

# Inter-Firm Employee Mobility, Displacement, and Foreign Direct Investment Spillovers<sup>\*</sup>

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## **Abstract:**

It is believed that labour mobility may be an important transmission channel of Foreign Direct Investment productivity spillovers in host countries. This paper examines empirically this proposition, by following virtually all employees in Portugal in each year between 1986 and 2000. We then focus on those employees that move from foreign to domestic firms, including those workers that are displaced by their foreign firms.

After discussing some theoretical results, our findings indicate relatively small labour flows between foreign and domestic firms (and smaller, in proportion to their size in the economy, than the equivalent flows between foreign firms only). Moreover, a considerable share of the foreign-to-domestic mobility involves switches in industries and/or occupations (but not so much geographical mobility). Other results – not easily reconcilable with the spillovers view – include that future displacement and lower wages are strong predictors of foreign-to-domestic mobility; and that, on average, movers take large pay cuts at their new jobs (particularly when not controlling for the characteristics of the domestic firms that hire them).

However, when comparing these movers from foreign to domestic firms and workers in domestic firms without previous experience in foreign firms, the wages of workers with previous foreign experience are always higher and also increase with the level of their prior tenure at foreign firms. These wage premium results hold regardless of whether the comparison is conducted across or within domestic firms. Overall, we believe the present evidence provides, at best, only some moderate support for the role of labour mobility in delivering FDI spillovers to a host economy.

**JEL codes:** C23, F23, J31.

**Keywords:** FDI, Wages, Matched Employer-Employee Data, Worker Mobility, Knowledge Management.

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## **Non-Technical Executive Summary:**

As globalisation becomes a defining process of today's world, it is increasingly more important to understand the implications of the activities of multinational enterprises. One crucial specific dimension of these implications concerns whether multinationals, and foreign firms in particular, generate productivity spillovers that benefit domestic firms. This is a question of great relevance also from a policy point of view: If such spillovers do not materialise, then the large amounts of public money that are typically spent in many countries around the world in attracting multinationals would probably be better devoted to other applications.

Moreover, in theory there are several reasons to expect that multinationals will seek (successfully or not) to minimise such productivity spillovers. Indeed, these spillovers, while benefiting the host economy, may come at the cost of the erosion of the special assets (technology, brand, management, etc) whose exploitation underpins the decision by the multinational to invest abroad in the first place.

In this context, it is particularly useful to engage in in-depth evaluations of these productivity spillovers. This paper pursues this course of analysis by focusing on a specific possible micro-foundation underpinning the transmission channel of these spillovers: worker mobility from foreign to domestic firms. As workers in foreign firms will be exposed, at least partially, to those special assets and/or may receive special training, those skills may be transferred to domestic firms whenever those workers move to the latter. The application of those skills at domestic firms may then generate higher productivity. However, foreign firms may try to prevent this process of knowledge transfer, namely by trading-off pecuniary spillovers for productivity spillovers, i.e. they may pay higher wages to their host-country workers in order to ensure their assets will not be passed to domestic competitors.

Another related topic which figures prominently in the public debate about globalisation and multinationals – and a topic which we also seek to contribute to – concerns what is apparently an increasing likelihood that foreign firms leave their host economies (“footloose multinationals”). In this context, it is important to analyse what are the employment and wage implications of these firm closures, in particular in terms of the workers that are laid off.

In this empirical paper, we investigate these issues by exploiting an extraordinarily rich and detailed data set. These data, a matched employer-employee panel, covers virtually *all* firms in Portugal from 1986 to 2000 (except for 1990). Moreover, the data also includes individual information about *all* employees in each one of the years in which their firm is present in this census. We also cover not only manufacturing but also services, a sector which is becoming increasingly more important but which has largely been ignored in Foreign Direct Invest (FDI) research. Moreover, besides using a large set of control variables, we also exploit worker and firm specific codes in order to follow these workers over time, including when they move between firms.

We first use these data to provide a detailed analysis of different aspects of FDI in Portugal over the 15-year period covered. Among other results, we present evidence of a considerable increase in the importance of foreign firms, from about 1,000 firms employing around 120,000 workers in 1986 to about 2,200 firms and 230,000

employees in 2000. There is also, every year, a considerable amount of turnover in the sector, as there are large numbers of foreign firms that open up or close down and that acquire or are acquired by domestic firms. These openings, closures or acquisitions involve several thousands of employees in each year of the period covered.

In the main section of the paper, which is focused on worker mobility from foreign to domestic firms, we then derive our key results, which are as follows:

(1) Given the large number of workers in foreign firms, there is a relatively small number of them that move from foreign to domestic firms. This result still holds even when including worker displacements from foreign firms that close down. In relative terms, there is much more mobility between foreign firms than from foreign to domestic firms

(2) The workers more likely to move from foreign to domestic firms are those that are less well paid in their foreign firms (after controlling for their human capital characteristics, such as education or experience). This result applies mostly across foreign firms and not so much within each foreign firm, indicating that most movers come from low-paying foreign firms. Future displacement is also a strong predictor of mobility from a foreign to a domestic firm.

(3) Workers that move between these two types of firms take a reasonably large pay cut, i.e. are less well paid in domestic firms. This pay cut can be, on average, as big as 15% over one year and is typically bigger for displaced workers.

(4) When comparing these movers to their new colleagues in domestic firms, we find that movers are better paid on average. Moreover, their prior experience in foreign firms is rewarded at a significant and relatively high rate by the domestic firms.

Overall, we take these results to indicate that foreign firms seem to be largely successful in retaining the key personnel whose presence in domestic firms would lead to productivity spillovers. Alternatively, it could be argued that domestic firms have restricted absorption capacities, which limits their interest in – and therefore the wages they would be willing to pay for – workers with foreign experience. However, a small share of these workers does still move in a way consistent with the creation of spillovers (i.e. being better paid, and the more so the more time they had spent before in the foreign firm). Our conclusion is thus that, in Portugal, productivity spillovers via worker mobility may exist but are relatively small.

In terms of policy implications, our results stress the importance of attracting foreign multinationals that are likely to generate the strongest possible spillovers within domestic firms. The results also emphasise the large role that worker mobility can play towards that goal of creation of spillovers. Specifically, the potential in terms of spillover-generation can be evaluated by examining the absorptive capacity of domestic firms in the same or related industries.

Another important aspect concerns the cooperative/competitive natures of the likely relationship between the foreign and domestic firms. For instance, foreign firms that regard host economies as export platforms and source inputs domestically are also more likely to behave cooperatively in their interactions with local firms (and thus

facilitate worker mobility) than foreign firms that seek market share in the host economy.

Among other policy implications, greater flexibility in labour regulations may also enhance the generation of spillovers. For instance, unwanted employees in foreign firms who do not leave because of high firing costs could otherwise move to domestic firms, possibly increasing productivity in the latter.

## 1. Introduction

It is by now an established fact that globalisation is an increasingly important phenomenon in shaping people's lives and affecting economic development and prosperity. In this context, one of the most relevant dimensions of globalisation is foreign direct investment (FDI): on top of trade and migrations, FDI, and the consequent ownership of establishments in different countries than one's own, has become an important aspect of the world economy. According to the World Investment Report (UNCTAD, 2005), total FDI inflows in 2004 amounted to 648 billion US dollars, corresponding to 7.3% of world investment.<sup>1</sup>

A crucial question that arises in this context concerns the impact of FDI in host economies: for instance, is it the case that domestic firms benefit from the presence of foreign firms in their country? This is obviously a key issue from the point of view of economic policy, as governments across the world have spent considerable amounts of taxpayers' money (directly in the form of subsidies and indirectly in the form of tax concessions) in attracting such foreign investments. These government incentives can be explainable precisely as a tool to bridge the gap between the benefit the multinational would derive from setting up in the host economy and the total benefit that would accrue to both the multinational and the domestic firms (and the entire domestic economy) from that investment decision (Blomström and Kokko, 1998).

On the one hand, it is clear that a host economy will be able to reap some benefits from the presence of foreign multinationals. For instance, labour demand is likely to increase, leading to higher employment and wage levels. On the other hand, it must also be acknowledged that there are important incentives for foreign multinationals to generate as few spillovers as possible upon the host economy. For instance, if one takes into account the popular Ownership-Localisation-Internalisation theoretical framework (Dunning, 1977) widely used in International Business and International Economics, one of its implications is that multinationals will be keen to keep their special assets being exploited abroad protected from spillovers that may lead to the erosion of the value of such special assets.

One possible transmission mechanism of such spillovers from foreign to domestic firms is worker mobility. In fact, employees of foreign firms will necessarily be given access to the assets whose ownership explain the FDI decision in the first place, although the degree of such access will of course vary, depending on the worker's characteristics and the foreign firm's policies in that respect. To the extent that such workers will be exposed at least partially to the foreign assets, the potential for spillovers to domestic firms immediately arises, as those workers may, for different reasons, eventually move to such latter firms.

The potential for mobility and its consequences in terms of the erosion of the multinational assets will not be disregarded by foreign firms. This would imply that, for instance, one observes a trade-off between pecuniary and productivity spillovers. In order to prevent mobility of key personnel, foreign firms may pay them higher wages, above the values that such personnel would receive in competing (domestic) firms. However, many factors (e.g. personal reasons) may imply that, even if foreign firms are

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<sup>1</sup> See also Wolf (2004) for an incisive overview of several issues surrounding globalisation.

able to set wages at an appropriate level, employees would still leave, eventually leading to the generation of spillovers within domestic firms.

This paper seeks to assess empirically the magnitude of productivity spillovers that may arise from worker mobility. This goal is undertaken by following virtually *all* employees in domestic and foreign firms based in Portugal between 1986 and 2000. By analysing the rich data sets that underpins our study, we are able to present evidence about different related issues, including 1) the relative share of workers that do move from foreign to domestic firms; 2) the characteristics of those workers that move (when compared to their colleagues in foreign firms that do not move); 3) the wage differences of these workers as they move from a foreign to a domestic firm; and 4) the characteristics of those workers that move (when compared to their new colleagues in domestic firms that have not moved from a foreign firm).

Putting together this set of evidence allows us to assess to what extent worker mobility may play an important role in the black box of productivity spillovers. In this way, this paper makes a number of important contributions to the FDI literature. In particular, our work is the first to follow movers from foreign to domestic firms. So far, and to the best of our knowledge, no evidence was available about any aspect of the mobility process between these two types of firms. In contrast, we are able to provide a careful characterisation of this mobility process, allowing for an evaluation of the scope of spillovers generated in this way.

Secondly, we also consider the specific case of inter-firm mobility driven by foreign firms that close down their establishments. As other locations become more attractive, in particular in Eastern Europe and Asia, divestment becomes a more prominent phenomenon, therefore leading to worker displacement. We exploit these events, in order to at least partially circumvent the endogenous nature of non-displacement mobility. Moreover, we also examine the specific case of foreign firms that are acquired by domestic investors. Additionally, issues regarding worker and firm heterogeneity are also addressed by controlling in different specifications for worker and/or firm fixed effects. Although these controls may not allow for the interpretation of all our results in terms of causal relationships, the consideration of these fixed effects enables a more much finer analysis of the data and their patterns.

Finally, this is also one of first papers that analyses service sector FDI. This wider data coverage is important not only because employment shares in services are increasing in most developed world (recent estimates indicate that the manufacturing sector in the US comprises now less than 10% of total employment), but also because FDI in services has, in many countries, already overtaken FDI in manufacturing (UNCTAD, 2004). However, data constraints not present in this paper have prevented other researchers from including service sector domestic and foreign firms in their analyses.

Moreover, although the paper is motivated mainly from an international economics approach, this work also provides important insights in respect to the functioning of labour markets. Among other aspects, the paper 1) clarifies the role of worker mobility as an adjustment mechanism to economic shocks and imbalances in the labour market; 2) provides evidence about the importance of firm and industry-specific skills (Neal, 1995), in particular in the context of the displacement literature (Jacobson et al, 1993);

and 3) indirectly assesses the role played by mobility in the identification of models with worker and firm fixed effects (Abowd et al, 1999).

From the point of view of policy implications, it is our belief that a better understanding of the transmission channels of productivity spillovers can significantly enhance FDI-related welfare increases. For instance, our results can be exploited in terms of widening the range of circumstances under which mobility will impact positively domestic firms and in terms of channelling FDI incentives to industries or types of foreign firms that are more likely to generate such spillovers in the first place. Other policy implications of our findings may also arise in the domains of labour market (e.g. firing costs) and patents/trade secrets regulations.

The remaining of the paper is structured as follows. The next section reviews the relevant literature for our study, including theoretical and empirical papers, mostly from international and empirical economics. Section three describes the data, a rich census covering *all* firms and *all* employees based in Portugal, between 1986 and 2000, and uses this information to overview some developments in FDI in the country. The main section of the paper, section four, presents our findings, including sub-sections on mobility flows, worker characteristics before and after mobility, and wage changes upon mobility. Finally, section five concludes, discusses policy implications and outlines some topics left for further research.

## **2. Literature**

There are several theoretical and empirical results which are important to consider in order to better understand the empirical approaches and findings documented in this paper. One important contribution involves the concept of human capital (Becker, 1964) and the theory of compensating differentials.

Considering two alternative jobs that offer different opportunities for a worker to acquire general skills, it must be the case that the pay structures of each job are different. In particular, one would expect lower starting wages and higher wage growth in the job with greater learning opportunities. Should the firm pay for the worker's general skills, in a later period this worker would benefit from better wage prospects outside her present firm, leading either to the worker's exit or to an additional pay rise in order to keep the worker in the firm.

In the context of a multinational that provides learning opportunities (related to the special asset the multinational owns), one would expect that multinational employees would be paid lower wages at first but then benefit from steeper wage profiles. To this extent, the worker would be paying for the opportunity to learn and any possible spillovers to other firms (including domestic firms) would be immediately internalised by the multinational.

The previous result assumes implicitly that the value of the general skills acquired by employees in a multinational is the same for all firms in which the workers may be employed and does not depend on the characteristics of the market(s) in which those

firms operate. However, once one drops those assumptions, one needs to qualify the resulting conclusions.

In particular, Pakes and Nitzan (1983) introduce the useful concept of the “joint profit effect”, by which they mean the total profit derived from the exploitation of the specific asset by either only one firm (the firm that created the asset in the first place) or by that firm and another that may meanwhile also have had access to the asset by attracting the worker involved in the conception of the asset. The result indicates that, if the profit obtained by the original firm in a monopoly context exceeds the sum of the profits of the two firms, in a duopoly context, then the first firm will always find it profitable to pay more to the scientist than the maximum that the second firm would be willing to pay. In general, the more concentrated the market, the more a firm has to lose from worker turnover and therefore the less likely it will be that such turnover will be observed.

These results are considered in the specific context of foreign firms in a host labour market by Fosfuri et al (2001). The key assumption in their model is about the need that multinationals face in terms of training local workers, so that they can successfully produce from foreign locations. The paper also generates a joint profit result but qualified by the degree of unrelatedness between the markets (the one in which the foreign firm operates and the one in which the trained worker may move to) and by the absorptive capacity of the domestic firm.<sup>2</sup>

In terms of the empirical literature on FDI productivity spillovers, a much larger set of contributions could be mentioned. In a nutshell, one could summarise these papers in three waves, which have reached progressively more convincing results. A first wave was based in cross-section studies which found that domestic firms based in industries that exhibited a larger concentration of foreign firms were also more productive. This was assumed by many to imply that foreign firms generated positive productivity spillovers.

