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Margarita Carvalho
João Cerejeira

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Universidade do Minho
Escola de Economia e Gestão

"Mergers and Acquisitions and wage effects in the Portuguese banking sector"[*]

Margarita Carvalho[†] João Cerejeira[‡]

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Abstract

This study examines the impacts of mergers and acquisitions (hereafter M&A) on wages of workers for the period 1993-2007. The results suggest a positive effect of M&A on wages; however, for workers that have participated in M&A in an acquired bank, it seems that M&A has a detrimental impact reflected by a reduction of the positive effect. We have also observed that the effects of acquisitions differ over time indicating that time dimension is an important element to consider, as the positive effect is not so manifest in the second year after the M&A; moreover we observe that the positive effect decreases even more in the third year after the M&A. The research also tries to assess if the effects differ according to the M&A type and the worker qualification level. Empirical results show that for highly qualified workers, M&A seems to be positive for wages. M&A may also produce different effects on employees' wages according to the type of operation. Domestic acquisitions tend to have a positive effect on wages, but when analysing the impact on workers of foreign acquisitions, the results show a negative effect.

Keywords: mergers, acquisitions, wages, employment, banking.

JEL Classification: G21, G34, J21, J31

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[†] Department of Economics and NIPE, School of Economics and Management, University of Minho, Campus de Gualtar, 4710-057, Braga, Portugal; e-mail address: margaritas@eeg.uminho.pt.

[‡] Department of Economics and NIPE, School of Economics and Management, University of Minho, Campus de Gualtar, 4710-057, Braga, Portugal; e-mail address: jccsilva@eeg.uminho.pt.

1. Introduction

Until the mid-1980s, the Portuguese banking sector was publicly owned and limited by strong administrative and legal controls. In the following years several factors contributed towards the development of this sector. The liberalization and the deregulation in the banking sector together with globalization and technological development have created a new competitive environment. The harmonization of the prudential regulation implemented during the first half of the nineties and the creation in 1993 of the Single European Market for financial services were important determinants of the liberalization process[1]. As a result, the integration of financial markets has blurred the distinction between activities such as lending, investment banking, asset management and insurance. All these transformations have created threats and opportunities, and banks have reacted to the increasing competition by cutting costs and expanding in size, often by merging with competitors or taking them over.

The Portuguese case is an interesting subject of investigation as it has undergone, since 1990, an accelerating consolidation process, representing an interesting opportunity to investigate the effects of M&A on wages. For Portugal, research focusing on the banking labour market is scarce and, to our knowledge, the only study that presents evidence regarding the Portuguese banking industry was presented by Monteiro (2004, 2010) who assessed the impact of privatisation on wages. Additionally, a comprehensive dataset covering this period is available so it is possible to assess the impact of M&A operations on individuals whose firms where subject to ownership changes. The use of matched employer-employee data allows us to access detailed information on individuals and in doing so it is possible to control for differences at the worker level and to control for changes in the composition of the workforce.

The literature on employment and wage effects of M&A is mostly concentrated at the plant and firm level (Conyon et al., 2002a; Conyon et al., 2004; Gugler and Yurtoglu, 2004; Lehto and Böckerman, 2008; McGucking and Nguyen, 2001; Oberhofer, 2013), so it is not possible to assess the effects of these operations on an individual worker. Using individual workers' wages rather than plant or firm wages will allow us to deal with individual heterogeneity. Thus, this study contributes by analysing the effects of M&A at the individual level, considering the relationship between ownership changes and workers. In this context, the aim of this study is to assess the impacts of M&A on the

[1] The *Second Banking Directive* (89/646/CEE, of 15 December 1989) has been transposed into Portuguese legislation by the Decree-Law 298/92, of 31 December, which established the RGICSF (*Regime Geral das Instituições de Crédito e Sociedades Financeiras*).

labour market for workers of acquired firms, including unobservable firm and individual characteristics by using the fixed effects least squares dummy variables regression as proposed by Andrews et al. (2006) and the spell fixed effects approach implemented by Graham et al. (2012) in their study on managerial attributes and executive compensation.

The impacts of M&A may not happen immediately, so this investigation also takes into account the time dimension and it examines the effect of M&A on wages in different years after the M&A. The longitudinal nature of our dataset enables us to analyse the impact of M&A on employees and to consider the time dimension of those effects.

