Workers' Mobility and Internal Labour Markets

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Abstract: Understanding factors that influence mobility is relevant and has benefits for both organizations and individuals. In this study, we propose a different outlook on internal mobility and on the internal working of the firm. Instead of focusing on the determinants of mobility and promotions within the same establishment, we will focus on internal mobility that involves an establishment change.

On the other hand, we will focus on the outcomes of mobility but, our approach, will allow us to quantify and distinguish between different returns to different types of mobility. To understand the determinants of mobility and to identify the respective returns we will organize mobility into the following classification: Same-employer transfers without region change; Same-employer transfers with region change; Employer changes without region change; Employer changes with region change; and our basecategory, employees that remain in the same establishment of the same firm.

The dataset in this study comes from Quadros de Pessoal (QP), a matched employer-employee survey. Our results indicate that same-employer transfers include workers that are performing well at the present firm. These transfers may act as a "promotion" within the firm which is consistent with our hypothesis that in multi-plant firms there exists a global internal labour market which is built on the firm as a whole.

Comparing wage premiums for the group of same-employer transfers involving region changes with the group of same-employer transfers that were locally transferred, we propose a new approach to estimate wage premiums for migration. We conclude that there exists a greater reward when employees have to incur in additional costs such as those involved in relocation.

Keywords: Returns to mobility, internal labour markets, intra-firm mobility, migration.

1 Introduction

1.1 Intra-firm and Inter-firm mobility: who's moving, and where to?

Understanding factors that influence mobility is relevant and can have benefits for both organizations and individuals (Ostroff and Clark, 2001). From the companies' perspective, mobility will be an essential tool to internally achieve an efficient allocation of resources. From the workers' point of view, mobility may enhance career perspectives in that company or in another company. Analyzing internal mobility brings up the concept of internal labour markets and the seminal work of Doeringer and Piore (1971), while the study of external mobility often leads us to the turnover literature.

Within internal labour markets pricing and allocation of labour is governed by a set of administrative rules and procedures, distinguishable from the rules of the external labour market where pricing, allocating and training decisions are influenced directly by economic variables. The creation of internal labour markets may be a response to several factors. When turnover costs are high the creation of internal labour markets may be a strategy to reduce turnover. Moreover, internal labour markets may also be a response to the existence of specific human capital (Becker, 1962), mobility costs or matching effects (Jovanovic, 1979) or the working of specific systems of incentives (Lazear, 1979). Internal labour market's literature often explores the existence of an internal job ladder and we can find numerous studies focusing on promotion dynamics and on the determinants of promotions (McCue, 1996; Pergamit and Veum, 1999; Lazear and Oyer, 2004; Lima, 2004; Lima and Centeno, 2003).

McCue (1996) exploits the Panel Study of Income Dynamics (PSID) using individual's reported job change to identify a promotion. Pergamit and Veum (1999) use the National Longitudinal Survey of Youth (NLSY) to study the causes and consequences of promotions. Exploring the potential of large matched employer-employee datasets, Lazear and Oyer (2004) analyze internal job mobility and the importance of internal and external labour markets,

Lima (2004) studies the determinants of job mobility within and between firms and Lima and Centeno (2003) evaluate the role of specific human capital in promotion dynamics.

In this study, we propose a different outlook on internal mobility and on the internal working of the firm. Instead of focusing on the determinants of mobility and promotions within the same establishment, we will focus on internal mobility that involves an establishment change. In multi-establishment firms, the existence of an internal labour market will not be restricted to one particular establishment. When these firms decide to fill a vacancy through internal reallocation they may transfer an employee that works in that particular location or they may also transfer someone that works in a subsidiary of the same firm but in another location. In multi-plant firms the workings of an internal labour market will be based on the firm as a whole, necessarily including all the establishments belonging to that firm. The novelty in our approach is to analyze this broader class of internal mobility, considering workers that experience a relocation of their workplace. Although with distinct features, these transfers are also a way to move within the internal labour market of the multi-establishment firm.

These internal transfers can be promotions or reassignments. They can occur as a reward for great work, to test potential for more senior positions, or because the worker is the best or most readily available candidate to fill an immediate need. Nevertheless, these moves will be an important device in guarantying an efficient allocation of resources within the firm.

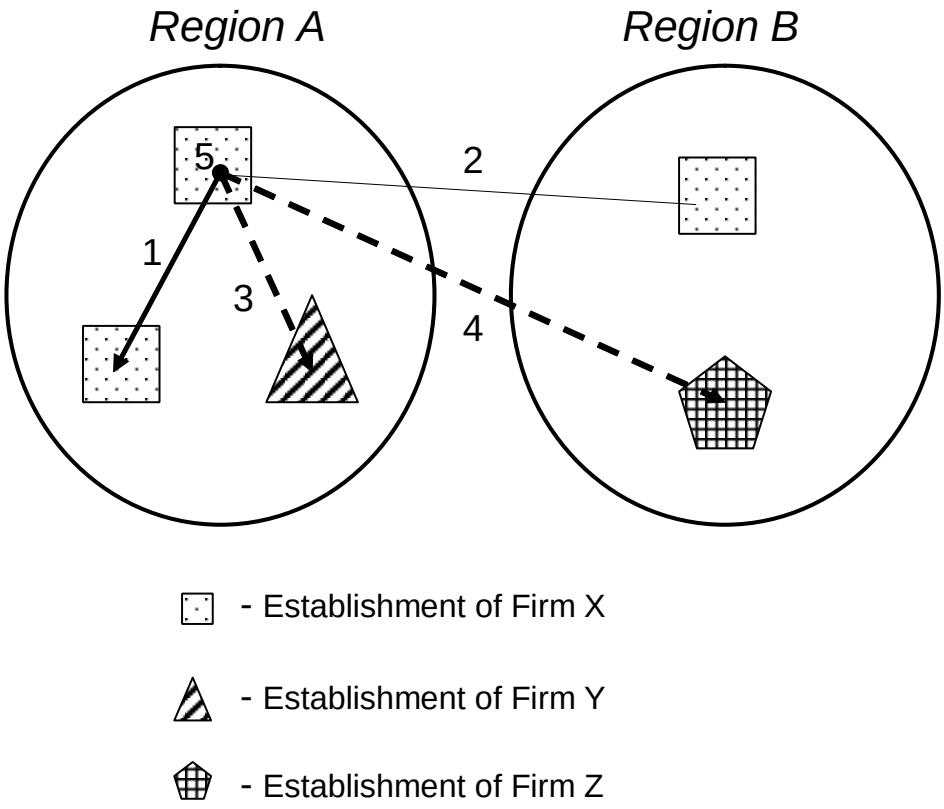
We can find only a few studies reporting results for these group of internal movers. However, these studies focus on the relation between these kind of transfers and migration literature rather than looking at them as movements in a job ladder of an internal labour market. In fact, for these transferred employees that, although remaining with the same employer, have to change job location, the transfer may be accompanied by the decision to migrate. The move will be local, if the new establishment is close to the one where the individual previously worked but it will involve a migration if the change is performed to an establishment located in a different region. Using German data from 1984 to

2000, Hunt (2004) reports conclusions for these group of transferred individuals, although restricting her analysis to inter-state movers. In Hunt's approach the transfer goes hand in hand with the decision to migrate which leads her to call these workers, "same-employer migrants". Her study was a step forward in migration literature as Hunt's paper explores the link between internal transfers and migration while most of the previous literature focused on the link between migration and employer change (Schaeffer, 1985; Shaw, 1991; Krieg and Bohara, 1999). Hunt (2004) focuses on the estimation of migration probabilities. Another work reporting results for these transferred employees is from Bartel (1979). Once again, the focus is placed on the importance of analyzing migration decisions together with job mobility decisions. She distinguishes between three kinds of migrations: quits, layoffs and transfers. Precisely this last group includes workers that migrated without changing employer. She reports that the groups considered have different characteristics and that the determinants and causes of migration differ from one kind of mobility to another. Bartel (1979) analyzes migration propensities but also the effects of migrations on wages.

Mobility involving region changes will clearly involve higher costs. These costs may be monetary (travel costs, lodging costs,...) or psychological costs (separation from family, adaptation to a new environment,...). Therefore, a transfer to a more distant location may have different determinants. We will analyze both local and non-local internal transfers but also employer changes. As we previously remarked, the existence of an internal labour market may have an impact on turnover rates. Having evidence about who leaves the firm will help us understand the determinants of turnover but will also give us a hunch on who stays and builds a career inside the internal labour market of the firm.

To understand the determinants of mobility and to analyze who moves and where to, we will organize mobility into the following classification:

- **Type 1** - Same-employer transfers without region change: workers that perform a local change of establishment within the same firm;
- **Type 2** - Same-employer transfers with region change: workers that perform a non-local change of establishment within the same firm;



- **Type 3** - Employer change without region change: workers that change firm within the same region;
- **Type 4** - Employer change with region change: workers that change firm and also change region;
- **Type 5** - Basecategory: employees that remain in the same establishment of the same firm.

The different types of mobility are presented in the diagram above.

1.2 Returns to mobility: the effect of worker's mobility on wages

Returns to mobility have been the subject of an extensive literature. In fact, workers' mobility may be seen as an investment in human capital which may enhance wage growth opportunities (in the same company or in another company). We will focus on the analysis of these returns but, our approach, will also allow us to quantify and distinguish different returns to different types of mobility. As we have shown in the previous section, when talking about workers' mobility we may be referring to considerably different events.

Most existing literature focus on returns for two broad kinds of mobility:

- Migrations and, in most studies, this implies an employer change;
- Internal mobility and, in most studies, this implies mobility within the same establishment.

We will emphasize returns to a particular type of mobility - internally transferred workers that experience a relocation of the workplace without changing employer as they are transferred to another establishment of the same firm. We have seen in the previous section that this move may be local, if the new establishment is close to the one where the individual previously worked, or may involve a migration if the change is performed to an establishment in a different region. As we will see later on, focusing on this group of workers will allow us to separate and distinguish between returns to different types of mobility.

The search for higher wages is one of the most important motivations for workers' mobility. Several works report the search for better wages as one of the main forces driving migration (Shaw, 1991; Farber, 1983; Yankow, 2003). On the other hand, studies on internal labour markets often relate returns to mobility to promotion events (McCue, 1996; Pergamit and Veum, 1999; Lima and Centeno, 2003) and improved wage growth opportunities (Lima, 2004; Lima and Pereira, 2003; Hegedus & Hartman, 1992).

Depending on the type of mobility considered, several issues arise while estimating returns to mobility. One strategy compares the outcomes of movers

that change employer with stayers in the same employer. However, Antel (1986) alerts to the fact that not recognizing the link between worker's mobility and job change decisions may underestimate the returns to mobility. The problem is that while mobile workers improve their wages through job change, at the same time, immobile workers experience wage gains as a result of specific training (Antel, 1986). We propose a different approach to distinguish between different types of returns to mobility. Considering the group of individuals that are transferred to another establishment within the same employer, we may be able to distinguish between wage growth resulting from moving up in the internal labour market and wage growth that rewards migration. This may be implemented by comparing the wage premium of individuals that are involved in a local transfer with the premium of individuals that are transferred to an establishment in a different region. The first premium will be related to progression in the internal job ladder while the additional wage growth when the transfer involves a region change will measure the migration premium. This approach also allow us to develop on the work of Yankow (2003) that compares the outcomes of individuals who change job and migrate against the outcomes of those individuals changing employer within their current labour market. Yankow's objective is to determine whether job change involving migration differs in important ways from local job changes. Our approach also allow us to compare local with non-local changes but will differ from Yankow's method as we will compare individuals that perform these changes within the same employer. Comparing returns across job changers as in Yankow (2003) may include greater uncertainty and several variables that affect returns may be difficult to control. We believe that comparing individuals that remain with the same employer allow us to better isolate the additional premium for non-local job changes. A transfer to a more distant location will impose higher costs on workers, so a tangible reward should be greater when employees have to incur additional costs such as those involved in migration.

2 The data

2.1 Description

The dataset in this study comes from **Quadros de Pessoal (QP)**, a **matched employer-employee survey**. *QP* is an annual mandatory employment survey collected by the Portuguese Ministry of Employment that every firm with wage earners has to fill in[1]. The data includes firm-specific information (location, industry, number of establishments, employment, sales, ownership, legal setting, etc.), establishment-specific details (number of workers, location, activity, etc.) and workforce characteristics (gender, age, schooling, occupation, tenure, earnings, hours of work, etc.). The data are collected once per year in October.

The survey has a longitudinal dimension and both firms and workers have unique identification numbers which allow us to track them over time and to match workers and their firms. Measurement errors should be reduced as employers must post the information contained in the survey in a public place inside the firm.

In the present study we use data from 1999 to 2005, however, for the year 2001 the only information available is on firms' and establishments' characteristics as data on workers is not available. As we will detail bellow this lack of data poses some restrictions to our analysis.

In order to identify and classify workers' mobility, for those individuals who worked for several employers it was necessary to keep only the information for their main activity. Our main criterion to identify the workers' core activity was the number of normal hours worked in each job. The job to which the worker devoted more (normal) hours was identified as the worker's main activity. When this criterion was insufficient to identify the worker's main activity we applied, by this order, the following conditions: regular wage, other regular payments, number of extraordinary hours worked and finally irregular payments. After this procedures, the residual remaining duplicates were dropped.

In our empirical analysis, we restrict our treatment group to workers between

[1] The data does not cover family business without wage-earning employees, self-employed workers and public administration.

16 and 65 years old classified as wage earners and wages were converted to constant 2005 euros, using Consumer Price Index (CPI).

2.2 Sample construction - Treatment Group and Control Group

In order to study workers' internal mobility involving geographical changes, that is, mobility inside the firm that imply a change in the location of the workplace, our **treatment group** includes workers who fulfill the following conditions:

- the worker remains with the same employer in 1999 and 2000;
- between 1999 and 2000 the worker is transferred to another establishment of the same firm.