A second wave benefited from more detailed longitudinal data. Being thus able to relate differences in foreign presence in each industry over time and differences in productivity in domestic firms in the same industry again over time, the new analyses were more robust to the possibility that foreign firms were more likely to be based in more productive industries, rather than effecting the productivity of domestic firms.

The results in most studies using these data sets were indeed consistent with the latter hypothesis. For instance, in a widely-quoted study, Aitken and Harrison (1999) find no evidence of spillovers in Venezuela. They even argue that foreign firms may make domestic firms less productive as they steal market share from the latter forcing those domestic firms to produce at a less efficient scale. More generally, this lack of positive effects was also obtained in other similar studies, as indicated in a meta-analysis by Görg and Strobl (2001).

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<sup>2</sup> See also Franco and Filson (2005) which consider the case of knowledge diffusion by former employee’s imitation in spin-outs and present evidence from the US hard-disk industry and Fallick et al (2005) who examine mobility of skilled workers in Silicon Valley.



However, a third wave in this line of research seems to again reverse the conclusions of the previous wave, although similarly rich data and sophisticated econometric methods are used. Although this wave is still in its infancy, some papers have argued – and presented consistent evidence – that the existence of a productivity impact of foreign presence depends crucially on the type of domestic firms considered and the relationship between those domestic firms and foreign firms that may generate the spillover.

In particular, Javorcik (2004) finds persuasive evidence of positive spillovers to upstream domestic firms. This can be rationalised by taking into account that, unlike in the relationship between firms in the same industry, a foreign firm that acquires inputs from local suppliers will have no interest in preventing that such suppliers (most of whom will be domestic firms) become more productive.

Moreover, Blyde et al (2005), considering the same Venezuelan data as used in Aitken and Harrison (1999) but studying different relationships between foreign and domestic firms, now find evidence of positive spillovers but only under special circumstances or transmission channels. These positive spillovers depend on the characteristics of the domestic firms (namely their absorptive capacity), of the foreign firms (in particular whether they are export-oriented or produce for the internal market) and on the upstream/downstream relationship between the foreign and domestic firms.<sup>3</sup>

Another important paper in the empirical FDI literature is Görg and Strobl (2005) who use data from Ghana to study the performance of firms led by workers with prior experience in a foreign firm. Some evidence is presented that such firms (those whose owners have foreign experience) are more productive than other domestic firms. However, it is difficult to know if such productivity difference is caused by foreign experience itself. An alternative interpretation is that it is some unobserved worker characteristic that simultaneously leads to those workers being hired by foreign firms and those workers being more successful when leading their own firms.

One last stream of empirical FDI literature which we review analyses the wage differences between foreign and domestic firms. While most papers typically find that foreign firms pay higher wages, even after controlling for many observable differences between the two types of firms and their workers, some recent evidence has challenged that stylised fact. In particular, Martins (2004) and Heyman et al (2004) find no evidence that foreign firms pay higher wages when using individual data from Portugal and Sweden, respectively, and information on acquisitions of domestic firms by foreign investors.<sup>4</sup> This method can be particularly insightful as, unlike in previous studies, differences in unobservable characteristics between workers in domestic and foreign firms may drive the results, rather than differences in the pay policies themselves of domestic and foreign firms.

Additionally, some other empirical contributions, more closely related to the labour literature, are also important to bear in mind. These include some work by Farber (1994, 1999) which, among other results, emphasise the heterogeneity in mobility rates

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<sup>3</sup> See also Kugler (2005) for a treatment of different spillover channels. Moran et al (2005) present a recent overview of impacts of foreign firms upon host economies.

<sup>4</sup> See also Almeida (2003), who finds similar results using firm-level Portuguese data.

and also some stylised facts about inter-firm mobility: there are (still) many long-term jobs; most new jobs end early; and that the probability job ends declines with tenure.

Another interesting contribution is Møen (2004), who follow technical staff in Norwegian R&D intensive firms using a detailed matched employer-employee panel data set. Consistently with the Ariel and Pakes (1983) model referred earlier, it is found evidence of steeper wage profiles at firms that offer more learning opportunities.

Finally, there are also several contributions that examine the particular case of FDI in Portugal. The two main topics addressed are FDI spillovers (Flôres et al, 2000; Proença et al, 2002; Barbosa and Eiriz, 2005) and Divestment (Mata and Portugal, 2000; Corado Simoes, 2005). Other papers include Mata and Farinha (1996), Guimarães et al (2000), Mata and Portugal (2002), Barbosa et al (2004) and Martins (2005).

Although we will not survey all contributions, we wish to point out that the evidence above-mentioned regarding FDI spillovers in Portugal, using firm- or industry-level data, generally fails to find significantly positive results. This is the specific case of Barbosa and Eiriz (2005), who examine a sample of about 2,000 domestic manufacturing firms followed between 1994 and 1999 and search for potential spillovers from foreign firms of a horizontal or downstream vertical nature. All their estimates systematically fail to indicate significant evidence of positive spillovers.

### **3. Data**

This paper draws on a particularly rich annual census of all firms based in Portugal that have at least one employee – “Quadros de Pessoal (QP)” [Personnel Records]. In this census, administered by the Ministry of Employment, each firm in each year provides information about a large set of variables concerning the firm itself and also a list of all their employees. For each one of these employees again a large list of variables is also available.<sup>5</sup>

The time coverage of these data sets is also considerable, as we use information for all years from 1986 to 2000 (except 1990, when the census were briefly suspended). This is also a period in which FDI into the Portuguese economy grew considerably, following accession to the European Community in 1986. This time range is also interesting as it includes the emergence of FDI outflows (divestments).

Crucially for the purposes of this paper, the list of variables available in the data includes unique identifiers for both firms and employees. These variables allow us to follow workers over time and, in particular, as they move between foreign and domestic firms. The set of variables at the firm level include industry, region, size, age, foreign ownership, sales, and equity, while the variables at the worker level include education, age, gender, tenure, occupation, wages, hours, job level and promotions.

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<sup>5</sup> The coverage of “Quadros de Pessoal” implies that there is full information about all employees in the country. The only groups of workers which are not present in the data are therefore the self-employed and the public servants, besides the individuals in the informal sector.

The foreign ownership variable allows us to define firms as either foreign or domestic owned. Among the different criteria one could adopt, we define a firm to be foreign-owned when the share of its equity that is owned by foreign investors is of at least 50%. Although this threshold is not a necessary nor a sufficient condition for a firm to be led by a foreign investor, we believe this is the best level in terms of separating firms with a large enough foreign presence from the remaining firms. We also point out that we believe our results would not be sensitive to an alternative definition based on a threshold of 10%, as an analysis of the distribution of foreign ownership shares (see Figure 0) indicates that most firms with some foreign presence have a share of at least 50%, most of which being fully owned by foreign investors.<sup>6</sup>

In total, the data involves an average of about 2.3 million workers/year, 200,000 firms/year, and a total of about 500,000 different firms. Under the 50% threshold for foreign ownership, there is an average of about 150,000 workers/year employed by foreign firms in each year of the 1986-2000 period.

### **3.1 Foreign Firms: Descriptive Statistics**

The richness of the data allows us to provide a detailed characterization of the importance of FDI in the Portuguese economy and, in particular, in the Portuguese labour market. Given the aggregate numbers about FDI inflows to Portugal (see Figure 1), this presence is expected to increase during the period covered, 1986-2000. At the same time, it becomes clear, particularly since 1995, that FDI flows can both enter and leave the country, even without considering the investments made by Portuguese firms abroad.

Indeed, Figure 1 indicates that the peak of net FDI inflows reached in 1990 was only surpassed in 2000. During the rest of the decade, first the level of inflows declined and then the level of outflows increased considerably, closely following the level of inflows, and thus leading to small net inflows. These net inflows have only in 2000 surpassed the 5% of GDP mark. In any case, as the level of net inflows has always been positive, the stock of FDI in the Portuguese economy has increased over the period. According to UNCTAD (2005), the inward FDI stock in Portugal increased from 5 to 29 billion dollars between 1986 and 2000.

This increase in the stock of FDI is consistent with an employment analysis done at a less aggregate level (see the appendix). The number of foreign firms in manufacturing has increased from less than 400 in 1986 to slightly above 600 in 2000. Much more pronounced has been the increase in the number of services firms, from less than 600 in 1986 to more than 1,600 in 2000. In terms of their number of workers, manufacturing sector foreign firms employed about 80,000 people in 1986 and over 110,000 in 2000. The growth in the services sector has been even more considerable, increasing from less than 40,000 individuals in 1986 to just above 120,000 in 2000. That year was also the first in which service sector foreign firms employed more people than their counterparts in the manufacturing sector.

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<sup>6</sup> Only firms with a positive level of foreign ownership are described.

This analysis can be done at an even more disaggregate level: in Figure 2 we present employment levels in three selected years, 1986, 1993 and 2000, and in the most important 2-digit industries (defined as those industries with at least 1,000 employees in 2000). Among other results, one can point out that some industries display relatively large employment levels (here defined as more than 10,000 employees in 2000) in foreign firms, namely electric goods, cars, wholesale, retail, hotels and restaurants, finance and other services. Almost all of these industries also exhibit large increases in their number of employees, in particular in the case of cars, retail, finance and other services. It is worthwhile to underline again the importance of the services sector in terms of total employment by foreign firms and to recall the little attention that previous research has paid to this increasingly more important type of economic activities.

We also present some information about shares of employment by foreign firms in the different industries. Figure 2b relates these foreign employment shares with total employment levels in 2000, considering industries defined at the two digit level. The figure presents some evidence of a negative relationship between the size of the industry and the share of industry employment in foreign firms. For instance, Tobacco, TV's and similar machines and Cars are the industries with the biggest employment shares, all above 60%, while their total sizes are relatively small. On the other hand, there are a large number of industries with low foreign shares and of large total size, such as Building, Wholesale, Retail, Services to firms and Hotel and restaurants.

Given the sizeable turnover in FDI inflows to and from the country, it is also interesting to overview their magnitudes in terms of firm openings (greenfield investment) and closures and their sectoral distributions over time (Figure 3). We define a firm opening when an identifier appears for the first time; likewise, a firm closure corresponds to the cases in which a firm identifier does not appear again in the data. This is also why there are no firms reported as opening up in 1986 (the first period covered) or as closing down in 2000 (the last period covered).

Among other results suggested by the figure, we observe a much larger number of firms opening in the services sector than in manufacturing, at least twice bigger in all the years, in many cases three times bigger. A similar phenomenon also arises in terms of firm closures, as they are considerably larger in services than manufacturing. In absolute terms, we can observe that manufacturing sector openings or closures never exceed 50 per year (except for openings in 1991 and 1994)<sup>7</sup>. On the other hand, service sector openings or closures typically exceed 100 per year (except for the period 1986-1989).

These differences between manufacturing and services are probably related to higher occurrence of openings and closures within groups of firms of a lower size. There is corroborating evidence of this in Figure 4, which presents the number of employees in those firms at the time in which they open or close down and in each sector over the

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<sup>7</sup> There are purely statistical reasons that may explain why there are more openings in these two years. They have to do with the fact that no data are available for 1990, implying that firm openings in that year will be added to the count in 1991. Moreover, data for 1994 (and all subsequent years) was based in October while data for previous years was based in March. This implies a time period of 19 months between the 1993 and 1994 censuses, compared to time periods of 12 months between all other pairs of subsequent years.

period. Most cells indicate a number of employees affected of between 1,000 and 2,000, except for the outlier years which are 1999 and 2000. In any case, consistent with the standard result of smaller average firm sizes in the services sector, the large differences in terms of number of firms between the sectors which are documented in Figure 3 do not arise when the analyses takes the form of the number of employees.

There is, however, evidence that, since 1995, the number of workers hired by new foreign firms (greenfield investment) was surpassed by the number of workers displaced by foreign firms that close down.<sup>8</sup> This had happened on only a limited number of cases up till then (e.g. manufacturing closures in 1993), while it became a clear pattern from 1995 onwards. This result is very clearly consistent with that of the increase in outflows of FDI.

On top of openings and closures, acquisitions are also an important type of FDI flows in Portugal and elsewhere. According to UNCTAD (2004), acquisitions are, by far, the most important component of FDI in developed countries, while greenfield entry is more relevant in the case of developing countries. Figure 5, which documents the number of foreign acquisitions of domestic firms and the number of domestic acquisitions of foreign firms, by sector and over the 1986-2000 period, finds supporting evidence for this stylised fact of the greater importance of acquisitions with respect to greenfield also for Portugal.

This figure indicates an average number of foreign acquisitions of over 200 per year, reaching a peak of about 400 such acquisitions in 1993. It can also be shown that, once again, most of these acquisitions (either of domestic firms by foreign firms or vice-versa) take place in the services sector. The peak in domestic acquisitions of 1992 may be related to the onset of the worldwide recession in that period and to the appreciation of the Portuguese currency of the time, the escudo.

A relatively similar development takes place in terms of the employment levels involved in these acquisition events. There is a peak of 60,000 workers in foreign firms acquired by domestic investors in 1992, after which an average of about 5,000 workers per year see their foreign firms become domestically-owned. On the other hand, foreign acquisitions exhibit an increasing trend up to 1993 (when the acquisitions involved about 30,000 workers), after which they fall and stabilise at about 10,000 workers per year. As in the case of openings and closures, the number of firms from the service sector is proportionately much larger than the corresponding number of workers.

### **3.2 Mobility Data Sets**

In order to carry out our analysis of worker mobility from foreign to domestic firms, we create two main datasets. The first data set includes only workers with foreign experience. Specifically, we include all worker-year observations of workers who are

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<sup>8</sup> One must bear in mind that the results on the number of employees may be misleading, in the sense of underestimating the importance of these firms. This will happen to the extent that firms that close down may have by then reduced their workforce considerably with respect to their peak levels. Similarly, firms that open may not to do at their peak size, which will only be achieved after some years in business.

employed in a foreign firm during at least one period between 1986 and 2000. This specification generates a total of about 612,000 different workers, corresponding to about 3.44 million workers-year<sup>9</sup>. These employees work for about 3,400 foreign firms, corresponding to 22,400 firms-year.

Some of these workers are always present in foreign firms, without ever moving to domestic firms. These workers that do not exhibit mobility outside the group of foreign firms are later used as a comparison group in some analyses. Moreover, there are also some workers who exhibit more complex mobility patterns, moving from a foreign to a domestic firm, and then from that domestic firm to a foreign firm, etc. We drop these workers from our analysis.

Most of the analyses are then carried out using a specific subset of workers: those who move from foreign to domestic firms, in which such firm-type mobility is not driven by an acquisition (when a large enough share of the foreign capital is bought by domestic investors) and in which workers do not move again to a foreign firm. Under these criteria, we obtain a data set of about 57,000 different workers, observed in total about 290,000 times.

7,000 of these 57,000 workers (or 48,000 workers-year) are classified as displaced, as their foreign firms are not observed again in the data while these workers are observed in the last year in which the firm is observed in the data. This definition corresponds to a relatively stringent view of displacement: other analyses classify as displaced workers those employees who leave their firms when these firms go through large declines in their workforce (e.g. 30% or more) or when the employees leave the firm also in the year before the last that the firm is in business.