This research also tries to assess if the effects on wages differ according to the worker's qualification level and the type of M&A[2]. Regarding the definition of M&A we have adopted an all-embracing concept of M&A according to what matters, which is the existence of a common strategy to be implemented in the firms that are integrated. In this sense, patrimony depends on a unique economic centre, so we are concerned with the integration event no matter which form of integration it assumes.

The remainder of the paper is organized as follows: Section 2 briefly summarizes the literature that has examined the relationship between M&A, employment and wages. The following section focuses on the data and the description of the sample and it also contains the descriptive statistics for some of the variables used. Section 4 presents the empirical methodology and the corresponding results are reported in Section 5. Finally, the main conclusions are outlined in Section 6.

2. Literature review

2.1. Efficiency, employment and wages

The perception that M&A have negative effects on the labour market has been an interesting subject of investigation in recent years. The recognition of the M&A's efficiency gains related to increased productivity and reduced costs has put into question the relation between efficiency, employment and wages reduction. According to Jensen (1988), ownership changes result in organizational restructuring involving plant closings, layoffs of top-level and mid-level managers, staff and production workers and reduced compensation.

[2] We classify M&A as being domestic or foreign. To classify a bank as a foreign entity we consider in our analysis a 50% threshold of foreign participation.

In this sense, labour market impacts are crucial, since the workforce adjustments are determinant in achieving M&A gains, therefore the efficiency motive represents one of the most important motivations for the pursuance of these operations, so in synergy-promoting M&A we can expect that the firms involved may wish to rationalize and use their assets jointly to obtain scale economies. It is expected that the rationalization will include human capital, and the downsizing of overlapping activities certainly will include a reduction in the workforce (McGucking and Nguyen, 2001; Lehto and Böckerman, 2008). However, it may not be just the case that merging firms exploit short-run economies of scale, by reducing overall employment in the new entity; it may also be observed that efficiency gains would permit the newly combined entity to grow, which would increase labour demand, leading to an employment increase.

In the analysis of the effect of M&A on the labour market, several studies focus their attention on the changes in employment and/or in wages within a given time period. At the firm-level, the effects of M&A are obtained for the average plant or firm level worker. Even controlling for firm or plant-level human capital, these studies may not capture the effects on individual workers. The mixed results on the employment effects give an indication of the employment effects; however, they are uncertain concerning the nature of the labour market effects (Pendleton, 2016).

2.1.1. Firm-level evidence

Oberhofer (2013) confirms the evidence of a positive and significant impact of acquisitions on employment of acquired firms. His study examines the post-acquisition employment growth of acquired firms and concludes that targets of acquisition increase their employment growth rate after the operation which, according to the author, provides evidence for the existence of efficiency gains.

Several studies report negative employment effects of M&A. More precisely, Conyon et al. (2002a) report that UK mergers result in a reduction in wages and compensation for non-production workers and it has also found a reduction in employment on related mergers in comparison to non-related mergers. In a previous study, Conyon et al. (2001) consider the hypothesis that hostile takeovers constitute a disciplinary mechanism that will increase productivity and employment reduction and an opportunity to renege on implicit contracts that will increase job losses. They analyse the employment effects of hostile takeovers in the United Kingdom for the 1993-1996 period and they observe that hostile and friendly acquisitions are associated with a decrease in labour demand, therefore there is

no difference between these two types of transactions. Indeed, both types of acquisitions have an immediate negative effect on employment.

The hypothesis that mergers may serve as a mechanism of restructuring is also considered by Gugler and Yurtoglu (2004) in their study on employment effects for US and European mergers, they consider that M&A represent a general device to restore a firm's optimal employment level. Comparing USA and Europe, the authors find that there is a decline in employment for mergers involving European firms. Since Europe has more rigid labour markets, mergers constitute an effective mechanism to reduce excess labour. M&A, as suggested by Shleifer and Summers (1988), may constitute a mechanism to renege on implicit contracts, laying off workers or reducing their wages; in the case of rigid labour markets, they also serve as a means to renegotiate the existing labour contracts. This restructuring mechanism constitutes an important reason for the reduction of employment (Lehto and Böckerman, 2008; Kubo and Saito, 2012).