These workers will experience a relocation of their workplace but remain with the same employer and can be easily identified because the identification number of the firm does not change between 1999 and 2000, but there is a change in the establishment's identification number.

Our data includes firms with only one establishment as well as firms with more than one establishment. Table 1 contains information on the number of mono-establishment and multi-establishment firms in each year:

	1999	2000	2002	2003	2004	2005
One estab.	143543	145331	120480	114805	112065	116800
Multi-estab.	12156	12955	12333	12634	12739	13704
Total	155699	158286	132813	127439	124804	130504

Table 1: Number of mono-establishment and multi-establishment firms

We observe that approximately 90% of the firms have only one establishment and 10% are multi-plant firms. Multi-plant firms have, on average, 4 establishments.

In table 2 we also report the average number of workers for mono and multi-establishment firms:

We have done some consistency checks on the data. If we found an inconsistency in the variables gender, age or tenure this was repaired if possible or

	1999	2000	2002	2003	2004	2005
One estab.	10	10	12	12	12	13
Multi-estab.	68	67	69	68	70	70

Table 2: Average number of workers for mono and multi-establisment firms

otherwise the worker was dropped from the data. We have also excluded workers who have zero wage in 1999 or 2000. After these procedures we identified 98832 workers transferred to another establishment of the same firm[2].

We should remark that to change establishment without changing employer, the individual must work for a firm that has more than one establishment at least in one of the years for which we observe the move. Analyzing the data, we identified a group of individuals that appear to be **false** same-employer movers because they work in firms that have only **one** establishment in **both** pre and post-transfer years. They are falsely being identified as internal transfers because there is a change in the identification number of the firms' only establishment[3]. Table 3 characterizes our treatment group:

	1999/2000
"True" internal transfers	75810
"False" internal transfers	23022
Internal transfers	98832

Table 3: "True" and "False" internal transfers: Treatment Group

These "false" internal transfers were removed from the sample because they did not match the required conditions, namely, they could not have changed to another establishment of the same firm.

Table 4 contains the "false" internal transfers that remained in the following years after removing the 23022 "false" internal transfers from the panel.

	1999/2000	2000/2002	2002/2003	2003/2004	2004/2005
"False" internal transfers	-	370	328	197	165

Table 4: Remaining "false" internal transfers: Treatment Group

[2] As we explain better latter on, the inexistence of data on employees in 2001 poses some reserves in the identification of these workers between 2000 and 2002.

[3] Some of these cases may be explained by a relocation of the firm's only establishment.

These "false" internal transfers were also removed, obtaining a final treatment group of 74750 "true" internal transfers, that is, workers that were transferred to another establishment of the same firm.

The **control group** includes all the remaining workers that:

- appear in the database in 1999 and 2000;
- but are not internally transferred to another establishment of the same firm between 1999 and 2000.

By construction, we do not have individuals that were transferred to another establishment of the same firm in our control group between the years 1999 and 2000. However, these workers may perform internal transfers in subsequent years of the panel. For the control group we also identified and removed all workers identified as "false" internal transfers and after performing some consistency checks we obtained a control group of 1121907 individuals.

Before proceeding with the characterization of our groups, we should make two remarks. First, as we previously referred, we do not have data on individuals characteristics for the year 2001. This limitation poses some restrictions on the classification of worker's mobility. We can only classify workers using the available information for 2000 and 2002 but we do not know the worker's situation in 2001. For example, we may identify a worker as an internal transfer to another establishment of the same firm from 2000 to 2002 but, with the gap in 2001, we do not know if this internal transfer occurred in 2001 or in 2002. Theoretically, it would also be possible that, in 2001, the worker was in another employer or out of the panel. Second, due to our initial selection criterion of the workers' main activity when individuals work for more than one employer, the number of changes in employer may be slightly overestimated. As an example, in our panel, we may be misidentifying a change in employer when a change in the hours worked for each employer may have occurred.

2.3 Characterizing the data

Tables 5, 6, 7 and 8 characterize our **treatment group and control group** in terms of **workers' mobility**. We may identify:

- Internally transferred workers that change establishment without changing employer (considering our classification of mobility includes Type 1 and Type 2);
- No change: workers that remain with the same employer and in the same establishment (Basecategory or Type 5);
- Change employer: workers who change employer (considering our classification of mobility includes Type 3 and Type 4);
- Out of the panel and Into the panel: identifies workers that enter and exit the panel. For example, consider the data in table 5: in the treatment group, 18984 workers are in the panel in 2002 but do not appear in the panel in 2003 and 4411 workers are not in the panel in 2002 but appear in 2003.

	99/00	00/02	02/03	03/04	04/05
Internal transfers	74750	21837	12213	10019	9201
No change	-	27581	34477	35902	36458
Change employer	-	10266	4665	3118	4467
Out of the panel	-	15066	18984	20335	19824
Into the panel	-	-	4411	5376	4800
TOTAL	74750	74750	74750	7450	74750

Table 5: Workers' mobility: Treatment Group

	99/00	00/02	02/03	03/04	04/05
Internal transfers	100%	29%	16%	13%	12%
No change		37%	46%	48%	49%
Change employer		14%	6%	4%	6%
Out of the panel		20%	25%	27%	27%
Into the panel			6%	7%	6%
TOTAL	100%	100%	100%	100%	100%

Table 6: Workers' mobility (percentage): Treatment Group

	99/00	00/02	02/03	03/04	04/05
Internal transfers	-	45126	35523	31861	27770
No change	978758	644582	613750	589947	589116
Change employer	143149	141556	47666	38812	43604
Out of the panel	-	290643	347091	382840	377238
Into the panel	-	-	77877	78447	84179
TOTAL	1121907	1121907	1121907	1121907	1121907

Table 7: Workers' mobility: Control Group

	99/00	00/02	02/03	03/04	04/05
Internal transfers		4%	3%	3%	2%
No change	87%	57%	55%	53%	53%
Change employer	13%	13%	4%	3%	4%
Out of the panel		26%	31%	34%	34%
Into the panel			7%	7%	8%
TOTAL	100%	100%	100%	100%	100%

Table 8: Workers' mobility (percentage): Control Group

The data also allow us to observe the existence of **repeat internal movers** as some workers change establishment within the same employer several times. Table 9 reports the number of same-employer transfers done by workers from our **treatment group** and we observe that 82% of these workers changed twice.

In our **control group**, 91% of the workers are never transferred to another establishment of the same firm so the percentages shown in table 10 report to the total number of workers that are transferred to another establishment of the same firm at least once.

Number of same-employer transfers	Number of workers	%
1	41795	56%
2	19285	26%
3	8714	12%
4	3267	4%
5	1689	2%
Total	74750	100%

Table 9: Repeated transfers: Treatment Group

Number of same-employer transfers	Number of workers	%
0	1020522	-
1	70758	70%
2	23351	23%
3	6284	6%
4	992	1%
Total (excluding 0)	101385	100%
TOTAL	1121907	-

Table 10: Repeated transfers: Control Group

Some of this repeated internal movers are **return movers** showing that the previous transfer was merely temporary. We classify a transfer as a return move when the worker returns to an establishment in which he has worked in one of the previously observed years.

In table 11 we analyze, for our **treatment group**, the prevalence of return movers within the group of workers that were transferred to another establishment of the same firm.

	99/00	00/02	02/03	03/04	04/05
Internal transfers	74750	21837	12213	10019	9201
Return Internal transfers	-	8875	3089	3284	2471
%	-	41%	25%	33%	27%

Table 11: Return moves: Treatment Group

Table 12 details return internal transfers for the **control group**.

These transfers to another establishment impose costs on the worker and the costs will be different wether the transfer is local or non-local. These costs may be monetary (travel costs, lodging costs,...) and psychological costs (separation

	99/00	00/02	02/03	03/04	04/05
Internal transfers	-	45126	35523	31861	27770
Return Internal transfers	-	-	5226	8032	5977
%	-	-	15%	25%	22%

Table 12: Return moves: Control Group

from family, adaptation to a new work environment,...). For example, a transfer to a more distant location will probably impose higher costs on workers. We can identify how many of this **same employer** transfers were associated with a change in region. As transfers involving a region change will be more costly than transfers within the same region we analyze them as different kinds of mobility (considering our classification they are identified as Type 1 and Type 2).

In our analysis, we consider 21 regions. A change in region means that the worker is transferred to an establishment located in a different Portuguese district or to an establishment located in Madeira, Açores or abroad[4].

Tables 13 and 14 report the prevalence of region changes for workers changing establishment without changing employer in our **treatment group** and **control group**.

	Change region	%	Don't change	Total
1999/2000	12389	17%	62361	74750
2000/2002	5095	23%	16742	21837
2002/2003	2482	20%	9731	12213
2003/2004	2327	23%	7692	10019
2004/2005	2593	28%	6608	9201

Table 13: Region changes: Treatment Group

[4]Besides Madeira and Açores, Portugal is divided in 18 districts: Aveiro, Beja, Braga, Bragança, Castelo Branco, Coimbra, Évora, Faro, Guarda, Leiria, Lisboa, Portalegre, Porto, Santarém, Setúbal, Viana do Castelo, Viseu, Vila Real.

	Change region	%	Don't change	Total
1999/2000	-	-	-	-
2000/2002	6987	15%	38139	45126
2002/2003	5816	16%	29707	35523
2003/2004	4283	13%	27578	31861
2004/2005	4531	16%	23239	27770

Table 14: Region changes: Control Group

It may be enlightening to compare the previous group with the group of workers that **changed employer** (considering our classification of mobility, this will include Type 3 and Type 4). Tables 15 and 16 identify the prevalence of region changes for workers that **changed employer**:

	Change region	%	Don't change	Total
1999/2000	-	-	-	-
2000/2002	1836	18%	8430	10266
2002/2003	711	15%	3954	4665
2003/2004	722	23%	2396	3118
2004/2005	856	19%	3611	4467

Table 15: Region changes for workers that change employer: Treatment Group

	Change region	%	Don't change	Total
1999/2000	19001	13%	124148	143149
2000/2002	18393	13%	123163	141556
2002/2003	6659	14%	41007	47666
2003/2004	6204	16%	32608	38812
2004/2005	7274	17%	36330	43604

Table 16: Region changes for workers that change employer: Control Group

Apparently, in what concerns region changes, we do not observe significant differences between the group of workers that are internally transferred and the group of workers that change employer.

Firms are dynamic agents that may engage in processes of reorganization, expanding or downsizing their activity. Expansion may be done by opening new establishments and downsizing, in multi-plant firms, may include closing

existing ones. Individuals will be affected by these restructuring processes which will, necessarily, imply hiring, firing, transferring or reallocating workers.

The transference of workers to another establishment of the firm may be associated with the opening and closure of establishments. In fact, when the firm opens a new establishment she may fill the open vacancies by hiring in the internal labour market or by external hires. In this line of reasoning we may identify how many of this **same employer** transfers were made to **new establishments**. We identify an opening of a new establishment if that establishment appears in the panel for the first time in the year in which the transfer of the worker occurs. For the year 2001, we do not have data on employees but we used the available information on firms and establishments to identify openings of establishments in 2001. As we cannot separate same employer transfers that occurred in 2001 from the ones that occurred only in 2002, **for the years 2000/2002,** the data in tables 17 and 18 refers to changes to **an establishment that opened in 2001 or in 2002.**

	New estab.	%	Old	Total
1999/2000	23013	31%	51737	74750
2000/2002	4216	19%	17621	21837
2002/2003	3180	26%	9033	12213
2003/2004	2058	21%	7961	10019
2004/2005	1985	22%	7216	9201

Table 17: Internal transfers to new establishments: Treatment Group

	New estab.	%	Old	Total
1999/2000	-	-	-	-
2000/2002	15447	34%	29679	45126
2002/2003	10812	30%	24711	35523
2003/2004	9464	30%	22397	31861
2004/2005	9071	33%	18699	27770

Table 18: Internal transfers to new establishments: Control Group

Considering downsizing events, multi-plant firms may also decide to close one (or more) establishments. The workers from the closed establishments may be fired but they may also be transferred to another establishment of the same

firm that remains open. We also identify how many of this **same employer** transfers were associated with a **closure** of the establishment where the worker previously worked. We identify a closure if the establishment does not appear again in the survey during the period of analysis. For the reasons discussed in the previous paragraph, **for the years 2000/2002**, the data in tables 19 and 20 refers **to establishment closures that occurred in 2000 or 2001.**

	Close estab.	%	Other	Total
1999/2000	21566	29%	53184	74750
2000/2002	8691	40%	13146	21837
2002/2003	3691	30%	8522	12213
2003/2004	3954	39%	6065	10019
2004/2005	3966	43%	5235	9201

Table 19: Internal transfers due to establishment closure: Treatment Group

	Close estab.	%	Other	Total
1999/2000	-	-	-	-
2000/2002	14898	33%	30228	45126
2002/2003	11456	32%	24067	35523
2003/2004	10394	33%	21467	31861
2004/2005	10826	39%	16944	27770

Table 20: Internal transfers due to establishment closure: Control Group

Same employer transfers may be associated with promotion events (Bartel, 1979). Considering the data in our survey, we have at least two ways to empirically identify a promotion. We may use the information reported by employers as the **date of the last promotion** or associate promotions with a **change in the hierarchical level**.

The data distinguishes eight hierarchical levels (see Appendix B) defined by law (Decreto-Lei n.^{o} 121/78, de 2 Junho). Doing some aggregation, in our study we define six hierarchical levels:

- Level 1 - Top executives;
- Level 2 - Intermediary executives;
- Level 3 - Supervisors, team leaders, foremen;

- Level 4 - Higher-skilled and skilled professionals;
- Level 5 - Semi-skilled and non-skilled professionals;
- Level 6 - Apprentices, interns, trainees.

