to an expansion in sales and employment levels, and to an increase in the number of hierarchical layers. The increase in the number of layers mainly occurs for firms that initially had one or two hierarchical layers prior to the foreign acquisition. In addition, we find that acquired firms tend to experience a rise in wage inequality between the top and bottom layers, an effect that is particularly pronounced for firms that had two or three

¹Table A1 in the appendix reports that between 1996 and 2009 stocks of foreign direct investment in Portugal grew at an annual rate of 10% per year in real terms, on average. In both 1996 and 2009, the EU and the US accounted for over three quarters of these stocks. The main source countries of foreign investors are Spain, France, United Kingdom, Netherlands, Germany, USA, Switzerland and Luxembourg. Bloom, Sadun and Van Reenen (2012, pp. 194) provide evidence that firms in several of these countries tend to have better people-management practices than firms in Portugal.

layers before they were acquired. This rise in top-bottom inequality following foreign takeovers appears to reflect, at least in part, changes in observable measures of skill within each layer, notably schooling, experience and tenure.

These empirical results accord well with recent theories of knowledge-based hierarchies (Garciano and Rossi-Hansberg, 2006; Caliendo and Rossi-Hansberg, 2012). In this framework, the realization of output requires both labor and knowledge. More specifically, it requires successful problem solving, which in turn requires sufficient knowledge. Agents who do not know how to solve a problem, also do not know who else might be able to solve it, leading to an optimal pyramidal organization structure consisting of a bottom layer of production workers, and one or more successive layers of managers who specialize in problem solving. Agents are rewarded according to their knowledge, and hence workers in higher layers are rewarded with higher earnings. The value of more layers is to economize on knowledge acquisition in the organization, as fewer agents learn how to solve the more infrequent problems. However, adding more layers is not without costs, since there are communication costs each time a problem is passed from one layer to another. Therefore, the optimal organizational structure depends crucially on the size of communication costs relative to the costs of acquiring knowledge.

Takeovers from investors from higher-income nations can affect optimal firm organization through two different (but not mutually exclusive) channels. First, these acquisitions may lead to an expansion in the scale of production because of improved productivity or higher demand. Firms that expand production beyond a certain level optimally do so by adding layers to their hierarchical organization. Second, these ownership changes may improve management practices and reduce internal communication costs. This leads to an increase in the value of hierarchical organization and therefore to a rise in the optimal number of layers, while also resulting in a larger scale of production. When the number of hierarchical layers increases, be it through improved productivity, higher demand or lower internal communication costs, the optimal distribution of knowledge shifts upwards in the hierarchy, implying not only that more problems are solved, but also that a larger share of problems are solved at the top of the organization. Such a redistribution of knowledge can also result from a reduction of communication costs even if the number of hierarchical layers remains unchanged. Since wages reflect knowledge, an upwards redistribution of knowledge implies, in turn, a higher wage inequality between agents at the top and bottom of the hierarchy.

Although the data available to us do not allow us to fully discriminate between the relative importance of these channels, we provide suggestive evidence that reduced communication costs played some role in driving the observed impacts of foreign ownership. As noted above, there is evidence that firms from higher income countries tend to have superior management practices and make more extensive use of information technologies than firms in Portugal (Bloom, Sadun and Van Reenen, 2012). To examine if foreign acquisitions lead to the adoption of these technologies, we use an auxiliary firm-level longitudinal survey. These data are available for a shorter period (2004-2009), and contain indicators on the utilization of the intranet, the email, and internal networks. Using a similar identification strategy, we find that foreign acquisition

has a positive and strongly significant effect on the use of the intranet. While the small size of this sample recommends caution in drawing strong conclusions from these results, we interpret this evidence as supportive of the hypothesis that foreign takeovers lead to the reduction of internal communication costs.

In addition to the literature cited above, this paper complements and extends several strands of existing research. In a recent related paper, Caliendo et al. (2015) find that Portuguese firms that reorganize and add a management layer experience a 4% rise in quantity based productivity, while also observing a 4% drop in revenue-based productivity. A number of earlier studies provide evidence that foreign acquisitions lead to improvements in residual-based measures of productivity, employment, wages, innovation, and management practices, including important contributions by Griffith (1999), Conyon et al. (2002), Girma and Görg (2007), Almeida (2007), Arnold and Javorcik (2009), Guadalupe, Kuzmina and Thomas (2012), Bloom, Sadun and Van Reenen (2012) and Hijzen et al. (2013). While confirming that several of these outcomes also improve among Portuguese firms following foreign acquisition, we believe that this paper is the first to establish a causal link between foreign takeovers and the internal organization and pay structure of firms. In doing so, this paper also speaks to the literature on the labor market consequences of new information technologies, including Autor, Katz and Kruger (1998), Bresnahan, Brynjolfsson and Hitt (2002), Acemoglu and Autor (2011), Beaudry, Doms and Lewis (2010) and Autor, Dorn and Hanson (2015).

The paper proceeds as follows. Section 2 describes the main data set used in the analysis. Section 3 presents the empirical strategy and results related to the acquisition decision. Section 4 outlines the empirical strategy for examining the impacts of foreign acquisition on the internal organization and pay structure of firms and reports the corresponding results. Section 5 discusses if and how our empirical results can be rationalized in the context of the theory of knowledge-based hierarchies. Section 6 provides additional empirical evidence on one of the specific channels of causation identified by the theory. Section 7 concludes the paper.

2 Data

The empirical analysis in this paper draws mainly on data from *Quadros de Pessoal* for the years 1991 to 2009. This data set is an administrative census that gathers information on firms and their workers for the corporate sector in Portugal. It is collected yearly by the Ministry of Employment and participation is compulsory for every firm with wage earners.² Each firm is required to provide information about its attributes and those of each employee. The firm-level records include information on number of employees, industry code, geographical location, and percentage of capital that is owned by foreign investors. In the main analysis, we assume that a firm is foreign-owned if more than 50% of capital is owned by foreign investors.³

²Data for 2001 were not collected, and hence the analysis excludes this year.

³The estimates are robust if we assume that a firm is foreign-owned when more than 10% of capital is owned by foreign investors. Results based on this alternative threshold are available upon request.

The set of worker attributes includes monthly wages (base wage and other components of pay), gender, schooling, nationality, date of starting, occupation, and hours worked. The employee records may also be linked to those of the corresponding employer in each year. The administrative records in *Quadros de Pessoal* are recognized for their high reliability and are used by the Ministry of Employment for checking a firm’s compliance with labor law. The records must be made available to every worker in a public place of the establishment, which reduces the likelihood of misreporting.

Following Caliendo, Monte and Rossi-Hansberg (2015), we group employees into four hierarchical layers using detailed information on occupations: CEO and directors, top managers, supervisors, and operators. Table A2 in the Appendix provides a detailed definition of these occupations.

We are interested in examining the effects of foreign acquisitions on firm organization and pay structure. Hence we restrict our attention to firms that were domestically-owned in the first year of observation, and focus on changes from domestic to foreign ownership taking place within the same firm. In doing so, we exclude firms that experienced multiple ownership changes over time, implying that all firms in our sample are firms that either remained domestic or were acquired by foreign owners at some point during the period of analysis. Given our focus on how foreign acquisitions impact the internal organization of the firm, we also exclude from the analysis very small firms, i.e. we drop firm-year observations where the firm has less than 10 employees. We further drop firm-year observations for firms that do not have operators. With these restrictions, we have data on 938 firms that were acquired by foreign investors during the period of analysis.

Using the four groups of occupations reported in Table A2, we build hierarchical layers for each firm-year observation, where layers are labelled from 0 (the bottom layer) to 3 (the top layer in a four-layer firm). Firms that have employment in all four occupation groups will have four hierarchical layers (0, 1, 2 and 3). Firms that only have operators will have only one layer (Layer 0). Firms that have workers in one or two of the other occupational groups (besides operators) will have two or three hierarchical layers, respectively. The occupational composition of the second and third layers (Layer 1 and Layer 2, respectively) may therefore vary across firms. We also compute firm-year and firm-layer-year averages of earnings, education levels and other observable worker attributes, such as experience and tenure.

Figures 1 and 2 illustrate how foreign acquisitions are distributed over time and across industries, respectively. We observe that there were a sizable number of acquisitions taking place in most years, but with a noticeable peak in 2003. Foreign acquisitions also took place in almost every industry, but with a quite uneven distribution.

[Figure 1 here]
[Figure 2 here]

Table 1 reports descriptive statistics on the full sample used in the estimation. Column (1) reports statistics on firm-year observations with at least 10 employees for firms that were

initially domestically-owned. The other two columns distinguish between firms that remained domestic during the period of analysis (Column (2)) and firms that were eventually acquired by foreign investors (Column (3)). These statistics reveal that firms subject to acquisition tend to be larger, more productive, pay higher average wages, and have a higher number of layers. Notice that these differences reflect both initial heterogeneity in firm attributes among acquired and non-acquired firms, as well as future changes.⁴ The statistics reported in Table A3 reveal that, by the end of the sample period, firms in the estimation sample account for 64% of sales, 69.8% of employment and 70.4% of the wage bill of all firms that are in the *Quadros de Pessoal* data set. This table further reveals that, by the end of the sample period, firms in the estimation sample that were acquired by foreign investors accounted for 6.2% of total sales, 4.2% of total employment and 4.6% of the total wage bill.

[Table 1 here]

3 The selection decision

Before turning to the analysis of the effects of foreign acquisition on firm organization and wage structure, we explore the patterns of selection into acquisition. Evidence from several previous studies suggests that foreign investors tend to “cherry pick” the largest and most productive firms in each industry. Below we inspect for evidence on the presence of such selection in our estimation sample.

3.1 Estimation strategy

The likelihood that a firm is acquired by foreign investors can be estimated through a logit model. Let $foreign_{it}$ be an indicator variable that equals 1 if firm i is foreign-owned in year t , and $foreign^*_{it}$ a latent variable whose value determines whether or not the firm will be acquired by foreign investors in that year. We can then write $foreign_{it}=1[foreign^*_{it} > 0]$ and:

$$foreign^*_{it} = \beta X_{it-1} + \delta_s + \phi_t + \mu_{it}, \quad (1)$$

where X_{it-1} is a vector of lagged firm attributes (log sales and log labor productivity) that would be expected to influence the probability of acquisition in any given year (conditional on the firm being domestically-owned one year before), and δ_s and ϕ_t are industry and year fixed effects, respectively. We also estimate models with industry-specific time trends to account for the role of idiosyncratic shocks at the industry-level. In all specifications, we cluster the standard errors at the firm-level.

⁴Appendix A3 provides a detailed definition of each variable from *Quadros de Pessoal* used in the empirical analysis.

3.2 Results

Before turning to the regression analysis, we visually inspect for the presence of selection. Figure 3 depicts the distribution of residual log sales (top panel) and residual log labor productivity (bottom panel) for two groups of firms: (i) firms that were taken over by foreign investors during the sample period; and (ii) firms that remained domestically-owned. The residuals remove industry and year dummies from the original distributions of log sales and log labor productivity across the two sets of firms.⁵ Inspection of this figure reveals that the distribution of each of these variables for acquired firms lies clearly to the right of those that remain domestic, suggesting that foreign investors tend to target larger and more productive firms within each industry.

[Figure 3 here]

Table 2 reports the estimated coefficients and the corresponding marginal effects (in square brackets) from the logit model for the acquisition decision, as defined in equation (1). The dependent variable is the dummy variable for foreign ownership which is related to either lagged log sales or lagged log labor productivity, each relative to the industry mean. All regressions include industry and year dummies. The regressions in columns (2), (4), (6) and (8) additionally include industry trends that account for industry-specific idiosyncratic shocks.

[Table 2 here]

The results reported in this table provide evidence that larger or more productive firms are more likely to become foreign-owned. The estimates in columns (1) and (2) suggest an increase in lagged log sales is associated with a significantly higher yearly probability of being acquired. Rather than a continuous measure of sales, Columns (3) and (4) include indicator variables for each quartile of log sales. The point estimates suggest that the probability of acquisition is significantly higher in the third and fourth quartiles than in the first quartile. The results in Columns (5)-(8) point to similar patterns of selection when using log labor productivity (and the corresponding dummy indicators for quartiles), instead of log sales. In sum, the evidence presented in this section suggest that larger and more productive firms are more likely to be acquired by foreign investors. In other words, it suggests that foreign investors tend to “cherry pick” the larger and better performing domestic firms within each industry.

4 Effects of foreign ownership on internal organization and pay structure

4.1 Estimation strategy

Our strategy for examining the effect of foreign takeovers on internal organization proceeds in two steps. First, we adopt a difference-in-differences approach to compare changes over time in

⁵The densities are drawn using an Epanechnikov smoothing function with a bandwidth of 0.6.

performance and internal organization across acquired and non-acquired firms. Specifically, we estimate an equation of the form

$$y_{it} = \beta \text{foreign}_{it-1} + \gamma_i + \phi_t + \mu_{it}, \quad (2)$$

where i and t index firm and year, respectively; y_{it} is the variable of interest for firm i in year t ; foreign_{it-1} is the foreign ownership status of the firm in the previous year; γ_i is a firm fixed effect; ϕ_t is a year effect; and μ_{it} is the error term. We also estimate models with industry-specific time trends to account for the role of idiosyncratic shocks at the industry-level. In all specifications, we cluster the standard errors at the firm-level.

The firm fixed-effects account for the influence of all observable and unobservable drivers of the acquisition decision that are constant or strongly persistent over time. If heterogeneity in entrepreneurial capability (or productivity) across firms is fixed over time, as in the Melitz (2003) model, this method accounts for the selection patterns documented in the previous section. Hence we can compare the evolution of y_{it} at acquired firms with that in firms that remain in domestic hands.

However, if firm capability evolves over the life cycle (see, e.g., Arkolakis, 2016), this comparison may still be complicated by non-random selection. To address this issue, we adopt the leading approach in the literature (Arnold and Javorcik, 2009; Guadalupe, Kuzmina and Thomas, 2012) and combine difference-in-differences with propensity score matching (DD-PSM). The propensity score is the predicted probability of a firm being acquired by foreign investors as a function of firm attributes observed one year before the treatment occurs. We estimate a single model for the propensity score including all years and industries. We use log sales, sales growth, log labor productivity, number of layers, log hourly wage, and log hourly wage squared as explanatory variables, in addition to industry and year fixed-effects. We match treated firms by year, industry and number of layers, using one-to-one nearest-neighbor matching without replacement and imposing common support. By using DD-PSM we essentially inspect for divergence in the path of y_{it} between acquired firms and matched control firms that had similar observable attributes in the year prior to the acquisition.⁶

Table 3 reports the results from estimation of the propensity score. We use a multivariate logit specification in which foreign acquisition is explained by lagged values of the above-mentioned variables. The results confirm that foreign investors tend to target larger firms. They also indicate that, conditional on size and labor productivity, firms with higher hourly wages are more likely to be acquired. The negative sign of the point estimate on labor productivity reflects the fact that, unlike in Table 2, the logit model includes simultaneously several different (but correlated) observable attributes of firms.⁷

⁶The matching procedure implies that once a treated firm is matched with a control, the latter stays the same throughout the whole sample period.

⁷When lagged values of sales and/or labor earnings are excluded from the selection equation, the coefficient on lagged labor productivity turns positive. Although the variables included in the selection equation tend to be strongly correlated, they may reflect relevant heterogeneity between acquired and non-acquired firms. To

[Table 3 here]

Table 4 reports summary statistics for the matched sample in the year prior to acquisition. Column (1) refers to firms that were always domestically owned during the sample period, while Column (2) refers to firms that were acquired by foreign investors. Columns (3) and (4) report, respectively, the t-statistic and p-value for individual t-tests of difference in means. These statistics reveal that the matching procedure is successful at removing observable differences between domestic and acquired firms in the year prior to acquisition. All individual t-tests never reject the mean equality of observable attributes between domestic and acquired firms in the matched sample. Since matching is exact by industry, year and number of layers, firms in the treatment and comparison groups have exactly the same number of layers in the year prior to the foreign acquisition.

[Table 4 here]

Table A4 in the Appendix reports results from several additional tests of matching quality. The results provide further evidence that our matching procedure does a good job at removing observable differences between domestic and acquired firms. All individual t-tests and the two-group Hotelling t-square test never reject the mean equality of observable attributes between domestic and acquired firms in the matched sample. In addition, the very small magnitude of the Pseudo R² of the logit on the matched data, and the test of joint significance of regressors given by the Chi-square test, confirm the overall quality of the matching procedure.

[Table 5 here]

Table 5 reports summary statistics for the sample of matched firms, i.e., firms that prior to acquisition were similar among a number of key observable attributes. In comparison with Table 1, domestic and acquired firms in the matched sample are clearly more similar along the set of attributes measured. This would be expected since matching seeks to remove initial heterogeneity across firms along a number of observable attributes. Notice, however, that some differences remain, as would also be expected if foreign acquisition were to affect how these variables evolve over time.

4.2 Effects on the scale of operations, labor productivity and average wages

We proceed by examining the effects of foreign acquisitions on several indicators of firm performance. For each outcome of interest, we report the difference-in-differences estimates using the full and the matched sample, with and without industry specific time trends. All regressions include year dummies. In line with results of several studies reviewed above, the estimates reported in Panel A of Table 6 reveal that foreign acquisitions lead to an expansion in the scale

minimize these differences across acquired and non-acquired firms, we include them simultaneously in the logit model used for estimation of the propensity score.

of operations, as measured by log sales. We also observe that the point estimates remain fairly similar when using either the full or the matched sample, and when including industry-specific time trends.

Panel B of Table 6 reports similar results for different sub-samples of firms, divided according to the initial number of layers. When these sub-samples are drawn from the full sample of firms, the definition of "initial" is somewhat different for treated and untreated firms. For the former group of firms, the initial number of layers is measured in the year prior to the foreign acquisition, whereas, for the latter group of firms, the initial number of layers is measured in the first year of observation. The results from these regressions are given in Columns (1) and (2). However, when the sub-samples are drawn from the matched sample, the definition of "initial" is equal for treated and untreated firms. This follows from the above described matching procedure, where the treated and untreated firms in each matched pair have the same number of layers in the year prior to the foreign acquisition. This is another reason why the DD-PSM estimator is more appropriate for the purposes of this analysis.

The results from our preferred specifications (Columns (3) and (4)), suggest that the positive effect of foreign acquisitions on sales is mainly driven by firms that had at least two layers prior to the acquisition. The estimated coefficients for these sub-samples are positive and significant, and of similar magnitude to those reported in Panel A. The coefficient for firms with initially one layer is also positive, but less precisely estimated. Notice also that firms with initially two and three layers account for the vast majority of observations in the estimation sample. Table A5 reports analogous estimates for the effects of foreign acquisitions on employment levels. Although the significant effects are now restricted to firms with initially two or three layers, these estimates point to broadly similar conclusions. Foreign acquisitions lead to an increase in the scale of operations, and this effect is mainly driven by firms that initially had at least two hierarchical layers prior to the acquisition.

[Table 6 here]

Table 7 reports effects of foreign acquisitions on labor productivity. Comparison of the point estimates in Panel A of Tables 6 and A5 reveal that the effects on log sales are larger than the effects on log employment, and hence labor productivity (measured as the ratio of log sales to log employment) clearly increases following acquisition. Once more, these results are driven by firms that initially had at least two layers prior the foreign acquisition.

[Table 7 here]

The results in Panel A of Table 8 reveal that average hourly wages also rise following the foreign acquisition. The estimates in Panel B reveal that these effects are present for all subgroup of firms; i.e., foreign acquisitions lead to an increase in average wages regardless of the initial number of hierarchical layers.

[Table 8 here]

4.3 Effects on internal organization and pay structure

Our main interest lies in opening the "black box" of the firm and explore whether foreign takeovers also affect the internal organization and pay structure of firms. The estimates in Panel A of Table 9 reveal that acquired firms tend to experience an increase in the number of hierarchical layers of employees, compared with firms that remain on domestic hands. The difference-in-differences results are robust across different samples, and do not depend on the inclusion of industry-specific time trends. The results from our preferred specifications in Columns (3) and (4) of Panel B reveal that this average effect is mainly driven by firms that initially had one or two hierarchical layers. This result is quite intuitive, since these are the groups of firms with a larger scope for adding layers to their organization. For firms with a higher number of initial layers, the estimated results using the full sample (Columns (1) and (2)) show large and significantly positive effects of foreign acquisitions on the number of layers, but these effects vanish when using the matched sample. This is probably due to the fact that "initial number of layers" is measured in the same year for every pair of treated and control firms in the matched sample, as previously explained, thereby avoiding a potential bias related to the conceptual problem of defining "initially" in a consistent way for treated and control firms when using the full sample.

[Table 9 here]

We proceed by examining the effects of foreign takeovers on the pay structure of firms. The results reported in Table 8 suggest that average wages go up following acquisition. But this leaves open the possibility that wages evolve differently across layers within acquired firms. These layer-level wage effects can in principle occur through two different channels: (1) a direct effect of foreign ownership for a given organizational structure; and (2) an indirect effect through the changes in organizational structure induced by the foreign acquisition. The estimates in Tables 10 and 11 seek to distinguish between these two channels.

In Table 10 we examine how foreign acquisitions impact average hourly wages of different layers, conditioning on both the initial and the current number of layers of each firm. For each sub-sample of firms (defined according to the initial number of layers) we estimate a set of equations similar to (2), but where the dependent variable is the average wage in Layer x in a z -layer firm. In other words, the sample of firm-year observations for acquired and non-acquired firms is divided on the basis of their initial and current organizational structure. This implies that, for each sub-sample, we compare the wage level in a given layer of an acquired firm with the equivalent layer of domestic firms that evolve similarly (in terms of organizational structure) over time since the foreign acquisition.⁸ For brevity, Table 10 reports only the estimated coefficients and standard errors using the matched sample of firms and including industry trends.⁹ Tables

⁸For example, when estimating the effect of foreign ownership on average wages in Layer 2 of a 3-layer firm, for firms with initially 2 layers, we compare top-layer wages in foreign and domestic firms that have added one layer to their organizational structure since the foreign takeover.

⁹Notice that there are not enough observations to estimate layer-level wage effects for two cases that both

B1.1 to B1.4 in the Online Appendix report the full set of estimates from these regressions, including also the less stringent specifications considered above.

[Table 10 here]

The results in Table 10 reveal that, when controlling for the organizational structure of the firm, we tend not to observe significant effects of foreign acquisitions on wages within each layer. The relatively few significant effects are observed among firms in which the number of layers either remains unchanged or rises over time. Apart from this, the estimates do not reveal clear systematic patterns. Tables B2.1 to B4.4 in the Online Appendix reveal that these positive wage effects do not appear to be systematically associated with changes in the skill composition of the workforce in each layer, as measured by schooling, experience and tenure. In Tables B5.1 to B5.4 we also fail to observe systematic links between these wage effects and the share of Portuguese nationals in each layer.

In Table 11 we examine wage effects of foreign acquisitions across layers, but now allowing for potential indirect wage effects through organizational changes. Recall that the results in Table 9 reveal that foreign acquisitions lead to an increase in the number of layers, especially among firms that initially had one or two layers. It is therefore plausible that these organizational changes induced by foreign ownership are accompanied by differential impacts on wages across layers. To preserve comparability across treated and control firms, we test for the presence of these wage effects only in the top and bottom layers of the firm. The bottom layer has always the same occupational composition and hence is comparable across firms irrespective of their organizational structure. Comparison of wages in the other layers is more challenging if acquired and non-acquired firms modify their organizational structure over time. For example, hourly wages in Layer 2 in a 3-layer firm may not be comparable to hourly wages in Layer 2 in a 4-layer firm. We therefore restrict the analysis to the bottom and top layers of the firm, which are conceptually more amenable to inter-firm comparisons in this context.