In their study regarding the changes in employment and wages after a merger in Japan, Kubo and Saito (2012) find a reduction in the number of employees that occurs three years following the operation. A possible explanation for this suggests that firms try to reduce employment by suspending the recruitment of new employees, or by asking for voluntary retirement. In this sense, firms try to avoid the dismissal of employees. They also find that this negative effect on employment is more pronounced for related and non-rescue mergers. When analysing the employment conditions of those that remain in the firm, they observe a wage increase and conclude that employment conditions improve after a merger, namely for related and non-rescue mergers. Kuvandikov et al. (2014) however, consider that for related transactions, the expected reduction in employment is not always observed. This indicates that M&A are not always bad for the labour market, thus considering that it is important to distinguish between job transfer and job loss.

In line with these ideas, notwithstanding that in some cases ownership changes may be less positive for workers, it may be the case that in larger plants where the managerial discipline hypothesis is more valid, the reduction in employment may have benefits as ownership changes improve efficiency that countervail the losses for many workers (McGucking and Nguyen, 2001). The same point of view is also shared by Amess et al. (2014), according to whom, for related acquisitions, a wage increase is expected as a result of efficiency gains. This increase in wages will result from low productivity workers losing their jobs after takeovers and a higher average productivity and wages for the remaining workers is observed.

Ownership changes may not just be an opportunity to renege on implicit contracts, but they have other consequences on wages as long as they affect the structure of the product market and influence wages through profits and bargaining positions (Conyon et al., 2004). The authors observe that profitability and wages increase following an acquisition and that the type of transaction is important. In this sense, workers will obtain larger wage increases if they are involved in related mergers and the increase in wages results not just from an improved bargaining position, but also from the increase in profitability, suggesting that there is an increase in labour efficiency.

2.1.2. Evidence from linked employer-employee data

Empirical studies that have made use of matched employer-employee data focus their analysis at the individual level. According to Siegel (2008), M&A transactions increase additional investment in human capital and promote quality improvement for workers that remain in the same firm. For Swedish manufacturing plants, the authors find that employment is reduced after ownership change. However, this effect occurs most strongly for full acquisitions and divestitures and unrelated acquisitions. The findings suggest that M&A are associated with a decline in earnings. However, when analysing different types of transactions, the findings also suggest that earnings decline more in the case of workers who worked at a plant that was acquired by an owner that did not previously own an establishment. For partial investitures, the authors observe an increase in earnings. Thus, human capital is valued differently according to the type of transaction and those who acquire just a part of the firm or those who enter into a new industry by a purchase mechanism, value more the existing stock of human capital.

The positive effect on earnings and in the quality of human capital is also observed in a subsequent study (Siegel et al., 2009), which suggests that plants involved in an ownership change present an improvement in terms of average employee age, experience and percentage of workers with a college degree. At the individual level, it seems that job losses for women and non-Swedish workers occur with ownership changes, however higher turnover rates are observed for the same type of workers that were not subject to ownership changes. The authors observe that highly educated workers appear to be more mobile, and women, foreign-born and younger workers employed at plants involved in ownership changes experience higher job losses and reductions in wages.

Siegel and Simons (2010) find, by using linked employer-employee data for virtually all Swedish manufacturing firms and employees and consistent with human capital theory, that M&A enhance plant productivity, although they also result in the downsizing of establishments and firms.

Furthermore, they observe that M&A have a positive effect on workers' careers by improving the sorting and matching of workers and managers to firms and industries that are best suited to their skills. In spite of the reduction of establishments and firms, the plants involved in M&A operations were subject to a quality improvement of their employees.

This line of reasoning is in accordance with Smeets et al. (2016) in their study on post-merger organizational integration, pointing out the importance of human capital, as well as knowledge sharing in M&A. In this sense, even if M&A may result in a negative experience for many employees, highly skilled workers will still benefit. Thus, workers with less firm-specific human capital, education and tenure will probably be more prone to leave the merged firm.

2.2. Foreign ownership, employment and wages

2.2.1. Firm-level evidence

As cross-border M&A have increased substantially worldwide, the relationship between foreign ownership and wages has also been a topic of investigation. In their study about the impact of foreign ownership on firm level productivity and wages in the UK manufacturing industry for the 1989-1994 period, Conyon et al. (2002b) find that domestic acquisitions, namely horizontal acquisitions, are accompanied by a reduction in wages that are explained by the opportunity that acquisitions offer to renege on implicit labour contracts and to transfer surplus from the workforce. When they compare foreign to domestic acquisitions, they observe an increase in average wages after a foreign acquisition.