In any case, it is worthwhile to recall that foreign divestment has become an increasingly important phenomenon in Portugal, as more profitable investment destinations become available elsewhere in the world, especially in the second half of the period covered. The inter-firm mobility generated in this way can have special interest in our analysis of spillovers as it does not result from a worker choice directly. We come back to this point later in the paper.

Coming back to the main data set, there are 115,000 domestic firms (observed as about 336,000 firms-year) – these are firms which workers leave to work in foreign firms or firms go to after they leave their domestic firms. The latter subset, of greater interest in this paper, comprises about 34,000 firms (corresponding to about 80,000 firms-year).

Some of these statistics are in themselves interesting results regarding the scope for spillovers related to worker mobility. For instance, although there are, on average and in each year, about 150,000 workers employed by foreign firms, only a total of about 57,000 different workers move over the entire 14-year period from such foreign firms to domestic firms. A related point is the large dispersion or scattering of these movers across domestic firms: each of the latter hire an average of less than two workers from foreign firms. Moreover, because the number of movers is small, so is the percentage of domestic firms that employs at least once one former employee of a foreign firm, which we calculate at approximately 7%.

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<sup>9</sup> There is a worker-year for each year in which a worker is present over the period considered.

Besides the data set with workers with foreign experience, a second main data set which we create is based on the domestic firms of those workers who move from foreign to domestic firms, including firms-year and their workers in years in which they have no worker with prior foreign experience. This second data set is used to compare the characteristics of movers and of workers without foreign experience, in order to further assess the scope for productivity spillovers from foreign to domestic firms.

Given the large size of the resulting data set and the consequent computational constraints, we have reduced the data to a 30% sample of co-workers. This gave rise to a data set of about 2.08 million different workers (4.25 million observations). We will come back to these data sets in the following section, in which we present the main results of this paper.

## **4. Results**

The main analyses conducted in this paper, and presented in this section, will characterise different aspects of the mobility process from foreign to domestic firms. The next subsection presents evidence about the magnitude of the flows and seeks to characterise it in greater detail by comparing those and other types of flows. Subsection 4.2 looks instead at the characteristics of the workers that do move, in particular when contrasting those workers to other workers, either in the entire set of foreign firms or only in the same foreign firm, but who do not move. We then assess, in subsection 4.3, the wage impact of mobility, comparing wages before and after those workers become employed in domestic firms. Finally, subsection 4.4 engages in a similar analysis of that in 4.2, but now comparing movers with their colleagues in domestic firms.

### **4.1. Mobility flows**

We have measured the worker flows from foreign to domestic firms by examining, for each foreign firm in each year (corresponding to a total of 22,409 firms-years), how many of their employees appear in domestic firms in the following time period. These numbers of workers that have exhibited mobility have then been divided by the respective foreign firm size. In this way we can provide an indication of the importance of mobility in terms of the workforce of foreign firms.

Figure 7 presents the results, in terms of the distribution of shares of foreign-to-domestic mobility. This distribution is also reweighted, in order to provide a better indication of the total size of the flows between these two types of firms. It can be seen that the distribution is very heavily skewed, as the modal category is zero, i.e. when no worker in a foreign firm in a given year is present in a domestic firm in the following year.

The mean percentage of these flows is 4.7%. As the average size of these foreign firms is 98 workers, this percentage indicates that about five workers per year leave each

foreign firm and move to a domestic firm in the following period.<sup>10</sup> We regard this percentage as relatively low, especially when comparing to estimates of mobility rates in domestic firms, which typically range from 10% to 15%.

Another interesting result concern the mobility flows between foreign firms. These were found to be, on average, 2.2%. Although this is clearly a smaller percentage than in the case of mobility from foreign to domestic firms (4.7%), one must recall that the size of the foreign sector is still considerably smaller than that of the domestic sector (for instance, in 2000, the number of employees in foreign firms corresponded to about 10% of the number of employees in domestic firms).

The comparison of mobility flows from foreign to domestic firms and from foreign to other foreign firms suggests that the labour market of foreign firms may exhibit some segmentation. On average, every year, from a foreign firm of a size of 100, about five workers leave for a domestic firm while two leave for a foreign firm. This approximately two to one ratio is clearly disproportional to the ten to one ratio in terms of employment in domestic and foreign firms in the entire economy.

It is also important to know who these movers are and how they compare with workers in domestic and foreign firms that do not move. Table 1 presents descriptive statistics about these three groups of workers considered in this work, under the headlines "Foreign stayers", "Domestic stayers" and "Movers". The latter category is divided into two subgroups, that of movers in the last year before they move ("before") and of movers in the first year after they move from the foreign firm ("after").

The variables described in the table are the year for which the observation is recorded, the schooling level of the worker (measured in years of schooling, nine being the current compulsory level), labour-market experience (defined as age - education - 6), tenure (the number of years the worker has remained in the current firm), a female dummy (taking value one for women), the real monthly pay (gross value, in 2004 euros), the real hourly pay (as the real monthly pay but now divided by the number of hours worked - normal plus overtime) and firm size (the total number of workers in the firm).

It can be observed that there are clear differences between foreign and domestic stayers: the latter are less educated, have been in their current firm for a longer period, are less likely to be women and, importantly, earn lower wages, either in terms of monthly or hourly pay. The differences between about €1,000 (the monthly pay of foreign stayers) and €800 (domestic stayers) is particularly considerable. Compared with domestic stayers, and disregarding differences in human capital and other characteristics, foreign stayers earn a wage premium of about 25%.

In terms of the contrast between movers, before and after they move, there are of course no sizeable differences between the two groups in terms of human capital characteristics, as these groups are made of the same individuals (the minor

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<sup>10</sup> One caveat to bear in mind is that the mobility values presented here are biased downward, although only slightly, due to missing identifiers in some firms. In fact, an average of about 10% of employees in each foreign firm has no valid individual identifier, precluding them being followed to other firms, should they move.



differences observable are related to missing observations for some variables). The mean “before” year is also smaller than the mean “after” year, for obvious reasons. What is more interesting to notice is the lower level of pay (either monthly or hourly) received by these movers after they move to a domestic firm. In monthly terms, for instance, pay falls from about €880 to €800. Again compared to their pay in domestic firms, movers were earning a wage premium of about 10% in foreign firms.

As before, part of this wage difference may be explained by taking into account the different characteristics, not of the employees themselves, which are the same, but of the firms in which they work. For instance, a large body of research indicates that large firms pay higher wages (Oi and Idson, 1999). In our data, as average firm size falls from 990 to 690 when workers move from foreign to domestic firms, one could indeed expect that wages would also fall.

A critical issue in order to understand whether workers are indeed worse-off in these circumstances concerns the nature of the wage differentials between different types of firms. For instance, taking the example of the firm-size wage differential, if this wage premium arises as a compensation for the possibly more tiring work environment of large firms, then the wage cut documented here does not necessarily translate into lower welfare. However, the wage premium may also reflect some form of rent sharing that occurs in large firms but not in smaller firms. In this case, our movers would definitely be worse-off when they are employed in domestic firms.

#### **4.2. Before mobility**

In this subsection, we characterise those workers that move from foreign to domestic firms. This analysis is conducted across foreign firms and also within each foreign firm from which workers move to domestic firms. In particular, we try to answer the following question: How do the wages of workers in foreign firms that leave to domestic firms compare to the wages of workers that do not leave the (same or other) foreign firms?

Answering this question corresponds to an important step in order to indirectly assess the scope for productivity spillovers from foreign to domestic. One can expect that such spillovers are more likely when domestic firms are able to attract the most qualified workers of foreign firms, which are also likely to be the best paid, either in absolute levels or conditionally on their (human capital) characteristics.

In a first analysis, we focus on the relationship between wages and displaced, on the one hand, and mobility from a foreign to a domestic firm, on the other hand. We estimate Linear Probability Models in which the dependent variable is a dummy variable taking value one for workers in foreign firms that will, in the future, move to a domestic firm. The set of controls (also to be considered in the following analyses) includes education dummies, a quartic in experience, a quadratic in tenure, a gender dummy, occupation dummies, a quadratic in job level rank, industry dummies (based on a two-digit definition), log firm size and region dummies (based on "distritos").

Another control included in some specifications is a fixed effect for each foreign firm. This approach implies that we allow for differences across foreign firms in terms of the propensity of their workers to leave and be hired by domestic firms. Moreover, under

this specification including firm fixed effects, we are able to estimate the "impact" of displacement and residual wages out of differences across colleagues in the same firm, rather than by comparing the entire pool of workers in foreign firms, without taking into account possible common effects across workers in the same firms.

The two main regressors, whose coefficients are displayed in Table 2, are a dummy that takes value one for workers that will be displaced in the future and the log real hourly wage. As the specification already includes a large set of controls for worker and firm characteristics, the coefficients of the latter regressor can be interpreted as indicating whether better paid workers (given their and their firms' characteristics) are more or less likely to leave foreign firms.

For the benefit of robustness, we also consider a different specification of the dependent variable, which takes value one only if mobility occurs in the immediately next time period, rather than at some later year as in the main specification.

Using more than 1.1 million observations, our results indicate that displacement is a strong predictor of mobility from a foreign to a domestic firm. Workers that will eventually be displaced because their foreign firm closes down are between 4.3% and 20.1% more likely to become employed in a domestic firm than workers whose foreign firms do not close down.

Moreover, we also find evidence that high-wage workers are less likely to leave their firms for domestic firms. Across eight specifications, only in one is the coefficient not significantly negative. In general, it is the less well paid workers that eventually move to domestic firms. The effect is, however, stronger without controls for firm fixed effects. This indicates that a large part of the differences in the likelihood of moving to a domestic firm have to do with the foreign firm in which the employee works. In other words, it is not so much being well paid in terms of the firm pay rates that predicts not moving to a domestic firm; it is instead, to a larger extent, working in a firm that pays, high average wages.

In our next, complementary, analysis, we investigate the wage differences between workers in foreign firms. We now consider a standard wage equation, with the same human capital and firm controls as before but extended with dummies that flag workers that will later move to a domestic firm, allowing for differences for those that are also displaced.

Our results, presented in Table 3, indicate that future movers to domestic firms are already being paid less than workers who will not move. The difference is, however, relatively small, at less than 1%. A bigger difference is about workers that will be displaced, who are paid more than 4% less than workers who will not be displaced. These results are robust to considering mobility immediately in the next period or mobility at some later stage.

However, consistently with the findings of Table 2, the inclusion of firm fixed effects proves to be important, as all coefficients (mobility and displacement) now become statistically insignificant. This indicates, once again, that foreign-to-domestic movers are not selected, or at least not so much, in terms of their wage differences within firms, but more so in terms of the wage differences across firms. In other words, the workers that

move from foreign to domestic firms are more likely to be employed in low-paying foreign firms.

### 4.3. Wage differences upon mobility

Another important step in order to characterise the nature of the mobility flows between foreign and domestic firms is to measure the wage changes of these movers. According to the discussion before, the more the movers' wages increase, the more likely that their mobility was driven by a deliberate policy by domestic firms of attracting workers in foreign firms. Such a policy would therefore be consistent with the view that domestic firms would benefit, in terms of their productivity, from the inclusion in their workforce of those workers, i.e. that there would be productivity spillovers.

We carry out this analysis by pooling all the observations of the set of workers that undergo a movement from foreign to domestic firms. We then seek to understand what their wage profiles are before, during and after the mobility episode. We conduct the analysis in terms of wage levels and in terms of wage residuals (i.e. controlling for worker and firm characteristics) and considering the entire set of movers or only the subset of movers that were displaced from their foreign firms when they close down.

In particular, the wage levels equation is as follows:

$$(1) \quad \ln y_{it} = \alpha_{-6} I(\text{leaves in 6 years}) + \dots + \alpha_{-1} I(\text{leaves next year}) + \alpha_1 I(\text{left last year}) \\ + \dots + \alpha_6 I(\text{left 6 years ago}) + \text{year dummies} + \varepsilon_{it}$$

The variable  $I(\text{leaves in 6 years})$ , for instance, is an indicator variable taking value one if the observation (a worker-year) will leave the foreign firm in six years time. Similarly, the variable  $I(\text{left last year})$ , for instance, takes value one if the observation left his or her firm in the previous year. In this context, the parameters  $\alpha_{-6}, \dots, \alpha_{-1}, \alpha_1, \dots, \alpha_6$ , estimated again by Ordinary Least Squares, indicate the average wage levels or the wage profile of workers that at some stage will move or have already moved from a foreign to a domestic firm.

As mentioned before, we also consider a similar wage residuals analysis, whose equation is as follows:

$$(2) \quad \ln y_{it} = \beta_{-6} I(\text{leaves in 6 years}) + \dots + \beta_{-1} I(\text{leaves next year}) + \beta_1 I(\text{left last year}) + \\ \dots + \beta_6 I(\text{left 6 years ago}) + \text{year dummies} + X_{it}'\gamma + \varepsilon_{it}$$

$X_{it}$  denotes the worker and firm characteristics (the same as indicated for previous analyses).

Figure 8 presents the results, i.e. the values of the different  $\alpha$  and  $\beta$  coefficients of the two previous equations. These coefficients can be interpreted as the relative values of the wages of workers that eventually move from foreign to domestic firms. (As the coefficients are very precisely determined and as we use a population in our analysis, we do not report standard errors here.) We study both the absolute values of these wages (blue line) and the wage residuals (pink line). The latter wages correspond to the

difference between the wages that could be expected given the worker's and firm's characteristics and the wage that the worker effectively earns. These residual wages can also be interpreted as a measure of worker quality that is not observed given the characteristics that we can control for. For instance, more able or more motivated workers are likely to have high wage residuals.<sup>11</sup>

The most important result that can be taken from this figure are the large wage declines of workers that move from foreign to domestic firms. While in the last period before the mobility episode, workers average wage levels are -10% than the reference category (workers-year present in the data more than six years after moving from a foreign to a domestic firm or more than six years before moving from a foreign to a domestic firm), the average levels drop to -25% once the workers have moved to their new domestic firms.

Another result is that these workers were already experiencing negative wage growth even before moving to the domestic firms. While in period -3, average wages of movers were 0% different than those of the comparison category, in period -2 wages are 5% lower and then almost 10% lower in period -1. On the other hand, the large wage decline upon mobility is reduced in the following years, as it increases from -25% in period 1 to -15% in period 2. However, this wage loss is still always more than 10% up to period 6.

Part of this wage increase (in particular in terms of wage levels) after the first period in a domestic firm may be due to compositional differences. For instance, workers that have done particularly badly in terms of their new match after they leave their foreign firm may also be more likely to leave their domestic firm in such a way that they cannot be traced further in the data (e.g. they may become self-employed).

These results are not substantially different when assessed from the point of view of wage residuals. Comparing periods -1 and 1, there is again a considerable wage fall, of about 8%. This smaller value, although of an economically very significant level, is related to the different characteristics of domestic firms, when compared to foreign firms. Given that domestic firms are more likely to be operating in industries that typically pay lower wages, employ fewer workers and have other characteristics typically related to lower wages, then once one controls for that, as in the wage residuals analysis, the wage cut is not as acute as in the case of wage levels, in which those factors are not taken into account.