[Table 11 here]

The pooled estimates (Panel A) in Table 11 reveal a strong and significant positive effect of foreign acquisitions on wages in the top layer of the acquired firms, whereas the effect on wages in the bottom layer is small and only weakly significant.¹⁰ Thus, it appears that foreign acquisitions lead to a pronounced increase in wage inequality between employees at the top and bottom of the organization. The sub-sample estimates in Panel B show that these results are mainly driven by firms which had two or three layers at the time of acquisition.

involve a dramatic organizational change over time, namely (i) firms with initially one layer that add three more layers and (ii) firms with initially four layers that remove three of these layers.

¹⁰Notice that the prevalence of missing wage observations tends to be larger at the top than at the bottom of the organization, implying that the estimated top-layer wage effects are based on fewer observations than the bottom-layer wage effects. As a robustness check we have re-estimated the bottom-layer wage effects using only firms for which we have wage observations also in the top layer. The results are practically identical and are available upon request.

The strongest results appear for firms with initially two layers. For these firms, our preferred estimate (in Column 4) indicates a top-layer wage increase of almost 13% as a result of foreign acquisition, with no sign of any wage effects in the bottom layer. For firms in this sub-sample, we also know that foreign acquisition leads to a significant increase in the number of layers (cf. Table 9) and virtually no layer-level wage effects when compared with similarly organized non-acquired firms (cf. Table 10). This suggests that the strong increase in top-bottom wage inequality observed for this group of firms is to a large extent related to organizational changes (i.e., the addition of managerial layers) resulting from foreign acquisition.

As previously shown, a similar increase in the number of layers as a result of foreign takeover, and lack of layer-level wage effects when controlling for organizational structure, also appears for the sub-sample of firms with only one initial layer. However, for this group of firms, the effect of foreign ownership on top-layer wages is not statistically significant in our most preferred specification, although the point estimates are even larger than those found for firms with initially two layers (and weakly significant in the regressions using the full sample). It is worth noticing, though, that these estimates are derived from a much smaller sub-sample of firms, which might explain the lack of statistical significance.

For the sub-sample consisting of firms with initially three layers, we find similar layer-level wage effects as for the sub-sample with initially two-layer firms. Foreign acquisition leads to a strong and significant effect on top-layer wages and no significant effect on bottom-layer wages, implying a strong increase in top-bottom wage inequality. For this group of firms, though, we find no significant effect of foreign acquisition on the number of layers, implying that foreign ownership leads to higher top-layer wages without significantly affecting the hierarchical organization (relative to comparable non-acquired firms). Judging by the results reported in Table 10, it appears that the increase in top-layer wages is driven by firms that either kept three layers or added a fourth layer.

Finally, the results for the sub-sample of firms with initially four layers show a different picture. Although the results are more similar to the results for the other groups of firms when the sub-sample is drawn from the full sample, with a marked increase in top-bottom wage inequality as a result of foreign acquisition, the results are turned around when the sub-sample is drawn from the matched sample. Here, foreign takeover leads to a strong and significant increase in bottom-layer wages with no significant effect on top-layer wages. This is consistent with the results reported in Table 10, which show a significant increase in bottom-layer wages for four-layer firms that remained unchanged (in terms of organizational structure) over time. It should be noted, though, that these results are based on a sample of 96 firms, which comprise less than 9% of the total number of firms in the matched sample.

In Tables B6 to B8 in the Online Appendix, we examine if foreign acquisitions also lead to changes in worker attributes in the top and bottom layers, notably education, potential experience in the labor market and tenure at the firm. The results in Table B6 reveal that foreign acquisitions tend to lower the average years of schooling of the bottom layer among firms that initially had two layers and three layers (although the effect is not statistically significant

for the latter group of firms). The estimates in Tables B7 and B8 reveal that foreign acquisitions lead to an increase in the levels of experience and tenure of workers at the top layer among firms that initially had three layers. For firms that initially had two layers, these point estimates are also positive but insignificant. Since wages tend to be positively associated with education, experience and tenure, these results suggest that the observed increase in top-bottom wage inequality following acquisition reflects in part changes in worker attributes that tend to be associated with knowledge.

In order to gain even further insight on the wage effects of foreign acquisitions, we have also estimated the effects of foreign ownership on wages averaged across all "managerial layers" (i.e., Layers 1-3). As before, these effects are estimated on separate sub-samples of firms according to the initial number of layers. The results, shown in Table B10 in the Online Appendix, reveal that, in the pooled regression, the point estimate of the foreign ownership effect is somewhat larger for average "managerial wages" than for average wages in the bottom layer. However, the effect on average managerial wages is considerably smaller and also less precisely estimated than the previously reported effect on average top-layer wages.¹¹ Furthermore, the effect tends to be statistically insignificant in the sub-sample regressions. These results provide further confirmation that the overall positive wage effects of foreign acquisitions are to a large extent driven by wage increases at the top layer of the organization.

4.4 Foreign versus domestic acquisitions

Finally, we explore whether the above reported foreign ownership effects are present also when considering the reverse type of ownership change – when previously foreign-owned firms are acquired by domestic owners. In our data we identify 349 firms which had foreign ownership in the first year of observation and which were subsequently acquired by domestic investors during the period of analysis. After constructing a sample consisting of these firms along with firms that had either domestic or foreign ownership throughout the entire period, we estimate equation (2) using the same set of dependent variables as those reported in Tables 6-9. In these estimations we use two alternative control groups; firms that were always domestic or always foreign. The results are reported in Tables B11.1 to B14.2 in the Online Appendix and show that, when identifying ownership effects only through changes of ownership from foreign to domestic hands, foreign ownership has hardly any significant effects on sales, employment, labor productivity, wages and number of hierarchical layers.

Two conclusions can be drawn from these results. First, the previously reported results in this section is related to *type of ownership* and do not seem to be the effects of acquisitions *per se*. Second, foreign ownership seems to have *persistent* effects. The latter conclusion is based on the fact that ownership effects do not appear to be symmetric. In other words, foreign ownership implies changes in the scale of operations, labor productivity, wages and internal organization

¹¹The results reported in Table B10 are based on estimations using all available wage observations in Layers 1-3. We have also estimated the effects using only firms without missing wage observations in any managerial layer. The resulting estimates are very similar and are available upon request.

of the firm, but these effects only apply to firms that were initially owned by domestic investors. They are not reverted if ownership is subsequently transferred from foreign to domestic hands.

5 Discussion

How can our empirical results be rationalized? Clearly, there are several possible (and not mutually exclusive) explanations. In this section we present a discussion of potential explanations for some of our key results within the context of recently developed theories of knowledge hierarchies, which allows us to identify potential mechanisms that could create a link between foreign acquisitions and the internal organization and wage structure of firms.

5.1 A theory of knowledge hierarchies

The theory of firms as knowledge hierarchies has been developed by Garicano (2000) and Garicano and Rossi-Hansberg (2004, 2006), and further extended by Caliendo and Rossi-Hansberg (2012). Here we will briefly present the main ingredients of the theory, as laid out by Garicano and Rossi-Hansberg (2006).¹²

The starting point is that production requires both labor and knowledge. More specifically, the realization of output requires successful problem solving, which in turn requires sufficient knowledge. This is modeled as agents (workers) drawing one problem per unit of time, where output is one if the problem is solved and zero otherwise. However, some problems occur more often than others. If we rank problems according to their likelihood of occurring, problem z is characterized by a density function $f(z)$ and a corresponding cumulative distribution function $F(z)$, where $f'(z) < 0$. A problem can be solved by an agent who has enough knowledge. Assuming that knowledge is cumulative, i.e., knowledge \hat{z} implies that all problems $z \in [0, \hat{z}]$ can be solved, the proportion of all problems an agent with knowledge \hat{z} can solve is given by $q := F(\hat{z})$. An agent that encounters a problem that he does not know how to solve, can ask a more knowledgeable agent for help in solving the problem. However, each time a problem is passed from one agent to another, there is a communication cost of $h < 1$ units of time incurred.

A key assumption of the theory is that an agent who does not know how to solve a problem also does not know who else might be able to solve it. Under this assumption, the optimal organizational structure is a knowledge hierarchy consisting of a bottom layer of production workers and one or more successive layers of managers who specialize in problem solving. The amount of knowledge increases as we move up in the hierarchical structure. Thus, production workers learn to solve the most common problems, whereas agents in higher layers in addition learn how to solve more exceptional problems. In each layer, unsolved problems are passed on to the next layer until the problem is solved or until it reaches the top layer. Furthermore, the hierarchy has a pyramidal shape, where higher layers become successively smaller. In equilibrium, agents are

¹²See also Garicano and Rossi-Hansberg (2015) for an overview of different variations of this modelling framework.

rewarded according to their knowledge, which implies that wages are higher for agents working in higher layers of the organization.¹³

When designing the optimal organizational structure, the firm has to decide on the number and size of layers, and on the required knowledge of agents in each layer. Suppose that a firm has L layers with n_0 production workers (the number of agents in Layer 0) with knowledge q_0 and $L - 1$ layers of problem solvers (managers), where the knowledge of managers in Layer i is q_i . This implies that the number of problems passed on to Layer 1 is $n_0(1 - q_0)$. Since it takes h units of time to communicate each problem, the number of managers in Layer 1 needed to deal with the problems passed on from Layer 0 is $n_1 = hn_0(1 - q_0)$. More generally, the size of Layer i is $n_i = hn_0(1 - q_{i-1})$. Thus, it is easy to see that $q_0 < q_1 < \dots < q_L$ implies $n_0 > n_1 > \dots > n_L$.

The value of more layers is to economize on knowledge acquisition in the organization. Since not all problems occur with the same frequency, it is more efficient that fewer agents learn how to solve the more infrequent problems. By adding layers in a knowledge hierarchy, the more knowledgeable problem solvers can be shielded from having to deal with simple (and frequently occurring) problems and can concentrate on solving the harder (and rarer) problems, which increases the value of acquiring knowledge. However, adding more layers is not without costs, since there are communication costs each time a problem is passed from one layer to another. Thus, the optimal organizational structure depends crucially on the size of communication costs relative to the costs of acquiring knowledge.

5.2 Foreign acquisition and firm reorganization

How can foreign ownership affect optimal firm (re)organization in the context of the theory presented above? In principle, there are two different (but not mutually exclusive) channels through which foreign ownership could have an effect, and we will argue that the expected effects through both channels are consistent with some of the key results of our empirical analysis.

First, foreign ownership might directly lead to an expansion in the scale of production because of improved productivity (for example through investments in machinery and new technology) or because of higher demand (for example through product quality upgrading or better access to export markets through integration of acquired plants into the foreign parent company's production and distribution network).¹⁴ In turn, this is likely to increase the number of hierarchical layers for at least some of the firms that increase their scale of production. As shown by Caliendo and Rossi-Hansberg (2012), firms that expand beyond a certain level optimally do so by adding layers to their hierarchical organization. This theoretical prediction is also empirically confirmed by Caliendo et al. (2015), using data on French manufacturing firms.

¹³These general characteristics of the optimal organizational structure are similar if agents are *ex ante* identical, as in Garicano (2000) or Caliendo and Rossi-Hansberg (2012), or if they are *ex ante* heterogeneous, as in Garicano and Rossi-Hansberg (2006). The optimal structure is also qualitatively similar even if knowledge is not cumulative, as in Caliendo and Rossi-Hansberg (2012).

¹⁴Evidence of such foreign ownership effects is found by Arnold and Javorcik (2009), Guadalupe, Kuzmina and Thomas (2012) and Ge, Lai and Zhu (2015), respectively for Indonesian, Spanish and Chinese firms.

Second, foreign ownership might also lead to changes in the optimal hierarchical structure for a given scale of production. One of the common explanations in the literature regarding the positive productivity effects of foreign acquisitions is that such a takeover also implies the transfer of new (and better) management practices to the acquired firm (see, e.g., Bloom, Sadun and Van Reenen, 2012). A key element of good management practice is to secure efficient communication and information flows within the organization. Improvement in management practices along this dimension will reduce the cost of communication, as measured by h in the theoretical model. A reduction in h implies that more problems can be communicated per unit of time, which increases the productivity of problem solvers. Thus, for a given number of hierarchical layers, an optimal response to a reduction in communication costs is to let a larger share of problems be solved by agents in the managerial layer(s), which implies an upwards redistribution of knowledge in the organization. Furthermore, since the optimal number of layers is, all else equal, determined by a trade-off between economizing on knowledge acquisition (increasing the number of layers) and economizing on total communication costs within the organization (reducing the number of layers), a reduction of communication costs will also increase the value of hierarchical organization and therefore (weakly) increase the optimal number of layers. Notice here that a reduction of communication costs also leads to higher productivity and a larger scale of production. The reason is that a larger number of problems are communicated per unit of time, which in turn implies that a larger share of problems are solved. This reduces the marginal cost of production for a given hierarchical structure, and even more so if the firm is optimally reorganized by the addition of one or more extra managerial layers.

If the number of hierarchical layers increases, be it through an incentive to increase the scale of production or through a reduction of internal communication costs, the optimal distribution of knowledge shifts upwards in the hierarchy, implying that a larger share of problems are solved at the top (relative to the bottom) of the organization. As previously explained, a reduction in communication costs will have a similar effect even if the number of layers remains unchanged. Since wages reflect knowledge, such an upwards redistribution of knowledge will, in turn, imply a larger wage inequality between agents at the top and bottom of the hierarchy. Thus, our two key results, that foreign ownership leads to (i) a higher number of hierarchical layers and (ii) an increase in wage inequality between the top and the bottom of the organization, are consistent with both of the two above suggested links between foreign ownership and internal organization. Furthermore, a larger scale of production will be the outcome in both cases.

While it is hard to pinpoint the exact channel(s) through which foreign ownership affects the acquired firms' internal organization and wage structure, the positive correlations between foreign ownership and each of the above-mentioned variables suggest that the model of knowledge hierarchies is a relevant theoretical framework for understanding our findings. This applies in particular to our results for the sub-sample of firms with two hierarchical layers at the time of foreign acquisition, where we find that foreign ownership is associated with larger scale of

production, a higher number of layers and higher top-bottom wage inequality.¹⁵ For firms with initially three layers, we find similar positive effects of foreign ownership on scale of production and top-bottom wage inequality, but find no significant effect on the number of layers in the matched sample (although the point estimates are positive). However, these results are still consistent with an explanation whereby foreign acquisition leads to lower internal communication costs, which would lead to higher top-bottom wage inequality even if the number of layers remains unchanged.

Finally, each of our suggested possible mechanisms for the effect of foreign acquisition on internal pay structure, whether it works through firm reorganization or not, relies on a redistribution of knowledge internally in the acquired firms. Indeed, our results on workforce characteristics do provide some evidence that foreign acquisitions are accompanied by a within-firm redistribution of knowledge that would be consistent with increased top-bottom wage inequality, as indicated by a reduction in the average education level of workers in the bottom layer and an increase in experience and/or tenure at the top of the organization, which might reflect changes in the distribution of on-the-job acquired knowledge.

6 Effects of foreign takeovers on use of information technologies

In this section we exploit an auxiliary firm-level data set for the period 2004-2009 to examine empirically one of the potential channels of causation identified above: foreign acquisitions lead to the adoption of information technologies that are expected to improve the information flow within the organization, and thereby reduce internal communication costs.

To this end, we merged *Quadros de Pessoal* with data from *Inquérito à Utilização de Tecnologias de Informação e da Comunicação nas Empresas*, a firm-level survey conducted since 2004 by the National Statistical Institute which gathers information on the use of information technologies. Interestingly for our purposes, this survey collects information on whether the firm makes use of several information technologies that are expected to stimulate efficient communication flows in the organization, notably the intranet, the e-mail, and internal networks. The survey also contains information on whether firms use the extranet, which would be expected to predominately improve information flows between the firm and outside parties. Using unique firm identifiers provided by the National Statistical Institute, we were able to match information for 1624 firms from our main sample, of which 172 were acquired by foreign investors during the period of analysis.

Table A6 provides summary statistics on these linked auxiliary survey data. These statistics reveal that the majority of firms in this sample used the intranet, the e-mail, or internal networks: in the full sample, the proportion of firm-year observations for which these indicators take the value of one ranges between 69.9% and 89.5%. The proportion of firms using the extranet in the full sample is lower at 44%. These statistics also reveal that firms acquired by foreign investors

¹⁵These firms constitute a sizeable share (more than 35%) of the total number of foreign acquisitions in our matched sample.

are more likely to use all these information technologies. These proportions are higher in the matched sample than in the full sample. The share of firms using the e-mail is very close to unity in the full sample and equals one in the matched sample. Therefore, the data do not appear to exhibit sufficient variation to examine the effects of foreign acquisition on the use of this technology.

[Table 12 here]

In order to examine whether foreign acquisitions impact the use of each of these technologies, we adopt the identification strategy outlined in Section 4. The difference-in-differences estimates in Panel A of Table 12 reveal that foreign acquisitions lead to a statistically significant increase in the propensity to use the intranet. This finding holds both in the full sample (columns (1) and (2)) and in the matched sample (columns (3) and (4)). In the matched sample, the point estimates for the other relevant technologies (reported in Panels B and D) are also positive but imprecisely estimated.

A potential concern about this result is that treated and control firms might exhibit pre-acquisition differences in the use of the intranet. For robustness, in Table A7 we examine the effects of foreign acquisitions on the use of this technology in a sample of firms that was matched also on intranet use prior to the foreign acquisition. Reassuringly, the estimates of interest remain positive, significant and of similar magnitude to those reported in Table 12.

It is important to emphasize that the analysis in this section is based on a smaller and less representative sample of firms.¹⁶ This feature of the data recommends particular caution in drawing strong conclusions from these results. With this caveat in mind, it is interesting that these estimates are in line with the predictions of the theory of knowledge-based hierarchies. In particular, since the intranet is essentially aimed at promoting more efficient communication flows inside organizations, the fact that its use tends to increase following foreign acquisition can be interpreted as supporting evidence for one of the precise mechanisms emphasized by this class of models, as explained and discussed in Section 5.

7 Concluding remarks

Recent theories of knowledge-based hierarchies suggest that reorganization, through changes in hierarchical layers of employees, is key to understand how firms expand and contract and the evolution of pay in each layer. While existing evidence lends strong support to this class of models, relatively little is known about whether and how different economic or policy shocks can lead to firm reorganization and thereby influence labor market outcomes.

¹⁶Besides covering a much shorter time period, this data include all Portuguese firms only above a certain size (more than 250 employees). For smaller firms, the data include only a stratified random sample that is drawn each year. This implies a clear bias towards larger firms in the process of linking this data with data from our main sample, as evidenced by a considerably higher average firm size (as well as labor productivity and average wage) in the sample based on the auxiliary data (Table A6) than in the sample used in the main analysis (Table 1).

We exploited comprehensive data on Portuguese firms and their workers spanning the period 1991 to 2009 to study the effect of foreign takeovers on the internal organization and pay structure of firms. Our results provide evidence that foreign acquisitions lead to: (1) an expansion in the scale of operations; (2) a higher number of hierarchical layers; and (3) increased wage inequality between the top and bottom layers in firms that reorganize and add layers. These results accord well with a theory of knowledge-based hierarchies in which foreign takeovers lead to improved productivity, higher demand, or reduced communication costs within the acquired firms. Using an auxiliary survey data set, we provided evidence that foreign acquisition has a positive and significant effect on the use of the intranet. Although the small size of this sample recommends caution in drawing strong conclusions from this result, we interpret it as suggestive that reduced communication costs played some role in driving the impacts of foreign acquisitions.

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A Appendix

A.1 Foreign direct investment in Portugal

Table A1 reports evidence on the stocks and rates of growth of foreign direct investment in Portugal during the period 1996-2009.

[Table A1 here]

A.2 Definition of hierarchical layers

Following Caliendo, Monte and Rossi-Hansberg (2015), we use detailed information on workers occupation to construct four hierarchical layers of employees. Table A2 presents the definition of these occupations.

[Table A2 here]

A.3 Definitions of variables from *Quadros de Pessoal*

Here we describe in more detail the variables used in the main analysis:

Foreign ownership: Dummy variable that equals one if more than 50% of capital is owned by foreign investors;

Sales: Total value of sales (in Portugal and abroad) of the firm during the reference year;

Sales growth: Rate of change between the value of sales in the reference year and in the prior year;

Employment: Number of employees at the firm in October of the reference year;

Labor productivity: Ratio between the the total value of sales and employment during the reference year;

Number of layers: Number of hierarchical layers at the firm in October of the reference year;

Hourly wage: Ratio between the wage bill and the total number of hours worked at the firm in October of the reference year. The wage bill is computed on the basis of the monthly wage and employment. The monthly wage includes the base wage and other components of pay;

Education: Average number of years of schooling of employees at the firm in the reference year;

Tenure: Average number of years of tenure of employees at the firm in the reference year;

Potential experience: Average number of years of potential labor market experience of employees at the firm in the reference year. Potential experience is defined as the difference between the worker's age and the number of years of schooling;

Portuguese nationals: Share of Portuguese nationals among firm employees in the reference year. Individual-level data on worker nationality are available only since 1999. Data for earlier years were imputed from individual worker records for 1999-2009;

All monetary variables are in euros and have been deflated to constant 2009 prices using GDP and CPI deflators (obtained from AMECO) for sales and wages, respectively.

A.4 Definitions of variables from *Inquérito à Utilização de Tecnologias de Informação e da Comunicação nas Empresas*

Here we describe in more detail the variables employed in the analysis using auxiliary survey data:

Use of intranet: Dummy variable that equals one if the firm has intranet in the reference year;

Use of e-mail: Dummy variable that equals one if the firms uses the e-mail in the reference year;

Use of extranet: Dummy variable that equals one if the firms uses the extranet in the reference year;

Use of internal networks: Dummy variable that equals one if the firms uses internal networks in the reference year;

A.5 Additional summary statistics

Table A3 provides summary statistics on the estimation sample relative to the private sector as a whole.

[Table A3 here]

A.6 Propensity score matching

Tables A4 shows the tests of matching quality discussed in Section 4.1.

[Table A4 here]

A.7 Additional results

Tables A5 reports the effects of foreign ownership on employment.

[Table A5 here]

A.8 Summary statistics and robustness, auxiliary survey data

Table A.6 provides summary statistics on auxiliary survey data from *Inquérito à Utilização de Tecnologias de Informação e da Comunicação nas Empresas*. Table A7 reports effects of foreign acquisition on the use of intranet using a sample of firms matched also on intranet use prior to the foreign acquisition.

[Table A6 here]

[Table A7 here]

Table 1: Summary statistics, full sample, 1991-2009

	All firms	Always domestic	Acquired by foreign investors
	(1)	(2)	(3)
Log sales	14.0677 (1.3365)	14.0411 (1.3169)	15.5926 (1.5529)
Employment	42.1986 (143.0868)	40.4140 (128.6462)	144.7823 (485.1442)
Log labor productivity	10.8681 (1.0532)	10.8561 (1.0453)	11.5595 (1.2592)
Number of layers	2.0508 (0.7620)	2.0411 (0.7572)	2.6098 (0.8227)
Log hourly wage	1.4504 (0.4146)	1.4419 (0.4073)	1.9366 (0.5263)
Education (years of schooling)	6.2147 (2.1079)	6.1780 (2.0792)	8.3235 (2.6149)
Tenure (years)	7.4826 (5.2359)	7.4883 (5.2356)	7.1516 (5.2389)
Potential experience (years)	25.8508 (6.5251)	25.9121 (6.5114)	22.3306 (6.3436)
N (obs.)	432,955	425,552	7,403
N (firms)	74,666	73,728	938

Notes: The table reports means and standard deviations (in parentheses) for the full sample of firm-year observations with at least 10 employees over the period 1991-2009 (except 2001 and 2002) of firms that are not foreign owned in their first year in the sample. A firm is foreign owned if foreign investors hold at least 50% of capital. Column (1) refers to all firms, column (2) refers to firms that did not change ownership during the sample period, and column (3) refers to firms that changed foreign ownership status only once during the sample period. Monetary variables are in 2009 prices.