The positive effect of foreign takeovers on wages may be explained by the possession and transfer of a firm specific asset that enhances productivity and profitability for these firms. If foreign firms are more productive and if the efficient use of the firm specific asset requires productive workers, then we may observe higher wages after the transfer of the firm specific asset to the target firm. It may also occur that foreign firms offer non-competitive wages that increase productivity and profitability in order to reduce labour turnover, motivate employees, enhance loyalty and select highly skilled workers (Girma and Görg, 2007; Bandick, 2011). This line of reasoning is also present in Oldford and Otchere (2016) in a sense that not only will higher productivity generate higher wages, but also higher wages may be paid to the remaining employees in order to achieve increased productivity.

Another explanation is that the change in ownership may alter the industrial relations practices, so these changes may have effects on wages. We may observe that the wage level in the foreign affiliate is linked to the parent company, or that foreign firms pay higher wages than domestic firms in order to avoid industrial relations disputes. Moreover, the authors consider that higher wages may also be expected when successful work practices or new arrangements are transferred to foreign subsidiaries. Thus, to implement these practices or arrangements effectively, workers are compensated with higher wages.

In order to identify the causal effect of foreign acquisitions on wages, Girma and Görg (2007) investigate the impact on wages of the takeover of a domestic establishment by foreign owners and observe that the post-acquisition wage effect depends on the nationality of the foreign acquirer and the skill group of workers. They find a wage increase, on average, for skilled and unskilled workers for US firms. However, these effects are not observable in the case of EU firms.

Huttunen (2007) shares the same ideas as Girma and Görg (2007) in terms of the theoretical explanations for higher wages paid by foreign-owned firms, nonetheless the author points out that these firms employ qualified workers in comparison to domestic firms, thus this represents a reasonable explanation for a wage premium. In her study on the effect of foreign acquisition on wages in Finland, she finds that foreign acquisition has a positive effect on wages for all skill groups; however, the effect becomes more evident as the level of schooling increases. She also observes that the effect is not immediate and it is observed within 1 to 3 years after the acquisition. According to the author, this delay may be due to several reasons, for instance foreign firms implement more training, thus wages in plants acquired by foreign-owned firms increase only some years after the acquisition and the increase in wages is higher for highly educated workers. Another reason is related to some organizational changes that may occur in the firm that require time to be implemented. It may also occur that changes in average wages result from changes in the employment composition of the workforce, which creates adjustment costs, therefore the changes are not immediate. Finally, the author also considers that measurement problems may create uncertainty about the right time for the acquisition.

2.2.2. Evidence from linked employer-employee data

It is, however, not clear if the increase in wages after a foreign acquisition is due to worker reallocation and changes in the firm´s human capital or due to increases in labour productivity and this is explained by the difficulty in obtaining information about firms and workers over time (Almeida, 2007).

Aiming at analysing the foreign wage premium that is documented by the literature, the author is also interested in the effects of acquisitions on labour reallocation, as ownership changes are associated with the reallocation of resources to efficient uses.

The results show that foreign acquisitions have small effects on human capital and on average wages of the acquired firms. Thus, foreign ownership does not improve the labour market outcomes, as foreign ownership may be motivated by some unobservable characteristics as education and wages. The differences between foreign and domestic firms result from a selection effect, thus foreign firms select domestic firms to acquire that have a more educated workforce and pay higher wages.

In line with these ideas, Heyman et al. (2007) observe a small foreign wage premium. Their comparison of foreign-owned firms with domestic firms for the Swedish private sector suggests that foreign takeovers have no positive effect on wages. When analysing at the individual level the foreign ownership premium disappears, thus, according to the authors, firm level analysis tends to overestimate the foreign wage premium, so for an individual worker we can expect that a foreign acquisition will result in a reduction of wage growth. Similar conclusions for Portugal are obtained by Martins (2004) who considers that the overestimation of the commonly documented wage premium is due to the lack of a good comparison between domestic and foreign firms; and to the workers' unobserved heterogeneity.

Martins and Esteves (2008) in their study about the Brazilian labour market find that both types of acquisitions (domestic to foreign or *vice versa*) do not tend to affect wages significantly. When considering the wage implications of worker mobility, they also find that there are different impacts according to the type of acquisition, thus movers from foreign to domestic firms suffer larger wage cuts, and movers from domestic to foreign firms observe lower wage cuts or an increase in their pay.