After considering the general case of mobility between domestic and foreign firms, we now focus on workers whose mobility episode occurs in the context of displacement. As for the general case, we again find evidence of a considerable wage decline when workers move between firms, this time of about 15%. However, one important difference is that, while in the general case wages recovered somewhat after the transition pay cut, in the case of displacement, pay levels continue to fall. Four years after moving from a foreign to a domestic firm, the pay cut will already exceed 40%.

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<sup>11</sup> We must also bear in mind that the individuals whose wages are used to compute each wage level or wage residual values over the twelve periods studied are not necessarily the same. Some part of the differences across time will therefore be due to composition differences.

These results may not be consistent with those of Carneiro and Portugal (2003b), who find that the earnings of displaced workers remain at around 9% to 11% below their expect levels up to four years after displacement. However, their paper considers displacement from all types of firms, not only foreign firms as we do. If that difference in the sample definition is what explains the difference in the results in the two papers, then it must be the case that displacement from foreign firms is particularly costly when compared to displacement from domestic firms. This lends support to the argument that foreign firms pay higher wages than domestic firms.

In terms of wage residuals, we observe again that workers displaced from foreign firms take a smaller pay cut than when not controlling for worker characteristics: the pay cut is now of about 5%. One possible reason driving this result is that domestic firm characteristics evolve in such a way that fully explain the deterioration of wage levels, leaving wage residuals largely unchanged.

Although the mean effects are as above, it is also interesting to notice that the distribution of wage differences over the mobility period is much more concentrated for displaced workers than for non-displaced workers - see Figure 10. This is consistent with the view that not displaced workers will include a much more heterogeneous group of individuals, ranging from workers that move because they are attracted by domestic firms with better pay packages to workers that are fired from foreign firms and are only able to find jobs offering much worse pay levels.

Finally, Table 4 indicates some additional differences between the "before" and "after" periods, as workers move from foreign to domestic firms. Among other differences, it can be underlined the relatively small shares of workers that stay in the same industry, defined at the two-digit level (only 24%) or that stay in the same job, defined in terms of 15 categories (34%). However, a much larger share of individuals stays in the same region, as defined in terms of "distritos" (65%).

These statistics help one to understand why movers, on average, suffer from such large wage cuts: when moving to different industries or different jobs, many of these workers will not only lose their firm-specific skills but also their industry- and job-specific skills. Given the previous evidence on their experience and tenure (15 and 5 years, respectively, on average), it is easy to see the potential loss faced by these workers upon displacement or from dismissal, particularly in a context in which workers cannot or are not willing to search for jobs outside their area of residence.

There is some evidence consistent with these explanations in Table 5. This table splits the set of movers between those that benefit from higher real wage upon mobility (right-hand side columns) and those workers that are worse off after they move. The characteristics presented concern the period before worker mobility, i.e. the last year the worker is employed by his or her foreign firm.

It can be observed that there are several differences between these two types of workers. Those that do better after they move are more educated (9.2 vs. 8.1 years of schooling), which is consistent with evidence that suggests that education "protects" workers against displacement, making them more flexible in terms of adjusting to different jobs. Moreover, the "winners" from their mobility also had less tenure in their foreign firm (therefore having fewer firm-specific skills to lose from moving to another

firm); were at a higher job level (the smaller the value of the variable, the higher the job level); and were in bigger firms.

In terms of the differences between their two jobs, these also indicate differences in the direction expected: successful movers are more likely to stay in the same industry and in the same occupation. Firm size increases for "winners" while falls for "losers"; the new job level of "winners" is higher while the opposite applies for "losers"; and, while both average firm ages falls, they fall by more for "losers" than for "winners".

#### 4.4. After mobility

This last subsection enquires about the characteristics of the same movers which were studied before but now comparing them to their new colleagues in domestic firms. Among other questions, we now take a different benchmark into account (domestic colleagues) and assess the remuneration of movers from that point of view.

The main question in this subsection concerns wage differences between workers with and without foreign experience. We investigate this by considering the equation below:

$$(3) \quad \ln y_{it} = X_{it}'\beta_1 + I(\text{mover from Foreign firm}) \{ \beta_2 + \beta_3 \text{ten\_for}_i + \beta_4 \text{ten\_for}_i^2 + \beta_5 I(\text{same job}) + \beta_6 I(\text{same industry}) + \beta_7 I(\text{same region}) + \text{displaced} [ \beta_8 + \beta_9 \text{ten\_for}_i + \beta_{10} \text{ten\_for}_i^2 ] \} + \lambda_j + \varepsilon_{it}$$

The regressor  $I(\text{mover from Foreign firm})$  denotes an indicator function, taking value one for workers-year that have previously moved from a foreign firm;  $\text{ten\_for}_i$  denotes the tenure at foreign firm. The other indicator functions are interpreted in a similar way, while "displaced" is a dummy taking value one for workers that have been displaced from their previous foreign firms.  $\lambda_j$  is a firm effect.

Using this specification, we are able to assess whether the size of the wage differences (if any) between workers with and without foreign experience depend on the length of their previous tenure at foreign firms and/or on whether or not these workers were displaced from their foreign firms.

The results of this and several variations of this specification are presented in Tables 6a (without firm fixed effects) and 6b (with firm fixed effects). All regressions use at least 3.2 million individual observations. Focusing now on Table 6a, the results indicate systematic wage premiums earned by workers with prior foreign experience. In columns 1-6, the premium ranges from 1.3% to 5.4%. Only in column 7 is the premium not significant, but it then can be seen that tenure in foreign firms is rewarded at a considerable rate, 1.8% per year with a very small term for the quadratic term. It should be recalled that all these results are to be added to the returns to all human capital variables, including tenure in the current domestic firm and general experience.

The most interesting results come from Table 6b, which considers specifications that include firm fixed effects. These specifications imply that one already allows for different wage levels or wage policies of each firm and for these differences to be correlated with the attraction of workers from foreign firms. The analysis is therefore conducted in

terms of the relationship (if any) between prior foreign experience and wages within each firm.

Across almost all specifications, columns 8-14, it is found that workers with foreign experience are better paid (only in column 13 is that not the case). Moreover, tenure in foreign firms is also rewarded positively, at rates ranging between 0.4% and 1% per year. Consistently with previous analyses, workers who have moved from the same industry are also paid more, between 1.4% and 2.1%. Finally, displacement does not seem to imply any wage differences within the worker's new firm.

Overall, we take from this analysis that workers with prior foreign experience are better paid than their colleagues. On top of a premium that does not depend on the number of years spent at the foreign firm there is also an additional return that depends on the prior tenure at a foreign firm.

## **5. Conclusions**

This work was motivated by the importance of understanding the productivity impacts of foreign firms upon host economies. The specific channel examined in the paper involves the mobility of workers from foreign to domestic firms. This type of mobility may allow domestic firms to gain access to specific assets in the possession of foreign firms that will then increase the productivity of domestic firms and enhance domestic welfare.

Our empirical analysis was conducted using a detailed data set, including information on virtually all employees in Portugal between 1986 and 2000 and their firms. Our main goal when using these data was to follow workers over time, in particular when they leave foreign firms to domestic firms. (This is the first work, in Portugal or any other country, of this magnitude and scope: a detailed micro-level analysis of a very large share of the entire labour market of a country over a long period of time.)

After presenting detailed descriptive statistics about the entire population of foreign firms in Portugal and their employees, we analysed the magnitude of the worker mobility flows between foreign and domestic firms. We documented relatively small flows, and proportionately smaller than the same flows but between foreign firms.

We also found evidence that the wages of workers in foreign firms that will move to domestic firms are lower than the wages of workers that will not move. This result was stronger when we did not control for the worker's firm, suggesting that movers come from low-paying foreign firms. Moreover, displacement was also found to be a significant predictor of foreign-to-domestic firm mobility.

Our results also indicated sizeable pay cuts for workers that move from foreign to domestic firms, particularly for displaced workers. This suggests that at least a large part of these mobility episodes are not consistent with the case of the transmission of spillovers.

Finally, we found that foreign experience is valued in domestic firms: workers that are hired from foreign firms are paid more than similar workers without such prior foreign

experience. This wage premium proved also to be a long-lasting effect, and proportional to tenure in foreign firm. There was also some evidence of sorting of movers towards high-wage domestic firms.

Overall, our interpretation of this set of findings, in terms of the research question set out in the beginning is that some evidence could be found that employee mobility is a transmission channel of productivity spillovers, although the evidence is of limited size. On the one hand, a relatively small number of workers moves from foreign to domestic firms. Moreover, a large part of these movers suffers wage cuts when they become employed in domestic firms, even if they were already being paid less than their colleagues before they move.

On the other hand, we also obtain evidence that the foreign experience in workers that move from foreign firms is rewarded by domestic firms. This is consistent with the view that these workers gained general skills in foreign firms that are then applied in their new domestic firms. To the extent that there is a gap between the contribution of those skills to the productivity of the firm and the reward paid by the domestic firms to those employees, then there will a productivity spillover.

Our findings also suggest some implications of relevance to this and other academic literatures. For instance, our findings of wage cuts when workers move from foreign to domestic firms indicate that the pay policies of foreign firms are more generous than those of domestic firms. These findings also support the common result in the literature of a foreign-firm wage premium but contrast with the evidence that, when domestic firms are acquired by foreign investors, those workers benefit from no wage increase (Martins, 2004).

Another important literature for which our findings are relevant is the one which estimates labour market models that allow for worker and firm heterogeneity (Abowd et al, 1999). While it is assumed in this literature that workers that move between firms are random after conditioning for their characteristics, our results suggest very strongly that such movers are a selected subset of a firm's workforce.

Finally, there are several extensions of this paper which we plan to pursue. One such extension involves the analysis of industry differences in the mobility flows studied in the paper and then relating those eventual differences to the wages paid by foreign firms and the presence of similar domestic firms and their characteristics. In this way we may test in greater detail some of the theoretical results mentioned in this paper, namely those concerning the joint profit effect and the absorptive capacity of domestic firms.

Another extension of interest involves paying greater attention to the subset of highly-qualified workers or, in general, to those workers that are more likely to generate spillovers. Although we have seen that few workers leave foreign firms for domestic firms, it may also be interesting to investigate this further, namely by repeating our analysis for those individuals whose qualifications (education, experience, tenure) may make them more likely to carry important information that may generate productivity spillovers in domestic firms.



One additional extension would investigate whether workers that leave foreign firms are more likely to (successfully) set up their own firms. While the present paper focuses on productivity spillovers upon pre-existing firms, it may also be the case that the experience acquired at foreign firms develops entrepreneurial skills or leads to the generation of spin-offs by former employees. These would be additional avenues in which foreign firms impact positively a host economy and for which there is, at present, no evidence, neither for Portugal nor for any other country.

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Figures

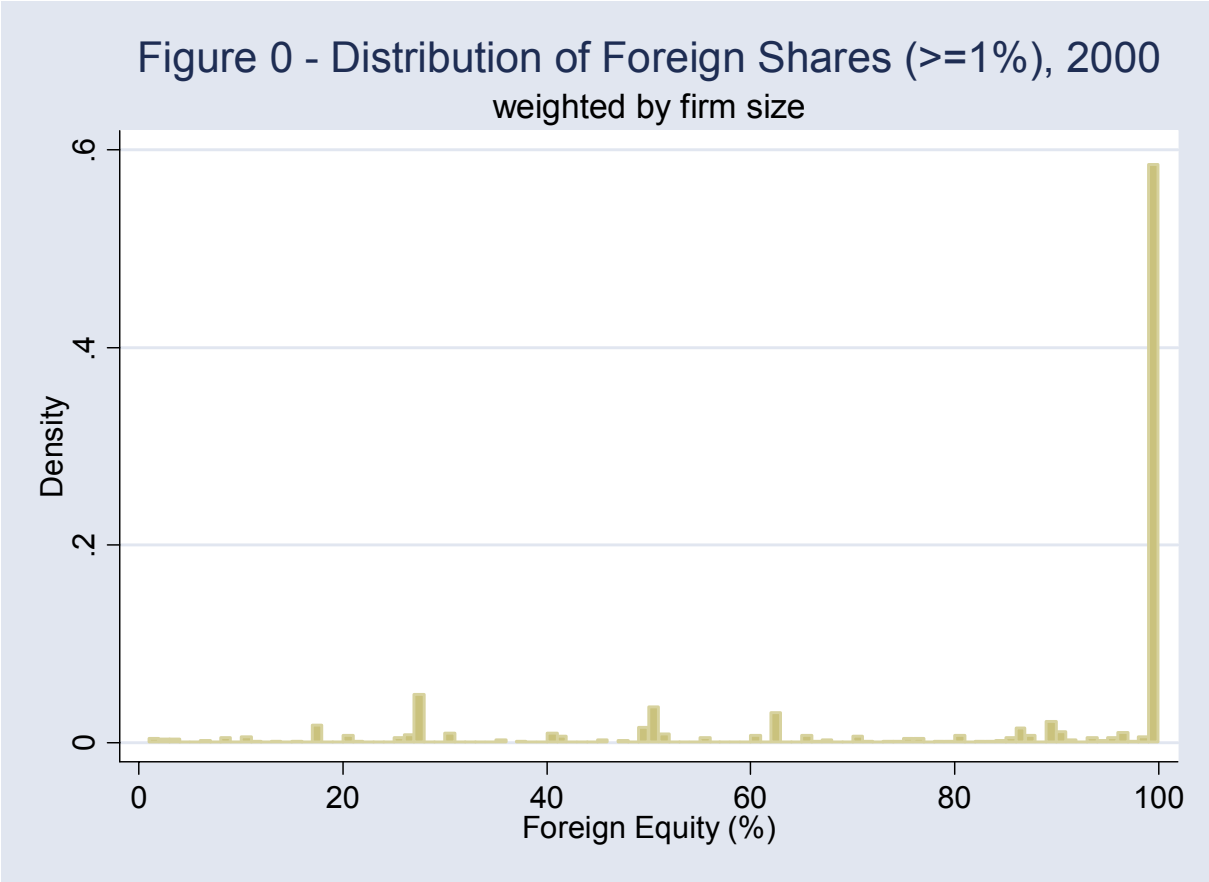
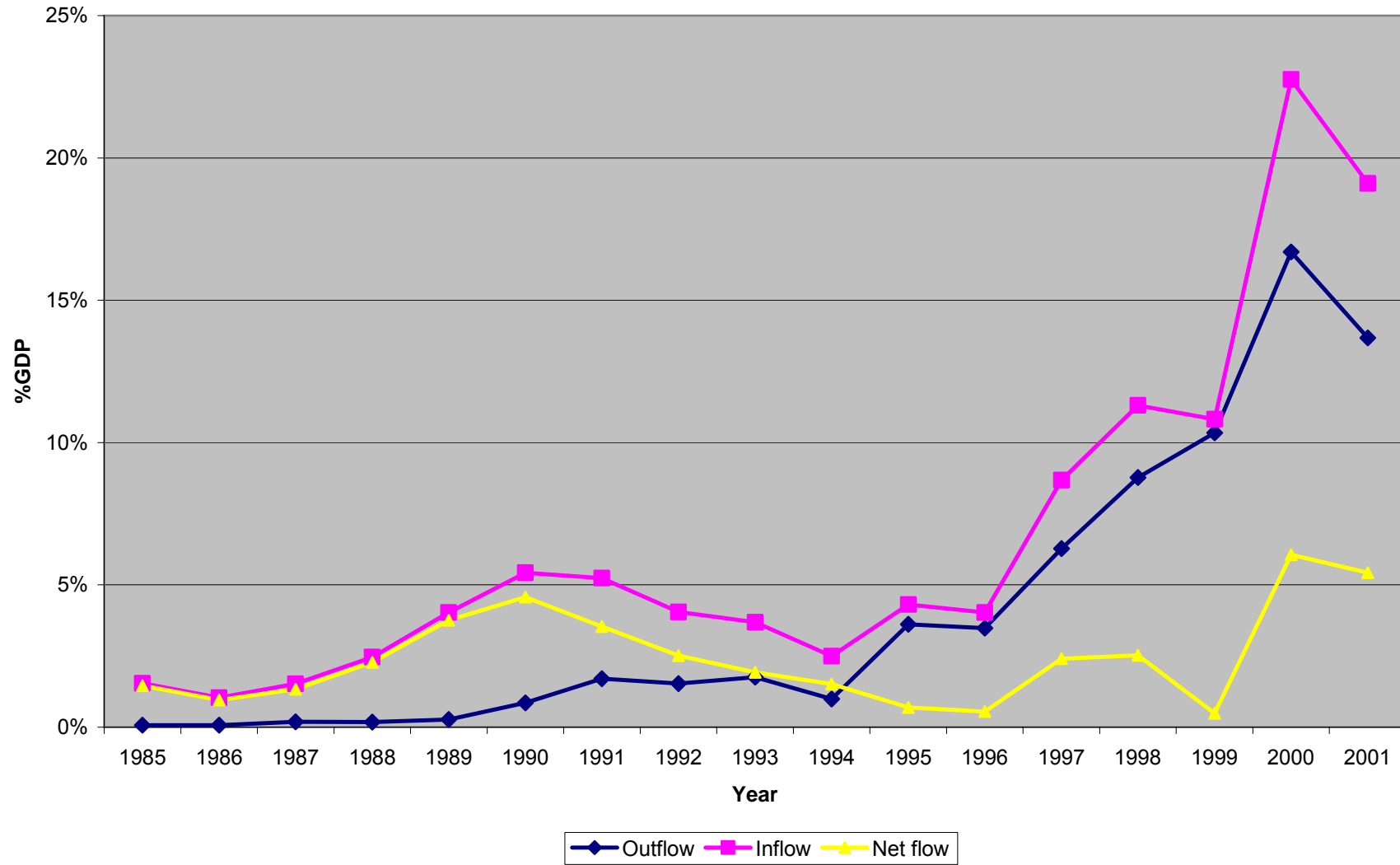