Table 2: The acquisition decision

	Dependent variable: foreign ownership							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log sales	0.7220*** (0.0225) [0.0037***]	0.7199*** (0.0226) [0.0035***]						
2nd quartile			0.6341*** (0.1319) [0.0031***]	0.6343*** (0.1317) [0.0030***]				
3rd quartile			1.4868*** (0.1259) [0.0074***]	1.4849*** (0.1256) [0.0070***]				
4th quartile			2.8248*** (0.1147) [0.0140***]	2.8298*** (0.1148) [0.0133***]				
Log labor productivity					0.6759*** (0.0377) [0.0046***]	0.6758*** (0.0379) [0.0044***]		
2nd quartile							0.1241 (0.1033) [0.0008]	0.1114 (0.1035) [0.0007]
3rd quartile							0.7007*** (0.1063) [0.0046***]	0.6894*** (0.1066) [0.0043***]
4th quartile							0.0041*** (0.1010) [0.0111***]	0.0048*** (0.1015) [0.0105***]
Industry trends	N	Y	N	Y	N	Y	N	Y
N (obs.)	432,955	432,955	432,955	432,955	432,955	432,955	432,955	432,955
N (firms)	74,666	74,666	74,666	74,666	74,666	74,666	74,666	74,666

Notes: Standard errors in parentheses clustered at firm level. *10% level, **5% level, and ***1% level. Log sales and log labor productivity are relative to the industry mean and lagged one year relative to the dependent variable. All regressions include year and industry dummies. Marginal effects at the mean of the variables in square brackets.

Table 3: Propensity score estimates

Dependent variable: foreign ownership		
	Coefficient	Marginal effect (at mean of variable)
	(1)	(2)
Log sales	0.4494*** (0.0453)	0.0003*** (0.0000)
Sales growth	-0.0000 (0.0001)	-0.0000 (0.0000)
Log labor productivity	-0.4193*** (0.0660)	-0.0002*** (0.0000)
Number of layers	0.06400 (0.0643)	0.0000 (0.0000)
Log hourly wage	4.2050*** (0.3977)	0.0025*** (0.0002)
Log hourly wage squared	-0.5281*** (0.0872)	-0.0003*** (0.0000)
Industry effects		Yes
Year effects		Yes
N (obs.)		426,109
N (firms)		74,381

Notes: All independent variables defined in levels are lagged one year (prior to acquisition). Sales growth is calculated between the year prior to acquisition and the acquisition year. Standard errors in parentheses clustered at the firm-level. *10% level, **5% level, and ***1% level.

Table 4: Summary statistics, matched sample, year prior to acquisition

	Always domestic	Acquired by foreign investors	Difference in means, t-test	p-value
	(1)	(2)	(3)	(4)
Log sales	15.1610	15.0620	-1.06	0.290
Sales growth	6.0505	13.7390	1.08	0.282
Lagged sales growth	8.1978	10.6230	0.28	0.779
Employment	102.6400	93.1390	-0.83	0.406
Log labor productivity	11.3370	11.3060	-0.42	0.678
Number of layers	2.4304	2.4304	0.00	1.000
Log hourly wage	1.8452	1.8692	0.81	0.416
N (obs.)	618	618		
N (firms)	606	618		

Notes: The table reports means for the matched sample of firm-year observations with at least 10 employees in the year prior to acquisition. A firm is foreign owned if foreign investors hold at least 50% of capital. Column (1) refers to firms that did not change ownership during the sample period, and column (2) refers to firms that changed foreign ownership status only once during the sample period. Sales growth is calculated between the year prior to acquisition and the year of acquisition. Lagged sales growth is calculated between two years prior to acquisition and one year prior to the acquisition.

Table 5: Summary statistics, matched sample, 1991-2009

	All firms	Always domestic	Acquired by foreign investors
	(1)	(2)	(3)
Log sales	15.4025 (1.6019)	15.2351 (1.6181)	15.6328 (1.5503)
Employment	124.5430 (343.3684)	108.3468 (230.0602)	146.8231 (454.3711)
Log labor productivity	11.4477 (1.2207)	11.3565 (1.1843)	11.5731 (1.2575)
Number of layers	2.5062 (0.8277)	2.4351 (0.8249)	2.6048 (0.8214)
Log hourly wage	1.8132 (0.4908)	1.7379 (0.4544)	1.9167 (0.5193)
Education (years of schooling)	7.4611 (2.4668)	6.9319 (2.3081)	8.1889 (2.4927)
Tenure (years)	9.2612 (5.6606)	10.7543 (5.5167)	7.2072 (5.1936)
Potential experience (years)	25.0820 (6.6300)	26.9829 (6.3104)	22.4671 (6.1519)
N (obs.)	11,966	6,860	5,106
N (firms)	1224	606	618

Notes: The table reports means and standard deviations (in parentheses) for the matched sample of firm-year observations with more than 10 employees over the period 1991-2009 (except 2001 and 2002) of firms that are not foreign owned in their first year in the sample. A firm is foreign owned if foreign investors hold at least 50% of capital. Column (1) refers to all firms, column (2) refers to firms that did not change ownership during the sample period, and column (3) refers to firms that changed foreign ownership status only once during the sample period. Monetary variables are in 2009 prices.

Table 6: Effects of foreign acquisition on sales

Dependent variable: log sales				
	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
A. Pooled				
Foreign ownership	0.3752*** (0.0452)	0.3771*** (0.0452)	0.2951*** (0.0549)	0.2916*** (0.0549)
Industry trends	N	Y	N	Y
N (obs.)	432,955	432,955	11,966	11,966
N (firms)	74,666	74,666	1,224	1,224
B. Conditional on initial number of layers				
Firms with initially 1 layer				
Foreign ownership	0.1009 (0.0994)	0.0976 (0.0987)	0.1044 (0.1245)	0.0788 (0.1231)
Industry trends	N	Y	N	Y
N (obs.)	167,301	167,301	1,573	1,573
N (firms)	26,969	26,969	184	184
Firms with initially 2 layers				
Foreign ownership	0.3527*** (0.0765)	0.3568*** (0.0766)	0.3348*** (0.0903)	0.3235*** (0.0889)
Industry trends	N	Y	N	Y
N (obs.)	189,655	189,655	4,110	4,110
N (firms)	34,685	34,685	431	431
Firms with initially 3 layers				
Foreign ownership	0.3878*** (0.0680)	0.3860*** (0.0680)	0.2832*** (0.0861)	0.2800*** (0.0874)
Industry trends	N	Y	N	Y
N (obs.)	72,429	72,429	5,355	5,355
N (firms)	12,363	12,363	521	521
Firms with initially 4 layers				
Foreign ownership	0.6194*** (0.1572)	0.5859*** (0.1584)	0.3410** (0.1709)	0.3518** (0.1720)
Industry trends	N	Y	N	Y
N (obs.)	3,570	3,570	1,033	1,033
N (firms)	649	649	96	96

Notes: Foreign ownership status is lagged one year. All regressions include year dummies. Standard errors in parentheses clustered at firm level. *10% level, **5% level, and ***1% level.

Table 7: Effects of foreign acquisition on labor productivity

Dependent variable: log labor productivity				
	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
A. Pooled				
Foreign ownership	0.2406*** (0.0380)	0.2440*** (0.0380)	0.1541*** (0.0467)	0.1529*** (0.0468)
Industry trends	N	Y	N	Y
N (obs.)	432,955	432,955	11,966	11,966
N (firms)	74,666	74,666	1,224	1,224
B. Conditional on initial number of layers				
Firms with initially 1 layer				
Foreign ownership	0.0486 (0.0959)	0.0525 (0.0946)	0.0327 (0.1172)	0.0042 (0.1142)
Industry trends	N	Y	N	Y
N (obs.)	167,301	167,301	1,573	1,573
N (firms)	26,969	26,969	184	184
Firms with initially 2 layers				
Foreign ownership	0.1901*** (0.0603)	0.1935*** (0.0603)	0.1552** (0.0692)	0.1506** (0.0696)
Industry trends	N	Y	N	Y
N (obs.)	189,655	189,655	4,110	4,110
N (firms)	34,685	34,685	431	431
Firms with initially 3 layers				
Foreign ownership	0.2537*** (0.0580)	0.2555*** (0.0581)	0.1405* (0.0771)	0.1414* (0.0785)
Industry trends	N	Y	N	Y
N (obs.)	72,429	72,429	5,355	5,355
N (firms)	12,363	12,363	521	521
Firms with initially 4 layers				
Foreign ownership	0.4409*** (0.1435)	0.3884*** (0.1451)	0.2736** (0.1320)	0.2727** (0.1321)
Industry trends	N	Y	N	Y
N (obs.)	3,570	3,570	1,033	1,033
N (firms)	649	649	96	96

Notes: Foreign ownership status is lagged one year. All regressions include year dummies. Standard errors in parentheses clustered at firm level. *10% level, **5% level, and ***1% level.

Table 8: Effects of foreign acquisition on hourly wage

Dependent variable: log hourly wage				
	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
A. Pooled				
Foreign ownership	0.0800*** (0.0116)	0.0808*** (0.0116)	0.0674*** (0.0133)	0.0660*** (0.0133)
Industry trends	N	Y	N	Y
N (obs.)	432,955	432,955	11,966	11,966
N (firms)	74,666	74,666	1,224	1,224
B. Conditional on initial number of layers				
Firms with initially 1 layer				
Foreign ownership	0.0717*** (0.0265)	0.0709*** (0.0264)	0.0679** (0.0309)	0.0610** (0.0304)
Industry trends	N	Y	N	Y
N (obs.)	167,301	167,301	1,573	1,573
N (firms)	26,969	26,969	184	184
Firms with initially 2 layers				
Foreign ownership	0.0793*** (0.0221)	0.0709*** (0.0220)	0.0487** (0.0232)	0.0475** (0.0230)
Industry trends	N	Y	N	Y
N (obs.)	189,655	189,655	4,110	4,110
N (firms)	34,685	34,685	431	431
Firms with initially 3 layers				
Foreign ownership	0.0833*** (0.0166)	0.0839*** (0.0429)	0.0677*** (0.0196)	0.0650*** (0.0195)
Industry trends	N	Y	N	Y
N (obs.)	72,429	72,429	5,355	5,355
N (firms)	12,363	12,363	521	521
Firms with initially 4 layers				
Foreign ownership	0.1655*** (0.0454)	0.1420*** (0.0429)	0.1195** (0.0508)	0.1096** (0.0490)
Industry trends	N	Y	N	Y
N (obs.)	3,570	3,570	1,033	1,033
N (firms)	649	649	96	96

Notes: Foreign ownership status is lagged one year. All regressions include year dummies. Standard errors in parentheses clustered at firm level. *10% level, **5% level, and ***1% level.

Table 9: Effects of foreign acquisition on the number of layers

Dependent variable: number of layers				
	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
A. Pooled				
Foreign ownership	0.0981*** (0.0275)	0.1000*** (0.0274)	0.1312*** (0.0309)	0.1276*** (0.0304)
Industry trends	N	Y	N	Y
N (obs.)	432,955	432,955	11,966	11,966
N (firms)	74,666	74,666	1,224	1,224
B. Conditional on initial number of layers				
Firms with initially 1 layer				
Foreign ownership	0.1120 (0.0762)	0.1034 (0.0745)	0.2889*** (0.0840)	0.2923*** (0.0810)
Industry trends	N	Y	N	Y
N (obs.)	167,301	167,301	1,573	1,573
N (firms)	26,969	26,969	184	184
Firms with initially 2 layers				
Foreign ownership	0.2306*** (0.0506)	0.2310*** (0.0504)	0.2338*** (0.0588)	0.2314*** (0.0576)
Industry trends	N	Y	N	Y
N (obs.)	189,655	189,655	4,110	4,110
N (firms)	34,685	34,685	431	431
Firms with initially 3 layers				
Foreign ownership	0.2343*** (0.0370)	0.2325*** (0.0369)	0.0250 (0.0391)	0.0297 (0.0387)
Industry trends	N	Y	N	Y
N (obs.)	72,429	72,429	5,355	5,355
N (firms)	12,363	12,363	521	521
Firms with initially 4 layers				
Foreign ownership	0.4435*** (0.1557)	0.4680*** (0.1137)	-0.0207 (0.1176)	-0.0695 (0.1223)
Industry trends	N	Y	N	Y
N (obs.)	3,570	3,570	1,033	1,033
N (firms)	649	649	96	96

Notes: Foreign ownership status is lagged one year. All regressions include year dummies. Standard errors in parentheses clustered at firm level. *10% level, **5% level, and ***1% level.

Table 10: Layer-level analysis of the effects of foreign acquisition on log hourly wages, conditional on the organizational structure of acquired and non-acquired firms

Dependent variable: log hourly wages of	Firms currently with	Firms initially with			
		1 Layer	2 Layers	3 Layers	4 Layers
		(1)	(2)	(3)	(4)
Layer 0	1 Layer	0.0687* (0.0385)	0.0763 (0.0856)	-0.1943 (0.2152)	
Layer 0	2 Layers	-0.0205 (0.0548)	-0.0101 (0.0356)	0.0112 (0.0537)	0.6732 (0.6240)
Layer 1		-0.1358 (0.1377)	0.0136 (0.0457)	0.0869 (0.1096)	0.6187 (0.5605)
Layer 0		0.0115 (0.1482)	0.0485 (0.0422)	0.0241 (0.0237)	0.1099 (0.0864)
Layer 1	3 Layers	0.0540 (0.1973)	-0.0126 (0.0639)	0.0073 (0.0312)	-0.0772 (0.0918)
Layer 2		0.3383 (0.4201)	0.1435 (0.1011)	0.1018** (0.0403)	0.0417 (0.2102)
Layer 0			-0.0712 (0.0670)	-0.0146 (0.0367)	0.1328* (0.0782)
Layer 1	4 Layers		0.0893 (0.1236)	0.0216 (0.0648)	0.1884*** (0.0625)
Layer 2			0.4226*** (0.1131)	0.0101 (0.1734)	0.1157 (0.1058)
Layer 3			0.3377 (0.3349)	0.3724* (0.2207)	0.1368 (0.2680)

Notes: The table summarizes the point estimates (and standard errors) on the effects of foreign ownership on hourly wages at the layer-level, conditioning the sample of acquired and non-acquired firms on their organizational structure (i.e. on their initial and current number of layers). All results are from regressions using the matched sample of firms and including industry trends. Standard errors in parentheses clustered at firm level. *10% level, **5% level, and ***1% level. Tables B1.1 to B1.4 of the online appendix report the full set of results for these regressions.

Table 11: Effects of foreign acquisition on log hourly wage of top and bottom layers

	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
A. Pooled				
Dependent variable: log hourly wage of top layer				
Foreign ownership	0.1528*** (0.0296)	0.1534*** (0.0296)	0.1220*** (0.0325)	0.1183*** (0.0326)
Industry trends	N	Y	N	Y
N (obs.)	179,974	179,974	8,690	8,690
N (firms)	42,456	42,456	1,115	1,115
Dependent variable: log hourly wage of bottom layer				
Foreign ownership	0.0190* (0.0113)	0.0200* (0.0113)	0.0251* (0.0132)	0.0245* (0.0132)
Industry trends	N	Y	N	Y
N (obs.)	432,954	432,954	11,966	11,966
N (firms)	74,665	74,665	1,224	1,224
B. Conditional on initial number of layers				
Firms with initially 1 layer				
Dependent variable: log hourly wage of top layer				
Foreign ownership	0.1828* (0.1061)	0.1849* (0.1071)	0.1715 (0.1338)	0.1373 (0.1570)
Industry trends	N	Y	N	Y
N (obs.)	33,809	33,809	460	460
N (firms)	9,240	9,240	108	108
Dependent variable: log hourly wage of bottom layer				
Foreign ownership	0.0437* (0.0452)	0.0461* (0.0452)	0.0523* (0.0309)	0.0486 (0.0304)
Industry trends	N	Y	N	Y
N (obs.)	167,300	167,300	1,573	1,573
N (firms)	26,968	26,968	184	184
Firms with initially 2 layers				
Dependent variable: log hourly wage of top layer				
Foreign ownership	0.1440*** (0.0474)	0.1447*** (0.0473)	0.1377*** (0.0504)	0.1280** (0.0518)
Industry trends	N	Y	N	Y
N (obs.)	95,541	95,541	2,965	2,965
N (firms)	23,367	23,367	409	409
Dependent variable: log hourly wage bottom layer				
Foreign ownership	0.0191 (0.0213)	0.0200 (0.0213)	-0.0010 (0.0229)	-0.0005 (0.0229)
Industry trends	N	Y	N	Y
N (obs.)	189,655	189,655	4,110	4,110
N (firms)	34,685	34,685	431	431

Table 11: Effects of foreign acquisition on log hourly wage of top and bottom layers (continued)

	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
Firms with initially 3 layers				
Dependent variable: log hourly wage of top layer				
Foreign ownership	0.1480*** (0.0382)	0.1477*** (0.0382)	0.1129*** (0.0428)	0.1114*** (0.0426)
Industry trends	N	Y	N	Y
N (obs.)	47,687	47,687	4,458	4,458
N (firms)	9,258	9,258	510	510
Dependent variable: log hourly wage of bottom layer				
Foreign ownership	0.0139 (0.0160)	0.0145 (0.0160)	0.0156 (0.0194)	0.0123 (0.0195)
Industry trends	N	Y	N	Y
N (obs.)	72,429	72,429	5,355	5,355
N (firms)	12,363	12,363	521	521
Firms with initially 4 layers				
Dependent variable: log hourly wage of top layer				
Foreign ownership	0.2806** (0.1284)	0.2867** (0.1266)	0.0811 (0.1387)	0.0558 (0.1415)
Industry trends	N	Y	N	Y
N (obs.)	2,937	2,937	899	899
N (firms)	591	591	96	96
Dependent variable: log hourly wage of bottom layer				
Foreign ownership	0.0807* (0.0425)	0.0802* (0.0423)	0.1346*** (0.0487)	0.1340*** (0.0489)
Industry trends	N	Y	N	Y
N (obs.)	3,570	3,570	1,033	1,033
N (firms)	649	649	96	96

Notes: Foreign ownership status is lagged one year. All regressions include year dummies. Standard errors in parentheses clustered at firm level. *10% level, **5% level, and ***1% level.

Table 12: Effects of foreign acquisition on the use of information technologies

	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
A. Dependent variable: use of intranet				
Foreign ownership	0.1989*** (0.0617)	0.2041*** (0.0622)	0.1960** (0.0867)	0.1965** (0.0911)
Industry trends	N	Y	N	Y
Matched sample	N	N	Y	Y
N (obs.)	4,268	4,268	233	233
N (firms)	1,624	1,624	65	65
B. Dependent variable: use of email				
Foreign ownership	-0.0017 (0.0012)	-0.0012 (0.0011)	n.d. n.d.	n.d. n.d.
Industry trends	N	Y		
Matched sample	N	N		
N (obs.)	4,268	4,268		
N (firms)	1,624	1,624		
C. Dependent variable: use of extranet				
Foreign ownership	0.0218 (0.1054)	0.0156 (0.1053)	0.0462 (0.1241)	0.0596 (0.1337)
Industry trends	N	Y	N	Y
Matched sample	N	N	Y	Y
N (obs.)	4,268	4,268	233	233
N (firms)	1,624	1,624	65	65
D. Dependent variable: use of internal networks				
Foreign ownership	-0.0292*** (0.0097)	-0.0291*** (0.0100)	0.0206 (0.0335)	0.0206 (0.0347)
Industry trends	N	Y	N	Y
Matched sample	N	N	Y	Y
N (obs.)	4,268	4,268	233	233
N (firms)	1,624	1,624	65	65

Notes: Foreign ownership status is lagged one year. All regressions include year dummies. Standard errors in parentheses clustered at firm level. *10% level, **5% level, and ***1% level.

Table A1: Foreign direct investment in Portugal, 1996-2009

	1996		2009		annual
	stock	% of total	stock	% of total	growth rate
	(1)	(2)	(3)	(4)	1996-2009
Spain	7,848	28.57	22,597	24.04	8.5
France	3,532	12.86	6,118	6.51	4.3
United Kingdom	2,835	10.32	6,973	7.42	7.2
Netherlands	2,664	9.70	16,747	17.81	15.2
Germany	2,423	8.82	3,035	3.23	1.7
USA	1,597	5.81	1,442	1.53	-0.8
Switzerland	1,237	4.50	850	0.90	-2.9
Luxembourg	1,148	4.18	7,393	7.86	15.4
Italy	587	2.14	4,280	4.55	16.5
Belgium	469	1.71	1,075	1.14	6.6
Brazil	436	1.59	3,703	3.94	17.9
Ireland	134	0.49	1,422	1.51	19.9
Angola	7	0.03	255	0.27	31.8
European Union	22,815	83.04	72,043	76.64	9.2
Total	27,473	100.00	94,005	100.00	9.9

Notes: The table reports end-of-year stocks of foreign direct investment in Portugal by country of origin in 1996 and 2009. Stocks are in millions of euros at 2009 prices. Column (5) reports the annual average rate of growth of FDI stocks between 1996 and 2009. Data come from the Balance of Payments Statistics of the Central Bank of Portugal. Data are reported in accordance with BPM6 methodology and were updated in February 2016. Data prior to 1996 are not available.

Table A2: Definition of hierarchical occupations

Occupation level	Occupations	Correspondence in CNP94
CEO and Directors	"General directors" and "directors and managers of small firms"	121; 131
Top managers	"Directors of production, finance or other"	122, 123
Supervisors	"Specialists in scientific and intellectual jobs"; "Intermediate-level technicians and professionals"	between 200 and 400
Operators	"Administrative staff"; "Service and sales staff"; "Workers and craft"; "Machine operators"; "Unskilled workers"	above 400

Notes: The table reports the definition of occupations included in each layer using the 1994 National Classification of Occupations (CNP94)

Table A3: Importance of the estimation sample in the private sector as a whole

Year	All firms			Always domestic			Acquired by foreign investors		
	Sales	Empl.	Wage bill	Sales	Empl.	Wage bill	Sales	Empl.	Wage bill
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1992	0.5548	0.5673	0.5883	0.5276	0.5361	0.5546	0.0270	0.0270	0.0283
1993	0.5806	0.5907	0.6090	0.5278	0.5551	0.5712	0.0339	0.0281	0.0292
1994	0.5815	0.6049	0.6240	0.5311	0.5632	0.5792	0.0492	0.0312	0.0336
1995	0.5839	0.6104	0.6283	0.5323	0.5744	0.5892	0.0496	0.0324	0.0348
1996	0.5927	0.6174	0.6340	0.5355	0.5760	0.5910	0.0509	0.0329	0.0348
1997	0.5970	0.6182	0.6351	0.5392	0.5773	0.5916	0.0535	0.0332	0.0356
1998	0.5988	0.6202	0.6369	0.5393	0.5779	0.5917	0.0540	0.0344	0.0368
1999	0.5988	0.6205	0.6408	0.5394	0.5796	0.5968	0.0542	0.0349	0.0375
2000	0.6012	0.6266	0.6437	0.5471	0.5849	0.6000	0.0548	0.0353	0.0378
2003	0.6026	0.6275	0.6456	0.5478	0.5950	0.6108	0.0550	0.0356	0.0381
2004	0.6144	0.6342	0.6525	0.5594	0.6009	0.6177	0.0563	0.0409	0.0430
2005	0.6156	0.6409	0.6538	0.5632	0.6060	0.6182	0.0565	0.0410	0.0437
2006	0.6197	0.6438	0.6620	0.5647	0.6108	0.6244	0.0578	0.0416	0.0440
2007	0.6254	0.6489	0.6727	0.5712	0.6135	0.6347	0.0594	0.0417	0.0449
2008	0.6336	0.6938	0.6995	0.5758	0.6656	0.6702	0.0595	0.0423	0.0452
2009	0.6402	0.6982	0.7041	0.6063	0.6712	0.6758	0.0615	0.0429	0.0458
N (obs.)		432,955			425,552			7,403	
N (firms)		74,666			73,728			938	

Notes: The table reports the share of sales, employment and wage bill of firms used in the estimation sample relative to the whole private sector. It includes firm-year observations with more than 10 employees of firms that are not foreign owned in their first year in the sample. A firm is foreign owned if foreign investors hold at least 50% of capital. 'Always domestic' refers to firms that did not change ownership during the sample period, 'Acquired by foreign investors' refers to firms that changed foreign ownership status only once during the sample period. Firms acquired in 2002 are excluded from the estimation sample, due to missing data for the variables included in the selection equation (values of sales, wage bill and labor productivity in 2001).