In another study, Heyman et al. (2011) examine the impact of cross-border acquisitions on intra-firm wage dispersion for Swedish firms. Their results show that multinational operations do not affect wage dispersion, but it is the acquisition itself that affects wage dispersion. They also find that the positive effects are mostly concentrated on managers, namely CEOs, and that wages for other high-skilled workers are not affected. For medium and low skilled workers, they observe a negative effect of acquisition on wages, so there is an increase in wage dispersion.

Both Girma and Gorg (2007) and Heyman et al. (2011) assume that skilled labour is important and a scarce production factor, since skills are required to implement the transformations of the acquisition process. Therefore, wages will increase for high-skilled workers and remain constant for other types of workers. The authors also assume that the bargaining process associated with foreign

ownership may contribute to wage dispersion, as skilled workers will be in a better position than unskilled workers.

In spite of the recognition of the wage differentials between foreign and domestically-owned firms and the existence of a foreign wage premium, it is not very evident if foreign firms pay higher wages to identical workers, thus it is important to change the unit of observation from the firm or plant level to the individual level. (Heyman et al., 2007; Oberhofer et al., 2012; Hijzen et al., 2013). Furthermore, Hijzen et al. (2013) observe that, at least in developed countries, foreign takeovers have a small positive effect or even a negative effect on individual wages. They present a cross-country study that includes Portugal and analyse the effects of foreign ownership on wages, employment and worker turnover rates. They find that, notwithstanding the overestimation of the foreign wage premium, there is a positive wage effect of foreign takeovers and that the wage effects associated with worker movements from domestic to foreign firms are also important.

3. Data

The analysis draws on a large matched employer-employee dataset known as *Quadros de Pessoal.* This is an annual compulsory survey run by the Ministry of Employment and Social Security that collects information on all firms located in Portugal with wage-earners. Records are available at the firm and plant level as well as at the worker level. The firm variable includes information on location, industry, sales, legal setting, year of constitution, share of the firm's equity owned by foreign parties, number of establishments and number of employees. At the establishment level it comprises information on location, industry and number of workers, among others. The set of workers' characteristics includes age, education, tenure, wages, hours worked and occupation.

To assess the impacts of ownership change on workers, we have used longitudinal data on firms and their employees from 1985 to 2007[3]. The dataset is restricted to 2007 as the Financial Crisis took place in 2008. The existence of unique (time-invariant) identifiers allows for matching firms and workers in each year and it also allows us to follow them over time, so it is possible to identify the banking entities and the workers of those firms.

[3] Data on workers is not available for 1990 and 2001.

The entities in our sample were restricted to those operating in "other monetary intermediation" (code 65120), according to the Portuguese Classification of Economic Activities – CAE–rev 2.1 (1995 version) and they include all monetary institutions, excluding the Central Bank[4].

After de creation of the main dataset it was important to identify all domestic acquisitions. The identification of domestic acquisitions is possible through the use of data collected on an annual basis by the *Associação Portuguesa de Bancos* (APB) in their *Boletins Informativos.* This dataset contains information on all banks in Portugal and reports the changes that took place in the banking sector. Besides accounting information, the dataset also reveals information on the firm (such as age, ownership, size, number of employees and branches and localization) and on employees' characteristics (qualifications, type of activity and occupation in each bank). Another important fact is that, every year, the *Boletim Informativo* presents a synthesis of the evolution in the banking sector in comparison to the previous year, mentioning which banks entered or exited the banking sector or which ones were involved in the process of M&A, so it allows us to find those entities in the *Quadros de Pessoal*, by matching some information with that obtained from the APB. We have also identified all the entities that were not engaged in those processes. Table 1 highlights the major transformations occurred in the banking sector of the banks listed in the *Boletins Informativos*, between 1993 and 2006[5]. The remaining banks that were not subject to M&A transformations are displayed in the Appendix A.2. (Table A.2).

The *Boletins Informativos* present information on share capital (*capital social*) as well as *Quadros de Pessoal*, thus it was possible to match the information and identify the entities. The information provided by the APB is only available from 1993 onwards, so it was possible to compare the evolution of this variable in *Quadros de Pessoal* and in the *Boletins Informativos* throughout the period under analysis. The existing information allowed the bank's identification and, in the cases where the comparison was uncertain, a third source of information was used. The information contained in the "Information Disclosure System" of the *Comissão do Mercado de Valores Mobiliários (CMVM)* was valuable, since it was possible to find information on the registries of the entities and institutions completed since the second quarter of the year 2000. In a few cases it was necessary to use this source of information.