Figure 1 - FDI flows to Portugal, as % of GDP, 1985-2001



**Figure 2 - Employment in Foreign Firms, by Industry, 1986, 1993 and 2000**  
 (Only industries with at least 1,000 employees in foreign firms in 2000)

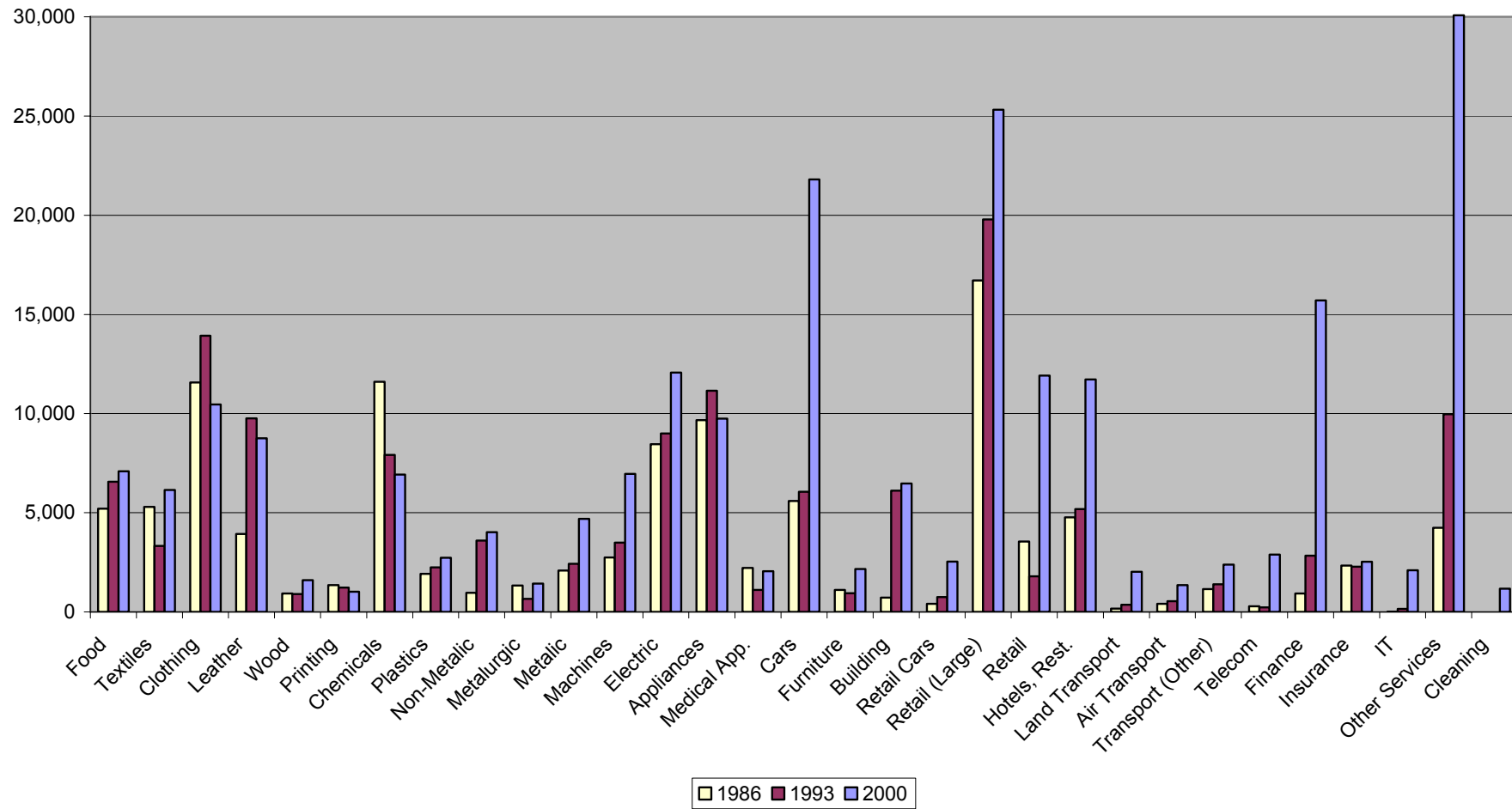
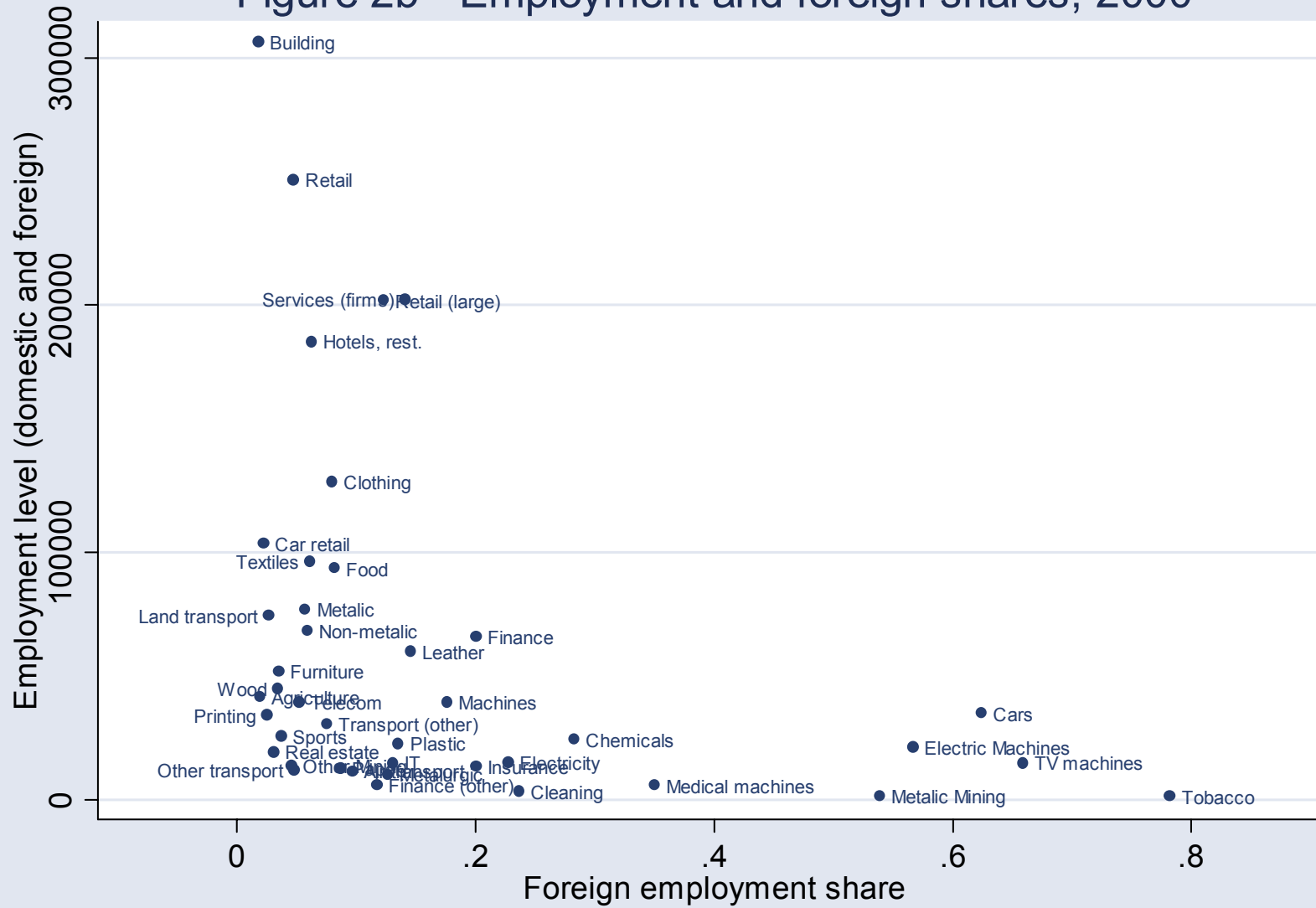
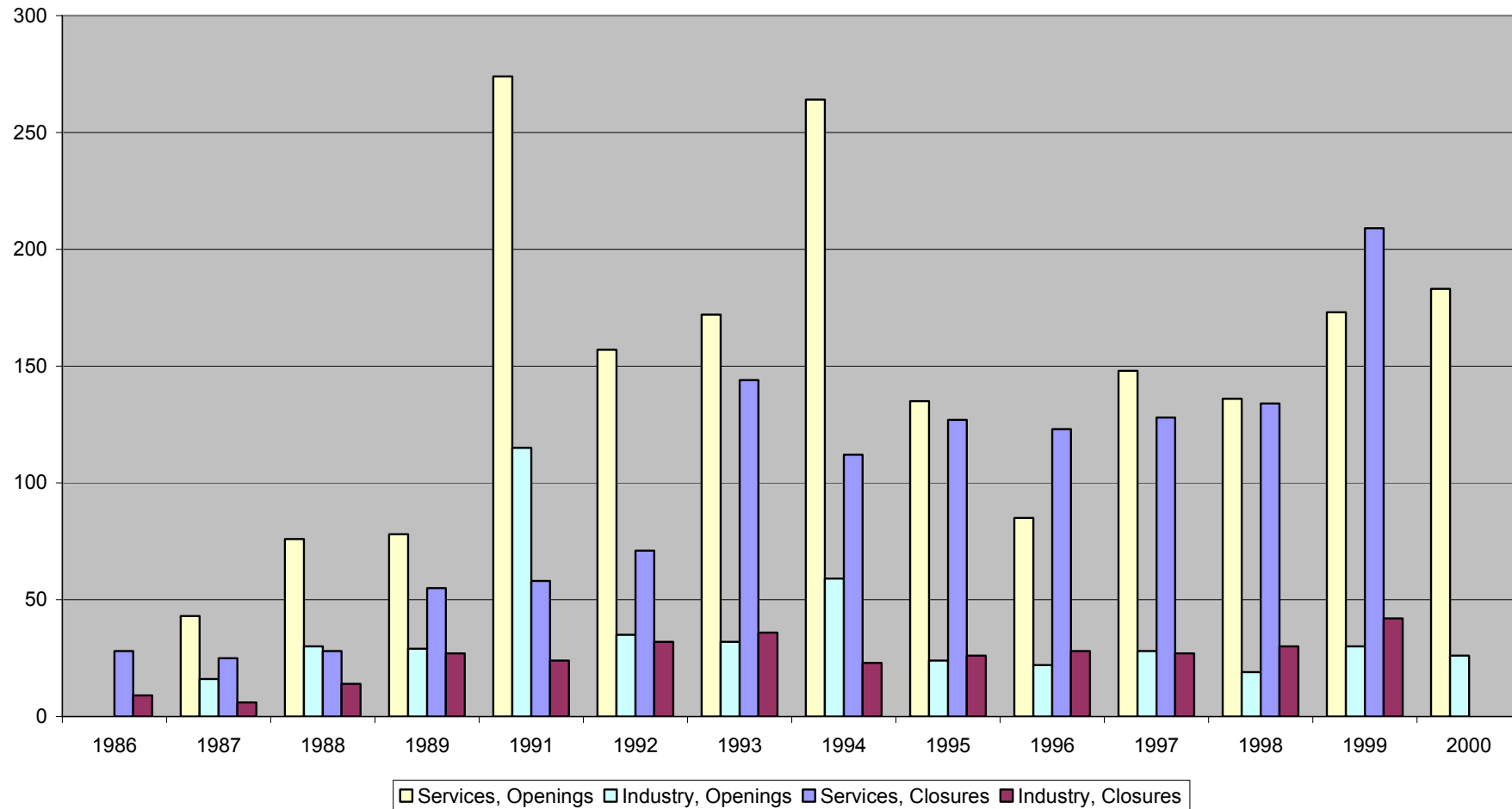