Table A4: Indicators of covariate balancing before and after matching

Panel A: t-test before and after matching							
Variable	Sample	Mean		% bias	% reduction bias	t-test	p-value
		Treated	Control				
Log sales	Unmatched	15.1110	13.9810	71.9		20.690	0.000
	Matched	15.0620	15.1610	-6.3	91	-1.060	0.290
Log labor productivity	Unmatched	11.3220	10.7980	41.2		11.930	0.000
	Matched	11.3060	11.3370	-2.5	94	-0.420	0.678
Sales growth	Unmatched	4.1640	2.1589	2.8		0.600	0.549
	Matched	4.2042	6.7809	-3.6	-29	-0.630	0.528
Log hourly wage	Unmatched	1.8798	1.4124	96.7		28.420	0.000
	Matched	1.8692	1.8452	5.0	95	0.810	0.416
Log hourly wage squared	Unmatched	3.8326	2.1632	89.1		30.640	0.000
	Matched	3.7798	3.6546	6.7	93	1.060	0.291
Number of layers	Unmatched	2.4407	2.0085	53.9		14.170	0.000
	Matched	2.4304	2.4304	0.0	100	0.000	1.000
Food, beverage, tobacco	Unmatched	0.0337	0.0475	-7.0		-1.630	0.104
	Matched	0.0307	0.3074	0.0	100	0.000	1.000
Textiles, leather	Unmatched	0.0801	0.1249	-14.8		-3.380	0.001
	Matched	0.0809	0.0809	0.0	100	0.000	1.000
Wood, cork, paper	Unmatched	0.0337	0.0487	-7.6		-1.750	0.081
	Matched	0.0340	0.0340	0.0	100	0.000	1.000
Non-metallic manufacturing	Unmatched	0.1010	0.0490	19.8		6.000	0.000
	Matched	0.1019	0.1019	0.0	100	0.000	1.000
Metallic manufacturing	Unmatched	0.1234	0.0834	13.100		3.610	0.000
	Matched	0.1246	0.1246	0.000	100	0.000	1.000
Furniture	Unmatched	0.0112	0.0280	-12.100		-2.540	0.011
	Matched	0.0113	0.0113	0.000	100	0.000	1.000
Construction	Unmatched	0.0513	0.1285	-27.200		-5.760	0.000
	Matched	0.0518	0.0518	0.000	100	0.000	1.000
Wholesale and retail trade	Unmatched	0.3093	0.2403	15.500		4.030	0.000
	Matched	0.3107	0.3107	0.000	100	0.000	1.000
Hotels and restaurants	Unmatched	0.0305	0.0732	-19.400		-4.100	0.000
	Matched	0.0307	0.0307	0.000	100	0.000	1.000
Transport, storage, other	Unmatched	0.0609	0.0354	11.900		3.440	0.001
	Matched	0.0615	0.0615	0.000	100	0.000	1.000
Post, telecommunications	Unmatched	0.0048	0.0007	8.000		4.030	0.000
	Matched	0.0016	0.0016	0.000	100	0.000	1.000
Financial intermediation	Unmatched	0.0160	0.0066	8.900		2.890	0.004
	Matched	0.0146	0.0146	0.000	100	0.000	1.000
Real estate, renting, business	Unmatched	0.1154	0.0763	13.300		3.680	0.000
	Matched	0.1165	0.1165	0.000	100	0.000	1.000
Education	Unmatched	0.0032	0.0153	-12.700		-2.460	0.014
	Matched	0.0032	0.0032	0.000	100	0.000	1.000
Health, social work	Unmatched	0.0064	0.0213	-12.700		-2.570	0.010
	Matched	0.0065	0.0065	0.000	100	0.000	1.000
Other social activities	Unmatched	0.0096	0.0128	-3.000		-0.700	0.483
	Matched	0.0097	0.0097	0.000	100	0.000	1.000

Table A4: Indicators of the covariate balancing before and after matching (cont.)

Panel A: t-test before and after matching (cont.)							
		Mean		% reduction			
	Sample	Treated	Control	% bias	bias	t-test	p-value
1991	Unmatched	0.1010	0.0498	19.500		5.860	0.000
	Matched	0.1019	0.1010	0.000	100	0.000	1.000
1992	Unmatched	0.0737	0.0506	9.600		2.630	0.009
	Matched	0.0744	0.0744	0.000	100	0.000	1.000
1993	Unmatched	0.0417	0.0479	-3.000		-0.730	0.468
	Matched	0.0421	0.0417	0.000	100	0.000	1.000
1994	Unmatched	0.0449	0.0511	-2.900		-0.700	0.483
	Matched	0.0453	0.0453	0.000	100	0.000	1.000
1996	Unmatched	0.0224	0.0504	-15.000		-3.190	0.001
	Matched	0.0210	0.0210	0.000	100	0.000	1.000
1997	Unmatched	0.0465	0.0517	-2.400		-0.590	0.555
	Matched	0.0469	0.0469	0.000	100	0.000	1.000
1998	Unmatched	0.0192	0.0535	-18.400		-3.800	0.000
	Matched	0.0194	0.0194	0.000	100	0.000	1.000
1999	Unmatched	0.0369	0.0560	-9.100		-2.080	0.037
	Matched	0.0372	0.0372	0.000	100	0.000	1.000
2000	Unmatched	0.0385	0.0620	-10.800		-2.430	0.015
	Matched	0.0388	0.0388	0.000	100	0.000	1.000
2002	Unmatched	0.1827	0.0694	34.600		11.110	0.000
	Matched	0.1829	0.1829	0.000	100	0.000	1.000
2003	Unmatched	0.0833	0.0713	4.500		1.170	0.243
	Matched	0.0841	0.0841	0.000	100	0.000	1.000
2004	Unmatched	0.0353	0.0747	-17.400		-3.750	0.000
	Matched	0.0356	0.0356	0.000	100	0.000	1.000
2005	Unmatched	0.0529	0.0764	-9.600		-2.210	0.027
	Matched	0.0502	0.0502	0.000	100	0.000	1.000
2007	Unmatched	0.0946	0.0780	5.900		1.540	0.124
	Matched	0.0922	0.0922	0.000	100	0.000	1.000
2008	Unmatched	0.0609	0.0795	-7.300		-1.720	0.086
	Matched	0.0615	0.0615	0.000	100	0.000	1.000
Panel B: Two-group Hotelling T-squared test							
	Sample	T-squared		F-test		p-value	
	Matched	5.239		0.138		1.000	
Panel C: Pseudo R2 and test of joint significance of regressors							
	Sample	Pseudo R2		Chi2		p-value	
	Unmatched	0.126		1380.89		0.000	
	Matched	0.003		5.01		1.000	

Notes: The table reports results from the tests of matching quality described in section 4. The individual t-tests and the two-group Hotelling t-square statistic assess for mean equality of observable attributes between domestic and acquired firms in the matched sample. The Pseudo R2 of the logit on the matched data and test of joint significance of regressors given by the Chi-square test provide evidence on the overall quality of the matching procedure.

Table A5: Effects of foreign acquisition on employment

Dependent variable: log employment				
	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
A. Pooled				
Foreign ownership	0.1346*** (0.0280)	0.1331*** (0.0279)	0.1410*** (0.0304)	0.1387*** (0.0302)
Industry trends	N	Y	N	Y
N (obs.)	432,955	432,955	11,966	11,966
N (firms)	74,666	74,666	1,224	1,224
B. Conditional on initial number of layers				
Firms with 1 layer				
Foreign ownership	0.0523 (0.0674)	0.0451 (0.0620)	0.0717 (0.0554)	0.0746 (0.0549)
Industry trends	N	Y	N	Y
N (obs.)	167,301	167,301	1,573	1,573
N (firms)	26,969	26,969	184	184
Firms with 2 layers				
Foreign ownership	0.1626*** (0.0520)	0.1633*** (0.0521)	0.1796*** (0.0603)	0.1730*** (0.0602)
Industry trends	N	Y	N	Y
N (obs.)	189,655	189,655	4,110	4,110
N (firms)	34,685	34,685	431	431
Firms with 3 layers				
Foreign ownership	0.1341*** (0.0409)	0.1304*** (0.0406)	0.1416*** (0.0424)	0.1386*** (0.0420)
Industry trends	N	Y	N	Y
N (obs.)	72,429	72,429	5,355	5,355
N (firms)	12,363	12,363	521	521
Firms with 4 layers				
Foreign ownership	0.1785** (0.0895)	0.1974** (0.0870)	0.0674 (0.1129)	0.0792 (0.1110)
Industry trends	N	Y	N	Y
N (obs.)	3,570	3,570	1,033	1,033
N (firms)	649	649	96	96

Notes: Foreign ownership status is lagged one year. All regressions include year dummies. Standard errors in parentheses clustered at firm level. *10% level, **5% level, and ***1% level.

Table A6: Summary statistics, auxiliary survey data

	Full sample			Matched sample		
	All firms	Always domestic	Acquired by foreign investors	All firms	Always domestic	Acquired by foreign investors
	(1)	(2)	(3)	(4)	(5)	(6)
Use of intranet (yes=1)	0.6987 (0.4588)	0.6734 (0.4690)	0.8750 (0.3310)	0.8017 (0.3996)	0.7750 (0.4195)	0.8279 (0.3791)
Use of e-mail (yes=1)	0.9941 (0.0763)	0.9933 (0.0816)	1.0000 (0.0000)	1.0000 (0.0000)	1.0000 (0.0000)	1.0000 (0.0000)
Use of extranet (yes=1)	0.4412 (0.4966)	0.4244 (0.4943)	0.5578 (0.4971)	0.5331 (0.4999)	0.5333 (0.5011)	0.5328 (0.5009)
Use of internal networks (yes=1)	0.8946 (0.3071)	0.8826 (0.3219)	0.9776 (0.1481)	0.9876 (0.1109)	0.9750 (0.1568)	1.0000 (0.0000)
Log sales	17.0425 (1.4272)	16.9941 (1.4273)	17.3791 (1.3820)	17.5514 (1.4720)	17.7616 (1.3651)	17.3446 (1.5481)
Employment	377.8674 (817.4347)	357.0394 (734.948)	522.8862 (1240.308)	424.8471 (516.7220)	518.1750 (613.0257)	333.0492 (381.1033)
Log labor productivity	11.8568 (1.4956)	11.8376 (1.4940)	11.9906 (1.5010)	12.0278 (1.4931)	11.9778 (1.4151)	12.0770 (1.5705)
Log hourly wage	1.9207 (0.4590)	1.8831 (0.4356)	2.1830 (0.5273)	2.2395 (0.4729)	2.1447 (0.4284)	2.3328 (0.4971)
N (obs.)	4,268	3,732	536	233	111	122
N (firms)	1,624	1,452	172	65	32	33

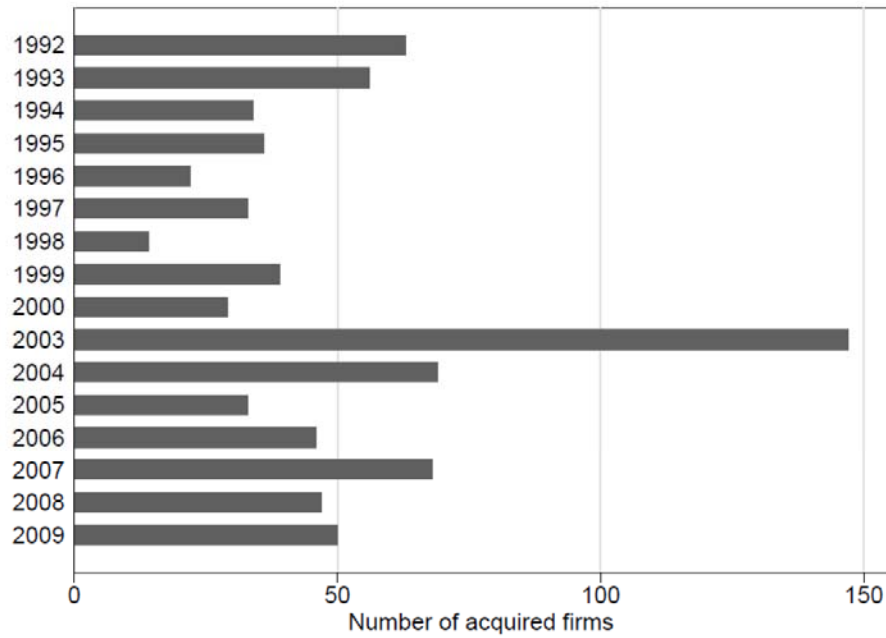
Notes: The table reports means and standard deviations (in parentheses) for firm-year observations with more than 10 employees over the period 2004-2009 of firms that are not foreign owned in their first year in the sample. A firm is foreign owned if foreign investors hold at least 50% of capital. Columns (1) and (4) refer to all firms, column (2) and (5), refer to firms that did not change ownership during the sample period, columns (3) and (6) refer to firms that changed to foreign ownership status only once during the sample period. Monetary variables are in 2009 prices.

Table A7: Effects of foreign acquisition on the use of intranet (matching also on intranet use prior to foreign acquisition)

Dependent variable: use of intranet	(1)	(2)
Foreign ownership	0.1842** (0.0856)	0.1847** (0.0849)
Industry trends	N	Y
Matched sample	Y	Y
R ²	0.718	0.730
N (obs.)	182	182
N (firms)	47	47

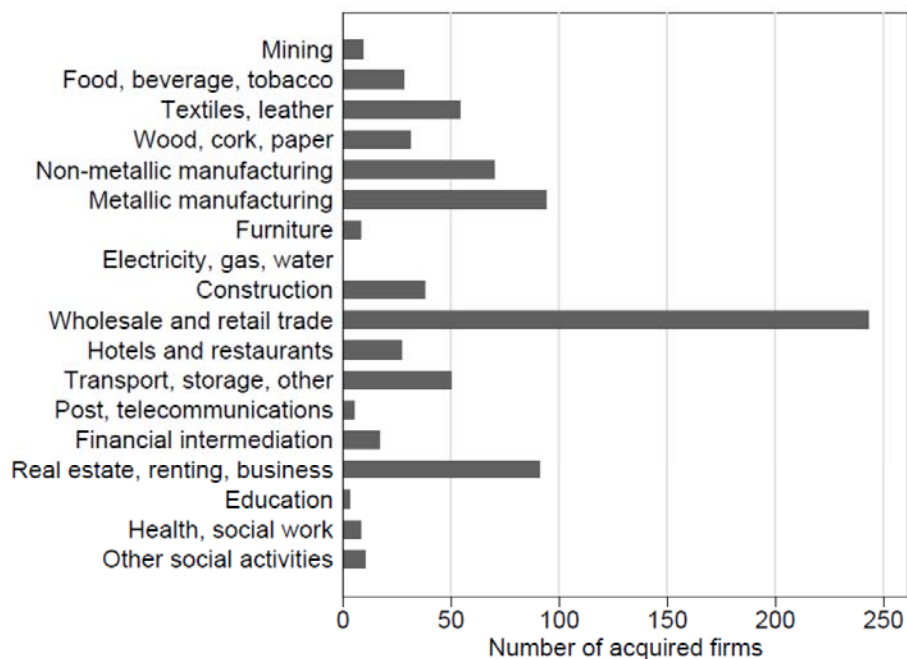
Notes: Foreign ownership status is lagged one year. All regressions include year dummies. Standard errors in parentheses clustered at firm level. *10% level, **5% level, and ***1% level.

Figure 1: Distribution of acquired firms over time



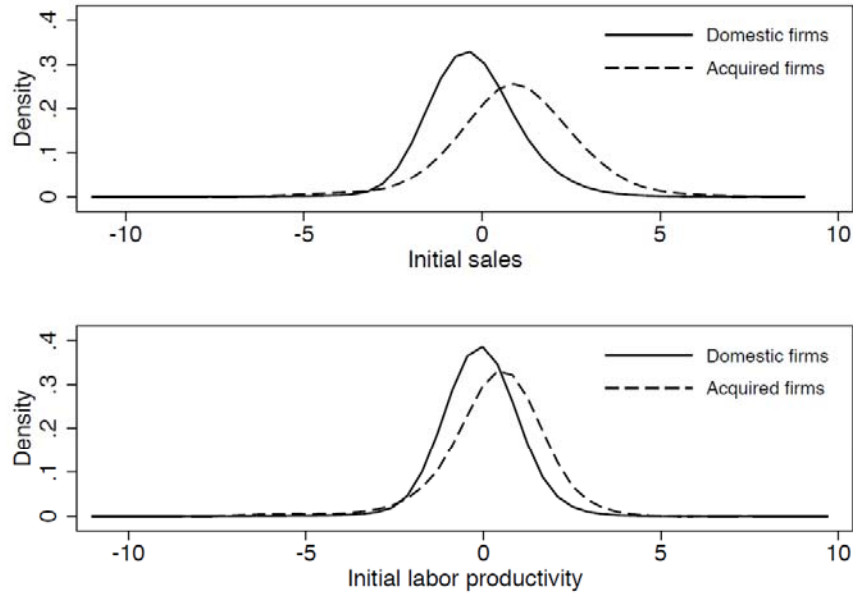
Notes: Using the estimation sample, the figure depicts the number of firms acquired by foreign investors in each year. The estimation sample consists of firm-year observations with at least 10 employees over the period 1991-2009 (except 2001 and 2002) that are not foreign-owned in their first year in the sample. Firms acquired in 2002 are excluded from the estimation sample, due to missing data for the variables included in the selection equation (values of sales, wage bill and labor productivity in 2001).

Figure 2: Distribution of acquired firms across industries



Notes: Using the estimation sample, the figure depicts the number of firms acquired by foreign investors in each industry. The estimation sample consists of firm-year observations with at least 10 employees over the period 1991-2009 (except 2001 and 2002) that are not foreign-owned in their first year in the sample.

Figure 3: Size and labor productivity distributions of domestic and acquired firms



Notes: The figure displays the distribution of residual log sales (top panel) and residual log labor productivity (bottom panel) for firms that were taken over by foreign investors during the sample period and firms that remained domestically-owned in the same period. The residuals remove industry and year dummies from the original distributions of log sales and log labor productivity across the two sets of firms. Sample consists of firm-year observations with at least 10 employees over the period 1991-2009 (except 2001 and 2002) that are not foreign-owned in their first year in the sample. Densities are drawn using an Epanechnikov smoothing function with a bandwidth of 0.6.

Online Appendix

Foreign acquisition and internal organization

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Table B1.1: Effects of foreign acquisition on hourly wages by layer, firms with initially 1 layer

	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
A. Number of layers unchanged				
Dependent variable: log hourly wages of layer 0				
Foreign ownership	0.0883*** (0.0340)	0.0900*** (0.0340)	0.0740** (0.0370)	0.0687* (0.0385)
Industry trends	N	Y	N	Y
N (obs.)	85,306	85,306	907	907
N (firms)	26,949	26,949	170	170
B. Added 1 layer				
Dependent variable: log hourly wages of layer 0				
Foreign ownership	0.0353 (0.0449)	0.0349 (0.0448)	-0.0236 (0.0730)	-0.0205 (0.0548)
Industry trends	N	Y	N	Y
N (obs.)	63,294	63,294	494	494
N (firms)	14,114	14,114	133	133
Dependent variable: log hourly wages of layer 1				
Foreign ownership	0.0803 (0.1173)	0.0791 (0.1173)	0.0051 (0.1418)	-0.1358 (0.1377)
Industry trends	N	Y	N	Y
N (obs.)	26,238	26,238	341	341
N (firms)	8,721	8,721	107	107
C. Added 2 layers				
Dependent variable: log hourly wages of layer 0				
Foreign ownership	-0.0441 (0.0939)	-0.0442 (0.0941)	0.0161 (0.1579)	0.0115 (0.1482)
Industry trends	N	Y	N	Y
N (obs.)	18,092	18,092	162	162
N (firms)	4,882	4,882	50	50
Dependent variable: log hourly wages of layer 1				
Foreign ownership	-0.0918 (0.1142)	-0.0919 (0.1143)	0.1722 (0.1267)	0.0540 (0.1973)
Industry trends	N	Y	N	Y
N (obs.)	17,338	17,338	363	363
N (firms)	4,660	4,660	81	81
Dependent variable: log hourly wages of layer 2				
Foreign ownership	0.2686** (0.1240)	0.2703** (0.1240)	0.2761 (0.4152)	0.3383 (0.4201)
Industry trends	N	Y	N	Y
N (obs.)	7,206	7,206	113	113
N (firms)	2,459	2,459	33	33

Notes: Foreign ownership status is lagged one year. All regressions include year dummies. Standard errors in parentheses clustered at firm level. *10% level, **5% level, and ***1% level.

Table B1.2: Effects of foreign acquisition on hourly wages by layer, firms with initially 2 layers

	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
A. Removed 1 layer				
Dependent variable: log hourly wages of layer 0				
Foreign ownership	0.0887 (0.1005)	0.0900 (0.1007)	0.0144 (0.0891)	0.0763 (0.0856)
Industry trends	N	Y	N	Y
N (obs.)	18,738	18,738	466	466
N (firms)	7,617	7,617	162	162
B. Number of layers unchanged				
Dependent variable: log hourly wages of layer 0				
Foreign ownership	-0.0097 (0.0319)	-0.0092 (0.0319)	-0.0101 (0.0356)	-0.0101 (0.0356)
Industry trends	N	Y	N	Y
N (obs.)	126,793	126,793	2,322	2,322
N (firms)	34,666	34,666	411	411
Dependent variable: log hourly wages of layer 1				
Foreign ownership	0.0254 (0.0425)	0.0266 (0.0424)	0.0180 (0.0446)	0.0136 (0.0457)
Industry trends	N	Y	N	Y
N (obs.)	73,618	73,618	1,973	1,973
N (firms)	22,972	22,972	392	392
C. Added 1 layer				
Dependent variable: log hourly wages of layer 0				
Foreign ownership	0.0841* (0.0489)	0.0841* (0.0490)	0.0585 (0.0398)	0.0485 (0.0422)
Industry trends	N	Y	N	Y
N (obs.)	41,751	41,751	1,174	1,174
N (firms)	10,751	10,751	257	257
Dependent variable: log hourly wages of layer 1				
Foreign ownership	0.0026 (0.0567)	0.0015 (0.0568)	-0.0060 (0.0602)	-0.0126 (0.0639)
Industry trends	N	Y	N	Y
N (obs.)	40,793	40,793	1,166	1,166
N (firms)	10,241	10,241	255	255
Dependent variable: log hourly wages of layer 2				
Foreign ownership	0.1339 (0.0855)	0.1301 (0.0860)	0.1266 (0.0934)	0.1435 (0.1011)
Industry trends	N	Y	N	Y
N (obs.)	20,284	20,284	881	881
N (firms)	6,210	6,210	212	212

Table B1.2: Effects of foreign acquisition on hourly wages by layer, firms with initially 2 layers (continued)

	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
C. Added 2 layers				
Dependent variable: log hourly wages of layer 0				
Foreign ownership	-0.0507 (0.0411)	-0.0378 (0.0383)	-0.0211 (0.0751)	-0.0712 (0.0670)
Industry trends	N	Y	N	Y
N (obs.)	2,373	2,373	148	148
N (firms)	1,053	1,053	45	45
Dependent variable: log hourly wages of layer 1				
Foreign ownership	0.0716 (0.1349)	0.089 (0.1413)	0.0451 (0.1241)	0.0893 (0.1236)
Industry trends	N	Y	N	Y
N (obs.)	2,365	2,365	148	148
N (firms)	1,049	1,049	45	45
Dependent variable: log hourly wages of layer 2				
Foreign ownership	0.2345 (0.2732)	0.2331 (0.2795)	0.3223 (0.2449)	0.4226*** (0.1131)
Industry trends	N	Y	N	Y
N (obs.)	1,972	1,972	144	144
N (firms)	855	855	43	43
Dependent variable: log hourly wages of layer 3				
Foreign ownership	0.1877 (0.2102)	0.1793 (0.2392)	0.2187 (0.4035)	0.3377 (0.3349)
Industry trends	N	Y	N	Y
N (obs.)	1,639	1,639	111	111
N (firms)	716	716	37	37

Notes: Foreign ownership status is lagged one year. All regressions include year dummies. Standard errors in parentheses clustered at firm level. *10% level, **5% level, and ***1% level.