[4] Three revisions of the CAE have occurred between 1985 and 2007. The methodology for CAE uniformization and the entities included on "other monetary intermediation" are described in Appendix A.1. (Table A.1.1 and Table A.1.2).

[5] The year 2007 was not considered as no important transformations for our analysis were reported in that year.

Table 1: Major banking transformations

Credit institution	Period
Acquisition of Banco Fonsecas & Burnay by Banco Português de Investimento.	1991
Acquisition of Banco Português do Atlântico by Banco Comercial Português.	1995
Acquisition of Banco Fomento do Exterior and Banco Borges & Irmão by Banco Português de Investimento.	1996
Merger of Banco Fonsecas & Burnay, Banco Fomento do Exterior, Banco Borges & Irmão and Banco Universo into Banco BPI.	1998
Merger of Banco Argentaria into Banco Bilbao Viscaya.	2000
Merger of Banco Nacional Ultramarino into Caixa Geral de Depósitos.	2001
Merger of Banco Mello, Banco Mello Imobiliário and Banco Português do Atlântico into Banco Comercial Português.	2001
Merger of Banco Pinto & Sotto Mayor into Banco Comercial Português.	2001
Merger of Credit Lyonnais Portugal into Banco Bilbao Viscaya Argentaria	2001
Acquisition of Banco Nacional de Crédito by Banco Popular Español.	2003
Merger of Banco Expresso Atlântico and Credibanco into Banco Comercial Português.	2004
Merger of Banco Totta & Açores and Banco Santander Portugal into Crédito Predial Português.	2004
Merger of Banco Internacional de Crédito into Banco Espírito Santo.	2005

Source: *Associação Portuguesa de Bancos.*

Note: For every firm subject to a M&A, information on variables like share capital, number of employees and branches and localization were collected. This data allowed us to find those entities in *Quadros de Pessoal* by matching some information with that obtained from the APB. Share capital was used as the primary matching variable due to its precise nature.

In our final dataset we identify almost all the entities that are listed in Table 1 and Table A.2. The merged dataset with 914 754 observations contained all the banks, including those that only appear in the *Quadros de Pessoal* dataset and those that only appear in the APB dataset. It was possible to identify through the matching process almost 85% of the entities, representing 774 575 worker-year observations.

After checking and clearing for inconsistencies, we only kept one observation per worker in each year, which resulted in an unbalanced panel with 747 921 observations (workers/years) and a total of 118 194 workers. Table 2 presents information on the number of banks and the number of bank employees from 1993 until 2007 for the acquirer and acquired entities and for all entities, including those not involved in M&A.

Table 2: Balance of the Panel (1993 – 2007)

Year	All		Acquirers		Acquired	
	Banks	Workers	Banks	Workers	Banks	Workers
1993	35	49 205	4	10 943	16	34 469
1994	39	58 812	6	21 937	16	32 361
1995	40	60 094	6	22 720	16	32 089
1996	40	60 056	6	22 648	16	31 947
1997	40	56 037	4	20 441	15	29 538
1998	38	54 953	5	20 159	14	28 295
1999	41	56 091	5	21 171	14	28 020
2000	40	54 047	6	24 584	10	21 615
2001	n/a	n/a	n/a	n/a	n/a	n/a
2002	40	50 013	7	27 618	7	13 509
2003	40	48 767	7	32 897	6	6 813
2004	39	48 306	7	32 579	5	6 314
2005	36	48 194	6	36 235	2	1 901
2006	33	50 703	6	38 594	1	1 143
2007	33	52 643	6	39 663	1	1 183

Source: computations from the author based on *Quadros de Pessoal*, 1993 – 2007

Notes: The number of acquired and acquirer banks and their respective number of employees are reported for the entire period (1993-2007) and do not correspond to the number of acquisitions in each year. For example, in 1993 we identify 16 banks that participated in M&A, however the acquisitions have occurred throughout the period of analysis; in the same way we observe that in the same year, 4 banks were identified as acquirers. The reduction of acquired banks can be explained by the integration processes that occurred after the M&A process, in which some banks were integrated into other banks.