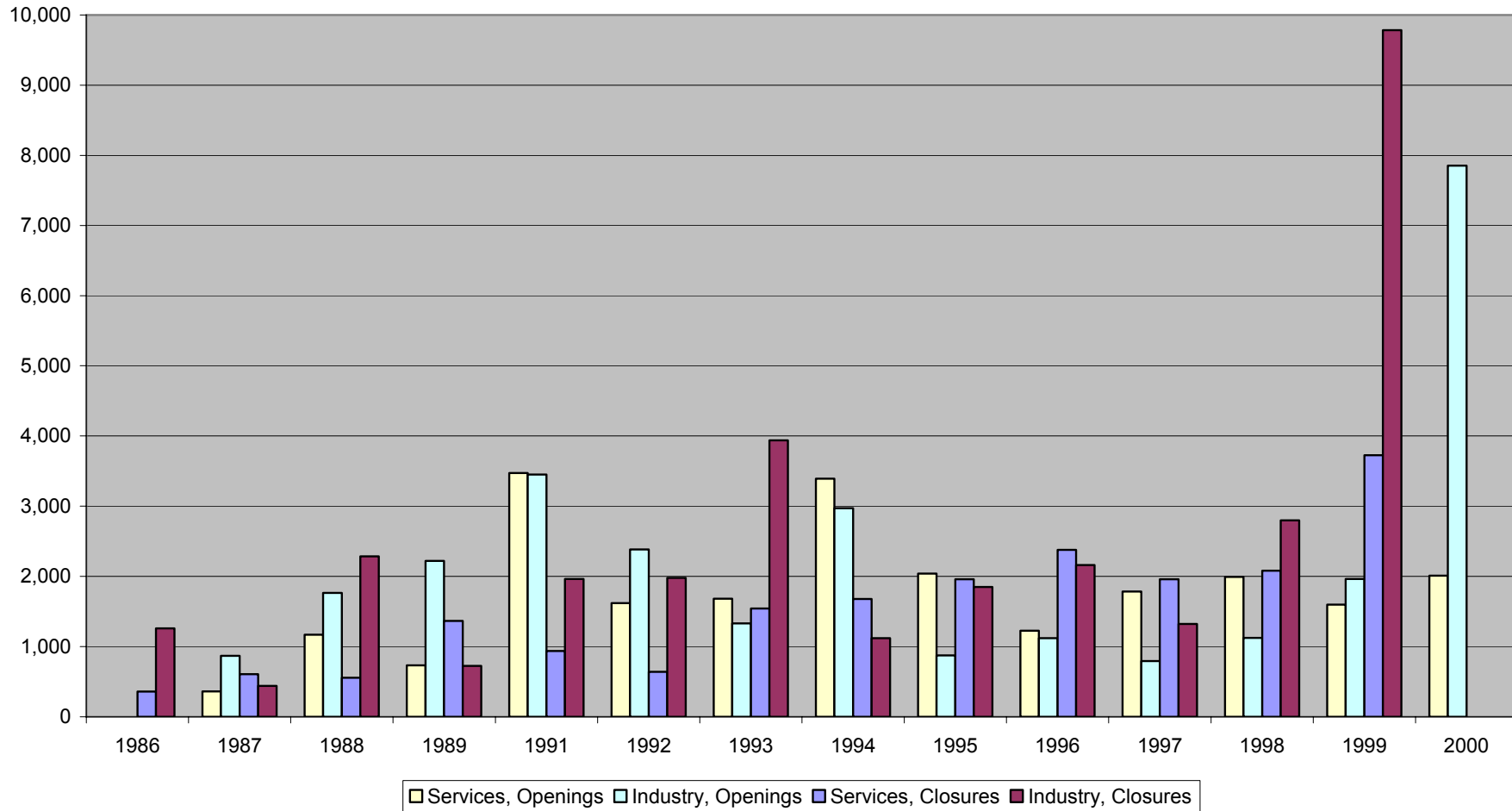
Figure 2b - Employment and foreign shares, 2000



**Figure 3 - Foreign firm openings (greenfield investment) and closures, 1986-2000**  
 Number of firms



**Figure 4 - Foreign firm openings (greenfield investment) and closures, 1986-2000**  
**Number of employees**



**Figure 5 - Number of Foreign and Domestic Acquisitions, 1987-2000**  
**All Sectors or Services only**

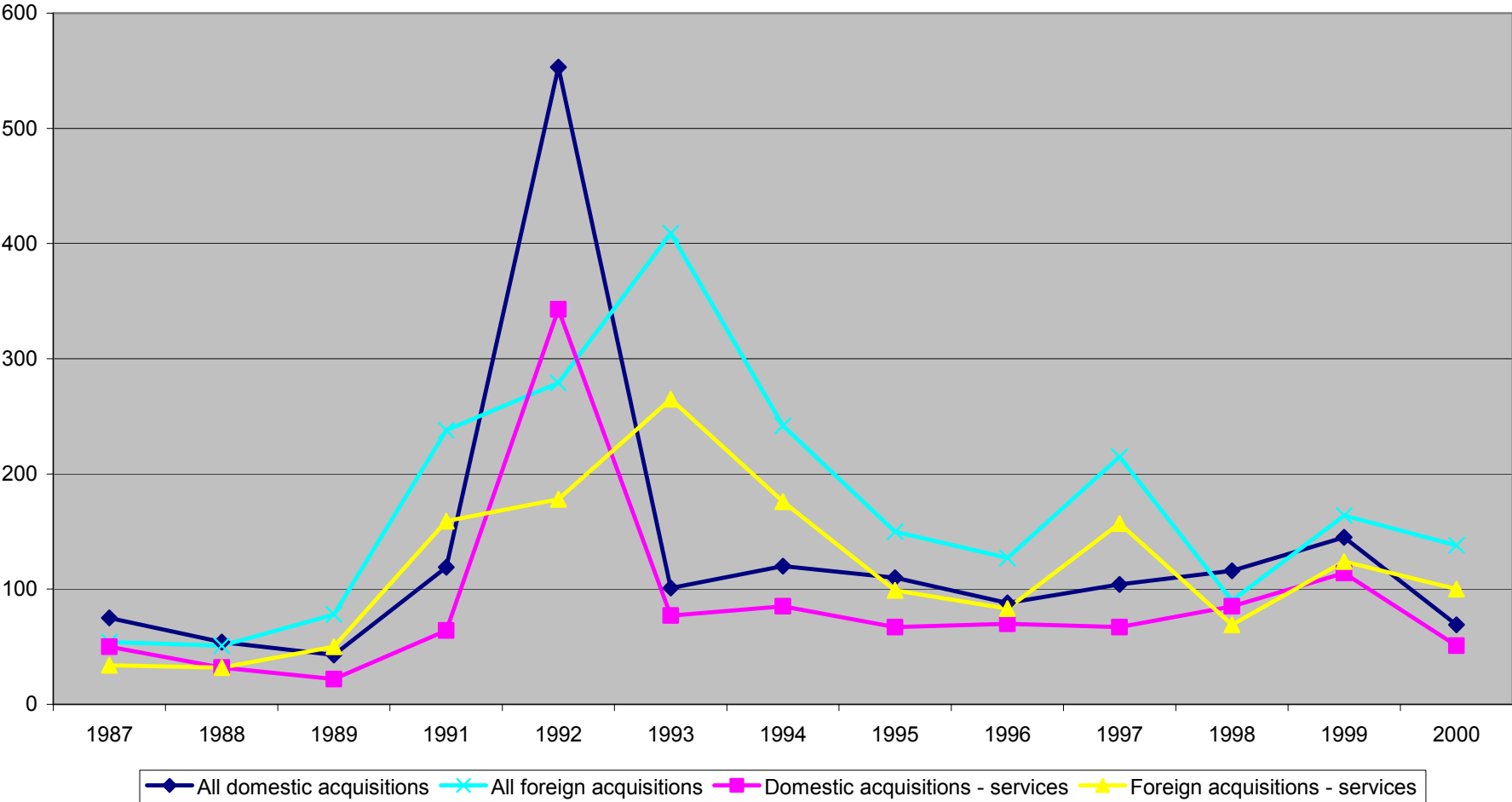


Figure 6 - Number of Employees involved in Foreign and Domestic Acquisitions, 1987-2000  
 (Firm Size after Acquisition), All Sectors or Services only