Table B1.3: Effects of foreign acquisition on hourly wages by layer, firms with initially 3 layers

	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
A. Removed 2 layers				
Dependent variable: log hourly wages of layer 0				
Foreign ownership	0.5578 (0.7923)	0.5080 (0.7323)	-0.2042 (0.2449)	-0.1943 (0.2152)
Industry trends	N	Y	N	Y
N (obs.)	2,209	2,209	139	139
N (firms)	1,065	1,065	73	73
B. Removed 1 layer				
Dependent variable: log hourly wages of layer 0				
Foreign ownership	0.0499 (0.0437)	0.0505 (0.0422)	0.0292 (0.0527)	0.0112 (0.0537)
Industry trends	N	Y	N	N
N (obs.)	16,938	16,938	1,136	1,136
N (firms)	5,509	5,509	330	330
Dependent variable: log hourly wages of layer 1				
Foreign ownership	0.0880 (0.0825)	0.0861 (0.0847)	0.0903 (0.1042)	0.0869 (0.1096)
Industry trends	N	Y	N	Y
N (obs.)	13,029	13,029	1,000	1,000
N (firms)	4,546	4,546	308	308
C. Number of layers unchanged				
Dependent variable: log hourly wages of layer 0				
Foreign ownership	0.0116 (0.0203)	0.0123 (0.0204)	0.0215 (0.0231)	0.0241 (0.0237)
Industry trends	N	Y	N	Y
N (obs.)	48,892	48,892	3,519	3,519
N (firms)	12,347	12,347	503	503
Dependent variable: log hourly wages of layer 1				
Foreign ownership	-0.0127 (0.0262)	-0.0124 (0.0262)	0.0055 (0.0306)	0.0073 (0.0312)
Industry trends	N	Y	N	Y
N (obs.)	48,128	48,128	3,496	3,496
N (firms)	12,156	12,156	502	502
Dependent variable: log hourly wages of layer 2				
Foreign ownership	0.0716** (0.0344)	0.0721** (0.0346)	0.0995** (0.0407)	0.1018** (0.0403)
Industry trends	N	Y	N	Y
N (obs.)	31,192	31,192	2,991	2,991
N (firms)	8,296	8,296	476	476

Table B1.3: Effects of foreign acquisition on hourly wages by layer, firms with initially 3 layers (continued)

	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
D. Added 1 layer				
Dependent variable: log hourly wages of layer 0				
Foreign ownership	-0.0061 (0.0437)	-0.0003 (0.0456)	-0.0005 (0.0350)	-0.0146 (0.0367)
Industry trends	N	Y	N	Y
N (obs.)	4,390	4,390	561	561
N (firms)	1,627	1,627	188	188
Dependent variable: log hourly wages of layer 1				
Foreign ownership	0.0253 (0.0630)	0.0203 (0.0629)	0.0619 (0.0710)	0.0216 (0.0648)
Industry trends	N	Y	N	Y
N (obs.)	4,381	4,381	561	561
N (firms)	1,624	1,624	188	188
Dependent variable: log hourly wages of layer 2				
Foreign ownership	0.0413 (0.1387)	0.0488 (0.1412)	0.0342 (0.1577)	0.0101 (0.1734)
Industry trends	N	Y	N	Y
N (obs.)	4,128	4,128	545	545
N (firms)	1,503	1,503	181	181
Dependent variable: log hourly wages of layer 3				
Foreign ownership	0.2311 (0.2224)	0.2207 (0.2173)	0.4064* (0.2355)	0.3724* (0.2207)
Industry trends	N	Y	N	Y
N (obs.)	3,466	3,466	467	467
N (firms)	1,291	1,291	155	155

Notes: Foreign ownership status is lagged one year. All regressions include year dummies. Standard errors in parentheses clustered at firm level. *10% level, **5% level, and ***1% level.

Table B1.4: Effects of foreign acquisition on hourly wages by layer, firms with initially 4 layers

	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
A. Removed 2 layers				
Dependent variable: log hourly wages of layer 0				
Foreign ownership	-0.0440 (0.1271)	-0.0525 (0.1178)	0.0753 (0.1655)	0.6732 (0.6240)
Industry trends	N	Y	N	Y
N (obs.)	348	348	83	83
N (firms)	130	130	36	36
Dependent variable: log hourly wages of layer 1				
Foreign ownership	-0.0877 (0.1222)	-0.0980 (0.1419)	0.1899 (0.2705)	0.6187 (0.5605)
Industry trends	N	Y	N	Y
N (obs.)	295	295	74	74
N (firms)	121	121	35	35
B. Removed 1 layer				
Dependent variable: log hourly wages of layer 0				
Foreign ownership	0.0728 (0.0746)	0.0717 (0.0750)	0.1157 (0.0872)	0.1099 (0.0864)
Industry trends	N	Y	N	Y
N (obs.)	1,596	1,596	549	549
N (firms)	409	409	91	91
Dependent variable: log hourly wages of layer 1				
Foreign ownership	0.0524 (0.0861)	0.0401 (0.0841)	-0.0560 (0.0913)	-0.0772 (0.0918)
Industry trends	N	Y	N	Y
N (obs.)	1,587	1,587	549	549
N (firms)	406	406	91	91
Dependent variable: log hourly wages of layer 2				
Foreign ownership	0.0919 (0.1812)	0.0925 (0.1825)	0.0782 (0.2092)	0.0417 (0.2102)
Industry trends	N	Y	N	Y
N (obs.)	1,344	1,344	482	482
N (firms)	381	381	91	91

Table B1.4: Effects of foreign acquisition on hourly wages by layer, firms with initially 4 layers (continued)

	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
C. Number of layers unchanged				
Dependent variable: log hourly wages of layer 0				
Foreign ownership	0.0177 (0.0763)	0.0288 (0.0804)	0.1284* (0.0738)	0.1328* (0.0782)
Industry trends	N	Y	N	Y
N (obs.)	1,602	1,602	390	390
N (firms)	643	643	88	88
Dependent variable: log hourly wages of layer 1				
Foreign ownership	0.1094 (0.0708)	0.1033 (0.0674)	0.2064*** (0.0720)	0.1884*** (0.0625)
Industry trends	N	Y	N	Y
N (obs.)	1,597	1,597	390	390
N (firms)	639	639	88	88
Dependent variable: log hourly wages of layer 2				
Foreign ownership	0.1634* (0.0974)	0.1887* (0.0973)	0.1061 (0.1023)	0.1157 (0.1058)
Industry trends	N	Y	N	Y
N (obs.)	1,482	1,482	381	381
N (firms)	581	581	87	87
Dependent variable: log hourly wages of layer 3				
Foreign ownership	0.2013 (0.2605)	0.2240 (0.2726)	0.1238 (0.2557)	0.1368 (0.2680)
Industry trends	N	Y	N	Y
N (obs.)	1,298	1,298	343	343
N (firms)	519	519	80	80

Notes: Foreign ownership status is lagged one year. All regressions include year dummies. Standard errors in parentheses clustered at firm level. *10% level, **5% level, and ***1% level.

Table B2.1: Effects of foreign acquisition on education by layer, firms with initially 1 layer

	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
A. Number of layers unchanged				
Dependent variable: education of layer 0				
Foreign ownership	0.0251 (0.2035)	0.0302 (0.2041)	0.0985 (0.2172)	0.0829 (0.2216)
Industry trends	N	Y	N	Y
N (obs.)	85,306	85,306	907	907
N (firms)	26,949	26,949	170	170
B. Added 1 layer				
Dependent variable: education of layer 0				
Foreign ownership	-0.1406 (0.2200)	-0.1352 (0.2209)	-0.1467 (0.2724)	-0.1333 (0.3099)
Industry trends	N	Y	N	Y
N (obs.)	63,294	63,294	494	494
N (firms)	14,114	14,114	133	133
Dependent variable: education of layer 1				
Foreign ownership	1.1661 (0.9061)	1.1576 (0.9098)	1.0000 (1.0046)	0.4048 (0.8365)
Industry trends	N	Y	N	Y
N (obs.)	26,238	26,238	341	341
N (firms)	8,721	8,721	107	107
C. Added 2 layers				
Dependent variable: education of layer 0				
Foreign ownership	0.4363*** (0.1573)	0.4507*** (0.1618)	0.1296 (0.2027)	-0.1750 (0.3320)
Industry trends	N	Y	N	Y
N (obs.)	18,092	18,092	162	162
N (firms)	4,882	4,882	50	50
Dependent variable: education of layer 1				
Foreign ownership	-1.8736*** (0.5822)	-1.8816*** (0.5830)	-0.4113 (0.6408)	0.2015 (1.0902)
Industry trends	N	Y	N	Y
N (obs.)	17,338	17,338	159	159
N (firms)	4,660	4,660	49	49
Dependent variable: education of layer 2				
Foreign ownership	1.2596 (0.9875)	1.2868 (0.9891)	-0.2500 (1.1451)	-0.6617 (1.0831)
Industry trends	N	Y	N	Y
N (obs.)	7,206	7,206	113	113
N (firms)	2,459	2,459	33	33

Notes: Foreign ownership status is lagged one year. All regressions include year dummies. Standard errors in parentheses clustered at firm level. *10% level, **5% level, and ***1% level.

Table B2.2: Effects of foreign acquisition on education by layer, firms with initially 2 layers

	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
A. Removed 1 layer				
Dependent variable: education of layer 0				
Foreign ownership	-0.0790 (0.6592)	-0.0716 (0.6586)	-0.2222 (0.7977)	0.0323 (0.5362)
Industry trends	N	Y	N	Y
N (obs.)	18,738	18,738	466	466
N (firms)	7,617	7,617	162	162
B. Number of layers unchanged				
Dependent variable: education of layer 0				
Foreign ownership	-0.1484 (0.1394)	-0.1461 (0.1394)	-0.2378* (0.1387)	-0.2207 (0.1391)
Industry trends	N	Y	N	Y
N (obs.)	126,793	126,793	2,322	2,322
N (firms)	34,666	34,666	411	411
Dependent variable: education of layer 1				
Foreign ownership	0.0554 (0.3501)	0.0528 (0.3475)	0.184 (0.3813)	0.1925 (0.3677)
Industry trends	N	Y	N	Y
N (obs.)	73,618	73,618	1,973	1,973
N (firms)	22,972	22,972	392	392
C. Added 1 layer				
Dependent variable: education of layer 0				
Foreign ownership	-0.1753 (0.2086)	-0.1752 (0.2091)	-0.3313 (0.2314)	-0.2419 (0.2427)
Industry trends	N	Y	N	Y
N (obs.)	41,751	41,751	1,174	1,174
N (firms)	10,751	10,751	257	257
Dependent variable: education of layer 1				
Foreign ownership	-0.2294 (0.5057)	-0.2276 (0.5099)	-0.1392 (0.6189)	-0.1816 (0.6601)
Industry trends	N	Y	N	Y
N (obs.)	40,793	40,793	1,166	1,166
N (firms)	10,241	10,241	255	255
Dependent variable: education of layer 2				
Foreign ownership	0.2341 (0.4847)	0.2273 (0.4808)	-0.2700 (0.5548)	-0.2525 (0.5607)
Industry trends	N	Y	N	Y
N (obs.)	20,284	20,284	881	881
N (firms)	6,210	6,210	212	212

Table B2.2: Effects of foreign acquisition on education by layer, firms with initially 2 layers
(continued)

	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
D. Added 2 layers				
Dependent variable: education of layer 0				
Foreign ownership	-0.9560 (1.4934)	-0.9393 (1.5049)	-1.3178 (1.5851)	-1.4570 (1.3723)
Industry trends	N	Y	N	Y
N (obs.)	2,373	2,373	148	148
N (firms)	1,053	1,053	45	45
Dependent variable: education of layer 1				
Foreign ownership	1.0631 (1.4294)	1.0582 (1.4525)	0.8557 (1.3672)	0.7214 (1.1684)
Industry trends	N	Y	N	Y
N (obs.)	2,365	2,365	148	148
N (firms)	1,049	1,049	45	45
Dependent variable: education of layer 2				
Foreign ownership	-3.8534* (2.0741)	-3.9663* (2.0829)	-4.3458** (2.0664)	-4.3960** (2.0947)
Industry trends	N	Y	N	Y
N (obs.)	1,972	1,972	144	144
N (firms)	855	855	43	43
Dependent variable: education of layer 3				
Foreign ownership	-1.8176 (3.8898)	-1.7427 (3.8813)	-1.5630 (3.2077)	-1.0724 (2.3973)
Industry trends	N	Y	N	Y
N (obs.)	1,639	1,639	111	111
N (firms)	716	716	37	37

Notes: Foreign ownership status is lagged one year. All regressions include year dummies. Standard errors in parentheses clustered at firm level. *10% level, **5% level, and ***1% level.

Table B2.3: Effects of foreign acquisition on education by layer, firms with initially 3 layers

	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
A. Removed 2 layers				
Dependent variable: education of layer 0				
Foreign ownership	-0.4085 (0.8845)	-0.2683 (0.8414)	-0.6125 (0.7310)	-0.6870 (1.1886)
Industry trends	N	Y	N	Y
N (obs.)	2,209	2,209	139	139
N (firms)	1,065	1,065	73	73
B. Removed 1 layer				
Dependent variable: education of layer 0				
Foreign ownership	-0.0780 (0.1880)	-0.0631 (0.1849)	-0.1242 (0.2390)	-0.1067 (0.2500)
Industry trends	N	Y	N	Y
N (obs.)	16,938	16,938	1,136	1,136
N (firms)	5,509	5,509	330	330
Dependent variable: education of layer 1				
Foreign ownership	-0.2132 (0.5220)	-0.2458 (0.5265)	-0.3909 (0.6109)	-0.4021 (0.6238)
Industry trends	N	Y	N	Y
N (obs.)	13,029	13,029	1,000	1,000
N (firms)	4,546	4,546	308	308
C. Number of layers unchanged				
Dependent variable: education of layer 0				
Foreign ownership	0.0136 (0.1051)	0.0155 (0.1053)	-0.0980 (0.1077)	-0.0745 (0.1049)
Industry trends	N	Y	N	Y
N (obs.)	48,892	48,892	3,519	3,519
N (firms)	12,347	12,347	503	503
Dependent variable: education of layer 1				
Foreign ownership	-0.0377 (0.1509)	-0.0363 (0.1503)	0.0845 (0.1670)	0.1268 (0.1626)
Industry trends	N	Y	N	Y
N (obs.)	48,128	48,128	3,496	3,496
N (firms)	12,156	12,156	502	502
Dependent variable: education of layer 2				
Foreign ownership	-0.0191 (0.1633)	-0.0227 (0.1638)	0.0411 (0.1908)	0.0803 (0.1892)
Industry trends	N	Y	N	Y
N (obs.)	31,192	31,192	2,991	2,991
N (firms)	8,296	8,296	476	476

Table B2.3: Effects of foreign acquisition on education by layer, firms with initially 3 layers (continued)

	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
D. Added 1 layer				
Dependent variable: education of layer 0				
Foreign ownership	-0.0196 (0.2421)	-0.0163 (0.2384)	-0.4240 (0.3595)	-0.4742 (0.4025)
Industry trends	N	Y	N	Y
N (obs.)	4,390	4,390	561	561
N (firms)	1,627	1,627	188	188
Dependent variable: education of layer 1				
Foreign ownership	-0.1303 (0.2874)	-0.1250 (0.2912)	-0.1885 (0.3182)	-0.3373 (0.3839)
Industry trends	N	Y	N	Y
N (obs.)	4,381	4,381	561	561
N (firms)	1,624	1,624	188	188
Dependent variable: education of layer 2				
Foreign ownership	0.1126 (0.3171)	0.1397 (0.3279)	0.1971 (0.3588)	0.2879 (0.3853)
Industry trends	N	Y	N	Y
N (obs.)	4,128	4,128	545	545
N (firms)	1,503	1,503	181	181
Dependent variable: education of layer 3				
Foreign ownership	-0.6536 (0.4533)	-0.6861 (0.4577)	0.1615 (0.4161)	-0.1006 (0.4549)
Industry trends	N	Y	N	Y
N (obs.)	3,466	3,466	467	467
N (firms)	1,291	1,291	155	155

Notes: Foreign ownership status is lagged one year. All regressions include year dummies. Standard errors in parentheses clustered at firm level. *10% level, **5% level, and ***1% level.

Table B2.4: Effects of foreign acquisition on education by layer, firms with initially 4 layers

	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
A. Removed 2 layers				
Dependent variable: education of layer 0				
Foreign ownership	-0.8971 (0.7736)	-0.8904 (0.7544)	-2.0196* (1.0249)	-1.7882 (2.4513)
Industry trends	N	Y	N	Y
N (obs.)	348	348	83	83
N (firms)	130	130	36	36
Dependent variable: education of layer 1				
Foreign ownership	-3.1281*** (0.4796)	-3.3613*** (0.7050)	-1.3705*** (0.4437)	-1.6379 (2.0675)
Industry trends	N	Y	N	Y
N (obs.)	295	295	74	74
N (firms)	121	121	35	35
B. Removed 1 layer				
Dependent variable: education of layer 0				
Foreign ownership	0.2449 (0.2986)	0.2484 (0.2975)	-0.0466 (0.2716)	0.0069 (0.2696)
Industry trends	N	Y	N	Y
N (obs.)	1,596	1,596	549	549
N (firms)	409	409	91	91
Dependent variable: education of layer 1				
Foreign ownership	0.0363 (0.4393)	0.0568 (0.4257)	-0.0459 (0.4037)	-0.0331 (0.4417)
Industry trends	N	Y	N	Y
N (obs.)	1,587	1,587	549	549
N (firms)	406	406	91	91
Dependent variable: education of layer 2				
Foreign ownership	-0.0976 (0.4044)	-0.0701 (0.4006)	0.6988 (0.5599)	0.3112 (0.4914)
Industry trends	N	Y	N	Y
N (obs.)	1,344	1,344	482	482
N (firms)	381	381	91	91

Table B2.4: Effects of foreign acquisition on education by layer, firms with initially 4 layers (continued)

	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
C. Number of layers unchanged				
Dependent variable: education of layer 0				
Foreign ownership	0.0576 (0.2590)	0.0218 (0.2396)	-0.0420 (0.2891)	-0.0979 (0.2599)
Industry trends	N	Y	N	Y
N (obs.)	1,602	1,602	390	390
N (firms)	643	643	88	88
Dependent variable: education of layer 1				
Foreign ownership	0.0858 (0.4393)	-0.0024 (0.4257)	0.2925 (0.4607)	0.0664 (0.4688)
Industry trends	N	Y	N	Y
N (obs.)	1,597	1,597	390	390
N (firms)	639	639	88	88
Dependent variable: education of layer 2				
Foreign ownership	0.7031*** (0.2668)	0.4387* (0.2491)	0.8702*** (0.2958)	0.7799*** (0.2780)
Industry trends	N	Y	N	Y
N (obs.)	1,482	1,482	381	381
N (firms)	581	581	87	87
Dependent variable: education of layer 3				
Foreign ownership	-0.1644 (0.2381)	-0.2414 (0.2227)	-0.4197 (0.2769)	-0.5225 (0.3156)
Industry trends	N	Y	N	Y
N (obs.)	1,298	1,298	343	343
N (firms)	519	519	80	80

Notes: Foreign ownership status is lagged one year. All regressions include year dummies. Standard errors in parentheses clustered at firm level. *10% level, **5% level, and ***1% level.

Table B3.1: Effects of foreign acquisition on experience by layer, firms with initially 1 layer

	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
A. Number of layers unchanged				
Dependent variable: experience of layer 0				
Foreign ownership	0.8783 (0.5498)	0.8345 (0.5477)	0.6274 (0.6236)	0.4369 (0.5865)
Industry trends	N	Y	N	Y
N (obs.)	85,306	85,306	907	907
N (firms)	26,949	26,949	170	170
B. Added 1 layer				
Dependent variable: experience of layer 0				
Foreign ownership	0.1674 (0.9339)	0.1570 (0.9363)	0.2803 (1.1169)	-0.2023 (1.1294)
Industry trends	N	Y	N	Y
N (obs.)	63,294	63,294	494	494
N (firms)	14,114	14,114	133	133
Dependent variable: experience of layer 1				
Foreign ownership	0.9762 (2.3043)	1.0278 (2.3089)	0.6544 (3.0416)	-1.2477 (3.0409)
Industry trends	N	Y	N	Y
N (obs.)	26,238	26,238	341	341
N (firms)	8,721	8,721	107	107
C. Added 2 layers				
Dependent variable: experience of layer 0				
Foreign ownership	0.5046 (0.6001)	0.4578 (0.5923)	-0.5470 (1.6523)	-0.2840 (1.8135)
Industry trends	N	Y	N	Y
N (obs.)	18,092	18,092	162	162
N (firms)	4,882	4,882	50	50
Dependent variable: experience of layer 1				
Foreign ownership	2.0308 (1.6011)	2.0761 (1.6099)	4.5527 (3.6561)	-0.3469 (3.5583)
Industry trends	N	Y	N	Y
N (obs.)	17,338	17,338	159	159
N (firms)	4,660	4,660	49	49
Dependent variable: experience of layer 2				
Foreign ownership	-7.3463 (7.3258)	-7.5285 (7.3595)	3.7895 (5.5211)	2.8192 (3.7917)
Industry trends	N	Y	N	Y
N (obs.)	7,206	7,206	113	113
N (firms)	2,459	2,459	33	33

Notes: Foreign ownership status is lagged one year. All regressions include year dummies. Standard errors in parentheses clustered at firm level. *10% level, **5% level, and ***1% level.

Table B3.2: Effects of foreign acquisition on experience by layer, firms with initially 2 layers

	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
A. Removed 1 layer				
Dependent variable: experience of layer 0				
Foreign ownership	-0.2589 (1.5093)	-0.2575 (1.5097)	0.6820 (1.8179)	-0.6061 (1.3446)
Industry trends	N	Y	N	Y
N (obs.)	18,738	18,738	466	466
N (firms)	7,617	7,617	162	162
B. Number of layers unchanged				
Dependent variable: experience of layer 0				
Foreign ownership	0.5664 (0.3921)	0.5758 (0.3917)	0.6453 (0.4459)	0.6234 (0.4429)
Industry trends	N	Y	N	Y
N (obs.)	126,793	126,793	2,322	2,322
N (firms)	34,666	34,666	411	411
Dependent variable: experience of layer 1				
Foreign ownership	0.1001 (1.1275)	0.1588 (1.1216)	0.2081 (1.3497)	0.3386 (1.3096)
Industry trends	N	Y	N	Y
N (obs.)	73,618	73,618	1,973	1,973
N (firms)	22,972	22,972	392	392
C. Added 1 layer				
Dependent variable: experience of layer 0				
Foreign ownership	-0.1662 (0.6197)	-0.1686 (0.6146)	0.4633 (0.6412)	0.0929 (0.6412)
Industry trends	N	Y	N	Y
N (obs.)	41,751	41,751	1,174	1,174
N (firms)	10,525	10,525	257	257
Dependent variable: experience of layer 1				
Foreign ownership	-3.2526** (1.4469)	-3.2418** (1.4544)	-3.8950** (1.7080)	-4.3301** (1.7377)
Industry trends	N	Y	N	Y
N (obs.)	40,793	40,793	1,166	1,166
N (firms)	10,241	10,241	255	255
Dependent variable: experience of layer 2				
Foreign ownership	-1.1855 (1.7621)	-1.1627 (1.7605)	2.0206 (1.5656)	2.0978 (1.6554)
Industry trends	N	Y	N	Y
N (obs.)	20,284	20,284	881	881
N (firms)	6,210	6,210	212	212

Table B3.2: Effects of foreign acquisition on experience by layer, firms with initially 2 layers (continued)

	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
D. Added 2 layers				
Dependent variable: experience of layer 0				
Foreign ownership	-2.5037 (3.1717)	-2.4764 (3.2045)	0.1177 (3.2405)	-0.0961 (3.6987)
Industry trends	N	Y	N	Y
N (obs.)	2,373	2,373	148	148
N (firms)	1,053	1,053	45	45
Dependent variable: experience of layer 1				
Foreign ownership	-5.5878 (5.2517)	-5.4029 (5.224)	-3.9412 (5.1487)	-2.5251 (4.1918)
Industry trends	N	Y	N	Y
N (obs.)	2,365	2,365	148	148
N (firms)	1,049	1,049	45	45
Dependent variable: experience of layer 2				
Foreign ownership	0.4905 (4.9689)	0.6288 (5.0438)	3.1351 (5.2020)	2.5222 (5.1008)
Industry trends	N	Y	N	Y
N (obs.)	1,972	1,972	144	144
N (firms)	855	855	43	43
Dependent variable: experience of layer 3				
Foreign ownership	4.4571 (7.5034)	4.0798 (7.4998)	6.2576 (6.4730)	6.0654 (6.9159)
Industry trends	N	Y	N	Y
N (obs.)	1,639	1,639	111	111
N (firms)	716	716	37	37

Notes: Foreign ownership status is lagged one year. All regressions include year dummies. Standard errors in parentheses clustered at firm level. *10% level, **5% level, and ***1% level.