The banks were categorized according to their participation or not in M&A processes. The workforce engaged in these processes represents, approximately, 86% of our sample against 14% that correspond to those that did not participate in M&A.

Table 3 provides information on the characteristics of employees from acquirer, acquired firms and non-merging firms. In terms of size, acquirer firms are larger. Non-merging firms present significant differences in terms of size and compensation. In fact, they are smaller and pay more to their employees. They also have younger and more educated workers when compared to merging firms.

Table 3: Summary statistics for acquirer, acquired and non-merging firms

Variable	M&A		Not M&A
	Acquirer	Acquired	
Number of establishments			
Mean	413.0	152.4	32.7
Std. Dev.	*298.5*	*123.3*	*61.78*
Firm employees			
Mean	4733.0	2307.0	362.8
Std. Dev.	*3778.0*	*1899.0*	*587.7*
Monthly wage (real)			
Mean (euro)	836.0	785.7	1201.0
Std. Dev.	*39.88*	*99.21*	*465.0*
Total compensation (real)			
Mean (euro)	1307.0	1195.0	1607.0
Std. Dev.	*160.0*	*175.8*	*521.3*
Schooling (years)			
Mean	13.0	11.7	13.8
Std. Dev.	*1.1*	*1.3*	*1.4*
Age			
Mean	37.2	39.2	35.3
Std. Dev.	*4.1*	*4.9*	*3.1*
Tenure (years)			
Mean	9.8	11.3	5.4
Std. Dev.	*4.8*	*6.5*	*3.6*
Banks	8	16	27

Source*:* computations from the author based on *Quadros de Pessoal*, 1993 – 2007

Notes*:* (1) Monthly wage corresponds to base salary and it is measured in real terms (base year = 1993); Total compensation is measured as the monthly wage plus other remunerations received on a regular and irregular basis, in real terms (base year = 1993). (2) Statistics are reported according to the categorization of banks in terms of participation or not in M&A processes for the entire period (1993-2007) and do not rely on the year of acquisition.

The distribution of the sample by levels of education is presented in Table 4. In a more detailed analysis, we can observe that the highest levels of education are found in non-merging firms, but when comparing acquirers with acquired firms the first present a more educated workforce. Table 4 also presents information on qualifications and suggests that non-merging firms in comparison to merging firms have more "top executives", however, merging firms, namely acquirers, are superior in terms of "intermediary executives", "supervisors" and "highly skilled workers".

Table 4: Panel characteristics by education and qualification levels (workers from acquirers, acquired and non-merging firms)

Variable	M&A		Not M&A	All
	Acquirer	Acquired		
Education Level				
Less than primary school	0.02%	0.36%	0.11%	0.15%
Primary school	1.59%	4.60%	1.89%	2.72%
Preparatory school	5.41%	7.84%	1.64%	5.75%
Lower secondary school	19.46%	31.60%	14.13%	23.07%
Secondary school	45.41%	36.89%	46.14%	42.44%
Upper secondary school	3.92%	2.96%	4.90%	3.72%
College	24.19%	15.75%	31.18%	22.15%
Qualification Level				
Top Executives	8.09%	6.51%	14.68%	8.46%
Intermediary executives	12.41%	9.77%	11.69%	11.35%
Supervisors	3.12%	2.33%	2.83%	2.79%
Highly skilled workers	67.13%	69.85%	59.01%	66.95%
Semi-skilled and unskilled workers	4.42%	3.79%	7.42%	4.62%
Apprentices	0.00%	0.00%	0.18%	0.03%
Observations	372 189	269 197	106 525	747 921

Source*:* computations from the author based on *Quadros de Pessoal*, 1993 – 2007

Note: Statistics are reported according to the categorization of banks in terms of participation or not in M&A processes for the entire period (1993-2007) and do not rely on the year of acquisition.

Table 5 computes some statistics for three levels of a worker's qualification: "high" (top and intermediary executives), "medium" (supervisors and highly skilled and skilled professionals), and "low" (semi-skilled and unskilled workers, and apprentices) for merging and non-merging firms. We observe that non-merging firms pay more, particularly to "high" and "medium" qualification levels, they have a younger workforce and a shorter employment relation through time with their employees. Comparing acquirer to acquired firms, acquirer firms, in general, pay more. However, workers of acquired banks with low qualifications are worst remunerated than their counterparts in the acquirer firms.