Tables 21 and 22 use the date of the last promotion reported by the employer to analyze how many **same employer** transfers were associated with a promotion event in the year of the transfer.

	Promoted	% (excluding missing)	Not Prom.	Miss	Total
1999/2000	11377	23%	37570	25803	74750
2000/2002	4658	29%	11489	5690	21837
2002/2003	1455	16%	7885	2873	12213
2003/2004	1220	16%	6363	2436	10019
2004/2005	955	15%	5347	2899	9201

Table 21: Internal transfers and promotions: Treatment Group

	Promoted	% (excluding missing)	Not Prom.	Miss	Total
1999/2000	-	-	-	-	-
2000/2002	12055	35%	22372	10699	45126
2002/2003	4263	16%	22542	8718	35523
2003/2004	4041	17%	20365	7455	31861
2004/2005	3272	16%	16766	7732	27770

Table 22: Internal transfers and promotions: Control Group

Associating promotions with hierarchical levels, tables 23 and 24 report the number of workers transferred to another establishment of the same firm that experience a change in the hierarchical level [5].

[5] So far, we are just reporting changes in hierarchical levels without controlling wether that change is, in fact, made to a higher level.

	Change level	%	Don't change	Total
1999/2000	15805	21%	58945	74750
2000/2002	4642	21%	17195	21837
2002/2003	1553	13%	10660	12213
2003/2004	968	10%	9051	10019
2004/2005	853	9%	8348	9201

Table 23: Internal transfers and changes in the hierarchical level: Treatment Group

	Change level	%	Don't change	Total
1999/2000	-	-	-	-
2000/2002	8912	20%	36214	45126
2002/2003	4518	13%	31005	35523
2003/2004	3232	10%	28629	31861
2004/2005	2767	10%	25003	27770

Table 24: Internal transfers and changes in the hierarchical level: Control Group

3 The Models

3.1 Intra-firm and Inter-firm mobility: who's moving, and where to?

To study mobility probabilities we will use the **multinomial logit model** (Schmidt and Strauss, 1975). The model extends the logit model when the response has more than two outcomes and it applies when variables are individual specific. Let y denote a random variable taking on the values $\{0, 1, ..., J\}$ for J a positive integer, and let X denote a set of regressors. In our model y will denote the type of mobility performed by the individual while X will contain individual specific variables (gender, age, education, tenure, promotions, nationality,...) and characteristics of the firm where the individual works. Demographic characteristics are believed to influence the costs of moving and therefore are related to the willingness to accept changes (Turban *et al.*, 1992). We are interested in how, *ceteris paribus*, changes in the elements of X affect the response probabilities, $P(y = j|X)$, $j = 0, 1, 2, ..., J$.

Let X be a $1 \times K$ vector with first-element unity, the multinomial logit (MNL) model has response probabilities:

$$P(y=j|X) = \frac{e^{x\beta_j}}{1+\sum_{h=1}^{J} e^{x\beta_h}}, \text{ where } \beta_j \text{ is } K \times 1 \text{ , } j = 1, ..., J$$

Because the response probabilities must sum to unity, $P(y=0|X)$ is determined once we know the probabilities for $j = 1, 2, ..., J$:

$$P(y=0|X) = \frac{1}{1+\sum_{h=1}^{J} e^{x\beta_h}}$$

The model implies that we can compute J odds-ratios:

$$\frac{P_j(x,\beta)}{P_h(x,\beta)} = e^{x(\beta_j - \beta_h)} \text{ and if } h = 0, \quad \frac{P_j(x,\beta)}{P_0(x,\beta)} = e^{x\beta_j}$$

Estimation of the MNL model is best carried out by maximum likelihood (McFadden, 1974).

3.2 Returns to mobility: the effect of worker's mobility on wages

Exploring outcomes of mobility, we want to analyze the returns to mobility separating between returns to different types of mobility. Considering our classification of mobility we will identify:

1. Same-employer transfers without region change ($SESR$ - Same Employer Same Region);
2. Same-employer transfers with region change ($SECR$ - Same Employer Change Region);
3. Employer change without region change ($CESR$ - Change Employer Same Region);
4. Employer change with region change ($CECR$ - Change Employer Change Region);
5. No change (Basecategory)

We estimate by OLS an equation capturing the difference in earnings for the different types of mobility considered:

$$\ln W_{it} = \beta_1 X_{it} + \beta_2 Z_{it} + \sum_{k=0}^{4} SESR_{it}^{k}\delta_k + \sum_{k=0}^{4} SECR_{itk}^{k}\lambda_k + \sum_{k=0}^{4} CESR_{it}^{k}\alpha_k +$$

$$\sum_{k=0}^{4} CECR_{it}^{k}\tau_k + \gamma_t + \varepsilon_{it}$$

where $\ln W_{it}$ is the logarithm of real hourly earnings for individual i at period t. Hourly earnings are defined as the ratio between total **regular** and **irregular** labour earnings and the total number of normal hours worked. We deliberately chose to include irregular earnings because some pay differentials for transferred employees may arise in the form of **irregular benefits**.

X_{it} is a vector of individual characteristics and Z_{it} includes a set of characteristics from the firm in which the individual works. The variable $SESR_{it}^{k}$ is a dummy variable that takes the value one if at time t worker i is k years after being transferred to another establishment of the same firm in the same region. The δ_k parameters reflect the difference in earnings k years after changing establishment within the same region and the corresponding reference group, workers that don't change employer nor establishment. $SECR_{it}^{k}$ is a dummy variable that takes the value one if at time t worker i is k years after being transferred to another establishment of the same firm located in a different region. The λ_k parameters reflect the difference in earnings k years after changing establishment and region and the corresponding reference group, workers that don't change employer nor establishment.

The variable $CESR_{it}^{k}$ is a dummy variable that takes the value of one if at time t worker i is k years after changing employer within the same region. The α_k parameters reflect the difference in earnings k years after changing employer within the same region and the corresponding reference group, workers that don't change employer nor establishment. The variable $CECR_{it}^{k}$ is a dummy variable that takes the value of one if at time t worker i is k years after changing employer and region. The τ_k parameters reflect the difference in earnings k years after changing employer and region and the corresponding reference group.

γ_t is a set of time dummies that control for year-specific effects and ε_{it} is a disturbance term which is assumed to have zero mean and constant variance.

4 Empirical Results

4.1 Intra-firm and Inter-firm mobility: who's moving, and where to?

Considering our classification of mobility types, we report results for the estimation of a multinomial logit model considering the following categories:

1. The worker changes establishment within the same employer **not changing region** (mobility = 1)
2. The worker changes establishment within the same employer **and changes region** (mobility = 2)
3. The worker changes employer **not changing region** (mobility = 3)
4. The worker changes employer **and changes region** (mobility = 4)
5. The worker remains in the same establishment of the same firm: No change (mobility =5 and basecategory)

We recall that, in our analysis, we consider 21 regions and a change in region means that the worker is transferred to an establishment located in a different district or to an establishment located in Madeira, Açores or abroad.

Table 25 reports results for this multinomial logistic regression (see Appendix C for a more detailed description of variables definition).

Notes:

mobility=5 is the base outcome

Estimation includes a set of time dummies

*** Estimates significant at 1%

** Estimates significant at 5%

* Estimates significant at 10%

	mobility = 1		mobility = 2		mobility = 3		mobility = 4	
Indep. var.	Coef.	t-ratio	Coef.	t-ratio	Coef.	t-ratio	Coef.	t-ratio
Tenure200	0,2024***	(12,63)	0,1210***	(3,59)	0,8825***	(45,27)	2,1581***	(23,47)
Tenure400	0,0070	(0,45)	-0,1209***	(-3,65)	0,1750***	(8,87)	0,2228**	(2,35)
Age	-0,0008	(-0,45)	0,0235***	(6,12)	-0,0769***	(-61,20)	-0,0759***	(-25,57)
Age squar.	0,0018	(0,87)	-0,0348***	(-7,69)	0,0698***	(45,05)	0,0658***	(17,79)
Female	-0,0086*	(-1,65)	-0,4225***	(-33,75)	-0,0555***	(-13,78)	-0,4888***	(-49,23)
Educ4	-0,0976***	(-8,87)	-0,1316***	(-5,74)	-0,3658***	(-40,59)	-0,7811***	(-39,58)
Educ9	-0,1360***	(-14,40)	-0,1241***	(-6,14)	-0,2418***	(-30,08)	-0,6175***	(-35,43)
Educ12	-0,0254***	(-2,85)	-0,0012	(-0,06)	-0,2960***	(-37,58)	-0,5916***	(-34,58)
Nationality	0,2633***	(11,67)	0,5426***	(14,83)	0,4856***	(29,24)	0,5638***	(17,09)
Prom [-3,0]	0,0128*	(1,89)	0,1228***	(9,04)	-0,3353***	(-49,40)	-0,4594***	(-27,95)
$\ln W$ lag	0,0402***	(6,73)	0,2028***	(17,00)	-0,2093***	(-41,68)	-0,3490***	(-30,76)
Size lag	0,2897***	(224,36)	0,5284***	(181,49)	-0,0061***	(-6,05)	-0,0801***	(-35,54)
Δ Size	0,1547***	(46,76)	0,3079***	(41,32)	-0,0266***	(-12,09)	-0,0034	(-0,74)
n_est	0,0012***	(76,12)	-0,0003***	(-6,61)	0,0021***	(124,07)	-0,0005***	(-7,64)
caeAB	-0,5112***	(-18,96)	-0,0763	(-1,14)	0,0063	(0,39)	0,5941***	(19,16)
caeC	-0,4502***	(-13,66)	-0,2122***	(-2,89)	0,1434***	(6,49)	0,2273***	(4,64)
caeD	-1,2951***	(-169,93)	-1,1109***	(-60,52)	-0,3628***	(-67,77)	-0,6007***	(-43,97)
caeE	-0,4301***	(-25,30)	-1,1867***	(-27,00)	1,3863***	(95,55)	0,8353***	(15,97)
caeF	0,0133	(1,50)	1,5371***	(95,67)	0,1314***	(19,10)	0,5904***	(41,56)
caeH	0,0589***	(5,58)	-0,3860***	(-11,50)	0,1780***	(21,67)	-0,0742***	(-3,30)
caeI	-0,8891***	(-91,52)	-1,0414***	(-49,61)	0,0739***	(8,95)	0,4088***	(22,81)
caeJ	-0,0692***	(-6,75)	-0,4060***	(-16,63)	0,0101	(0,89)	-0,1353***	(-4,21)
caeK	-0,2053***	(-20,89)	0,2135***	(10,62)	0,8266***	(123,58)	1,2120***	(86,92)
caeL	-0,5309***	(-9,77)	-1,1512***	(-6,16)	0,1016***	(2,56)	0,2689***	(3,13)
caeM	-0,2475***	(-13,04)	-0,1840***	(-3,40)	-0,4233***	(-24,27)	-0,3944***	(-8,98)
caeN	-0,0298***	(-2,59)	-0,9508***	(-18,95)	-0,7817***	(-59,80)	-0,6989***	(-20,58)
caeOQ	-0,1864***	(-12,96)	-0,2948***	(-7,88)	-0,0167	(-1,38)	0,0141	(0,47)
Constant	-3,9274***	(-100,72)	-7,6664***	(-89,62)	-0,4801***	(-15,33)	-3,2690***	(-30,41)
Log L.	-2395292,2							
Prob>X^2	0,0000							
Pseudo R^2	0,0961							
N	4199886							

Table 25: Multinomial logistic regression

Following estimation, we began by testing whether the different types of mobility considered could be pooled together into a common single status., i.e., we tested whether the coefficient estimates from the multinomial logit model could be constrained to be the same. In particular, we investigated whether we could pool together transfers and employer changes not involving region change (mobility types 1 and 3, in our estimation) and transfers and employer changes involving migration (mobility types 2 and 4, in our estimation). So, considering mobilities that imply a migration we mean to test whether, at the eyes of the worker, performing the move within the same employer is viewed as different from moves that imply an employer change. In the same line of reasoning, when considering mobilities that don't imply a region change, we want to test whether the worker views local moves with employer change differently from local transfers within the same employer.

Performing the tests, the hypothesis of pooling together these types of mobility was clearly rejected. Therefore, at the eyes of the worker, each of these categories seems to be well-defined, independent and should be analyzed separately.

Next, we report the estimated average probabilities of choosing each type of mobility:

- Pr (SESR) = 5,23%
- Pr (SECR) = 1,1%
- Pr (CESR) = 8,84%
- Pr (CECR) = 1,45%
- Pr (No change) = 83,38%

To emphasize the importance of same employer moves we may observe that 37,2% of the moves that don't involve a region change (SESR and CESR) are performed within the same employer. If we consider the group of moves that imply a region change (SECR and CECR) we conclude that 43,1% of these moves are made within the same employer. Most moves don't involve a change

in region/district, however, if we refined our classification of region change into smaller areas we might have different results.

Our results show a positive relation between pre-move wages and the likelihood of being transferred to another establishment of the same firm but we observe a negative relation between pre-move wages and the probability of changing employer. Bartel (1979) also found that pre-move wages had a negative effect on the probability of job separation (which included quits and layoffs) while, in the particular case of establishment transfers within the same employer, and for the group of younger man, she observed that higher pre-move wages increased the probability of being transferred.