Table B3.3: Effects of foreign acquisition on experience by layer, firms with initially 3 layers

	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
A. Removed 2 layers				
Dependent variable: experience of layer 0				
Foreign ownership	-6.6426 (6.3605)	-7.2588 (6.5387)	3.2723 (2.6485)	2.7304 (3.3568)
Industry trends	N	Y	N	Y
N (obs.)	2,209	2,209	139	139
N (firms)	1,065	1,065	73	73
B. Removed 1 layer				
Dependent variable: experience of layer 0				
Foreign ownership	-0.1577 (0.7929)	-0.1948 (0.7912)	0.1110 (0.9703)	-0.0635 (1.0167)
Industry trends	N	Y	N	Y
N (obs.)	16,938	16,938	1,136	1,136
N (firms)	5,509	5,509	330	330
Dependent variable: experience of layer 1				
Foreign ownership	1.6748 (1.6053)	1.6284 (1.5978)	2.9187 (2.0212)	2.697 (2.0557)
Industry trends	N	Y	N	Y
N (obs.)	13,029	13,029	1,000	1,000
N (firms)	4,546	4,546	308	308
C. Number of layers unchanged				
Dependent variable: experience of layer 0				
Foreign ownership	-0.4032 (0.3753)	-0.3933 (0.3751)	-0.0624 (0.3949)	-0.1065 (0.3932)
Industry trends	N	Y	N	Y
N (obs.)	48,892	48,892	3,519	3,519
N (firms)	12,347	12,347	503	503
Dependent variable: experience of layer 1				
Foreign ownership	-0.2088 (0.4979)	-0.2121 (0.4977)	-0.5214 (0.5032)	-0.6718 (0.4768)
Industry trends	N	Y	N	Y
N (obs.)	48,128	48,128	3,496	3,496
N (firms)	12,156	12,156	502	502
Dependent variable: experience of layer 2				
Foreign ownership	0.7870 (0.5995)	0.7982 (0.6021)	0.9691 (0.7007)	0.8293 (0.7001)
Industry trends	N	Y	N	Y
N (obs.)	31,192	31,192	2,991	2,991
N (firms)	8,296	8,296	476	476

**Table B3.3: Effects of foreign acquisition on experience by layer, firms with initially 3 layers
(continued)**

	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
D. Added 1 layer				
Dependent variable: experience of layer 0				
Foreign ownership	0.1742 (0.8130)	0.1581 (0.8049)	0.5368 (1.0052)	0.5483 (1.1041)
Industry trends	N	Y	N	Y
N (obs.)	4,390	4,390	561	561
N (firms)	1,627	1,627	188	188
Dependent variable: experience of layer 1				
Foreign ownership	0.2162 (1.3477)	0.1411 (1.3557)	1.0604 (1.5029)	1.6736 (1.7067)
Industry trends	N	Y	N	Y
N (obs.)	4,381	4,381	561	561
N (firms)	1,624	1,624	188	188
Dependent variable: experience of layer 2				
Foreign ownership	-1.2770 (1.5636)	-1.1188 (1.5793)	-1.2480 (1.8651)	-1.2468 (2.0886)
Industry trends	N	Y	N	Y
N (obs.)	4,128	4,128	545	545
N (firms)	1,503	1,503	181	181
Dependent variable: experience of layer 3				
Foreign ownership	-0.8049 (2.8471)	-0.9053 (2.8045)	1.5191 (2.6765)	2.8975 (2.6839)
Industry trends	N	Y	N	Y
N (obs.)	3,466	3,466	467	467
N (firms)	1,291	1,291	155	155

Notes: Foreign ownership status is lagged one year. All regressions include year dummies. Standard errors in parentheses clustered at firm level. *10% level, **5% level, and ***1% level.

Table B3.4: Effects of foreign acquisition on experience by layer, firms with initially 4 layers

	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
A. Removed 2 layers				
Dependent variable: experience of layer 0				
Foreign ownership	0.7957 (2.3438)	0.9259 (2.1951)	8.1036 (4.9159)	13.4235 (13.8807)
Industry trends	N	Y	N	Y
N (obs.)	348	348	83	83
N (firms)	130	130	36	36
Dependent variable: experience of layer 1				
Foreign ownership	-0.5684 (2.3221)	-0.9865 (2.7678)	4.2127 (4.1532)	-1.7719 (4.2678)
Industry trends	N	Y	N	Y
N (obs.)	295	295	74	74
N (firms)	121	121	35	35
B. Removed 1 layer				
Dependent variable: experience of layer 0				
Foreign ownership	-0.7701 (1.2762)	-0.6701 (1.2718)	1.1357 (0.8932)	1.0921 (0.9539)
Industry trends	N	Y	N	Y
N (obs.)	1,596	1,596	549	549
N (firms)	409	409	91	91
Dependent variable: experience of layer 1				
Foreign ownership	0.0924 (1.4291)	-0.0827 (1.4334)	-1.0476 (1.3630)	-1.1837 (1.4686)
Industry trends	N	Y	N	Y
N (obs.)	1,587	1,587	549	549
N (firms)	406	406	91	91
Dependent variable: experience of layer 2				
Foreign ownership	-2.5521 (3.0035)	-2.7129 (2.9998)	-4.2212 (3.8636)	-3.8326 (3.7615)
Industry trends	N	Y	N	Y
N (obs.)	1,344	1,344	482	482
N (firms)	381	381	91	91

Table B3.4: Effects of foreign acquisition on experience by layer, firms with initially 4 layers (continued)

	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
C. Number of layers unchanged				
Dependent variable: experience of layer 0				
Foreign ownership	-0.2473 (0.9719)	-0.0528 (1.0176)	-0.3376 (1.0445)	-0.1292 (1.0729)
Industry trends	N	Y	N	Y
N (obs.)	1,602	1,602	390	390
N (firms)	643	643	88	88
Dependent variable: experience of layer 1				
Foreign ownership	0.4919 (1.5019)	0.6128 (1.5610)	-0.0242 (1.1510)	0.4628 (1.2495)
Industry trends	N	Y	N	Y
N (obs.)	1,597	1,597	390	390
N (firms)	639	639	88	88
Dependent variable: experience of layer 2				
Foreign ownership	-0.8141 (1.0712)	-0.1039 (1.0615)	-1.5850 (1.2423)	-1.2789 (1.0543)
Industry trends	N	Y	N	Y
N (obs.)	1,482	1,482	381	381
N (firms)	581	581	87	87
Dependent variable: experience of layer 3				
Foreign ownership	0.8246 (1.9707)	0.8970 (1.9294)	1.5741 (2.0524)	1.6985 (2.1598)
Industry trends	N	Y	N	Y
N (obs.)	1,298	1,298	343	343
N (firms)	519	519	80	80

Notes: Foreign ownership status is lagged one year. All regressions include year dummies. Standard errors in parentheses clustered at firm level. *10% level, **5% level, and ***1% level.

Table B4.1: Effects of foreign acquisition on tenure by layer, firms with initially 1 layer

	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
A. Number of layers unchanged				
Dependent variable: tenure of layer 0				
Foreign ownership	0.6158*	0.6392*	0.3123	0.2023
	(0.3332)	(0.3289)	(0.4090)	(0.3649)
Industry trends	N	Y	N	Y
N (obs.)	85,306	85,306	907	907
N (firms)	26,949	26,949	170	170
B. Added 1 layer				
Dependent variable: tenure of layer 0				
Foreign ownership	0.1693	0.1744	0.2515	-0.4265
	(0.3926)	(0.3913)	(0.5222)	(0.4181)
Industry trends	N	Y	N	Y
N (obs.)	63,294	63,294	494	494
N (firms)	14,114	14,114	133	133
Dependent variable: tenure of layer 1				
Foreign ownership	-2.1989	-2.1934	-1.0453	-0.6723
	(1.8157)	(1.8259)	(1.8416)	(1.2761)
Industry trends	N	Y	N	Y
N (obs.)	26,238	26,238	485	485
N (firms)	8,721	8,721	141	141
C. Added 2 layers				
Dependent variable: tenure of layer 0				
Foreign ownership	2.1584***	2.1411***	-0.0366	-0.2261
	(0.8170)	(0.8231)	(0.6549)	(0.9231)
Industry trends	N	Y	N	Y
N (obs.)	18,092	18,092	162	162
N (firms)	4,882	4,882	50	50
Dependent variable: tenure of layer 1				
Foreign ownership	-1.0951	-1.0967	1.1217	-0.6078
	(1.1383)	(1.1474)	(1.3334)	(2.1803)
Industry trends	N	Y	N	Y
N (obs.)	17,338	17,338	159	159
N (firms)	4,660	4,660	49	49
Dependent variable: tenure of layer 2				
Foreign ownership	-8.7037	-8.9106	1.2301	3.9303
	(7.1555)	(7.2091)	(2.3598)	(3.1999)
Industry trends	N	Y	N	Y
N (obs.)	7,206	7,206	113	113
N (firms)	2,459	2,459	33	33

Notes: Foreign ownership status is lagged one year. All regressions include year dummies. Standard errors in parentheses clustered at firm level. *10% level, **5% level, and ***1% level.

Table B4.2: Effects of foreign acquisition on tenure by layer, firms with initially 2 layers

	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
A. Removed 1 layer				
Dependent variable: tenure of layer 0				
Foreign ownership	-0.8739 (0.6388)	-0.8608 (0.6374)	0.2011 (0.7615)	-0.0864 (0.8137)
Industry trends	N	Y	N	Y
N (obs.)	18,738	18,738	466	466
N (firms)	7,617	7,617	162	162
B. Number of layers unchanged				
Dependent variable: tenure of layer 0				
Foreign ownership	-0.2615 (0.2858)	-0.2591 (0.2864)	-0.0876 (0.2780)	-0.0916 (0.2776)
Industry trends	N	Y	N	Y
N (obs.)	126,793	126,793	2,322	2,322
N (firms)	34,666	34,666	411	411
Dependent variable: tenure of layer 1				
Foreign ownership	0.0792 (0.6336)	0.0971 (0.6365)	-0.0319 (0.7779)	-0.0404 (0.7801)
Industry trends	N	Y	N	Y
N (obs.)	73,618	73,618	1,973	1,973
N (firms)	22,972	22,972	392	392
C. Added 1 layer				
Dependent variable: tenure of layer 0				
Foreign ownership	-0.6418 (0.5289)	-0.6457 (0.5277)	-0.4169 (0.5649)	-0.6336 (0.5703)
Industry trends	N	Y	N	Y
N (obs.)	41,751	41,751	1,174	1,174
N (firms)	10,751	10,751	257	257
Dependent variable: tenure of layer 1				
Foreign ownership	-1.2685* (0.7413)	-1.2491* (0.7468)	-0.6990 (0.8942)	-1.0340 (0.9137)
Industry trends	N	Y	N	Y
N (obs.)	40,793	40,793	1,166	1,166
N (firms)	10,241	10,241	255	255
Dependent variable: tenure of layer 2				
Foreign ownership	-1.0653 (1.2765)	-1.0785 (1.2663)	0.0924 (1.1821)	-0.2640 (1.0794)
Industry trends	N	Y	N	Y
N (obs.)	20,284	20,284	881	881
N (firms)	6,210	6,210	212	212

**Table B4.2: Effects of foreign acquisition on tenure by layer, firms with initially 2 layers
(continued)**

	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
D. Added 2 layers				
Dependent variable: tenure of layer 0				
Foreign ownership	-3.4326 (2.5807)	-3.3701 (2.6130)	-1.5119 (2.9141)	-1.6386 (3.4936)
Industry trends	N	Y	N	Y
N (obs.)	2,373	2,373	148	148
N (firms)	1,053	1,053	45	45
Dependent variable: tenure of layer 1				
Foreign ownership	-6.5954 (5.5720)	-6.5375 (5.5786)	-4.0169 (5.0841)	-3.4643 (5.0364)
Industry trends	N	Y	N	Y
N (obs.)	2,365	2,365	148	148
N (firms)	1,049	1,049	45	45
Dependent variable: tenure of layer 2				
Foreign ownership	-7.5662 (4.8900)	-7.4861 (4.8717)	-4.2175 (4.3839)	-4.3403 (4.5022)
Industry trends	N	Y	N	Y
N (obs.)	1,972	1,972	144	144
N (firms)	855	855	43	43
Dependent variable: tenure of layer 3				
Foreign ownership	-8.8087 (5.3494)	-9.0208* (5.4672)	-6.6447 (5.0118)	-5.8790 (4.6624)
Industry trends	N	Y	N	Y
N (obs.)	1,639	1,639	111	111
N (firms)	716	716	37	37

Notes: Foreign ownership status is lagged one year. All regressions include year dummies. Standard errors in parentheses clustered at firm level. *10% level, **5% level, and ***1% level.

Table B4.3: Effects of foreign acquisition on tenure by layer, firms with initially 3 layers

	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
A. Removed 2 layers				
Dependent variable: tenure of layer 0				
Foreign ownership	-2.1636 (2.3985)	-2.7912 (2.6118)	0.3063 (2.0468)	-0.0419 (1.7681)
Industry trends	N	Y	N	Y
N (obs.)	2,209	2,209	139	139
N (firms)	1,065	1,065	73	73
B. Removed 1 layer				
Dependent variable: tenure of layer 0				
Foreign ownership	-0.2778 (0.4945)	-0.3190 (0.5083)	0.0561 (0.5658)	-0.0215 (0.5857)
Industry trends	N	Y	N	Y
N (obs.)	16,938	16,938	1,136	1,136
N (firms)	5,509	5,509	330	330
Dependent variable: tenure of layer 1				
Foreign ownership	1.8968* (1.0194)	1.8463* (1.0131)	2.0844 (1.3600)	2.0584 (1.3634)
Industry trends	N	Y	N	Y
N (obs.)	13,029	13,029	1,000	1,000
N (firms)	4,546	4,546	308	308
C. Number of layers unchanged				
Dependent variable: tenure of layer 0				
Foreign ownership	-0.4303 (0.2925)	-0.4287 (0.2927)	-0.1983 (0.3263)	-0.2008 (0.3250)
Industry trends	N	Y	N	Y
N (obs.)	48,892	48,892	3,519	3,519
N (firms)	12,347	12,347	503	503
Dependent variable: tenure of layer 1				
Foreign ownership	-0.5496* (0.3166)	-0.5483* (0.3171)	-0.5631 (0.3665)	0.6218* (0.3641)
Industry trends	N	Y	N	Y
N (obs.)	48,128	48,128	3,496	3,496
N (firms)	12,156	12,156	502	502
Dependent variable: tenure of layer 2				
Foreign ownership	0.7641* (0.4589)	0.7719* (0.4610)	0.7889 (0.6163)	0.6428 (0.6172)
Industry trends	N	Y	N	Y
N (obs.)	31,192	31,192	2,991	2,991
N (firms)	8,296	8,296	476	476

Table B4.3: Effects of foreign acquisition on tenure by layer, firms with initially 3 layers
(continued)

	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
D. Added 1 layer				
Dependent variable: tenure of layer 0				
Foreign ownership	0.1255 (0.5873)	0.1508 (0.5941)	0.1411 (0.5821)	0.3610 (0.6843)
Industry trends	N	Y	N	Y
N (obs.)	4,390	4,390	561	561
N (firms)	1,627	1,627	188	188
Dependent variable: tenure of layer 1				
Foreign ownership	-0.2377 (1.1064)	-0.2439 (1.1138)	0.4195 (1.3332)	1.0811 (1.2739)
Industry trends	N	Y	N	Y
N (obs.)	4,381	4,381	561	561
N (firms)	1,624	1,624	188	188
Dependent variable: tenure of layer 2				
Foreign ownership	-0.7407 (1.2370)	-0.6014 (1.2480)	-0.2211 (1.1252)	0.0414 (1.3028)
Industry trends	N	Y	N	Y
N (obs.)	4,128	4,128	545	545
N (firms)	1,503	1,503	181	181
Dependent variable: tenure of layer 3				
Foreign ownership	0.1959 (2.5314)	0.2598 (2.5402)	1.6717 (2.1504)	3.1513 (1.9299)
Industry trends	N	Y	N	Y
N (obs.)	3,466	3,466	467	467
N (firms)	1,291	1,291	155	155

Notes: Foreign ownership status is lagged one year. All regressions include year dummies. Standard errors in parentheses clustered at firm level. *10% level, **5% level, and ***1% level.

Table B4.4: Effects of foreign acquisition on tenure by layer, firms with initially 4 layers

	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
A. Removed 2 layers				
Dependent variable: tenure of layer 0				
Foreign ownership	2.4328 (1.8400)	1.9617 (1.6212)	4.6344 (2.8171)	7.0895 (6.1840)
Industry trends	N	Y	N	Y
N (obs.)	348	348	83	83
N (firms)	130	130	36	36
Dependent variable: tenure of layer 1				
Foreign ownership	-1.8416 (2.5937)	-2.8042 (2.7221)	3.2015 (3.4627)	-5.7212 (3.4707)
Industry trends	N	Y	N	Y
N (obs.)	295	295	74	74
N (firms)	121	121	35	35
B. Removed 1 layer				
Dependent variable: Tenure of layer 0				
Foreign ownership	0.1082 (1.0446)	0.1685 (1.0355)	1.6562* (0.8445)	1.7435* (0.8801)
Industry trends	N	Y	N	Y
N (obs.)	1,596	1,596	549	549
N (firms)	409	409	91	91
Dependent variable: tenure of layer 1				
Foreign ownership	0.8761 (0.8083)	0.7268 (0.8218)	0.2700 (0.8377)	0.3543 (0.9451)
Industry trends	N	Y	N	Y
N (obs.)	1,587	1,587	549	549
N (firms)	406	406	91	91
Dependent variable: tenure of layer 2				
Foreign ownership	-1.2943 (2.0483)	-1.4684 (2.0371)	-1.4886 (1.9332)	-1.0812 (1.8564)
Industry trends	N	Y	N	Y
N (obs.)	1,344	1,344	482	482
N (firms)	381	381	91	91

Table B4.4: Effects of foreign acquisition on tenure by layer, firms with initially 4 layers
(continued)

	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
C. Number of layers unchanged				
Dependent variable: tenure of layer 0				
Foreign ownership	-0.4531 (0.9054)	-0.3479 (0.9634)	-0.3279 (0.9147)	-0.2669 (0.9852)
Industry trends	N	Y	N	Y
N (obs.)	1,602	1,602	390	390
N (firms)	643	643	88	88
Dependent variable: tenure of layer 1				
Foreign ownership	0.5582 (1.0594)	0.6484 (1.1373)	0.6316 (0.7754)	0.8436 (0.8913)
Industry trends	N	Y	N	Y
N (obs.)	1,597	1,597	390	390
N (firms)	639	639	88	88
Dependent variable: tenure of layer 2				
Foreign ownership	-0.0091 (1.0275)	0.1752 (1.0626)	-1.0102 (1.1822)	-0.4768 (1.1449)
Industry trends	N	Y	N	Y
N (obs.)	1,482	1,482	381	381
N (firms)	581	581	87	87
Dependent variable: tenure of layer 3				
Foreign ownership	-0.0316 (1.3076)	0.1851 (1.4242)	0.6166 (1.5393)	0.7707 (1.5088)
Industry trends	N	Y	N	Y
N (obs.)	1,298	1,298	343	343
N (firms)	519	519	80	80

Notes: Foreign ownership status is lagged one year. All regressions include year dummies. Standard errors in parentheses clustered at firm level. *10% level, **5% level, and ***1% level.

Table B5.1: Effects of foreign acquisition on share of Portuguese nationals by layer, firms with initially 1 layer

	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
A. Number of layers unchanged				
Dependent variable: share of Portuguese nationals in layer 0				
Foreign ownership	-0.0041 (0.0172)	-0.0035 (0.0171)	-0.0176 (0.0190)	-0.0152 (0.0195)
Industry trends	N	Y	N	Y
N (obs.)	84,596	84,596	898	898
N (firms)	26,760	26,760	170	170
B. Added 1 layer				
Dependent variable: share of Portuguese nationals in layer 0				
Foreign ownership	-0.0039 (0.0282)	-0.0039 (0.0283)	-0.0065 (0.0283)	-0.0086 (0.0264)
Industry trends	N	Y	N	Y
N (obs.)	63,185	63,185	494	494
N (firms)	14,084	14,084	133	133
Dependent variable: share of Portuguese nationals in layer 1				
Foreign ownership	-0.1344 (0.1052)	-0.1341 (0.1053)	-0.1454 (0.1115)	-0.0218 (0.0486)
Industry trends	N	Y	N	Y
N (obs.)	25,253	25,253	302	302
N (firms)	8,356	8,356	97	97
C. Added 2 layers				
Dependent variable: share of Portuguese nationals in layer 0				
Foreign ownership	-0.0013 (0.0078)	-0.0011 (0.0078)	-0.0010 (0.0075)	-0.0081 (0.0115)
Industry trends	N	Y	N	Y
N (obs.)	18,069	18,069	162	162
N (firms)	4,875	4,875	50	50
Dependent variable: share of Portuguese nationals in layer 1				
Foreign ownership	0.0049* (0.0027)	0.0047* (0.0027)	-0.0052 (0.0066)	-0.0017 (0.0323)
Industry trends	N	Y	N	Y
N (obs.)	16,904	16,904	156	156
N (firms)	4,527	4,527	48	48
Dependent variable: share of Portuguese nationals in layer 2				
Foreign ownership	-0.4882 (0.3522)	-0.4877 (0.3527)	n.d.	n.d.
Industry trends	N	Y		
N (obs.)	7,012	7,012	102	102
N (firms)	2,372	2,372	31	31

Notes: Foreign ownership status is lagged one year. All regressions include year dummies. Standard errors in parentheses clustered at firm level. *10% level, **5% level, and ***1% level.