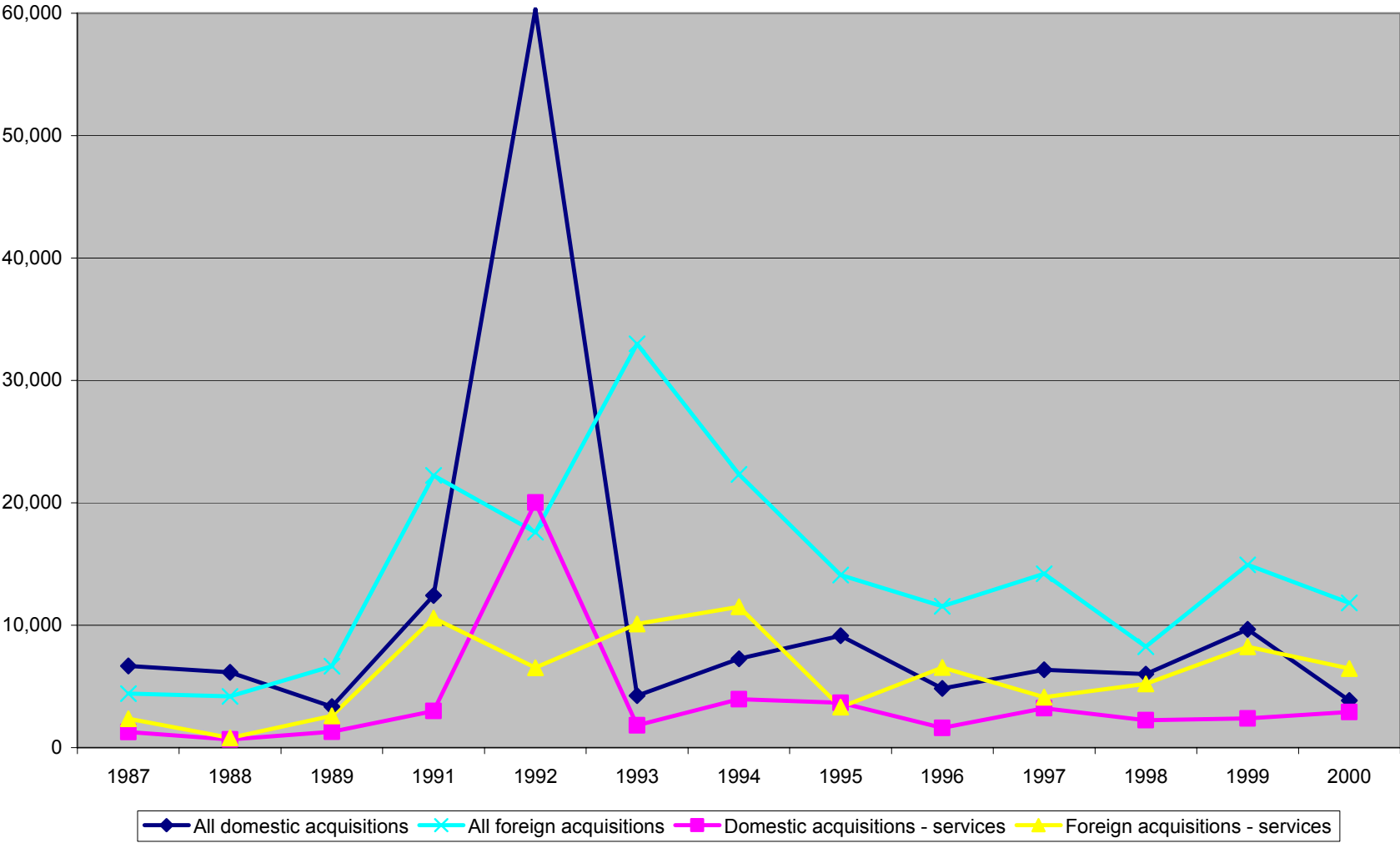


Figure 7 - Mobility from foreign to domestic firms  
Weighted by firm size

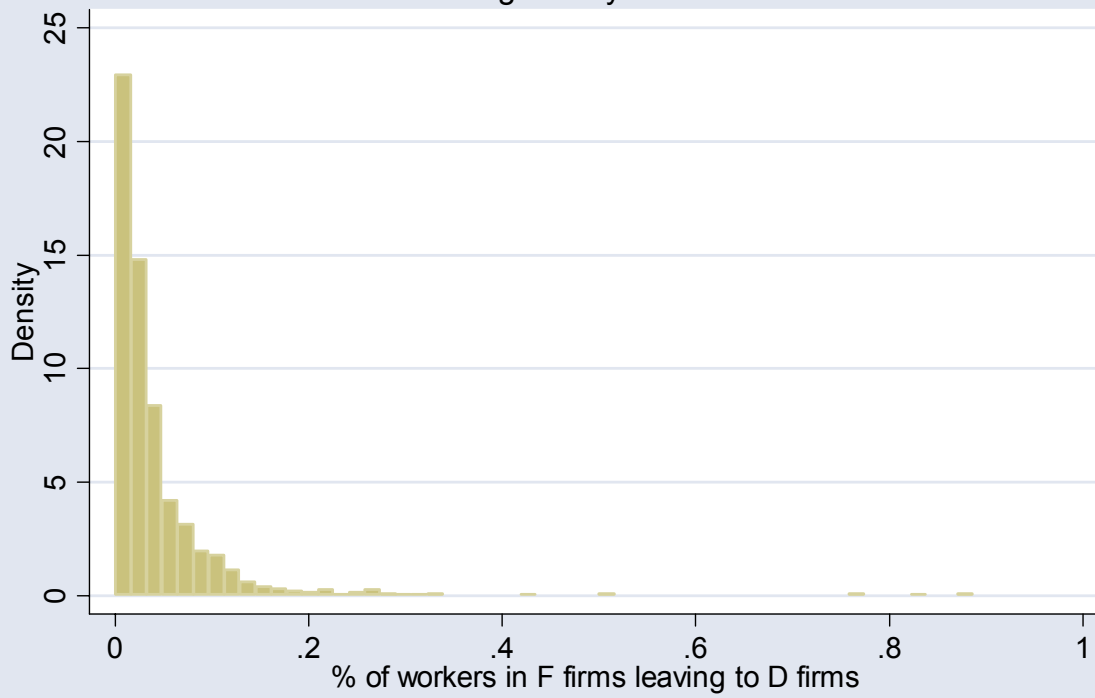


Figure 7a - Mobility from foreign to foreign firms  
Weighted by firm size



Figure 8 - Wages before and after mobility

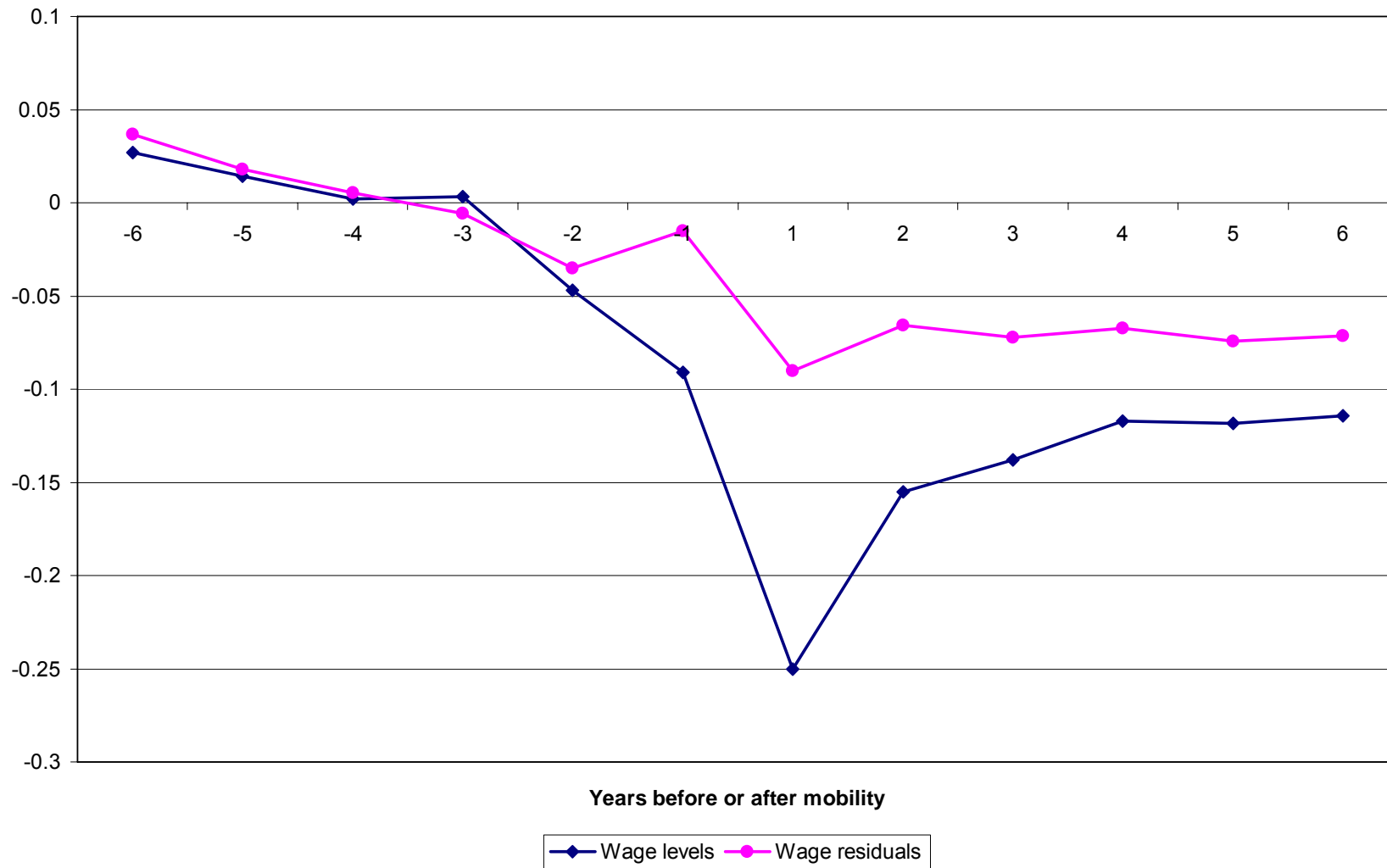


Figure 9 - Wages before and after mobility - displaced workers

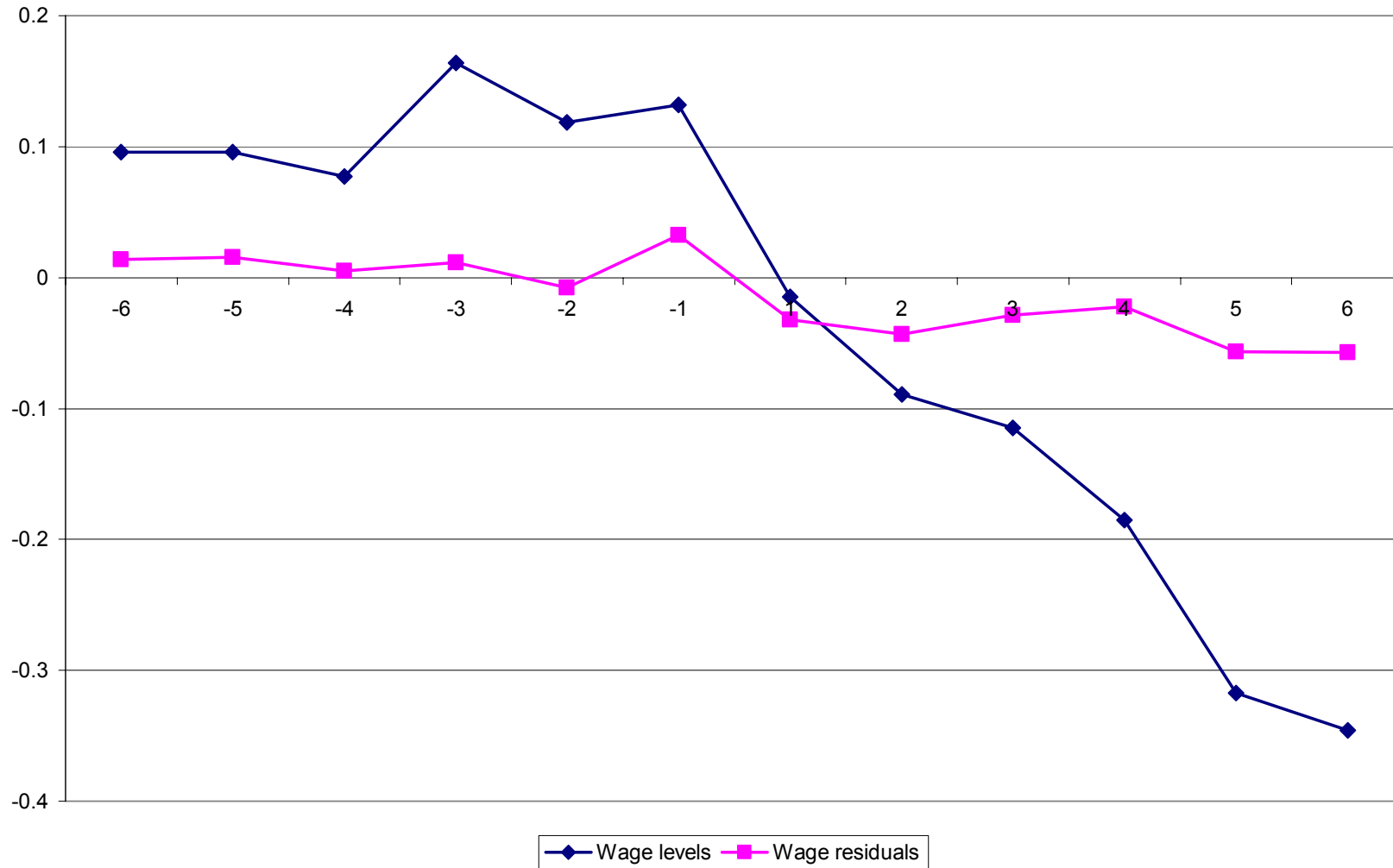
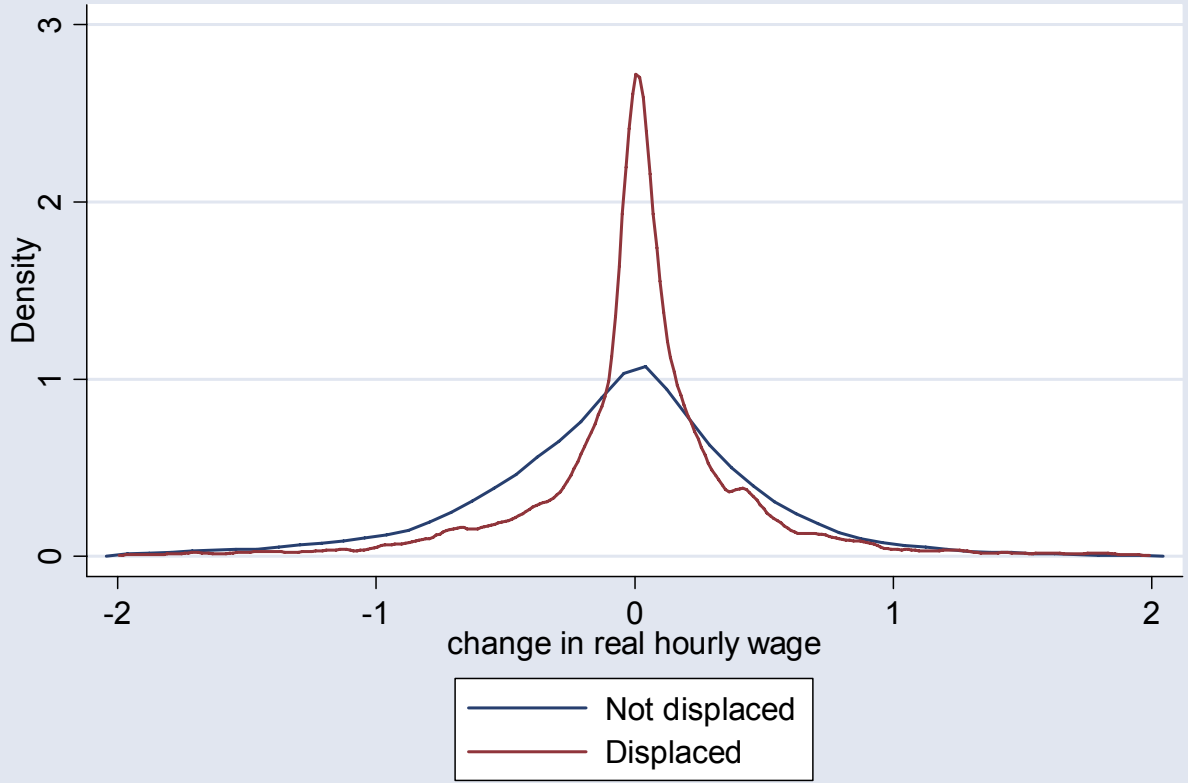




Figure 10 - Wage differences upon mobility to domestic firm



## Tables

**Table 1 - Descriptive statistics**

	<b>Foreign Stayers</b>			<b>Domestic Stayers</b>		
	<b>N</b>	<b>Mean</b>	<b>StDev</b>	<b>N</b>	<b>Mean</b>	<b>StDev</b>
<b>Year</b>	3,443,116	1993.9	4.3	4,252,710	1993.2	4.4
<b>Schooling</b>	3,361,876	7.8	4.0	4,139,991	6.7	3.8
<b>Experience</b>	3,286,455	21.0	11.8	4,034,851	24.3	13.2
<b>Tenure</b>	3,342,471	7.7	8.3	4,123,881	9.4	9.4
<b>Female</b>	3,443,116	0.44	0.50	4,252,710	0.38	0.48
<b>Real monthly pay</b>	3,251,630	997.1	919.6	3,596,892	801.8	698.3
<b>Real hourly pay</b>	3,248,182	6.0	7.0	3,590,350	4.9	7.0
<b>Firm size</b>	3,443,116	949.8	1712.5	4,252,710	1957.6	4944.5

	<b>Movers - before</b>			<b>Movers - after</b>		
	<b>N</b>	<b>Mean</b>	<b>StDev</b>	<b>N</b>	<b>Mean</b>	<b>StDev</b>
<b>Year</b>	57,286	1993.4	3.7	57,286	1995.5	3.9
<b>Schooling</b>	55,584	8.4	4.1	55,048	8.5	4.2
<b>Experience</b>	53,928	15.4	11.1	53,006	17.1	11.2
<b>Tenure</b>	55,196	4.7	6.7	54,667	2.2	5.2
<b>Female</b>	57,286	0.48	0.50	57,286	0.47	0.50
<b>Real monthly pay</b>	53,280	882.7	878.1	51,990	800.6	782.7
<b>Real hourly pay</b>	53,249	5.7	12.4	51,935	5.0	5.7
<b>Firm size</b>	57,286	992.7	1387.9	57,286	692.4	2346.4

**Table 2 - Determinants of going to leave**

Dependent variable: Dummy about mobility from a foreign to a domestic firm (either only in following period or in following period or after)

	Leave in following period or after			Leave in following period			
<b>Worker to be displaced</b>	0.145	0.15	0.043	0.185	0.189	0.201	
	[0.002]**	[0.002]**	[0.002]**	[0.001]**	[0.001]**	[0.002]**	
<b>Real log hourly wage</b>		-0.008	-0.008	-0.002	-0.004	-0.004	-0.001
		[0.001]**	[0.001]**	[0.001]**	[0.001]**	[0.001]**	[0.001]
<b>Firm fixed effects</b>			x				x
<b>Observations</b>	1151398	1104220	1104220	1104220	1151398	1104220	1104220
<b>Adjusted R-squared</b>	0.079	0.074	0.079		0.055	0.037	0.055
<b>R-squared</b>				0.193			0.092

Standard errors in brackets: \* significant at 5%; \*\* significant at 1%

Other controls (not reported): education dummies, quartic in experience, gender dummy, quadratic in tenure, occupation dummies, quadratic in job level rank, industry dummies (2-digit definition), log firm size, region dummies.

**Table 3 - Wage equation, workers in foreign firms**

Dependent variable: log real hourly wages

	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>
<b>Mover to domestic firm</b>	-0.009 [0.001]**	-0.007 [0.001]**	0 [0.001]	0 [0.001]				
<b>Displaced to domestic firm</b>		-0.042 [0.005]**		-0.005 [0.005]				
<b>Mover to domestic firm in following year</b>					-0.01 [0.002]**	-0.005 [0.002]*	0.002 [0.002]	0.003 [0.002]
<b>Displaced to domestic firm in following year</b>						-0.047 [0.005]**		-0.009 [0.005]
<b>Firm fixed effects</b>			x	x			x	x
<b>Observations</b>	1104220	1104220	1104220	1104220	1104220	1104220	1104220	1104220
<b>Adjusted R-squared</b>	0.667	0.667			0.667	0.667		
<b>R-squared</b>			0.745	0.745			0.745	0.745

Standard errors in brackets: \* significant at 5%; \*\* significant at 1%

Other controls (not reported): education dummies, quartic in experience, gender dummy, quadratic in tenure, occupation dummies, quadratic in job level rank, industry dummies (2-digit definition), log firm size, region dummies.

**Table 4 - Different characteristics, before and after mobility**

	Before		After	
	Mean	StDev	Mean	StDev
<b>Firm Age</b>	22.91	22.20	15.13	25.27
<b>Clothing</b>	0.11	0.31	0.05	0.22
<b>Footwear</b>	0.03	0.18	0.01	0.10
<b>Chemicals</b>	0.03	0.17	0.01	0.12
<b>Electric machines</b>	0.07	0.26	0.01	0.08
<b>Electric appliances</b>	0.03	0.17	0.01	0.11
<b>Building</b>	0.05	0.22	0.08	0.27
<b>Retail</b>	0.04	0.19	0.14	0.35
<b>Other services</b>	0.15	0.36	0.12	0.33
<b>Same region</b>			0.65	
<b>Same industry</b>			0.24	
<b>Same job</b>			0.34	

**Table 5 - Characteristics of winners and losers with mobility**

Variable	Lower real wage			Higher real wage		
	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
Year	22201	1995.61	3.90	19661	1995.62	3.99
Age	21302	31.07	9.64	19068	30.22	8.86
Schooling	21260	8.11	3.90	18984	9.22	4.33
Experience	20430	16.89	10.97	18430	14.97	10.49
Female	22201	0.45	0.50	19661	0.44	0.50
Tenure (foreign)	21392	4.38	6.51	18965	3.55	5.43
Job level	21194	5.63	1.69	18367	5.12	1.86
Lisbon	22201	0.43	0.49	19661	0.52	0.50
Firm size	22201	507.44	2158.24	19661	961.61	2881.26
Same region	22201	0.61	0.49	19661	0.66	0.47
Same industry	22201	0.22	0.41	19661	0.27	0.45
Same occupation	22201	0.29	0.45	19661	0.34	0.47
Change firm size	22201	-635.79	2633.96	19661	22.03	3057.94
Change job level	20283	0.19	1.63	17539	-0.49	1.63
Change firm age	9916	-7.36	30.11	9916	-5.28	30.05

**Table 6a - Wage equations, workers in domestic firms** (Dependent variable: log real hourly wages)

	1	2	3	4	5	6	7
<b>Experience in Foreign firm</b>	0.018	0.029	0.013	0.03	0.054	0.049	0.017
	[0.001]**	[0.002]**	[0.001]**	[0.002]**	[0.004]**	[0.004]**	[0.011]
<b>Tenure in Foreign firm</b>		0		-0.002			0.018
		[0.000]		[0.000]**			[0.002]**
<b>Tenure in Foreign firm^2</b>		0		0			-0.001
		[0.000]**		[0.000]**			[0.000]**
<b>Moved from same job</b>					-0.032	-0.034	-0.021
					[0.003]**	[0.003]**	[0.009]*
<b>Moved from same industry</b>					0.039	0.04	0.024
					[0.003]**	[0.004]**	[0.010]*
<b>Moved from same region</b>					-0.038	-0.037	0.008
					[0.004]**	[0.004]**	[0.011]
<b>Displaced</b>			0.032	-0.011		0.027	
			[0.003]**	[0.005]*		[0.008]**	
<b>Displaced and moved from same job</b>						0.023	
						[0.009]*	
<b>Displaced and moved from same industry</b>						-0.006	
						[0.010]	
<b>Displaced and moved from same region</b>						0	
						[0.000]	
<b>Tenure in Foreign firm &amp; Displaced</b>				0.014			
				[0.002]**			
<b>Tenure in Foreign firm^2 &amp; Displaced</b>				0			
				[0.000]**			
<b>Firm fixed effects</b>							
<b>Observations</b>	3326817	3322722	3326817	3322722	3296672	3296672	3219219
<b>Adjusted R-squared</b>	0.657	0.657	0.657	0.657	0.658	0.658	0.659
<b>R-squared</b>							

Standard errors in brackets: \* significant at 5%; \*\* significant at 1%

Other controls (not reported): education dummies, quartic in experience, gender dummy, quadratic in tenure, occupation dummies, quadratic in job level rank, industry dummies (2-digit definition), log firm size, region dummies.