We also observe that having been promoted in the three years before the move also increases the likelihood of being transferred (specially, if this transfer involves a region change) but has a negative effect on the probability of changing employer. Then, we may conclude that being promoted reduces the probability of a job separation. Although this may seem obvious, it may not be so because promotion also signals to the outside that the worker is valuable (Waldman, 1984). However, as long as some human capital is firm specific than a promotion may signal that the worker is better suited to the current firm than to other firms (Lazear, 1999, Jovanovic 1979). We have previously remarked that these establishment transfers can be a different way to move within internal labour markets and to build a career in multi-establishment firms. Apparently, our results indicate that these transferred individuals include workers that are performing well at the present firm. This may signal a good match which both the firm and the worker may be interested in maintaining and developing and may be consistent with Bartel's (1979) findings that firms transfer those individuals who have shown a commitment to the firm. Bartel (1979) also conjectures that these transfers act as a promotion within the firm which is consistent with our hypothesis that in multi-plant firms there exists a global internal labour market which is built on the firm as a whole.

In the case of workers that are performing poorly at the firm, either by lower wages or poor promotion perspectives, we observe that they are more likely to leave (voluntarily or involuntary). An unsuccessful track in the company in-

creases the likelihood of changing employer, probably indicating the termination of a bad match.

Education has a positive impact in all probabilities of mobility. This is consistent with most findings that more educated workers have less mobility costs (for instance, may be more adaptable to changes). When the move involves an employer change the usual explanation for this relation is that more instructed individuals tend to have better information about job opportunities. When the move involves a migration, more educated are also believed to have lower costs of migration and tend to be in "occupations that operate in a national labour market" (Bartel, 1979). This last argument may also be crucial within the context of internal labour markets in multi-establishment firms. As educated workers are more likely to occupy jobs that operate in a national labour market, when they work in multi-establishment firm, the firm may have a "national" internal labour market for more skilled professionals. For the worker, these transfers may constitute a less risky and less costly alternative to migrate. These results also appear to give substance to Hunt's (2004) conclusion that "skilled workers (...) have a low cost migration avenue that has not been considered in previous literature" which is "same-employer migration".

We notice that some variables like age and gender are not statistically significant when we consider the probability of changing establishment without changing region. This seems reasonable as the relevance of these variables may be of greater importance in transfers involving region changes. Our results show that the likelihood of being transferred to an establishment located in another region is higher for male workers and increases with age (which is consistent with Bartel, 1979 and Hunt, 2004). For employer changes, the variables age and gender are always statistically significant whether the change involves or not a migration. For these job separations, we find that movers are more likely to be younger male workers. This is consistent with findings that younger worker are still searching for a good job match or seem to choose, in the beginning of their careers, jobs that offer good on-the-job training and human capital accumulation and, in the future will move to another job that offers a more generous reward for the accumulated education, training and job experience (Schaeffer,

1985).

Hunt (2004) concludes that "same employer migrants" prevail in certain job categories like accountants and cashiers for women and architects and engineers for men. Considering the Portuguese Classification of Economic Activity (cae) at one letter[6], we conclude that establishment transfers not involving migration prevail in construction (cae F), in hotels and restaurants (cae H) and in wholesale and retail trade (cae G). When we consider transfers that imply a region change the activities in which the likelihood of being transferred is higher are construction (cae F), wholesale and retail trade (cae G) and real estate, renting and business activities (cae K).

As job tenure may be a proxy for the accumulation of specific human capital, the company might choose to transfer employees with higher tenure. Bartel (1979) finds a strong positive relation between job tenure and the probability of being transferred but a negative effect of tenure on the other kinds of migration (quits and layoffs). Our results agree with Bartel's negative relation for the case of employer changes. However, for same employer transfers, we find a positive sign for the group of less tenured employees (tenure less than 200 months). This may happen if, for this group of workers, the transfer is in itself an investment in specific human capital that may enhance career perspectives inside the firm. This kind of strategy is relatively frequent, for example, in financial institutions (cae J). Apparently, we may conclude that transferred individuals in multi-establishment firms may be higher tenured workers with more specific human capital or may be workers for whom these transfers are a way to accumulate specific human capital and improve their career opportunities within the firm's internal labour market. The likelihood of changing employer decreases with tenure, which is also consistent with the theory of specific human capital. When there are important investments in specific human capital both the firm and the worker have an interest in preserving and maintaining the job relation. As it is reasonable to assume that firm specific capital increases with tenure, then, the probability of displacement probability will be higher for low tenure employees, being possible to observe that new jobs tend to end early (Farber,

[6] Equivalent to Standard Industrial Classification (SIC) codes.

1999). Shaw (1991) also reports that investments in specific human capital reduce the probability of migration and changing employer.

We also conclude that same employer transfers prevail in large and growing firms. Firm's lagged growth has a positive and significant in the probability of same employer transfers. We also notice that transfers prevail in large firms where it is expected that internal labour markets are more likely to exist and to play an important role. Workers in large or growing firms are less likely to leave which is consistent with usual findings that large firms have lower turnover rates.

4.1.1 The Independence of Irrelevant Alternatives

It is stated that the appropriateness of the multinomial logit model relies on the property whereby $\frac{P_j(x,\beta)}{P_0(x,\beta)}$ is independent of the remaining probabilities, known as the **independence of irrelevant alternatives assumption (IIA)**. The IIA means that, all else being equal, a person's choice between two alternative outcomes is unaffected by what other choices are available. This assumptions is often illustrated by the commonly used example "Red bus/Blue bus" from McFadden (1974). Train (2003), however, points out that this example is rather extreme and unlikely to occur in serious, substantive research.

Performing the usual tests (Hausman test and Suest test) we could globally conclude that our model did not verify the IIA hypothesis**.** However, we obtained some inconsistency in conclusions across tests and specifications. Corroborating these findings, Long and Freese (2001) alert to the fact that these tests often give inconsistent results and may provide little guidance to violations of the IIA assumption. Fry and Harris (1996, 1998) explored the statistical properties of these tests discussing their size and power properties. Some recent literature argues that there may be some problems with these tests. Cheng and Long (2007) state that "even in well-specified models, IIA tests often reject the assumption when the alternatives seem distinct". They conclude that tests of the IIA assumption that are based on the estimation of a restricted choice set are unsatisfactory for applied work.

Multinomial probit model (MNP) is often proposed as an alternative to the

multinomial logit model (MNL). In fact, error specification in multinomial probit model allows correlations between the errors, thus potentially removing the IIA assumption, however it presents difficult computational problems. We can find in Stata the command "mprobit" that allows the estimation of a multinomial probit model. However, the "mprobit" command assumes that the errors are uncorrelated. Accordingly, "mprobit" estimates an exact counterpart to the multinomial logit fitted by the "mlogit" command – meaning that it also assumes IIA. Long and Freese (2006) alert to the fact that, if we use both "mprobit" and "mlogit" with the same model and data, we will get nearly identical predictions. Despite these facts, we have found some papers using "mprobit" command to estimate multinomial probit models and allegedly relaxing IIA (see for example, Jepsen, 2008 or Shi and Heerink, 2007).

On the other hand some authors argue that there exists little evidence showing that MNP will provide more accurate results than MNL. Kropko (2008), conducts computer simulations to show that MNL nearly always provides more accurate results than MNP, even when the IIA assumption is severely violated. They suggest that researchers should not assume that MNP is the most reliable empirical model. In the same line of reasoning, Dow and Endersby (2004) suggest that, for most purposes the simpler MNL is preferable to MNP.

As suggested by Cheng and Long (2007), it appears that the best advice regarding IIA goes back to an early statement by McFadden (1974) who wrote that the multinomial and conditional logit models should only be used in cases where the outcome categories "can plausibly be assumed to be distinct and weighed independently in the eyes of each decision maker." Similarly, Amemiya (1981) suggests that the MNL works well when the alternatives are dissimilar.

4.1.2 The Mixed Logit Model

As an alternative model and to overcame the violation of IIA hypothesis we are working on the estimation of a mixed logit model[7]. Mixed logit is a highly flexible model that can approximate any random utility model (McFadden and Train, 2000). As stated in Train (2003), mixed logit probabilities are the inte-

[7] Also referred to in various literatures as random parameter logit, mixed multinomial logit and hybrid logit.

grals of standard logit probabilities over a density of parameters. Stated more explicitly, a mixed logit model is any model whose choice probabilities can be expressed in the form:

$$P_{ni} = \int L_{ni}(\beta) f(\beta) d\beta,$$

where $L_{ni}(\beta)$ is the logit probability evaluated at parameters β.

$$L_{ni}(\beta) = \frac{e^{V_{ni}(\beta)}}{\sum_{j=1}^{J} e^{V_{nj}(\beta)}}$$

and $f(\beta)$ is a density function. $V_{ni}(\beta)$ is the observed portion of the utility, which depends on the parameters β. If utility is linear in β, then $V_{ni}(\beta) = \beta^{'} x_{ni}$. In this case, the mixed logit probability takes its usual form:

$$P_{ni} = \int \left(\frac{e^{\beta^{'} x_{ni}}}{\sum_{j} e^{\beta^{'} x_{nj}}} \right) f(\beta) d\beta.$$

The mixed logit probability is a weighted average of the logit formula evaluated at different values of β, with the weights given by the density $f(\beta)$. Standard logit is a special case where the mixing distribution $f(\beta)$is degenerate at fixed parameters b: $f(\beta) = 1$ for $\beta = b$ and 0 for $\beta \neq b$. The choice probability then becomes the simple logit formula:

$$P_{ni} = \frac{e^{b^{'} x_{ni}}}{\sum_{j} e^{b^{'} x_{nj}}}$$

The mixed logit probability can be derived from utility-maximizing behavior in several ways. The most widely used in recent applications, is based on random coefficients. The decision maker faces a choice among J alternatives. The utility of person n from alternative j is specified as:

$$U_{nj} = \beta_{n}^{'} x_{nj} + \varepsilon_{nj}$$

where x_{nj} are observed variables that relate to the alternative or decision maker, β_n is a vector of coefficients of these variables for person n, and ε_{nj} is a random term that is IID extreme value. The coefficients vary over decision makers in the population with density $f(\beta)$. This density is a function of parameters

that represent, for example, the mean and covariance of the $\beta\prime s$ in the population. This specification is the same as for standard logit except that β varies over decision makers rather than being fixed. The researcher specifies a distribution for the coefficients and estimates the parameters of that distribution. In most applications, $f(\beta)$ is specified to be normal or lognormal.

We use the Stata module "mixlogit" (Train 2003; Hole 2007) to perform the estimation. We specified the choice-specific constants as varying across individuals and as correlated across choices to account for unobserved dependencies among choices.

We report bellow our preliminary results. Due to time and computational reasons the preliminary estimation considers only three types of mobility (instead of five, as in the multinomial logit):

1. The worker changes establishment within the same employer;
2. The worker changes employer;
3. No change.

We also used only regressors for age, gender and education and the years 1999, 2000 2002 and 2003 of the panel. The results we obtained so far appear to validate the results obtained by the multinomial logit model. Table 26 reports preliminary results for the mixed logit regression.

The final 3 coefficients are the elements of the lower-triangular matrix L, that is the Cholesky factorization of the covariance matrix V. The covariance matrix for the random coefficients V is given by $V = LL^{'}$.

	Coef.	t-ratio
Age_SEM	0,0105	43,14
Age_Change_employer	-0,0333	-167,37
Female_SEM	-0,1714	-34,40
Female_Change_employer	-0,1626	-43,06
Education 4_SEM	-0,8455	-97,68
Education 4_Change_employer	-0,4213	-59,12
Education 9_SEM	-0,6428	-77,50
Education 9_Change_employer	-0,3239	-47,95
Education 12_SEM	-0,1334	-14,99
Education 12_Change_employer	-0,2596	-34,53
SEM	-2,2941	-185,30
Change_employer	-0,2715	-28,17
/111	0,0264	0,28
/121	0,0094	0,21
/122	0,0400	1,05

Table 26: Mixed Logit Model

4.2 Returns to mobility: the effect of worker's mobility on wages

To analyze the effect of different types of mobility on earnings, table 27 reports the results for a OLS regression of wages[8][9]:

Notes:

Dependent variable: Log of average real hourly earnings.

Estimation includes a set of time and industry dummies

*** Estimates significant at 1%

** Estimates significant at 5%

* Estimates significant at 10%

[8] We recall that average hourly earnings are defined as the ratio between total **regular** and **irregular** labor earnings and the total number of normal hours worked.

[9] We recall that we identify a change in region as a change to a different Portuguese district. We consider 21 regions, a change in region means that the worker is transferred to a different district or to Madeira, Açores or abroad.

Besides Madeira and Açores, Portugal is divided in 18 districts: Aveiro, Beja, Braga, Bragança, Castelo Branco, Coimbra, Évora, Faro, Guarda, Leiria, Lisboa, Portalegre, Porto, Santarém, Setúbal, Viana do Castelo, Viseu, Vila Real.

Independent variables	Coef.	t-ratio
SE_same_reg$_0$	0,0008	(0,96)
SE_same_reg$_1$	0,0059***	(5,98)
SE_same_reg$_2$	0,0098***	(8,64)
SE_same_reg$_3$	0,0267***	(19,08)
SE_same_reg$_4$	0,0298***	(14,13)
SE_change_reg$_0$	0,0401***	(21,86)
SE_change_reg$_1$	0,0452***	(21,33)
SE_change_reg$_2$	0,0453***	(14,98)
SE_change_reg$_3$	0,0461***	(15,06)
SE_change_reg$_4$	0,0579***	(12,39)
Age	0,0256***	(223,91)
Age squared	-0,0223***	(-162,38)
Female	-0,2211***	(-628,20)
Education 4	-0,6774***	(-794,23)
Education 9	-0,5246***	(-659,89)
Education 12	-0,3126***	(-389,50)
Nationality	0,0101***	(6,36)
Tenure	0,0087***	(139,05)
Tenure squared	-0,0092***	(-50,14)
Level 2	-0,1950***	(-175,33)
Level 3	-0,3549***	(-316,92)
Level 4	-0,5940***	(-651,31)
Level 5	-0,7617***	(-779,54)
Level 6	-0,7661***	(-604,16)
Size	0,0618***	(721,20)
Change emp_same_reg$_0$	0,0177***	(25,84)
Change emp_same_reg$_1$	0,0212***	(27,74)
Change emp_same_reg$_2$	0,0237***	(27,53)
Change emp_same_reg$_3$	0,0290***	(27,76)
Change emp_same_reg$_4$	0,0410***	(24,17)
Change emp_change_reg$_0$	0,0366***	(23,19)
Change emp_change_reg$_1$	0,0443***	(24,21)
Change emp_change_reg$_2$	0,0446***	(20,84)
Change emp_change_reg$_3$	0,0481***	(18,16)
Change emp_change_reg$_4$	0,0445***	(9,70)
Constant	1,780	(742,52)
$\overline{R}^2$	0,61	
N	5603759	

Table 27: OLS regression for wages

Most of our estimates are consistent with usual findings. Wages increase (at a decreasing) rate with age and tenure, are higher for men, increase with education and are larger for higher hierarchical levels. More importantly, our results also allow us to distinguish between the immediate gains to mobility and the future gains to mobility and also to discriminate returns between the different types of mobility considered.