Table B5.2: Effects of foreign acquisition on share of Portuguese nationals by layer, firms with initially 2 layers

	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
A. Removed 1 layer				
Dependent variable: share of Portuguese nationals in layer 0				
Foreign ownership	-0.1004 (0.0730)	-0.1003 (0.0731)	-0.1221 (0.0834)	-0.0555* (0.0312)
Industry trends	N	Y	N	Y
N (obs.)	18,674	18,674	460	460
N (firms)	7,587	7,587	160	160
B. Number of layers unchanged				
Dependent variable: share of Portuguese nationals in layer 0				
Foreign ownership	-0.0040 (0.0067)	-0.0039 (0.0067)	-0.0085 (0.0069)	-0.0084 (0.0068)
Industry trends	N	Y	N	Y
N (obs.)	126,329	126,329	2,316	2,316
N (firms)	34,537	34,537	411	411
Dependent variable: share of Portuguese nationals in layer 1				
Foreign ownership	-0.0032 (0.0151)	-0.0030 (0.0151)	-0.0045 (0.0171)	-0.0067 (0.0181)
Industry trends	N	Y	N	Y
N (obs.)	69,899	69,899	1,915	1,915
N (firms)	21,952	21,952	385	385
C. Added 1 layer				
Dependent variable: share of Portuguese nationals in layer 0				
Foreign ownership	0.0089 (0.0073)	0.0089 (0.0073)	0.0049 (0.0086)	0.0064 (0.0092)
Industry trends	N	Y	N	Y
N (obs.)	41,681	41,681	1,171	1,171
N (firms)	10,505	10,505	256	256
Dependent variable: share of Portuguese nationals in layer 1				
Foreign ownership	0.0010 (0.0164)	0.0008 (0.0164)	0.0036 (0.0185)	0.0042 (0.0202)
Industry trends	N	Y	N	Y
N (obs.)	39,929	39,929	1,142	1,142
N (firms)	10,014	10,014	253	253
Dependent variable: share of Portuguese nationals in layer 2				
Foreign ownership	-0.0628 (0.0525)	-0.0627 (0.0527)	-0.0691 (0.0633)	-0.0722 (0.0681)
Industry trends	N	Y	N	Y
N (obs.)	19,533	19,533	830	830
N (firms)	5,963	5,963	203	203

Table B5.2: Effects of foreign acquisition on share of Portuguese nationals by layer, firms with initially 2 layers (continued)

	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
D. Added 2 layers				
Dependent variable: share of Portuguese nationals in layer 0				
Foreign ownership	0.0177 (0.0204)	0.0174 (0.0204)	0.0188 (0.0195)	0.0148 (0.0130)
Industry trends	N	Y	N	Y
N (obs.)	2,370	2,370	148	148
N (firms)	1,051	1,051	45	45
Dependent variable: share of Portuguese nationals in layer 1				
Foreign ownership	0.0010 (0.0088)	-0.0025 (0.0088)	0.0135 (0.0147)	0.0118 (0.0162)
Industry trends	N	Y	N	Y
N (obs.)	2,343	2,343	148	148
N (firms)	1,034	1,034	45	45
Dependent variable: share of Portuguese nationals in layer 2				
Foreign ownership	-0.0808 (0.1009)	-0.0832 (0.1030)	-0.0536 (0.1092)	-0.0483 (0.1220)
Industry trends	N	Y	N	Y
N (obs.)	1,936	1,936	140	140
N (firms)	830	830	41	41
Dependent variable: share of Portuguese nationals in layer 3				
Foreign ownership	-0.0236 (0.0201)	-0.0237 (0.0208)	-0.2005 (0.2653)	-0.1622 (0.2225)
Industry trends	N	Y	N	Y
N (obs.)	1,598	1,598	110	110
N (firms)	692	692	37	37

Notes: Foreign ownership status is lagged one year. All regressions include year dummies. Standard errors in parentheses clustered at firm level. *10% level, **5% level, and ***1% level.

Table B5.3: Effects of foreign acquisition on share of Portuguese nationals by layer, firms with initially 3 layers

	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
A. Removed 2 layers				
Dependent variable: share of Portuguese nationals in layer 0				
Foreign ownership	0.0133 (0.0186)	-0.0080 (0.0324)	0.0115 (0.0084)	0.0027 (0.0098)
Industry trends	N	Y	N	Y
N (obs.)	2,199	2,199	137	137
N (firms)	1,057	1,057	72	72
B. Removed 1 layer				
Dependent variable: share of Portuguese nationals in layer 0				
Foreign ownership	-0.0072 (0.0099)	-0.0062 (0.0101)	-0.0054 (0.0123)	-0.0044 (0.0118)
Industry trends	N	Y	N	Y
N (obs.)	16,892	16,892	1,127	1,127
N (firms)	5,496	5,496	327	327
Dependent variable: share of Portuguese nationals in layer 1				
Foreign ownership	-0.0113 (0.0143)	-0.0125 (0.0145)	-0.0108 (0.0172)	-0.0150 (0.0189)
Industry trends	N	Y	N	Y
N (obs.)	12,678	12,678	950	950
N (firms)	4,436	4,436	300	300
C. Number of layers unchanged				
Dependent variable: share of Portuguese nationals in layer 0				
Foreign ownership	0.0018 (0.0052)	0.0017 (0.0051)	-0.0043 (0.0054)	-0.0041 (0.0051)
Industry trends	N	Y	N	Y
N (obs.)	48,740	48,740	3,514	3,514
N (firms)	12,308	12,308	503	503
Dependent variable: share of Portuguese nationals in layer 1				
Foreign ownership	-0.0024 (0.0044)	-0.0026 (0.0044)	-0.0017 (0.0038)	-0.0018 (0.0033)
Industry trends	N	Y	N	Y
N (obs.)	47,090	47,090	3,452	3,452
N (firms)	11,906	11,906	501	501
Dependent variable: share of Portuguese nationals in layer 2				
Foreign ownership	-0.0199 (0.0135)	-0.0200 (0.0135)	-0.0235* (0.0129)	-0.0228* (0.0131)
Industry trends	N	Y	N	Y
N (obs.)	29,404	29,404	2,860	2,860
N (firms)	7,838	7,838	467	467

Table B5.3: Effects of foreign acquisition on share of Portuguese nationals by layer, firms with initially 3 layers (continued)

	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
Dependent variable: share of Portuguese nationals in layer 0				
Foreign ownership	0.0272 (0.0261)	0.0266 (0.0266)	0.0345 (0.0391)	0.0357 (0.0427)
Industry trends	N	Y	N	Y
N (obs.)	4,385	4,385	561	561
N (firms)	1,626	1,626	188	188
Dependent variable: share of Portuguese nationals in layer 1				
Foreign ownership	0.0027 (0.0252)	0.0035 (0.0257)	0.0038 (0.0362)	0.0091 (0.0356)
Industry trends	N	Y	N	Y
N (obs.)	4,356	4,356	559	559
N (firms)	1,615	1,615	187	187
Dependent variable: share of Portuguese nationals in layer 2				
Foreign ownership	0.0380 (0.0406)	0.0388 (0.0414)	0.0765 (0.0655)	0.0763 (0.0696)
Industry trends	N	Y	N	Y
N (obs.)	4,033	4,033	535	535
N (firms)	1,453	1,453	175	175
Dependent variable: share of Portuguese nationals in layer 3				
Foreign ownership	-0.0102 (0.0698)	-0.0116 (0.0710)	-0.0142 (0.0956)	-0.0015 (0.0814)
Industry trends	N	Y	N	Y
N (obs.)	3,314	3,314	439	439
N (firms)	1,228	1,228	144	144

Notes: Foreign ownership status is lagged one year. All regressions include year dummies. Standard errors in parentheses clustered at firm level. *10% level, **5% level, and ***1% level.

Table B5.4: Effects of foreign acquisition on share of Portuguese nationals by layer, firms with initially 4 layers

	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
A. Removed 2 layers				
Dependent variable: share of Portuguese nationals in layer 0				
Foreign ownership	0.0082 (0.0168)	-0.0054 (0.0116)	0.0054 (0.0091)	-0.0008 (0.0282)
Industry trends	N	Y	N	Y
N (obs.)	348	348	83	83
N (firms)	130	130	36	36
Dependent variable: share of Portuguese nationals in layer 1				
Foreign ownership	0.0169 (0.0256)	0.0236 (0.0336)	n.d.	n.d.
Industry trends	N	Y		
N (obs.)	289	289	72	72
N (firms)	118	118	35	35
B. Removed 1 layer				
Dependent variable: Share of Portuguese nationals in layer 0				
Foreign ownership	-0.0177 (0.0273)	-0.0168 (0.0251)	-0.0190 (0.0277)	-0.0177 (0.0277)
Industry trends	N	Y	N	Y
N (obs.)	1,589	1,589	549	549
N (firms)	407	407	91	91
Dependent variable: share of Portuguese nationals in layer 1				
Foreign ownership	-0.0247 (0.0210)	-0.242 (0.0222)	-0.0090* (0.0052)	-0.0074 (0.0054)
Industry trends	N	Y	N	Y
N (obs.)	1,578	1,578	548	548
N (firms)	404	404	91	91
Dependent variable: share of Portuguese nationals in layer 2				
Foreign ownership	-0.1041** (0.0480)	-0.0890** (0.0416)	-0.0701* (0.0420)	-0.0637 (0.0423)
Industry trends	N	Y	N	Y
N (obs.)	1,315	1,315	468	468
N (firms)	373	373	91	91

Table B5.4: Effects of foreign acquisition on share of Portuguese nationals by layer, firms with initially 4 layers (continued)

C. Number of layers unchanged				
Dependent variable: share of Portuguese nationals in layer 0				
Foreign ownership	-0.0089 (0.0142)	-0.0089 (0.0143)	-0.0192 (0.0185)	-0.0175 (0.0194)
Industry trends	N	Y	N	Y
N (obs.)	1,598	1,598	390	390
N (firms)	641	641	88	88
Dependent variable: share of Portuguese nationals in layer 1				
Foreign ownership	-0.0038 (0.0087)	-0.0038 (0.0093)	-0.0079 (0.0089)	-0.0094 (0.0094)
Industry trends	N	Y	N	Y
N (obs.)	1,590	1,590	390	390
N (firms)	635	635	88	88
Dependent variable: share of Portuguese nationals in layer 2				
Foreign ownership	-0.0152 (0.0221)	-0.0193 (0.0216)	-0.0117 (0.0327)	-0.0110 (0.0302)
Industry trends	N	Y	N	Y
N (obs.)	1,455	1,455	381	381
N (firms)	565	565	87	87
Dependent variable: share of Portuguese nationals in layer 3				
Foreign ownership	-0.1326 (0.1143)	-0.1273 (0.1048)	-0.1846 (0.1254)	-0.1894 (0.1256)
Industry trends	N	Y	N	Y
N (obs.)	1,244	1,244	340	340
N (firms)	493	493	79	79

Notes: Foreign ownership status is lagged one year. All regressions include year dummies. Standard errors in parentheses clustered at firm level. *10% level, **5% level, and ***1% level.

Table B6: Effects of foreign acquisition on education of top and bottom layers

	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
A. Pooled				
Dependent variable: education of top layer				
Foreign ownership	0.0705 (0.1221)	0.067 (0.1215)	0.0214 (0.1426)	0.0161 (0.1417)
Industry trends	N	Y	N	Y
N (obs.)	179,974	179,974	8,690	8,690
N (firms)	42,456	42,456	1,115	1,115
Dependent variable: education bottom layer				
Foreign ownership	-0.0210 (0.0538)	-0.0162 (0.0537)	-0.1197* (0.0614)	-0.1186* (0.0611)
Industry trends	N	Y	N	Y
N (obs.)	432,954	432,954	11,966	11,966
N (firms)	74,665	74,665	1,224	1,224
B. Conditional on the initial number of layers				
Firms with initially 1 layer				
Dependent variable: education of top layer				
Foreign ownership	0.7735 (0.5938)	0.7796 (0.5976)	0.2508 (0.7281)	0.2631 (0.6815)
Industry trends	N	Y	N	Y
N (obs.)	33,809	33,809	460	460
N (firms)	9,240	9,240	108	108
Dependent variable: education bottom layer				
Foreign ownership	-0.0075 (0.1476)	0.0099 (0.1427)	0.0571 (0.1624)	0.0636 (0.1628)
Industry trends	N	Y	N	Y
N (obs.)	167,300	167,300	1,573	1,573
N (firms)	26,968	26,968	184	184
Firms with initially 2 layers				
Dependent variable: education of top layer				
Foreign ownership	0.3644 (0.2577)	0.3522 (0.2556)	0.2312 (0.2985)	0.3009 (0.2964)
Industry trends	N	Y	N	Y
N (obs.)	95,541	95,541	2,965	2,965
N (firms)	23,367	23,367	409	409
Dependent variable: education of bottom layer				
Foreign ownership	-0.1295 (0.1015)	-0.1266 (0.1015)	-0.2641** (0.1122)	-0.2503** (0.1118)
Industry trends	N	Y	N	Y
N (obs.)	189,655	189,655	4,110	4,110
N (firms)	34,685	34,685	431	431

Table B6: Effects of foreign acquisition on education of top and bottom layers (continued)

	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
Firms with initially 3 layers				
Dependent variable: education of top layer				
Foreign ownership	-0.0360 (0.1490)	-0.0262 (0.1489)	-0.1030 (0.1755)	-0.0935 (0.1767)
Industry trends	N	Y	N	Y
N (obs.)	47,687	47,687	4,458	4,458
N (firms)	9,258	9,258	510	510
Dependent variable: education of bottom layer				
Foreign ownership	-0.0481 (0.0767)	-0.0425 (0.0766)	-0.1101 (0.0859)	-0.1154 (0.0853)
Industry trends	N	Y	N	Y
N (obs.)	72,429	72,429	5,355	5,355
N (firms)	12,363	12,363	521	521
Firms with initially 4 layers				
Dependent variable: education of top layer				
Foreign ownership	0.0884 (0.2726)	0.1035 (0.2753)	0.0021 (0.3204)	-0.1492 (0.3138)
Industry trends	N	Y	N	Y
N (obs.)	2,937	2,937	899	899
N (firms)	591	591	96	96
Dependent variable: education of bottom layer				
Foreign ownership	0.2923* (0.1700)	0.2740* (0.1568)	-0.0130 (0.2154)	-0.0188 (0.2044)
Industry trends	N	Y	N	Y
N (obs.)	3,570	3,570	1,033	1,033
N (firms)	649	649	96	96

Notes: Foreign ownership status is lagged one year. All regressions include year dummies. Standard errors in parentheses clustered at firm level. *10% level, **5% level, and ***1% level.

Table B7: Effects of foreign acquisition on experience of top and bottom layers

	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
A. Pooled				
Dependent variable: experience of top layer				
Foreign ownership	0.6703 (0.4326)	0.6858 (0.4313)	1.2342** (0.5277)	1.1799** (0.5226)
Industry trends	N	Y	N	Y
N (obs.)	179,974	179,974	8,690	8,690
N (firms)	42,456	42,456	1,115	1,115
Dependent variable: experience bottom layer				
Foreign ownership	-0.3778* (0.1961)	-0.3664* (0.1962)	0.3012 (0.2240)	0.3243 (0.2220)
Industry trends	N	Y	N	Y
N (obs.)	432,954	432,954	11,966	11,966
N (firms)	74,665	74,665	1,224	1,224
B. Conditional on the number of layers				
Firms with initially 1 layer				
Dependent variable: experience of top layer				
Foreign ownership	-0.2453 (2.1649)	-0.2491 (2.1616)	2.4286 (2.1953)	3.9764 (2.3061)
Industry trends	N	Y	N	Y
N (obs.)	33,809	33,809	460	460
N (firms)	9,240	9,240	108	108
Dependent variable: experience bottom layer				
Foreign ownership	0.1129 (0.5138)	0.0827 (0.5149)	0.3958 (0.5342)	0.1588 (0.5123)
Industry trends	N	Y	N	Y
N (obs.)	167,300	167,300	1,573	1,573
N (firms)	26,968	26,968	184	184
Firms with initially 2 layers				
Dependent variable: experience of top layer				
Foreign ownership	0.0892 (0.8279)	0.1390 (0.8247)	1.2124 (0.9772)	1.0749 (0.9587)
Industry trends	N	Y	N	Y
N (obs.)	95,541	95,541	2,965	2,965
N (firms)	23,367	23,367	409	409
Dependent variable: experience of bottom layer				
Foreign ownership	0.0938 (0.2989)	0.1066 (0.2992)	0.6950* (0.3575)	0.6836* (0.3542)
Industry trends	N	Y	N	Y
N (obs.)	189,655	189,655	4,110	4,110
N (firms)	34,685	34,685	431	431

Table B7: Effects of foreign acquisition on experience of top and bottom layers (continued)

	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
Firms with initially 3 layers				
Dependent variable: experience of top layer				
Foreign ownership	1.7817*** (0.0233)	1.7630*** (0.0233)	1.5827** (0.6563)	1.5060** (0.6553)
Industry trends	N	Y	N	Y
N (obs.)	47,687	47,687	4,458	4,458
N (firms)	9,258	9,258	510	510
Dependent variable: experience of bottom layer				
Foreign ownership	-0.2903 (0.3118)	-0.2903 (0.3117)	0.1140 (0.3525)	0.1036 (0.3490)
Industry trends	N	Y	N	Y
N (obs.)	72,429	72,429	5,355	5,355
N (firms)	12,363	12,363	521	521
Firms with initially 4 layers				
Dependent variable: experience of top layer				
Foreign ownership	0.6304 (1.5442)	0.6601 (1.5395)	-1.0777 (1.9533)	-0.8356 (1.9333)
Industry trends	N	Y	N	Y
N (obs.)	2,937	2,937	899	899
N (firms)	591	591	96	96
Dependent variable: experience of bottom layer				
Foreign ownership	-0.3856 (0.6259)	-0.3603 (0.6309)	0.3409 (0.6815)	0.4295 (0.6970)
Industry trends	N	Y	N	Y
N (obs.)	3,570	3,570	1,033	1,033
N (firms)	649	649	96	96

Notes: Foreign ownership status is lagged one year. All regressions include year dummies. Standard errors in parentheses clustered at firm level. *10% level, **5% level, and ***1% level.

Table B8: Effects of foreign acquisition on tenure of top and bottom layers

	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
A. Pooled				
Dependent variable: tenure of top layer				
Foreign ownership	-0.0281 (0.2916)	-0.0188 (0.2912)	0.6077 (0.3750)	0.6056 (0.3735)
Industry trends	N	Y	N	Y
N (obs.)	179,974	179,974	8,690	8,690
N (firms)	42,456	42,456	1,115	1,115
Dependent variable: tenure of bottom layer				
Foreign ownership	-0.4330*** (0.1491)	-0.4211*** (0.1490)	-0.0213 (0.1733)	0.0010 (0.1725)
Industry trends	N	Y	N	Y
N (obs.)	432,954	432,954	11,966	11,966
N (firms)	74,665	74,665	1,224	1,224
B. Conditional on the number of layers				
Firms with initially 1 layer				
Dependent variable: tenure of top layer				
Foreign ownership	-2.4349* (1.4316)	-2.4370* (1.4417)	-1.4003 (1.6133)	-0.8945 (1.4058)
Industry trends	N	Y	N	Y
N (obs.)	33,809	33,809	460	460
N (firms)	9,240	9,240	108	108
Dependent variable: tenure of bottom layer				
Foreign ownership	0.1658 (0.3055)	0.1751 (0.3037)	0.1091 (0.3444)	-0.0558 (0.3058)
Industry trends	N	Y	N	Y
N (obs.)	167,300	167,300	1,573	1,573
N (firms)	26,968	26,968	184	184
Firms with initially 2 layers				
Dependent variable: tenure of top layer				
Foreign ownership	-0.3405 (0.4839)	-0.3137 (0.4835)	0.3459 (0.6162)	0.3152 (0.6144)
Industry trends	N	Y	N	Y
N (obs.)	95,541	95,541	2,965	2,965
N (firms)	23,367	23,367	409	409
Dependent variable: tenure of bottom layer				
Foreign ownership	-0.3913* (0.2094)	-0.3840* (0.2103)	0.0258 (0.2377)	0.0378 (0.2322)
Industry trends	N	Y	N	Y
N (obs.)	189,655	189,655	4,110	4,110
N (firms)	34,685	34,685	431	431

Table B8: Effects of foreign acquisition on tenure of top and bottom layers (continued)

	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
Firms with initially 3 layers				
Dependent variable: Tenure of top layer				
Foreign ownership	1.1428*** (0.4108)	1.1380*** (0.4114)	1.1143** (0.5193)	1.1113** (0.5227)
Industry trends	N	Y	N	Y
N (obs.)	47,687	47,687	4,458	4,458
N (firms)	9,258	9,258	510	510
Dependent variable: tenure of bottom layer				
Foreign ownership	-0.3986 (0.2443)	-0.3977 (0.2443)	-0.1510 (0.2803)	-0.1673 (0.2769)
Industry trends	N	Y	N	Y
N (obs.)	72,429	72,429	5,355	5,355
N (firms)	12,363	12,363	521	521
Firms with initially 4 layers				
Dependent variable: tenure of top layer				
Foreign ownership	-0.1978 (0.9464)	-0.2093 (0.9539)	-0.5210 (1.1584)	-0.3443 (1.1799)
Industry trends	N	Y	N	Y
N (obs.)	2,937	2,937	899	899
N (firms)	591	591	96	96
Dependent variable: tenure of bottom layer				
Foreign ownership	-0.0167 (0.5860)	-0.0027 (0.5876)	0.5511 (0.6923)	0.5535 (0.7123)
Industry trends	N	Y	N	Y
N (obs.)	3,570	3,570	1,033	1,033
N (firms)	649	649	96	96

Notes: Foreign ownership status is lagged one year. All regressions include year dummies. Standard errors in parentheses clustered at firm level. *10% level, **5% level, and ***1% level.

Table B9: Effects of foreign acquisition on share of Portuguese nationals of top and bottom layers

	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
A. Pooled				
Dependent variable: share of Portuguese nationals in top layer				
Foreign ownership	-0.0448*** (0.0108)	-0.0446*** (0.0108)	-0.0374*** (0.0120)	-0.0372*** (0.0121)
Industry trends	N	Y	N	Y
N (obs.)	171,897	171,897	8,301	8,301
N (firms)	40,900	40,900	1,092	1,092
Dependent variable: share of Portuguese nationals in bottom layer				
Foreign ownership	0.0015 (0.0032)	0.0015 (0.0032)	-0.0065* (0.0036)	-0.0065* (0.0036)
Industry trends	N	Y	N	Y
N (obs.)	431,286	431,286	11,926	11,926
N (firms)	74,416	74,416	1,223	1,223
B. Conditional on the number of layers				
Firms with initially 1 layer				
Dependent variable: share of Portuguese nationals in top layer				
Foreign ownership	-0.1595* (0.0848)	-0.1593* (0.0848)	-0.1128 (0.0816)	-0.0942 (0.0732)
Industry trends	N	Y	N	Y
N (obs.)	32,623	32,623	409	409
N (firms)	8,888	8,888	99	99
Dependent variable: share of Portuguese nationals in bottom layer				
Foreign ownership	0.0033 (0.0089)	0.0035 (0.0089)	-0.0063 (0.0109)	-0.0048 (0.0108)
Industry trends	N	Y	N	Y
N (obs.)	166,457	166,457	1,564	1,564
N (firms)	26,840	26,840	184	184
Firms with initially 2 layers				
Dependent variable: share of Portuguese nationals in top layer				
Foreign ownership	-0.0450** (0.0197)	-0.0446** (0.0198)	-0.0309 (0.0199)	-0.0285 (0.0203)
Industry trends	N	Y	N	Y
N (obs.)	91,030	91,030	2,855	2,855
N (firms)	22,447	22,447	402	402
Dependent variable: share of Portuguese nationals in bottom layer				
Foreign ownership	-0.0059 (0.0057)	-0.0057 (0.0057)	-0.0075 (0.0065)	-0.0072 (0.0066)
Industry trends	N	Y	N	Y
N (obs.)	189,054	189,054	4,095	4,095
N (firms)	34,595	34,595	430	430

Table B9: Effects of foreign acquisition on share of Portuguese nationals of top and bottom layers (continued)

	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
Firms with initially 3 layers				
Dependent variable: share of Portuguese nationals in top layer				
Foreign ownership	-0.0262** (0.0113)	-0.0264** (0.0113)	-0.0226* (0.0124)	-0.0226* (0.0126)
Industry trends	N	Y	N	Y
N (obs.)	45,396	45,396	4,249	4,249
N (firms)	8,983	8,983	503	503
Dependent variable: share of Portuguese nationals in bottom layer				
Foreign ownership	0.0017 (0.0046)	0.0018 (0.0046)	-0.0050 (0.0048)	-0.0049 (0.0047)
Industry trends	N	Y	N	Y
N (obs.)	72,216	72,216	5,339	5,339
N (firms)	12,333	12,333	521	521
Firms with initially 4 layers				
Dependent variable: share of Portuguese nationals in top layer				
Foreign ownership	-0.0859** (0.0424)	-0.0828** (0.0429)	-0.0963* (0.0578)	-0.0907 (0.0602)
Industry trends	N	Y	N	Y
N (obs.)	2,848	2,848	880	880
N (firms)	582	582	96	96
Dependent variable: share of Portuguese nationals in bottom layer				
Foreign ownership	-0.0062 (0.0126)	-0.0060 (0.0128)	-0.0113 (0.0148)	-0.0112 (0.0152)
Industry trends	N	Y	N	Y
N (obs.)	3,559	3,559	1,033	1,033
N (firms)	648	648	96	96

Notes: Foreign ownership status is lagged one year. All regressions include year dummies. Standard errors in parentheses clustered at firm level. *10% level, **5% level, and ***1% level.