**Table 6b - Wage equations, workers in domestic firms**

Dependent variable: log real hourly wages

	8	9	10	11	12	13	14
<b>Experience in Foreign firm</b>	0.016 [0.001]**	0.009 [0.002]**	0.016 [0.001]**	0.01 [0.002]**	0.025 [0.004]**	0.003 [0.010]	0.02 [0.004]**
<b>Tenure in Foreign firm</b>		0.005 [0.000]**		0.004 [0.000]**		0.01 [0.002]**	0.005 [0.001]**
<b>Tenure in Foreign firm^2</b>		0 [0.000]**		0 [0.000]**		0 [0.000]**	0 [0.000]**
<b>Moved from same job</b>					-0.009 [0.003]**	-0.022 [0.008]**	-0.009 [0.003]**
<b>Moved from same industry</b>					0.014 [0.003]**	0.021 [0.009]*	0.015 [0.003]**
<b>Moved from same region</b>					-0.006 [0.004]	0 [0.010]	-0.01 [0.004]*
<b>Displaced</b>			0.002 [0.003]	-0.007 [0.004]			
<b>Displaced and moved from same job</b>							
<b>Displaced and moved from same industry</b>							
<b>Displaced and moved from same region</b>							
<b>Tenure in Foreign firm &amp; Displaced</b>				0.003 [0.002]*			
<b>Tenure in Foreign firm^2 &amp; Displaced</b>				0 [0.000]			
<b>Firm fixed effects</b>	x	x	x	x	x	x	x
<b>Observations</b>	3326817	3322722	3326817	3322722	3296672	3219219	3283333
<b>Adjusted R-squared</b>							
<b>R-squared</b>	0.766	0.766	0.766	0.766	0.766	0.766	0.766

Standard errors in brackets: \* significant at 5%; \*\* significant at 1%

Other controls (not reported): same as before



## Appendix

Figure A1 - Number of Domestic Firms, Agriculture, Manufacturing and Services, 1986-2000

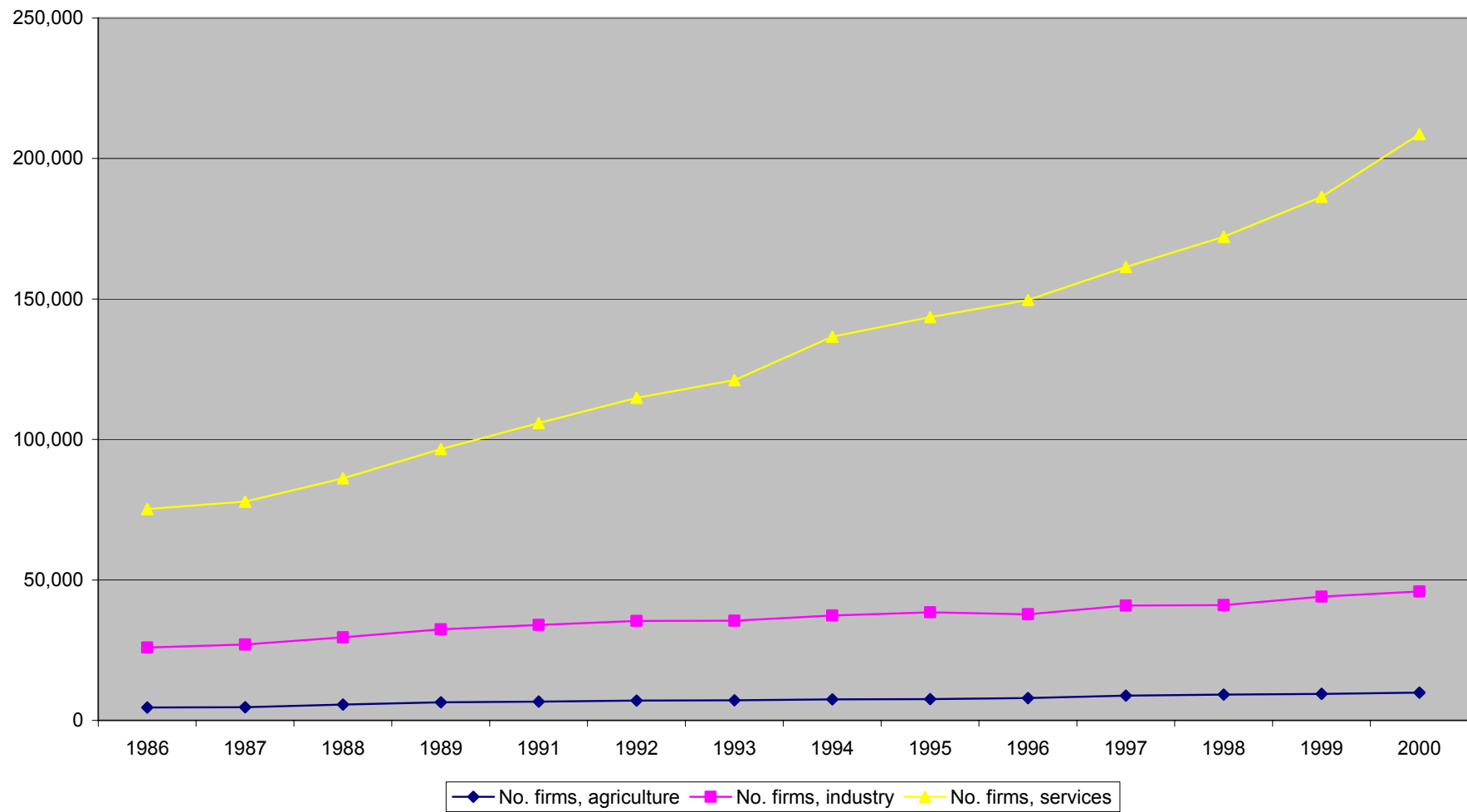


Figure A2 - Number of foreign firms, Agriculture, Manufacturing and Services, 1986-2000

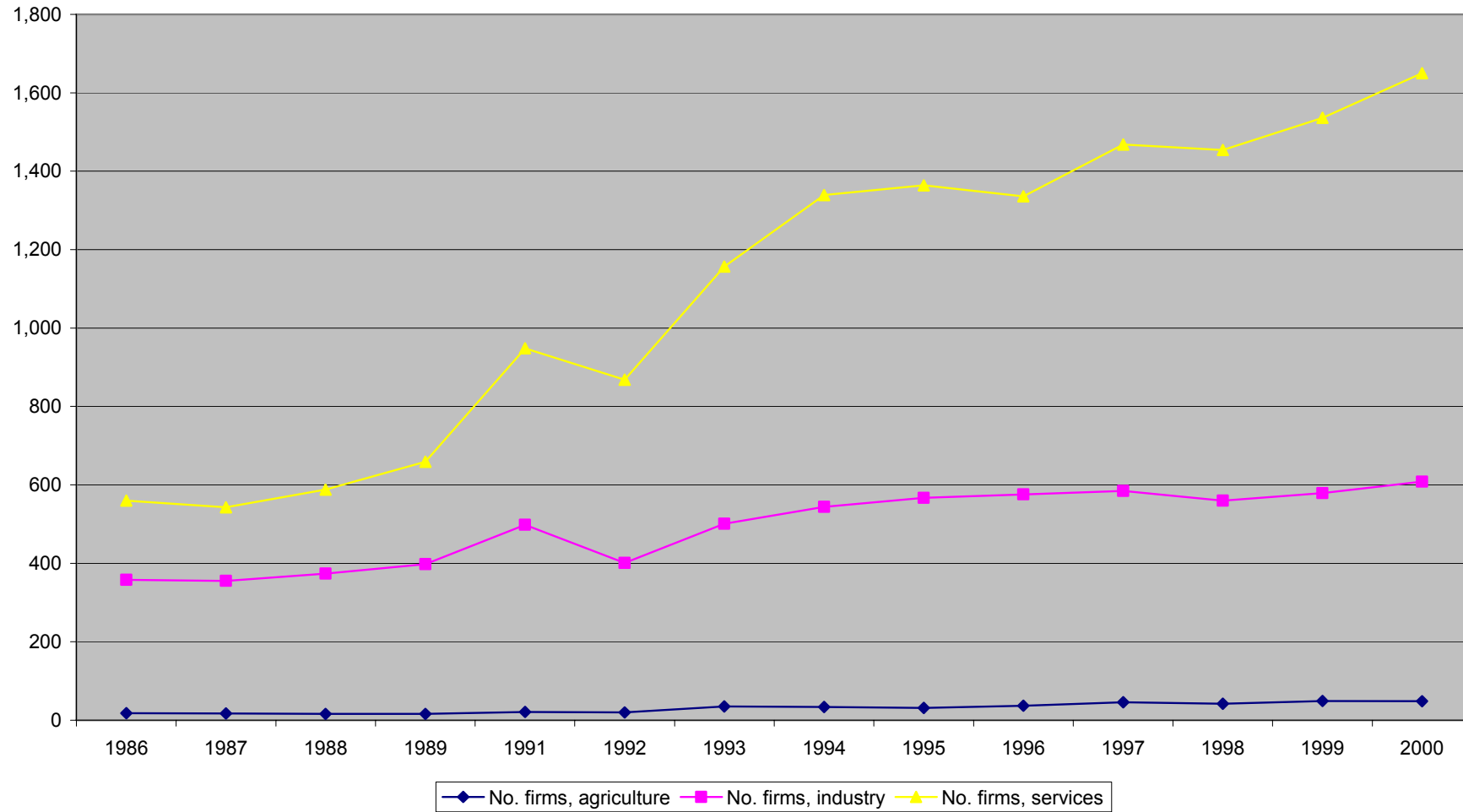


Figure A3 - Employment by Domestic Firms, Agriculture, Manufacturing and Services, 1986-2000

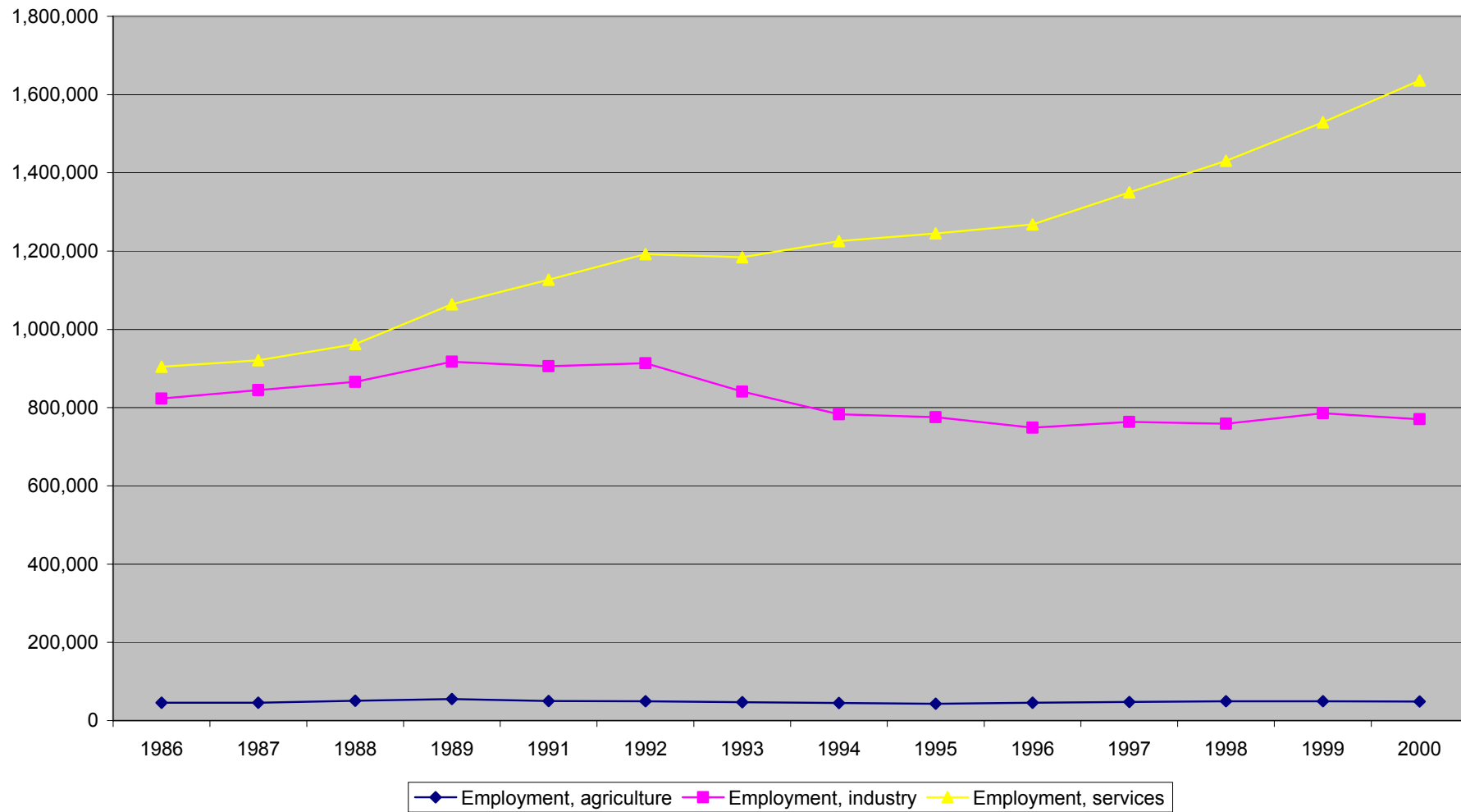


Figure A4 - Employment by Foreign Firms, Agriculture, Manufacturing and Services, 1986-2000