We can see that for same-employer transfers without region change, in the year of the transfer the wage premium is not statistically significant. As the transfer does not involve a region change, it may not be necessary to pay a wage premium to the worker. In fact, this kind of transfer will not impose significant costs on the worker (for example, it won't be necessary to change the place of residence). In the two years that follow, these workers earn more 0,6% and 1%[10]. Higher premiums are observed three and four years after the transfer when this group of workers earn more 2,7% and 3%, respectively. These wage premiums may be the result from the accumulation of specific human capital and progression in the firms' internal labour markets. These results generally agree with Bartel's (1979) findings that wage premiums of transferred workers are larger than the gains of employees who are not transferred. By accepting changes, an employee may show continued willingness to work on behalf of the organization and may gain skills that will lead to enhanced future opportunities (Ostroff and Clark, 2001). These enhanced future opportunities are reflected in the wage premiums that we observe for these transferred workers.

Looking at the results for the group of same-employer transfers involving region changes, we may observe that wage premiums are larger. In the year of the transfer these same-employer migrants earn 4,1% more than the reference group. In the years that follow, these workers earn more 4,6%, 4,6%, 4,7% and 6%, respectively, one year, two years, three years and four years after the transfer. These payments are considerably larger than the ones observed in the previous group as these premiums include, not only the progression in the internal labour market but also the compensating differential for migration. The difference between the premiums for this two groups, **provides an estimation**

[10] To calculate the discrete percentage change in y induced by Δx the matematical transformation $\exp(coef.) - 1$ is employed.

of the wage premium for migration. We conclude that there exists a greater reward when employees have to incur in additional costs such as those involved in relocation. Our results also appear to corroborate other findings from migration literature noting that returns to migration are not immediate, increasing the relevance of following individuals in the years that follow the transfer (Schaeffer 1985, Yankow, 2003). Recall that the wage premium for this same-employer migrants reaches almost 6% four years after the transfer.

We may also analyze results for the two groups of employer changers. The interpretation of these results demands additional caution as the information contained in our database does not allow us to separate voluntary quits from involuntary layoffs. Following Yankow (2003), we may compare the outcomes of individuals who change job and migrate against the outcomes of those individuals changing employers within the same region. The premiums for employer changes without region change are 1,8%, 2,1%, 2,4%, 2,9%, 4,2% respectively in the year of the change, one year, two years, three years and four years after the change. Notice that, if we compare these premiums with the premiums of individuals that are transferred within the same-employer and region they are considerably larger. In fact, same-employer transfers are less risky and cheaper as the worker does not have to go through the process of job search. When unknown aspects are greater the risk increases and this affects wage premiums. Our results apparently corroborate that a worker will demand a higher premium to accept the risk of an employer change.

The premiums for employer and region changes are, respectively, 3,7%, 4,5%, 4,6%, 4,9%, 4,6%. With increased caution, we may compare these results with the wage premiums for the group of individuals changing employer without changing region also obtaining an estimation for the wage premium of migration (as in Yankow, 2003).

Finally, comparing this last group with the premiums of same-employer migrants that change region we observe that the returns for employer and region changers are slightly lower. In this context, we recall that this group of employer changers pools together quits and layoffs imposing difficulties in the interpretation of these results. Some of these migrants that change employer may fail

to obtain better wage opportunities. It is possible that the proportion of "failures" in this group of migrants is greater than in the group of same-employer migrants due to an increased risk associated with changing employer and also because some of these changes were forced by involuntary layoffs.

We should remark that we also estimated a more parsimonious regression not controlling for employers' characteristics. This regression showed considerably larger premiums for all the groups. This finding corroborates recent empirical work on wage determination showing that employers' characteristics are a crucial determinant of workers' wages (Carneiro and Portugal, 2006).

Finally, table 28 reports the estimation of a regression with individual-specific effects. It should be noted that the fixed effects estimates of the coefficients of mobility dummies do not have a direct interpretation in terms of earnings differentials, since the coefficients represent within-individual earnings changes. Nevertheless, the fixed effects estimates also exhibit positive and significant effects .

Notes:

Dependent variable: Log of average real hourly earnings.

Estimation includes a set of time and industry dummies

Independent variables	Coef.	t-ratio
SE_same_reg$_0$	0,0134***	(22,27)
SE_same_reg$_1$	0,0160***	(24,49)
SE_same_reg$_2$	0,0166***	(22,25)
SE_same_reg$_3$	0,0299***	(33,10)
SE_same_reg$_4$	0,0315***	(23,42)
SE_change_reg$_0$	0,0144***	(11,10)
SE_change_reg$_1$	0,0167***	(11,80)
SE_change_reg$_2$	0,0129***	(8,10)
SE_change_reg$_3$	0,0173***	(8,86)
SE_change_reg$_4$	0,0190***	(6,42)
Age	0,0341***	(161,96)
Age squared	-0,0231***	(-91,10)
Education 4	-0,0828***	(-54,60)
Education 9	-0,0800***	(-55,51)
Education 12	-0,0655***	(-47,82)
Tenure	0,0038***	(46,94)
Tenure squared	-0,0011***	(-3,83)
Level 2	-0,0358***	(-31,77)
Level 3	-0,0435***	(-34,06)
Level 4	-0,1143***	(-108,83)
Level 5	-0,1586***	(-139,36)
Level 6	-0,1954***	(-150,79)
Size	0,0412***	(264,47)
Change emp_same_reg$_0$	0,0143***	(27,82)
Change emp_same_reg$_1$	0,0224***	(49,59)
Change emp_same_reg$_2$	0,0276***	(45,63)
Change emp_same_reg$_3$	0,0333***	(46,74)
Change emp_same_reg$_4$	0,0417***	(37,37)
Change emp_change_reg$_0$	0,0252***	(22,14)
Change emp_change_reg$_1$	0,0387***	(30,66)
Change emp_change_reg$_2$	0,0407***	(28,11)
Change emp_change_reg$_3$	0,0453***	(25,82)
Change emp_change_reg$_4$	0,0480***	(16,15)
Constant	0,5764***	(119,00)

Table 28: Fixed effects regression

5 Future directions for research

- **The self-selection problem**

The OLS estimation used to estimate wage returns is appropriated if same-employer transfers could be seen as a quasi-experiment. However, if unobserved individual heterogeneity affects the probability of being internally transferred, we will have a self-selection problem. In fact, the decision to perform a same-employer move is clearly endogenous. In this line of reasoning, we will explore the possibility of using an **instrumental variables estimator (IV)**. IV deals directly with selection on the unobservables. The IV approach requires the existence of at least one regressor exclusive to the decision rule. This regressor, the instrumental variable, only affects participation in the treatment and so is not in X (known as the exclusion restriction). In this line of reasoning, we propose to estimate wage equations correcting for selectivity using a multinomial logit model.

- **Other outcomes of being a same-employer mover**

So far, the section on returns to mobility addressed the impact of mobility on wages. We intend to explore other outcomes of mobility. We plan to analyze the importance of being a same employer mover on the likelihood of remaining with the same employer. We want to investigate if workers that perform this transfers between establishments of the same firm have a higher probability of remaining with the same employer, for example, three years after the move. This may follow on Bartel's findings that this type of internal transfers may signal a stronger commitment from the worker and from the firm in the maintenance of the labour relationship.

Appendix A

CAE - Portuguese Classification of Economic Activities (equivalent to SIC codes):

A Agriculture, animal husbandry, hunting and forestry
B Fishing
C Mining and quarrying
D Manufacturing
E Electricity, gas and water supply
F Construction
G Wholesale and retail trade
H Hotels and restaurants
I Transport, storage and communication
J Financial activities
K Real estate, renting and business activities
L Education
M Health and social work
N Other community, social and personal service activities
O Families with household employee
P International Institutions and other extra-territorial organizations

As in our panel we do not have observations for cae P, it may be dropped.

Appendix B

Hierarchical levels defined by law (Decreto-Lei n.^{o} 121/78, de 2 Junho):

1 Top executives (top management)
2 Intermediary executives (middle management)
3 Supervisors, team leaders, foremen
4 Higher-skilled professionals
5 Skilled professionals
6 Semi-skilled professionals
7 Non-skilled professionals
8 apprentices, interns, trainees

Appendix C

Variables definition:

Tenure 200	Tenure less than 200 months
Tenure 400	Tenure between 200 and 400 months
Age	Worker's age in years
Age squared	Square of worker's age (divided by100)
Female	Gender dummy equal 1 for female
Education 4	4 or less years of schooling
Education 9	6 or 9 years of schooling
Education 12	12 years of schooling
Nationality	Dummy equal 1 for foreign worker
Promotion [-3,0]	Dummy equal 1 if the worker was promoted in the previous 3 years
$\ln W$ lag	Regular real hourly wage in the previous year
Size lag	Firm size in the previous year (log number of workers)
Δ Size	Change in firm size
Tenure	Tenure in years
Tenure squared	Squared tenure in years (divided by100)
Level...	Dummies for hierarchical levels
n_est	Number of establishments
SE_same_reg$_X$	Dummy equal 1 X years after changing estab. in the same region
SE_change_reg$_X$	Dummy equal 1 X years after changing estab. with region change
Change emp_same_reg$_X$	Dummy equal 1 X years after changing employer in the same region
Change emp_change_reg$_X$	Dummy equal 1 X years after changing employer with region change

Appendix D: Marginal effects for Multinomial Logit Models

Multinomial Logit Model: five outcomes

Marginal Effects

Outcome 1

variable	dy/dx	Std. Err.	z	P>|z|	[95% C.I.]		X
ten_200*	.0035095	.00063	5.57	0.000	.002274	.004745	.7694
te~0_400*	-.0010985	.00064	-1.71	0.087	-.002356	.000159	.2044
idade	.0002697	.00008	3.27	0.001	.000108	.000431	40.446
idade_~d	-.0001983	.0001	-2.06	0.040	-.000387	-9.2e-06	17.381
sexo*	.0005572	.00022	2.51	0.012	.000122	.000993	.40267
escola~n*	.0103424	.0014	7.40	0.000	.007602	.013083	.00800
escol~04*	-.0026238	.00038	-6.93	0.000	-.003366	-.001882	.32718
escol~69*	-.0034323	.00034	-10.07	0.000	-.0041	-.002765	.40941
escol~12*	-.0002461	.00035	-0.69	0.488	-.000941	.000449	.17370
nation~y*	.0084937	.00115	7.36	0.000	.006232	.010755	.00904
promin~3*	.0003259	.00026	1.27	0.204	-.000177	.000829	.18246
varlnr~s	.0031978	.00049	6.55	0.000	.002241	.004155	.03001
dimemp	.0119462	.00005	230.81	0.000	.011845	.012048	4.5487
vardim~p	-.0047209	.00015	-31.17	0.000	-.005018	-.004424	-.01825
ano_2003*	-.0097494	.00023	-41.86	0.000	-.010206	-.009293	.25526
ano_2004*	-.0118143	.00024	-49.88	0.000	-.012279	-.01135	.21613
ano_2005*	-.0172246	.00023	-75.58	0.000	-.017671	-.016778	.2159
caeAB*	-.0132313	.00082	-16.19	0.000	-.014833	-.011629	.012
caeC*	-.0125951	.00101	-12.43	0.000	-.014581	-.010609	.00606
caeD*	-.042017	.00027	-154.93	0.000	-.042549	-.041485	.35177
caeE*	-.0089297	.00053	-16.71	0.000	-.009977	-.007882	.01250
caeF*	.0017261	.00041	4.21	0.000	.000922	.002531	.09620
caeH*	.0026265	.0005	5.21	0.000	.001639	.003614	.04972
caeI*	-.015646	.00026	-59.44	0.000	-.016162	-.01513	.0861
caeJ*	.0090784	.00048	19.09	0.000	.008146	.010011	.04736
caeK*	-.0111613	.00034	-33.12	0.000	-.011822	-.010501	.06487
caeL*	-.0110427	.00156	-7.08	0.000	-.014098	-.007987	.0021
caeM*	-.0057379	.00076	-7.52	0.000	-.007234	-.004242	.01416
caeN*	.0007468	.00052	1.42	0.155	-.000282	.001775	.04129
caeOQ*	-.0030233	.00057	-5.27	0.000	-.004147	-.001899	.02622