Table B10: Effects of foreign acquisition on log hourly wage averaged over all managerial layers

	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
A. Pooled				
Dependent variable: log hourly wage of managerial layer				
Foreign ownership	0.0182 (0.0175)	0.0189 (0.0175)	0.0355* (0.0205)	0.0351* (0.0206)
Industry trends	N	Y	N	Y
N (obs.)	230,687	230,687	9,787	9,787
N (firms)	47,797	47,797	1,130	1,130
Dependent variable: log hourly wage of bottom layer				
Foreign ownership	0.0190* (0.0113)	0.0200* (0.0113)	0.0251* (0.0132)	0.0245* (0.0132)
Industry trends	N	Y	N	Y
N (obs.)	432,954	432,954	11,966	11,966
N (firms)	74,665	74,665	1,224	1,224
B. Conditional on initial number of layers				
Firms with initially 1 layer				
Dependent variable: log hourly wage of managerial layer				
Foreign ownership	0.1167 (0.0858)	0.1173 (0.0862)	0.1431 (0.1105)	0.0896 (0.1293)
Industry trends	N	Y	N	Y
N (obs.)	44,359	44,359	511	511
N (firms)	10,250	10,250	113	113
Dependent variable: log hourly wage of bottom layer				
Foreign ownership	0.0437* (0.0452)	0.0461* (0.0452)	0.0523* (0.0309)	0.0486 (0.0304)
Industry trends	N	Y	N	Y
N (obs.)	167,300	167,300	1,573	1,573
N (firms)	26,968	26,968	184	184
Firms with initially 2 layers				
Dependent variable: log hourly wage of managerial layer				
Foreign ownership	0.0584* (0.0343)	0.0594* (0.0342)	0.0529 (0.0378)	0.0468 (0.0390)
Industry trends	N	Y	N	Y
N (obs.)	117,040	117,040	3,288	3,288
N (firms)	24,641	24,641	410	410
Dependent variable: log hourly wage bottom layer				
Foreign ownership	0.0191 (0.0213)	0.0200 (0.0213)	-0.0010 (0.0229)	-0.0005 (0.0229)
Industry trends	N	Y	N	Y
N (obs.)	189,655	189,655	4,110	4,110
N (firms)	34,685	34,685	431	431

Table B10: Effects of foreign acquisition on log hourly wage averaged over all managerial layers (continued)

	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
Firms with initially 3 layers				
Dependent variable: log hourly wage of managerial layer				
Foreign ownership	0.0031 (0.0224)	0.0029 (0.0224)	0.0188 (0.0273)	0.0194 (0.0275)
Industry trends	N	Y	N	Y
N (obs.)	65,799	65,799	5,072	5,072
N (firms)	12,257	12,257	519	519
Dependent variable: log hourly wage of bottom layer				
Foreign ownership	0.0139 (0.0160)	0.0145 (0.0160)	0.0156 (0.0194)	0.0123 (0.0195)
Industry trends	N	Y	N	Y
N (obs.)	72,429	72,429	5,355	5,355
N (firms)	12,363	12,363	521	521
Firms with initially 4 layers				
Dependent variable: log hourly wage of managerial layer				
Foreign ownership	0.0995* (0.0562)	0.0947* (0.0552)	0.0364 (0.0616)	0.0185 (0.0595)
Industry trends	N	Y	N	Y
N (obs.)	3,489	3,489	1,013	1,013
N (firms)	649	649	96	96
Dependent variable: log hourly wage of bottom layer				
Foreign ownership	0.0807* (0.0425)	0.0802* (0.0423)	0.1346*** (0.0487)	0.1340*** (0.0489)
Industry trends	N	Y	N	Y
N (obs.)	3,570	3,570	1,033	1,033
N (firms)	649	649	96	96

Notes: Foreign ownership status is lagged one year. All regressions include year dummies. Standard errors in parentheses clustered at firm level. *10% level, **5% level, and ***1% level.

Table B11.1: Effects of foreign acquisition on sales, using domestic acquisitions (control group: foreign firms)

Dependent variable: log sales				
	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
A. Pooled				
Foreign ownership	0.0100 (0.0736)	0.0687 (0.0755)	-0.0177 (0.0921)	0.0301 (0.0935)
Industry trends	N	Y	N	Y
N (obs.)	10,523	10,523	3,258	3,258
N (firms)	1,636	1,636	380	380
B. Conditional on initial number of layers				
Firms with 1 layer				
Foreign ownership	0.0146 (0.1504)	0.0398 (0.1499)	-0.1064 (0.2384)	0.0956 (0.2362)
Industry trends	N	Y	N	Y
N (obs.)	1,104	1,104	263	263
N (firms)	211	211	40	40
Firms with 2 layers				
Foreign ownership	0.0495 (0.1374)	0.0528 (0.1447)	0.1109 (0.1344)	0.1949 (0.1419)
Industry trends	N	Y	N	Y
N (obs.)	3,358	3,358	950	950
N (firms)	569	569	128	128
Firms with 3 layers				
Foreign ownership	0.0447 (0.1032)	0.1317 (0.1058)	-0.0017 (0.1205)	0.0308 (0.1232)
Industry trends	N	Y	N	Y
N (obs.)	5,204	5,204	1,708	1,708
N (firms)	729	729	178	178
Firms with 4 layers				
Foreign ownership	0.0249 (0.2654)	0.1103 (0.2824)	-0.0608 (0.3209)	-0.0299 (0.3133)
Industry trends	N	Y	N	Y
N (obs.)	857	857	424	424
N (firms)	127	127	41	41

Notes: Foreign ownership status is lagged one year. All regressions include year dummies. Standard errors in parentheses clustered at firm level. *10% level, **5% level, and ***1% level.

Table B11.2: Effects of foreign acquisition on sales, using domestic acquisitions (control group: domestic firms)

Dependent variable: Log sales				
	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
A. Pooled				
Foreign ownership	-0.0559 (0.0733)	-0.0570 (0.0733)	-0.0619 (0.0780)	-0.0334 (0.0794)
Industry trends	N	Y	N	Y
N (obs.)	428,186	428,186	4,829	4,829
N (firms)	74,071	74,071	504	504
B. Conditional on initial number of layers				
Firms with 1 layer				
Foreign ownership	-0.0601 (0.1417)	-0.0597 (0.1408)	-0.1846 (0.1595)	-0.0985 (0.1724)
Industry trends	N	Y	N	Y
N (obs.)	166,733	166,733	702	702
N (firms)	26,889	26,889	86	86
Firms with 2 layers				
Foreign ownership	0.0217 (0.1413)	0.0206 (0.1411)	-0.1524 (0.1026)	-0.0481 (0.1102)
Industry trends	N	Y	N	Y
N (obs.)	188,094	188,094	1,529	1,529
N (firms)	34,473	34,473	169	169
Firms with 3 layers				
Foreign ownership	-0.0410 (0.1001)	-0.0439 (0.1001)	-0.0797 (0.1174)	-0.0681 (0.1172)
Industry trends	N	Y	N	Y
N (obs.)	70,110	70,110	2,064	2,064
N (firms)	12,099	12,099	202	202
Firms with 4 layers				
Foreign ownership	-0.1352 (0.2289)	-0.0612 (0.2315)	0.0045 (0.3017)	0.1321 (0.3100)
Industry trends	N	Y	N	Y
N (obs.)	3,249	3,249	550	550
N (firms)	610	610	48	48

Notes: Foreign ownership status is lagged one year. All regressions include year dummies. Standard errors in parentheses clustered at firm level. *10% level, **5% level, and ***1% level.

**Table B12.1: Effects of foreign acquisition on labor productivity, using domestic acquisitions
(control group: foreign firms)**

Dependent variable: Log labor productivity				
	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
A. Pooled				
Foreign ownership	-0.0722 (0.0640)	-0.0086 (0.0650)	-0.0975 (0.0834)	-0.0294 (0.0831)
Industry trends	N	Y	N	Y
N (obs.)	10,523	10,523	3,258	3,258
N (firms)	1,636	1,636	380	380
B. Conditional on initial number of layers				
Firms with 1 layer				
Foreign ownership	-0.0414 (0.1192)	-0.0429 (0.1094)	-0.1710 (0.1934)	-0.0303 (0.1868)
Industry trends	N	Y	N	Y
N (obs.)	1,104	1,104	263	263
N (firms)	211	211	40	40
Firms with 2 layers				
Foreign ownership	-0.0095 (0.1053)	-0.0020 (0.1089)	0.0097 (0.1186)	0.1084 (0.1220)
Industry trends	N	Y	N	Y
N (obs.)	3,358	3,358	950	950
N (firms)	569	569	128	128
Firms with 3 layers				
Foreign ownership	-0.0290 (0.0914)	0.0579 (0.0897)	-0.0687 (0.1076)	-0.0079 (0.1076)
Industry trends	N	Y	N	Y
N (obs.)	5,204	5,204	1,708	1,708
N (firms)	729	729	178	178
Firms with 4 layers				
Foreign ownership	-0.1485 (0.2379)	-0.0193 (0.2388)	-0.1230 (0.3131)	0.0036 (0.2892)
Industry trends	N	Y	N	Y
N (obs.)	857	857	424	424
N (firms)	127	127	41	41

Notes: Foreign ownership status is lagged one year. All regressions include year dummies. Standard errors in parentheses clustered at firm level. *10% level, **5% level, and ***1% level.

**Table B12.2: Effects of foreign acquisition on labor productivity, using domestic acquisitions
(control group: domestic firms)**

Dependent variable: Log labor productivity				
	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
A. Pooled				
Foreign ownership	-0.1397** (0.0639)	-0.1410** (0.0638)	-0.1068 (0.0700)	-0.0670 (0.0702)
Industry trends	N	Y	N	Y
N (obs.)	428,186	428,186	4,829	4,829
N (firms)	74,071	74,071	504	504
B. Conditional on initial number of layers				
Firms with 1 layer				
Foreign ownership	-0.1175 (0.1140)	-0.1154 (0.1142)	-0.2153* (0.1222)	-0.0949 (0.1519)
Industry trends	N	Y	N	Y
N (obs.)	166,733	166,733	702	702
N (firms)	26,889	26,889	86	86
Firms with 2 layers				
Foreign ownership	-0.0284 (0.1066)	-0.0296 (0.1066)	0.0041 (0.0875)	0.057 (0.0935)
Industry trends	N	Y	N	Y
N (obs.)	188,094	188,094	1,529	1,529
N (firms)	34,473	34,473	169	169
Firms with 3 layers				
Foreign ownership	-0.1000 (0.0909)	-0.1021 (0.0892)	-0.1213 (0.1052)	-0.0883 (0.1019)
Industry trends	N	Y	N	Y
N (obs.)	70,110	70,110	2,064	2,064
N (firms)	12,099	12,099	202	202
Firms with 4 layers				
Foreign ownership	-0.3306 (0.2065)	-0.2302 (0.2107)	-0.0979 (0.2899)	0.0279 (0.2886)
Industry trends	N	Y	N	Y
N (obs.)	3,249	3,249	550	550
N (firms)	610	610	48	48

Notes: Foreign ownership status is lagged one year. All regressions include year dummies. Standard errors in parentheses clustered at firm level. *10% level, **5% level, and ***1% level.

**Table B13.1: Effects of foreign acquisition on hourly wage, using domestic acquisitions
(control group: foreign firms)**

Dependent variable: Log hourly wage				
	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
A. Pooled				
Foreign ownership	0.0336*	0.0310	-0.0535**	0.0007
	(0.0182)	(0.0189)	(0.0217)	(0.0221)
Industry trends	N	Y	N	Y
N (obs.)	10,523	10,523	3,258	3,258
N (firms)	1,636	1,636	380	380
B. Conditional on initial number of layers				
Firms with 1 layer				
Foreign ownership	-0.0669	0.0468	0.0127	0.0780
	(0.0540)	(0.0540)	(0.0921)	(0.0991)
Industry trends	N	Y	N	Y
N (obs.)	1,104	1,104	263	263
N (firms)	211	211	40	40
Firms with 2 layers				
Foreign ownership	-0.0069	0.0627	-0.0709*	-0.0242
	(0.0398)	(0.0429)	(0.0388)	(0.0415)
Industry trends	N	Y	N	Y
N (obs.)	3,358	3,358	950	950
N (firms)	569	569	128	128
Firms with 3 layers				
Foreign ownership	-0.0291	0.0301	-0.0332	0.0245
	(0.0232)	(0.0236)	(0.0280)	(0.0283)
Industry trends	N	Y	N	Y
N (obs.)	5,204	5,204	1,708	1,708
N (firms)	729	729	178	178
Firms with 4 layers				
Foreign ownership	-0.0848*	0.0002	-0.1074	-0.0311
	(0.0478)	(0.0427)	(0.0660)	(0.0599)
Industry trends	N	Y	N	Y
N (obs.)	857	857	424	424
N (firms)	127	127	41	41

Notes: Foreign ownership status is lagged one year. All regressions include year dummies. Standard errors in parentheses clustered at firm level. *10% level, **5% level, and ***1% level.

**Table B13.2: Effects of foreign acquisition on hourly wage, using domestic acquisitions
(control group: domestic firms)**

Dependent variable: Log hourly wage				
	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
A. Pooled				
Foreign ownership	-0.0396** (0.0180)	-0.0390** (0.0180)	-0.0567*** (0.0201)	-0.0108 (0.0204)
Industry trends	N	Y	N	Y
N (obs.)	428,186	428,186	4,829	4,829
N (firms)	74,071	74,071	504	504
B. Conditional on initial number of layers				
Firms with 1 layer				
Foreign ownership	-0.0620 (0.0503)	-0.0607 (0.0505)	-0.0445 (0.0484)	-0.0040 (0.0536)
Industry trends	N	Y	N	Y
N (obs.)	166,733	166,733	702	702
N (firms)	26,889	26,889	86	86
Firms with 2 layers				
Foreign ownership	-0.0186 (0.0394)	-0.0176 (0.0393)	-0.0329 (0.0464)	0.0114 (0.0502)
Industry trends	N	Y	N	Y
N (obs.)	188,094	188,094	1,529	1,529
N (firms)	34,473	34,473	169	169
Firms with 3 layers				
Foreign ownership	-0.0502** (0.0232)	-0.0501** (0.0232)	-0.0627** (0.0244)	-0.0111 (0.0244)
Industry trends	N	Y	N	Y
N (obs.)	70,110	70,110	2,064	2,064
N (firms)	12,099	12,099	202	202
Firms with 4 layers				
Foreign ownership	-0.1139** (0.0522)	-0.0759 (0.0507)	-0.0776 (0.0570)	-0.0272 (0.0568)
Industry trends	N	Y	N	Y
N (obs.)	3,249	3,249	550	550
N (firms)	610	610	48	48

Notes: Foreign ownership status is lagged one year. All regressions include year dummies. Standard errors in parentheses clustered at firm level. *10% level, **5% level, and ***1% level.

Table B14.1: Effects of foreign acquisition on the number of layers, using domestic acquisitions (control group: foreign firms)

Dependent variable: Number of layers				
	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
A. Pooled				
Foreign ownership	0.0300 (0.0471)	0.1027** (0.0492)	-0.0009 (0.0564)	0.0640 (0.0609)
Industry trends	N	Y	N	Y
N (obs.)	10,523	10,523	3,258	3,258
N (firms)	1,636	1,636	380	380
B. Conditional on initial number of layers				
Firms with 1 layer				
Foreign ownership	-0.2162* (0.1134)	-0.0133 (0.1036)	-0.2659* (0.1394)	-0.0046 (0.2241)
Industry trends	N	Y	N	Y
N (obs.)	1,104	1,104	263	263
N (firms)	211	211	40	40
Firms with 2 layers				
Foreign ownership	-0.0472 (0.0926)	0.0742 (0.0946)	-0.1355 (0.1107)	-0.0727 (0.1174)
Industry trends	N	Y	N	Y
N (obs.)	3,358	3,358	950	950
N (firms)	569	569	128	128
Firms with 3 layers				
Foreign ownership	0.0750 (0.0645)	0.1079 (0.0662)	0.0504 (0.0741)	0.1021 (0.0789)
Industry trends	N	Y	N	Y
N (obs.)	5,204	5,204	1,708	1,708
N (firms)	729	729	178	178
Firms with 4 layers				
Foreign ownership	-0.0100 (0.1249)	0.0186 (0.1490)	0.1816 (0.1740)	0.2937 (0.2077)
Industry trends	N	Y	N	Y
N (obs.)	857	857	424	424
N (firms)	127	127	41	41

Notes: Foreign ownership status is lagged one year. All regressions include year dummies. Standard errors in parentheses clustered at firm level. *10% level, **5% level, and ***1% level.

Table B14.2: Effects of foreign acquisition on the number of layers, using domestic acquisitions (control group: domestic firms)

Dependent variable: Number of layers				
	Full sample		Matched sample	
	(1)	(2)	(3)	(4)
A. Pooled				
Foreign ownership	0.0790*	0.0802*	-0.0217	0.0416
	(0.0478)	(0.0479)	(0.0510)	(0.0528)
Industry trends	N	Y	N	Y
N (obs.)	428,186	428,186	4,829	4,829
N (firms)	74,071	74,071	504	504
B. Conditional on initial number of layers				
Firms with 1 layer				
Foreign ownership	-0.2122**	-0.2098**	-0.3904***	-0.3521***
	(0.0993)	(0.0970)	(0.0887)	(0.1010)
Industry trends	N	Y	N	Y
N (obs.)	166,733	166,733	702	702
N (firms)	26,889	26,889	86	86
Firms with 2 layers				
Foreign ownership	-0.1348	-0.1325	-0.1524	-0.0481
	(0.0963)	(0.0968)	(0.1096)	(0.1138)
Industry trends	N	Y	N	Y
N (obs.)	188,094	188,094	1,529	1,529
N (firms)	34,473	34,473	169	169
Firms with 3 layers				
Foreign ownership	-0.0349	-0.0343	0.0441	0.0885
	(0.0658)	(0.0653)	(0.0684)	(0.0722)
Industry trends	N	Y	N	Y
N (obs.)	70,110	70,110	2,064	2,064
N (firms)	12,099	12,099	202	202
Firms with 4 layers				
Foreign ownership	-0.1333	-0.2186*	0.1899	0.2726*
	(0.1248)	(0.1296)	(0.1492)	(0.1578)
Industry trends	N	Y	N	Y
N (obs.)	3,249	3,249	550	550
N (firms)	610	610	48	48

Notes: Foreign ownership status is lagged one year. All regressions include year dummies. Standard errors in parentheses clustered at firm level. *10% level, **5% level, and ***1% level.

Table B15: Effects of foreign acquisition on the use of intranet (conditional on initial number of layers)

	(1)	(2)	(3)	(4)
A. Firms with initially 2 layers				
Foreign ownership	0.4320*	0.4279*	0.2396	0.0750
	(0.2420)	(0.2426)	(0.2253)	(0.1277)
Industry trends	N	Y	N	Y
Matched sample	N	N	Y	Y
R ²	0.744	0.749	0.643	0.664
N (obs.)	1,387	1,387	30	30
N (firms)	583	583	9	9
B. Firms with initially 3 layers				
Foreign ownership	0.2290***	0.2349***	0.2147*	0.2010
	(0.0778)	(0.0789)	(0.1203)	(0.1289)
Industry trends	N	Y	N	Y
Matched sample	N	N	Y	Y
R ²	0.730	0.733	0.739	0.760
N (obs.)	2,101	2,101	132	132
N (firms)	716	716	35	35
C. Firms with initially 4 layers				
Foreign ownership	0.0349	0.0328	0.0764	-0.0054
	(0.0380)	(0.0625)	(0.0898)	(0.0215)
Industry trends	N	Y	N	Y
Matched sample	N	N	Y	Y
R ²	0.748	0.764	0.830	0.938
N (obs.)	357	357	58	58
N (firms)	110	110	14	14

Notes: Foreign ownership status is lagged one year. All regressions include year dummies. Standard errors in parentheses clustered at firm level. *10% level, **5% level, and *1% level.

Table B16: Effects of foreign acquisition using survey data

	(1)	(2)	(3)	(4)	(5)	(6)
	All survey data		Matched survey data		Matched survey data (matching also on intranet use prior to acquisition)	
A. Dependent variable: log sales						
Foreign ownership	0.1605 (0.3271)	0.1652 (0.3278)	0.1228 (0.4071)	0.1394 (0.4340)	0.1410 (0.2516)	0.1624 (0.2153)
Industry trends	N	Y	N	Y	N	Y
Matched sample	N	N	N	N	N	N
R ²	0.891	0.891	0.748	0.756	0.848	0.864
N (obs.)	4,268	4,268	233	233	182	182
N (firms)	1,624	1,624	65	65	47	47
B. Dependent variable: log labor productivity						
Foreign ownership	0.3867 (0.2871)	0.3804 (0.2898)	0.3988 (0.3713)	0.3742 (0.3742)	0.5387** (0.2559)	0.2429** (0.1141)
Industry trends	N	Y	N	Y	N	Y
Matched sample	N	N	N	N	N	N
R ²	0.894	0.894	0.748	0.750	0.809	0.813
N (obs.)	4,268	4,268	233	233	182	182
N (firms)	1,624	1,624	65	65	47	47
C. Dependent variable: log hourly wage						
Foreign ownership	0.0164 (0.0768)	0.0149 (0.0742)	0.0772 (0.0909)	0.0638 (0.0718)	0.0965 (0.1028)	0.0728 (0.0700)
Industry trends	N	Y	N	Y	N	Y
Matched sample	N	N	N	N	N	N
R ²	0.928	0.929	0.890	0.898	0.865	0.881
N (obs.)	4,268	4,268	233	233	182	182
N (firms)	1,624	1,624	65	65	47	47
D. Dependent variable: number of layers						
Foreign ownership	-0.0073 (0.0767)	-0.0109 (0.0789)	-0.0896 (0.0.1191)	-0.0885 (0.1277)	0.0214 (0.1038)	0.0172 (0.1156)
Industry trends	N	Y	N	Y	N	Y
Matched sample	N	N	N	N	N	N
R ²	0.867	0.891	0.784	0.790	0.812	0.815
N (obs.)	4,268	4,268	233	233	182	182
N (firms)	1,624	1,624	65	65	47	47

Table B16: Effects of foreign acquisition using survey data (continued)

	(1)	(2)	(3)	(4)	(5)	(6)
	All survey data		Matched survey data		Matched survey data (matching also on intranet use prior to acquisition)	
E. Dependent variable: number of layers (excluding firms with initially 4 layers)						
Foreign ownership	0.0528 (0.0789)	0.0459 (0.0716)	-0.0297 (0.1193)	-0.0106 (0.1376)	0.0610 (0.1114)	0.0355 (0.1285)
Industry trends	N	Y	N	Y	N	Y
Matched sample	N	N	Y	Y	N	N
R ²	0.864	0.865	0.758	0.768	0.793	0.801
N (obs.)	3,911	3,911	175	175	144	144
N (firms)	1,514	1,514	51	51	38	38

Notes: Foreign ownership status is lagged one year. All regressions include year dummies. Standard errors in parentheses clustered at firm level. *10% level, **5% level, and *1% level.