(*) dy/dx is for discrete change of dummy variable from 0 to 1

Outcome 2

variable	dy/dx	Std. Err.	z	P>|z|	[95% C.I.]	X
ten_200*	-.0002663	.00019	-1.40	0.162	-.000639 .000107	.7694
te~0_400*	-.0006003	.00017	-3.54	0.000	-.000933 -.000268	.2044
idade	.000303	.00002	12.50	0.000	.000255 .000351	40.446
idade_~d	-.0003524	.00003	-12.45	0.000	-.000408 -.000297	17.381
sexo*	-.0021921	.00007	-32.28	0.000	-.002325 -.002059	.40267
escola~n*	.0008275	.00035	2.36	0.018	.000141 .001514	.00800
escol~04*	-.0005387	.0001	-5.36	0.000	-.000736 -.000342	.32718
escol~69*	-.0013449	.00009	-14.34	0.000	-.001529 -.001161	.40941
escol~12*	-.0006542	.0001	-6.87	0.000	-.000841 -.000467	.17370
nation~y*	.0021138	.00031	6.73	0.000	.001499 .002729	.00904
promin~3*	.0007263	.00008	9.49	0.000	.000576 .000876	.18246
varlnr~s	.0004308	.00013	3.29	0.001	.000174 .000688	.03001
dimemp	.0026	.00002	127.35	0.000	.00256 .00264	4.5487
vardim~p	-.001042	.00005	-22.69	0.000	-.001132 -.000952	-.01825
ano_2003*	-.0014138	.00006	-21.85	0.000	-.001541 -.001287	.25526
ano_2004*	-.0021789	.00006	-33.59	0.000	-.002306 -.002052	.21613
ano_2005*	-.0021087	.00006	-32.49	0.000	-.002236 -.001981	.2159
caeAB*	-.0006373	.00036	-1.77	0.077	-.001343 .000069	.012
caeC*	-.000767	.00038	-2.03	0.042	-.001507 -.000026	.00606
caeD*	-.0043265	.00009	-46.63	0.000	-.004508 -.004145	.35177
caeE*	-.0034345	.00008	-43.13	0.000	-.003591 -.003278	.01250
caeF*	.0162507	.00036	45.44	0.000	.01555 .016952	.09620
caeH*	-.0023195	.00013	-18.28	0.000	-.002568 -.002071	.04972
caeI*	-.0034188	.00006	-57.84	0.000	-.003535 -.003303	.0861
caeJ*	-.002255	.00008	-28.93	0.000	-.002408 -.002102	.04736
caeK*	.0001508	.00013	1.20	0.230	-.000096 .000397	.06487
caeL*	-.0032487	.00036	-9.03	0.000	-.003954 -.002544	.0021
caeM*	-.0004863	.00031	-1.58	0.113	-.001088 .000115	.01416
caeN*	-.003232	.00013	-25.38	0.000	-.003482 -.002982	.04129
caeOQ*	-.0010797	.00018	-6.15	0.000	-.001424 -.000735	.02622

(*) dy/dx is for discrete change of dummy variable from 0 to 1

Outcome 3

variable	dy/dx	Std. Err.	z	P>|z|	[95% C.I.]		X
ten_200*	.046336	.00099	46.58	0.000	.044386	.048286	.7694
te~0_400*	.0058927	.00159	3.71	0.000	.002776	.00901	.2044
idade	-.0057007	.0001	-57.01	0.000	-.005897	-.005505	40.446
idade_~d	.0053706	.00012	44.14	0.000	.005132	.005609	17.381
sexo*	-.001221	.00029	-4.16	0.000	-.001796	-.000646	.40267
escola~n*	.0232721	.00153	15.17	0.000	.020265	.026279	.00800
escol~04*	-.0060497	.00055	-10.97	0.000	-.00713	-.004969	.32718
escol~69*	-.0011669	.00052	-2.25	0.024	-.002182	-.000152	.40941
escol~12*	-.008697	.00051	-17.16	0.000	-.00969	-.007704	.17370
nation~y*	.0245451	.00164	15.00	0.000	.021337	.027753	.00904
promin~3*	-.0077682	.00039	-20.08	0.000	-.008526	-.00701	.18246
varlnr~s	-.0137702	.00063	-21.92	0.000	-.015001	-.012539	.03001
dimemp	-.0025383	.00007	-35.85	0.000	-.002677	-.0024	4.5487
vardim~p	-.0021555	.00017	-12.93	0.000	-.002482	-.001829	-.01825
ano_2003*	-.0514631	.00026	-201.69	0.000	-.051963	-.050963	.25526
ano_2004*	-.0587219	.00025	-231.43	0.000	-.059219	-.058225	.21613
ano_2005*	-.0517811	.00026	-200.80	0.000	-.052287	-.051276	.2159
caeAB*	.0030661	.00125	2.46	0.014	.000619	.005513	.012
caeC*	.0173619	.00196	8.86	0.000	.013521	.021203	.00606
caeD*	-.0175298	.00037	-47.20	0.000	-.018258	-.016802	.35177
caeE*	-.0135116	.00164	-8.25	0.000	-.01672	-.010303	.01250
caeF*	.00913	.00057	16.14	0.000	.008021	.010238	.09620
caeH*	.0111319	.00072	15.50	0.000	.009724	.01254	.04972
caeI*	-.0056827	.00061	-9.30	0.000	-.00688	-.004485	.0861
caeJ*	.0620968	.00123	50.54	0.000	.059689	.064505	.04736
caeK*	.0701274	.00091	76.88	0.000	.06834	.071915	.06487
caeL*	.0187487	.00343	5.47	0.000	.012028	.02547	.0021
caeM*	-.0236914	.00091	-25.90	0.000	-.025484	-.021899	.01416
caeN*	-.0363616	.00051	-70.81	0.000	-.037368	-.035355	.04129
caeOQ*	.0038621	.00092	4.21	0.000	.002064	.00566	.02622

(*) dy/dx is for discrete change of dummy variable from 0 to 1

Outcome 4

variable	dy/dx	Std. Err.	z	P>|z|	[95% C.I.]	X
ten_200*	.0110703	.00042	26.57	0.000	.010254 .011887	.7694
te~0_400*	.0015047	.00094	1.60	0.110	-.00034 .003349	.2044
idade	-.0007305	.00003	-23.13	0.000	-.000792 -.000669	40.446
idade_~d	.0006567	.00004	16.99	0.000	.000581 .000732	17.381
sexo*	-.0031658	.00009	-34.22	0.000	-.003347 -.002985	.40267
escola~n*	.0024303	.0004	6.14	0.000	.001654 .003206	.00800
escol~04*	-.003245	.00014	-23.01	0.000	-.003521 -.002969	.32718
escol~69*	-.0023878	.00014	-17.55	0.000	-.002654 -.002121	.40941
escol~12*	-.0027837	.00012	-22.68	0.000	-.003024 -.002543	.17370
nation~y*	.0046877	.00051	9.22	0.000	.003691 .005684	.00904
promin~3*	-.0028843	.00011	-26.43	0.000	-.003098 -.00267	.18246
varlnr~s	-.0015753	.00018	-8.68	0.000	-.001931 -.001219	.03001
dimemp	.0002259	.00002	10.72	0.000	.000185 .000267	4.5487
vardim~p	-.0004133	.00005	-8.86	0.000	-.000505 -.000322	-.01825
ano_2003*	-.0058442	.00009	-66.79	0.000	-.006016 -.005673	.25526
ano_2004*	-.0061559	.00009	-69.44	0.000	-.00633 -.005982	.21613
ano_2005*	-.0052797	.00009	-59.74	0.000	-.005453 -.005106	.2159
caeAB*	.0083907	.0006	13.89	0.000	.007206 .009575	.012
caeC*	.0010474	.00057	1.82	0.069	-.00008 .002174	.00606
caeD*	-.0038466	.00012	-31.78	0.000	-.004084 -.003609	.35177
caeE*	.0048732	.00083	5.84	0.000	.003239 .006507	.01250
caeF*	.0059157	.00023	25.77	0.000	.005466 .006366	.09620
caeH*	-.0012205	.00021	-5.94	0.000	-.001623 -.000818	.04972
caeI*	.0024983	.00023	10.99	0.000	.002053 .002944	.0861
caeJ*	-.0016132	.00023	-6.96	0.000	-.002067 -.001159	.04736
caeK*	.0167484	.0004	42.14	0.000	.015969 .017527	.06487
caeL*	.0045957	.00118	3.88	0.000	.002274 .006918	.0021
caeM*	-.0023483	.00032	-7.35	0.000	-.002975 -.001722	.01416
caeN*	-.0038909	.00019	-20.12	0.000	-.00427 -.003512	.04129
caeOQ*	-.0002137	.00029	-0.73	0.464	-.000785 .000358	.02622

(*) dy/dx is for discrete change of dummy variable from 0 to 1

Outcome 5

variable	dy/dx	Std. Err.	z	P>|z|	[95% C.I.]		X
ten_200*	-.0606496	.00123	-49.45	0.000	-.063053	-.058246	.7694
te~0_400*	-.0056987	.00186	-3.06	0.002	-.009352	-.002046	.2044
idade	.0058585	.00013	43.60	0.000	.005595	.006122	40.446
idade_~d	-.0054767	.00016	-34.08	0.000	-.005792	-.005162	17.381
sexo*	.0060217	.00038	15.76	0.000	.005273	.00677	.40267
escola~n*	-.0368723	.00216	-17.08	0.000	-.041103	-.032641	.00800
escol~04*	.0124573	.00069	18.05	0.000	.011104	.01381	.32718
escol~69*	.0083319	.00064	12.95	0.000	.007071	.009593	.40941
escol~12*	.012381	.00064	19.21	0.000	.011118	.013644	.17370
nation~y*	-.0398403	.00208	-19.15	0.000	-.043917	-.035763	.00904
promin~3*	.0096002	.00048	20.05	0.000	.008662	.010539	.18246
varlnr~s	.0117169	.00082	14.21	0.000	.010101	.013333	.03001
dimemp	-.0122339	.00009	-133.37	0.000	-.012414	-.012054	4.5487
vardim~p	.0083317	.00024	35.04	0.000	.007866	.008798	-.01825
ano_2003*	.0684704	.00036	189.68	0.000	.067763	.069178	.25526
ano_2004*	.078871	.00036	218.14	0.000	.078162	.07958	.21613
ano_2005*	.076394	.00036	212.12	0.000	.075688	.0771	.2159
caeAB*	.0024118	.00162	1.49	0.137	-.000765	.005588	.012
caeC*	-.0050472	.00229	-2.20	0.028	-.009536	-.000558	.00606
caeD*	.0677198	.00048	142.10	0.000	.066786	.068654	.35177
caeE*	.0210026	.00188	11.19	0.000	.017323	.024682	.01250
caeF*	-.0330225	.0008	-41.49	0.000	-.034582	-.031463	.09620
caeH*	-.0102184	.0009	-11.39	0.000	-.011977	-.00846	.04972
caeI*	.0222493	.0007	31.60	0.000	.020869	.023629	.0861
caeJ*	-.0673071	.00131	-51.34	0.000	-.069877	-.064738	.04736
caeK*	-.0758652	.00104	-73.30	0.000	-.077894	-.073837	.06487
caeL*	-.0090529	.00394	-2.30	0.021	-.016767	-.001339	.0021
caeM*	.0322638	.00126	25.58	0.000	.029791	.034736	.01416
caeN*	.0427377	.00076	55.98	0.000	.041241	.044234	.04129
caeOQ*	.0004546	.00112	0.41	0.685	-.001742	.002652	.02622

(*) dy/dx is for discrete change of dummy variable from 0 to 1

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Descriptive statistics

Descriptive statistics: treatment group

- **Descriptive statistics on workers**

Gender

Approximately 38% of workers in our treatment group are women.

Variable	Obs	Mean	Std. Dev.	Min	Max
sexo99	74750	.3844816	.4864758	0	1
sexo00	74750	.3844816	.4864758	0	1
sexo02	59684	.3793479	.4852288	0	1
sexo03	55766	.3897536	.4876987	0	1
sexo04	54415	.3867867	.4870186	0	1
sexo05	54926	.3907803	.4879297	0	1

Age

The average age in 1999 is around 38 years old.

Variable	Obs	Mean	Std. Dev.	Min	Max
idade_99	74750	37.51163	10.67982	16	65
idade_00	74750	38.51163	10.67982	17	66
idade_02	59684	40.10014	10.20256	19	68
idade_03	55766	40.65194	9.950263	20	69
idade_04	54415	41.33121	9.728495	21	70
idade_05	54926	41.86529	9.516055	22	71

Seniority

The average seniority is around 8 years.

Variable	Obs	Mean	Std. Dev.	Min	Max
antig_99	74750	8.469605	8.936596	0	51
antig_00	74750	9.469605	8.936596	1	52
antig_02	59684	10.6836	9.129882	0	54
antig_03	55766	10.93758	9.032591	0	55
antig_04	54415	11.35968	9.025444	0	56
antig_05	54926	11.50504	9.059645	0	57

Schooling

1999

Variable	Obs	Mean	Std. Dev.	Min	Max
escolar0_99	74750	.0227559	.1491252	0	1
escolar4_99	74750	.2833177	.4506124	0	1
escolar6_99	74750	.1558528	.3627182	0	1
escolar9_99	74750	.1789298	.3832961	0	1
escolar12_99	74750	.2350234	.4240163	0	1
escolarsu~99	74750	.1044281	.3058171	0	1

2000

Variable	Obs	Mean	Std. Dev.	Min	Max
escolar0_00	74750	.0240268	.1531332	0	1
escolar4_00	74750	.2852174	.4515209	0	1
escolar6_00	74750	.1611237	.3676475	0	1
escolar9_00	74750	.1823144	.386106	0	1
escolar12_00	74750	.2273177	.4191023	0	1
escolarsu~00	74750	.110301	.3132667	0	1

2002

Variable	Obs	Mean	Std. Dev.	Min	Max
escolar0_02	59684	.0226526	.1487947	0	1
escolar4_02	59684	.2610247	.4391971	0	1
escolar6_02	59684	.1566919	.3635131	0	1
escolar9_02	59684	.1849072	.3882255	0	1
escolar12_02	59684	.2332283	.4228899	0	1
escolarsu~02	59684	.1172509	.3217217	0	1

2003

Variable	Obs	Mean	Std. Dev.	Min	Max
escolar0_03	55766	.0210523	.1435598	0	1
escolar4_03	55766	.2565721	.4367451	0	1
escolar6_03	55766	.1619804	.3684361	0	1
escolar9_03	55766	.1926084	.3943516	0	1
escolar12_03	55766	.240756	.4275463	0	1
escolarsu~03	55766	.1253631	.3311332	0	1

2004

Variable	Obs	Mean	Std. Dev.	Min	Max
escolar0_04	54415	.0202701	.1409242	0	1
escolar4_04	54415	.2532206	.4348602	0	1
escolar6_04	54415	.1637232	.3700276	0	1
escolar9_04	54415	.1934577	.3950122	0	1
escolar12_04	54415	.2404668	.4273709	0	1
escolarsu~04	54415	.1280529	.3341518	0	1

2005

Variable	Obs	Mean	Std. Dev.	Min	Max
escolar0_05	54926	.0177329	.1319803	0	1
escolar4_05	54926	.245585	.4304374	0	1
escolar6_05	54926	.1678804	.3737635	0	1
escolar9_05	54926	.1936606	.3951696	0	1
escolar12_05	54926	.2429451	.4288661	0	1
escolarsu~05	54926	.1307942	.3371782	0	1

Potential experience

Potential experience was defined as follows:

If age-schooling > 5 = age - schooling - 6

If age-schooling<=5 = idade - 15

Variable	Obs	Mean	Std. Dev.	Min	Max
exp_99	74750	24.18194	12.50788	0	59
exp_00	74750	24.16265	12.80451	0	60
exp_02	59684	25.65999	12.44045	0	62
exp_03	55766	25.90005	12.21649	0	63
exp_04	54415	26.53237	12.01065	0	64
exp_05	54926	26.99388	11.78282	1	65

Hierarchical level

More than half of the workers in our treatment group belong to Level 4 - Higher-skilled and skilled professionals.

1999

Variable	Obs	Mean	Std. Dev.	Min	Max
nivel1_99	74750	.0511572	.2203197	0	1
nivel2_99	74750	.0496722	.2172684	0	1
nivel3_99	74750	.072495	.2593075	0	1
nivel4_99	74750	.5279331	.4992225	0	1
nivel5_99	74750	.232495	.4224257	0	1
nivel6_99	74750	.0383545	.1920519	0	1

2000

Variable	Obs	Mean	Std. Dev.	Min	Max
nivel1_00	74750	.0554783	.2289129	0	1
nivel2_00	74750	.0558127	.2295612	0	1
nivel3_00	74750	.078301	.2686465	0	1
nivel4_00	74750	.5120535	.499858	0	1
nivel5_00	74750	.2165084	.4118674	0	1
nivel6_00	74750	.0269833	.1620356	0	1

2002

Variable	Obs	Mean	Std. Dev.	Min	Max
nivel1_02	59684	.0580893	.2339141	0	1
nivel2_02	59684	.0735708	.2610733	0	1
nivel3_02	59684	.0911467	.28782	0	1
nivel4_02	59684	.541703	.498262	0	1
nivel5_02	59684	.1907044	.3928598	0	1
nivel6_02	59684	.014627	.1200555	0	1

2003

Variable	Obs	Mean	Std. Dev.	Min	Max
nivel1_03	55766	.0637665	.2443386	0	1
nivel2_03	55766	.0748485	.263149	0	1
nivel3_03	55766	.0900728	.2862886	0	1
nivel4_03	55766	.5326722	.4989359	0	1
nivel5_03	55766	.1999426	.3999605	0	1
nivel6_03	55766	.0137898	.1166184	0	1

2004

Variable	Obs	Mean	Std. Dev.	Min	Max
nivel1_04	54415	.0634751	.2438178	0	1
nivel2_04	54415	.077644	.2676131	0	1
nivel3_04	54415	.092401	.2895938	0	1
nivel4_04	54415	.5272076	.4992638	0	1
nivel5_04	54415	.2031058	.4023143	0	1
nivel6_04	54415	.0109712	.1041685	0	1

2005

Variable	Obs	Mean	Std. Dev.	Min	Max
nivel1_05	54926	.0610458	.2394164	0	1
nivel2_05	54926	.0774315	.2672772	0	1
nivel3_05	54926	.0942177	.292134	0	1
nivel4_05	54926	.5132542	.4998288	0	1
nivel5_05	54926	.2085533	.406278	0	1
nivel6_05	54926	.0107417	.1030851	0	1

Nationality (Portuguese vs foreign)

Around 1% of workers in our treatment group are foreigner.

Variable	Obs	Mean	Std. Dev.	Min	Max
nationali~99	74750	.0105552	.1021955	0	1
nationali~00	74750	.0105552	.1021955	0	1
nationali~02	59684	.0129515	.1130664	0	1
nationali~03	55766	.0135925	.1157929	0	1
nationali~04	54415	.0126436	.1117316	0	1
nationali~05	54926	.0127808	.1123286	0	1

Normal hours worked

Variable	Obs	Mean	Std. Dev.	Min	Max
nhnor_99	74750	159.6983	21.94206	0	189
nhnor_00	74750	161.1293	21.80789	0	180
nhnor_02	59684	159.8941	33.92314	0	180
nhnor_03	55766	160.8093	32.13813	0	180
nhnor_04	54415	155.9079	32.21146	0	180
nhnor_05	54926	155.7605	32.62698	0	180

Extra hours worked

Variable	Obs	Mean	Std. Dev.	Min	Max
nhext_99	74750	2.659184	10.06371	0	172
nhext_00	74750	3.379719	12.83909	0	172
nhext_02	59684	3.401263	13.04044	0	174
nhext_03	55766	3.217928	12.98707	0	173
nhext_04	54415	3.222714	12.32932	0	176
nhext_05	54926	3.572097	13.43883	0	175

Total hours worked

Variable	Obs	Mean	Std. Dev.	Min	Max
nhtot_99	74750	162.3575	24.7827	0	345
nhtot_00	74750	164.509	26.05797	0	346
nhtot_02	59684	163.2953	37.29642	0	348
nhtot_03	55766	164.0272	35.55056	0	346
nhtot_04	54415	159.1306	35.60289	0	352
nhtot_05	54926	159.3326	36.49405	0	351

Normal hours worked (ln)

Variable	Obs	Mean	Std. Dev.	Min	Max
lnnhnor_99	74714	5.058124	.2100334	1.386294	5.241747
lnnhnor_00	74713	5.066623	.2160047	1.386294	5.192957
lnnhnor_02	57918	5.091101	.1998606	1.609438	5.192957
lnnhnor_03	54443	5.089527	.2094166	1.386294	5.192957
lnnhnor_04	53158	5.056511	.2153496	0	5.192957
lnnhnor_05	53613	5.055968	.2190036	0	5.192957

Total hours worked (ln)

Variable	Obs	Mean	Std. Dev.	Min	Max
lnnhtot_99	74714	5.072762	.2182957	1.386294	5.843544
lnnhtot_00	74713	5.08468	.2272301	1.386294	5.846439
lnnhtot_02	57918	5.109335	.2124983	1.609438	5.852202
lnnhtot_03	54443	5.106594	.2211959	1.386294	5.846439
lnnhtot_04	53158	5.074071	.2274346	0	5.863631
lnnhtot_05	53613	5.075263	.2329713	0	5.860786

Regular real wage (ln)

Variable	Obs	Mean	Std. Dev.	Min	Max
ln~lwager_99	74750	6.711599	.6116973	2.320259	10.55599
ln~lwager_00	74750	6.777803	.627671	2.559753	10.32518
ln~lwager_02	57947	6.858596	.6264876	2.578379	9.529574
ln~lwager_03	54465	6.861089	.6528627	2.345082	9.680107
ln~lwager_04	53164	6.872097	.6498615	2.350975	10.00994
ln~lwager_05	53627	6.87676	.6582272	1.506297	9.764225

Total real wage (ln.)

Notice that the total real wage includes: base wage, other regularly paid components, non-systematic payments and extra-time work payments.

Variable	Obs	Mean	Std. Dev.	Min	Max
lnrealwage..	74750	6.806235	.6311129	2.320259	10.55599
lnrealwage..	74750	6.876726	.6497715	2.559753	13.27004
lnrealwage..	57947	6.960348	.6461643	2.578379	12.45199
lnrealwage..	54465	6.966803	.6705604	2.345082	11.78068
lnrealwage..	53164	6.973654	.6614133	2.350975	12.31599
lnrealwage..	53627	6.980891	.6722555	1.506297	11.04337

Hourly Regular real wage (ln)

Variable	Obs	Mean	Std. Dev.	Min	Max
ln~hwager_99	74714	1.653426	.6078733	.3648976	5.545359
ln~hwager_00	74713	1.711178	.6149047	.4740951	5.195282
ln~hwager_02	57918	1.767726	.6015981	.1347752	4.505694
ln~hwager_03	54443	1.771744	.6184909	.5021224	4.730554
ln~hwager_04	53158	1.815622	.6406084	.4926996	5.653231
ln~hwager_05	53613	1.820928	.6444589	.5324982	4.811338

Hourly Total real wage (ln)

Variable	Obs	Mean	Std. Dev.	Min	Max
lnrealhwag..	74714	1.733243	.6213883	.3648976	5.545359
lnrealhwag..	74713	1.79185	.6328582	.4740951	8.674037
lnrealhwag..	57918	1.851136	.62032	.1347752	7.298699
lnrealhwag..	54443	1.860195	.6364224	.5023281	6.627391
lnrealhwag..	53158	1.899547	.6487036	.4928102	7.210042
lnrealhwag..	53613	1.905782	.6555685	.5324982	7.194485

Real wage growth

Variable	Obs	Mean	Std. Dev.	Min	Max
varlnrealw~0	74750	.0662038	.2678392	-3.712908	3.683496
varlnrealw~2	57947	.0438222	.3031971	-4.24032	4.392547
varlnrealw~3	49079	.009557	.2621211	-4.934374	3.76666
varlnrealw~4	47274	.0118292	.2548299	-4.587789	5.335141
varlnrealw~5	48386	.0211964	.2513651	-3.767879	4.608973

Real hourly wage growth

Variable	Obs	Mean	Std. Dev.	Min	Max
varlnrealh~0	74712	.0577601	.2221618	-3.032444	2.890608
varlnrealh~2	57917	.0254562	.2564846	-3.342886	3.16965
varlnrealh~3	49057	.0106203	.2043705	-3.205194	2.895553
varlnrealh~4	47266	.0487898	.1964553	-2.730925	3.339573
varlnrealh~5	48378	.0222243	.1972232	-2.965747	3.417565

- **Descriptive statistics on employers**

The employers in our treatment group have, on average, 5 establishments and 94 employees.

48% of our employers belong to CAE G - Wholesale and retail trade

11% of our employes belong to CAE D - Manufacturing

Variable	Obs	Mean	Std. Dev.	Min	Max
nest_99	6481	4.970375	17.59335	1	566
pemp_99	6481	94.29286	458.7993	1	16992
dimemp_99	6481	3.075825	1.460344	0	9.740498
vvend_99	6481	1.10e+07	8.19e+07	0	3.26e+09
prod_99	6481	89173.05	199069.2	0	9614265
foreignsu~99	6481	.0486036	.2150545	0	1
foreignin~99	6481	.0109551	.1040997	0	1
caeA_99	6481	.0188243	.1359145	0	1
caeB_99	6481	.0007715	.0277671	0	1
caeC_99	6481	.0089492	.0941834	0	1
caeD_99	6481	.1154143	.3195459	0	1
caeE_99	6481	.0020059	.0447454	0	1
caeF_99	6481	.0564728	.2308502	0	1
caeG_99	6481	.4831045	.499753	0	1
caeH_99	6481	.0671193	.2502478	0	1
caeI_99	6481	.0365684	.1877142	0	1
caeJ_99	6481	.0260762	.1593743	0	1
caeK_99	6481	.071131	.2570634	0	1
caeL_99	6481	.0003086	.0175655	0	1
caeM_99	6481	.0217559	.1458968	0	1
caeN_99	6481	.0575528	.2329139	0	1
caeO_99	6481	.0339454	.1811026	0	1
caeP_99	6481	0	0	0	0
caeQ_99	6481	0	0	0	0

Descriptive statistics: control group

- **Descriptive statistics on workers**

Gender

Approximately 42% of workers in our control group are women.

Variable	Obs	Mean	Std. Dev.	Min	Max
sexo_99	1121907	0,4151414	0,4927466	0	1
sexo_00	1121907	0,4151414	0,4927466	0	1
sexo_02	831264	0,408419	0,4915417	0	1
sexo_03	774816	0,4115868	0,4921213	0	1
sexo_04	739067	0,4128245	0,4923421	0	1
sexo_05	744669	0,4142297	0,4925889	0	1

Age

The average age in 1999 is around 37 years old.

Variable	Obs	Mean	Std. Dev.	Min	Max
idade_99	1121907	36.79763	10.98384	15	64
idade_00	1121907	37.79763	10.98384	16	65
idade_02	831264	39.46763	10.49167	18	67
idade_03	774816	40.02714	10.22053	19	68
idade_04	739067	40.58998	9.954307	20	69
idade_05	744669	41.15064	9.69214	21	70

Seniority

The average seniority is around 8 years.

Variable	Obs	Mean	Std. Dev.	Min	Max
antig_99	1121907	8.322848	8.861139	0	52
antig_00	1121907	8.993051	9.008923	0	53
antig_02	831264	10.34379	9.098318	0	55
antig_03	774816	10.72174	9.065419	0	56
antig_04	739067	11.01275	9.022339	0	57
antig_05	744669	11.2519	9.124541	0	57

Schooling

1999

Variable	Obs	Mean	Std. Dev.	Min	Max
escolar0_99	1121907	.0193127	.1376215	0	1
escolar4_99	1121907	.3580832	.479437	0	1
escolar6_99	1121907	.2312304	.4216196	0	1
escolar9_99	1121907	.1555548	.3624329	0	1
escolar12_99	1121907	.1565852	.3634094	0	1
escolarsu~99	1121907	.0642504	.2451986	0	1

2000

Variable	Obs	Mean	Std. Dev.	Min	Max
escolar0_00	1121907	.0201933	.1406611	0	1
escolar4_00	1121907	.3522413	.4776689	0	1
escolar6_00	1121907	.2346763	.4237965	0	1
escolar9_00	1121907	.1601033	.366702	0	1
escolar12_00	1121907	.1563632	.3631995	0	1
escolarsu~00	1121907	.0662764	.2487648	0	1

2002

Variable	Obs	Mean	Std. Dev.	Min	Max
escolar0_02	831264	.0206312	.1421464	0	1
escolar4_02	831264	.3278826	.4694421	0	1
escolar6_02	831264	.2327059	.4225566	0	1
escolar9_02	831264	.1677927	.3736823	0	1
escolar12_02	831264	.1582313	.364958	0	1
escolarsu~02	831264	.0716728	.2579455	0	1

2003

Variable	Obs	Mean	Std. Dev.	Min	Max
escolar0_03	774816	.0197105	.1390036	0	1
escolar4_03	774816	.3218571	.4671888	0	1
escolar6_03	774816	.2404945	.4273841	0	1
escolar9_03	774816	.1758495	.3806923	0	1
escolar12_03	774816	.1638492	.3701389	0	1
escolarsu~03	774816	.0752953	.2638674	0	1

2004

Variable	Obs	Mean	Std. Dev.	Min	Max
escolar0_04	739067	.0189387	.1363088	0	1
escolar4_04	739067	.3097852	.4624052	0	1
escolar6_04	739067	.2424354	.4285566	0	1
escolar9_04	739067	.1809863	.3850071	0	1
escolar12_04	739067	.1680416	.3739035	0	1
escolarsu~04	739067	.0781445	.268399	0	1

2005

Variable	Obs	Mean	Std. Dev.	Min	Max
escolar0_05	744669	.0162596	.1264722	0	1
escolar4_05	744669	.2974033	.4571158	0	1
escolar6_05	744669	.2453855	.4303158	0	1
escolar9_05	744669	.185512	.3887126	0	1
escolar12_05	744669	.1724471	.3777688	0	1
escolarsu~05	744669	.080946	.2727524	0	1

Potential experience

Potential experience was defined as follows:

If age-schooling > 5 = age - schooling - 6

If age-schooling<=5 = idade - 15

Variable	Obs	Mean	Std. Dev.	Min	Max
exp_99	1121907	23.6108	12.54196	0	58
exp_00	1121907	24.53782	12.57483	0	59
exp_02	831264	26.13271	12.15938	0	61
exp_03	774816	26.46794	11.89601	0	62
exp_04	739067	26.92241	11.64321	0	63
exp_05	744669	27.37366	11.37607	0	64

Hierarchical level

More then half of the workers in our control group belong to Level 4 - Higher-skilled and skilled professionals.

1999

Variable	Obs	Mean	Std. Dev.	Min	Max
nivel1_99	1121907	.0399659	.1958792	0	1
nivel2_99	1121907	.03177	.1753873	0	1
nivel3_99	1121907	.0420864	.2007863	0	1
nivel4_99	1121907	.5254981	.4993496	0	1
nivel5_99	1121907	.2825011	.450216	0	1
nivel6_99	1121907	.0635668	.2439797	0	1

2000

Variable	Obs	Mean	Std. Dev.	Min	Max
nivel1_00	1121907	.0450929	.2075079	0	1
nivel2_00	1121907	.0314705	.1745857	0	1
nivel3_00	1121907	.0449841	.2072694	0	1
nivel4_00	1121907	.5329533	.4989131	0	1
nivel5_00	1121907	.2794403	.4487244	0	1
nivel6_00	1121907	.0509392	.2198736	0	1

2002

Variable	Obs	Mean	Std. Dev.	Min	Max
nivel1_02	831264	.0473171	.2123164	0	1
nivel2_02	831264	.0378881	.1909257	0	1
nivel3_02	831264	.0509345	.2198641	0	1
nivel4_02	831264	.5533573	.4971451	0	1
nivel5_02	831264	.2610518	.4392084	0	1
nivel6_02	831264	.0291291	.1681685	0	1

2003

Variable	Obs	Mean	Std. Dev.	Min	Max
nivel1_03	774816	.050128	.2182092	0	1
nivel2_03	774816	.039381	.1944997	0	1
nivel3_03	774816	.0514083	.2208293	0	1
nivel4_03	774816	.5533146	.4971497	0	1
nivel5_03	774816	.2626778	.4400891	0	1
nivel6_03	774816	.0233075	.1508783	0	1

2004

Variable	Obs	Mean	Std. Dev.	Min	Max
nivel1_04	739067	.0520278	.2220832	0	1
nivel2_04	739067	.0416539	.1997971	0	1
nivel3_04	739067	.0535946	.2252161	0	1
nivel4_04	739067	.543672	.4980894	0	1
nivel5_04	739067	.2661139	.4419248	0	1
nivel6_04	739067	.0196464	.138782	0	1

2005

Variable	Obs	Mean	Std. Dev.	Min	Max
nivel1_05	744669	.0512147	.2204355	0	1
nivel2_05	744669	.042388	.2014728	0	1
nivel3_05	744669	.054768	.2275269	0	1
nivel4_05	744669	.5396102	.4984289	0	1
nivel5_05	744669	.2655878	.441646	0	1
nivel6_05	744669	.0187264	.1355573	0	1

Nationality (portuguese vs foreign)

Around 0,5% of workers in our treatment group are foreigner.

Variable	Obs	Mean	Std. Dev.	Min	Max
nationali~99	1121907	.0053846	.0731819	0	1
nationali~00	1121907	.0053846	.0731819	0	1
nationali~02	831264	.0079181	.0886306	0	1
nationali~03	774816	.009268	.0958234	0	1
nationali~04	739067	.0100789	.0998867	0	1
nationali~05	744669	.0100877	.0999298	0	1

Normal hours worked

Variable	Obs	Mean	Std. Dev.	Min	Max
nhnor_99	1121907	161.261	22.72413	0	189
nhnor_00	1121907	162.5157	22.77528	0	180
nhnor_02	831264	159.4531	36.58935	0	180
nhnor_03	774816	160.2284	35.70091	0	180
nhnor_04	739067	157.0587	34.54542	0	180
nhnor_05	744669	156.6895	35.15534	0	180

Extra hours worked

Variable	Obs	Mean	Std. Dev.	Min	Max
nhext_99	1121907	1.706723	8.564569	0	200
nhext_00	1121907	2.145259	9.73619	0	297
nhext_02	831264	2.012979	9.225537	0	197
nhext_03	774816	1.999312	9.255085	0	248
nhext_04	739067	2.045084	9.301556	0	220
nhext_05	744669	2.151234	9.412364	0	207

Total hours worked

Variable	Obs	Mean	Std. Dev.	Min	Max
nhtot_99	1121907	162.9677	24.5268	0	373
nhtot_00	1121907	164.6609	25.11756	0	470
nhtot_02	831264	161.4661	38.21565	0	370
nhtot_03	774816	162.2277	37.36392	0	421
nhtot_04	739067	159.1038	36.26601	0	393
nhtot_05	744669	158.8408	36.91181	0	380

Normal hours worked (ln)

Variable	Obs	Mean	Std. Dev.	Min	Max
lnnhnor_99	1120998	5.06647	.2249101	0	5.241747
lnnhnor_00	1121054	5.073598	.2311739	0	5.192957
lnnhnor_02	802812	5.090186	.2233849	0	5.192957
lnnhnor_03	750431	5.091973	.2261329	0	5.192957
lnnhnor_04	717726	5.068862	.225819	0	5.192957
lnnhnor_05	722179	5.06711	.2323612	0	5.192957

Total hours worked (ln)

Variable	Obs	Mean	Std. Dev.	Min	Max
lnnhtot_99	1120998	5.07584	.2297345	0	5.921578
lnnhtot_00	1121054	5.085222	.2371845	0	6.152733
lnnhtot_02	802812	5.101377	.2290964	0	5.913503
lnnhtot_03	750431	5.103028	.2316441	0	6.042633
lnnhtot_04	717726	5.080375	.2316894	0	5.97381
lnnhtot_05	722179	5.079267	.2383203	0	5.940171

Regular real wage (ln)

Variable	Obs	Mean	Std. Dev.	Min	Max
ln~lwager_99	1121907	6.494586	.56382	-2.47435	11.22793
ln~lwager_00	1121907	6.543157	.5834991	-2.049952	11.60581
ln~lwager_02	803289	6.616289	.5968936	1.252516	11.11996
ln~lwager_03	750857	6.6164	.6061296	.8946495	11.20582
ln~lwager_04	718063	6.621887	.6076988	1.17232	11.24458
ln~lwager_05	722499	6.631759	.6155366	.9242589	11.45717

Total real wage (ln)

Notice that the total real wage includes: base wage, other regularly paid components, non-systematic payments and extra-time work payments.

Variable	Obs	Mean	Std. Dev.	Min	Max
lnrealwage..	1121907	6.56206	.5940603	-2.47435	11.74836
lnrealwage..	1121907	6.616626	.6129766	-2.049952	13.26892
lnrealwage..	803289	6.692079	.6261991	1.252516	13.19672
lnrealwage..	750857	6.695933	.6370457	.8946495	13.39293
lnrealwage..	718063	6.703608	.6378261	1.17232	12.78487
lnrealwage..	722499	6.716938	.6457122	.9242589	12.76656

Hourly Regular real wage (ln)

Variable	Obs	Mean	Std. Dev.	Min	Max
ln~hwager_99	1120998	1.428263	.5431791	-3.572962	6.39711
ln~hwager_00	1121054	1.469564	.5564403	-7.203243	6.581925
ln~hwager_02	802812	1.52626	.5668672	.0373669	6.214475
ln~hwager_03	750431	1.524566	.5695594	.5019234	6.143223
ln~hwager_04	717726	1.55318	.5825889	.4917514	6.227304
ln~hwager_05	722179	1.564875	.5873028	.5306283	6.343859

Hourly Total real wage (ln)

Variable	Obs	Mean	Std. Dev.	Min	Max
lnrealhwag..	1120998	1.486299	.5693133	-3.572962	6.654613
lnrealhwag..	1121054	1.531279	.5828933	-7.203243	8.14496
lnrealhwag..	802812	1.59068	.5949473	.0373669	8.28822
lnrealhwag..	750431	1.592925	.6019871	.5019234	8.239636
lnrealhwag..	717726	1.623279	.6122642	.4917514	7.902208
lnrealhwag..	722179	1.637799	.6176397	.5306283	7.973006

Real wage growth

Variable	Obs	Mean	Std. Dev.	Min	Max
varlnrealw~0	1121907	.0485714	.2900742	-8.291295	9.754653
varlnrealw~2	803289	.0374023	.304518	-5.184348	8.19291
varlnrealw~3	660615	.0024681	.2750231	-5.728764	4.857928
varlnrealw~4	630308	.0080221	.2646938	-5.185967	5.523208
varlnrealw~5	631396	.0145919	.2590232	-5.397026	5.223094

Real hourly wage growth

Variable	Obs	Mean	Std. Dev.	Min	Max
varlnrealh~0	1120974	.0413162	.2195726	-8.369412	5.80832
varlnrealh~2	802784	.0302757	.2299153	-3.65388	8.240256
varlnrealh~3	660251	.0023731	.1845817	-3.965114	4.23239
varlnrealh~4	630009	.0333039	.17839	-3.567413	3.488675
varlnrealh~5	631180	.0167269	.1775692	-4.602227	4.613341

- **Descriptive statistics on employers**

The employers in our sample have, on average, 1 establishment and 15 employees.

31% of our employers belong to CAE G - Wholesale and retail trade

21% of our employes belong to CAE D - Manufacturing

Variable	Obs	Mean	Std. Dev.	Min	Max
nest_99	154636	1.241128	4.014107	1	566
pemp_99	154636	14.78022	111.3535	1	16992
dimemp_99	154636	1.696501	1.116482	0	9.740498
vvend_99	154636	1252954	2.75e+07	0	6.74e+09
prod_99	154636	62075.4	508365.5	0	1.76e+08
foreignsu~99	154636	.0117178	.1076132	0	1
foreignin~99	154636	.0023604	.0485265	0	1
caeA_99	154636	.0330647	.1788062	0	1
caeB_99	154636	.00097	.0311301	0	1
caeC_99	154636	.0045591	.0673672	0	1
caeD_99	154636	.2101192	.4073944	0	1
caeE_99	154636	.0004397	.0209655	0	1
caeF_99	154636	.1349815	.3417049	0	1
caeG_99	154636	.3132518	.4638173	0	1
caeH_99	154636	.1053959	.3070639	0	1
caeI_99	154636	.0307755	.1727095	0	1
caeJ_99	154636	.00604	.0774826	0	1
caeK_99	154636	.0757068	.2645293	0	1
caeL_99	154636	.0010153	.0318475	0	1
caeM_99	154636	.0126491	.1117548	0	1
caeN_99	154636	.0344486	.1823791	0	1
caeO_99	154636	.0365762	.1877195	0	1
caeP_99	154636	0	0	0	0
caeQ_99	154636	6.47e-06	.002543	0	1