Table 5: Sample means, by qualification levels (workers from acquirers, acquired and non-merging firms)

	M&A						Not M&A			All		
	Acquirer			Acquired								
Variable	QUAL-L	QUAL-M	QUAL-H	QUAL-L	QUAL-M	QUAL-H	QUAL-L	QUAL-M	QUAL-H	QUAL-L	QUAL-M	QUAL-H
Monthly wage (real)												
Mean (euro)	591.6	756.7	1242.6	409.1	696.8	1135.1	612.6	746.4	1489.5	543.0	733.1	1257.6
Std. Dev.	*175.8*	*201.9*	*614.3*	*175.5*	*168.9*	*520.6*	*291.4*	*341.3*	*1158.1*	*225.8*	*215.7*	*737.1*
Total compensation (real)												
Mean (euro)	808.5	1093.6	1996.5	581.1	1004.5	1944.4	859.3	1047.0	2199.9	753.6	1054.5	2019.6
Std. Dev.	*314.8*	*384.6*	*1567.9*	*287.2*	*454.9*	*1074.8*	*419.0*	*560.1*	*2331.3*	*353.3*	*438.8*	*1626.3*
Schooling (years)												
Mean	9.1	12.1	13.5	5.1	10.8	12.6	9.8	13	14.0	8.1	11.7	13.3
Std. Dev.	*3.4*	*3.2*	*3.3*	*2.3*	*3.0*	*3.4*	*3.3*	*3.0*	*3.1*	*3.6*	*3.2*	*3.3*
Age												
Mean	42.5	38.5	43.4	46.6	41.2	45.7	38.5	34.5	40.7	42.8	39.0	43.5
Std. Dev.	*9.8*	*9.6*	*8.2*	*8.5*	*9.8*	*9.0*	*11.0*	*8.5*	*8.8*	*10.1*	*9.8*	*8.7*
Tenure (years)												
Mean	15.2	11.8	14.0	16.3	15.1	17.2	11.0	7.6	9.6	14.6	12.5	14.1
Std. Dev.	*8.5*	*9.0*	*9.1*	*6.1*	*9.2*	*10.6*	*9.2*	*7.5*	*8.8*	*8.3*	*9.2*	*9.8*
Observations	16 449	261 469	76 300	10 193	194 321	43 826	8 101	65 877	28 081	34 733	521 669	148 211

Source*:* computations from the author based on *Quadros de Pessoal*, 1993 – 2007

Notes*:* (1) Monthly wage corresponds to base salary and it is measured in real terms (base year = 1993); Total compensation is measured as the monthly wage plus other remunerations received on a regular and irregular basis, in real terms (base year = 1993). (2) Qualifications levels: QUAL-L: Semi-skilled and unskilled workers, and apprentices; QUAL-M: Supervisors and highly skilled and skilled professionals; QUAL-H: Top executives and intermediary executives. (3) Statistics are reported according to the categorization of banks in terms of participation or not in M&A processes for the entire period (1993-2007) and do not rely on the year of acquisition.

If we consider different types of acquisitions, Table 6 presents the sample means for domestic and foreign acquisitions. We observe that firms that were engaged in foreign acquisitions present a higher compensation level. We also note that workers from foreign acquisitions are younger, more educated and register a shorter relation with their employer in terms of tenure.

Table 6: Sample means, by type of acquisition

Variable	Domestic	Foreign
Number of establishments		
Mean	184.4	118.5
Std. Dev.	*125.3*	*110.2*
Firm employees		
Mean	2903.0	1528
Std. Dev.	*1939.0*	*1534*
Monthly wage (real)		
Mean (euro)	759.6	840.9
Std. Dev.	*59.34*	*153.0*
Total compensation (real)		
Mean (euro)	1142	1320.0
Std. Dev.	*137.4*	*211.7*
Schooling (years)		
Mean	11.5	12.4
Std. Dev.	*1.4*	*1.2*
Age		
Mean	40.3	37.6
Std. Dev.	*5.6*	*3.2*
Tenure (years)		
Mean	12.9	9.8
Std. Dev.	*6.8*	*5.2*
Observations	188 774	78 383
Number of banks	10	5

Source*:* computations from the author based on *Quadros de Pessoal*, 1993 – 2007
Notes*:* (1) Monthly wage corresponds to base salary and it is measured in real terms (base year = 1993); Total compensation is measured as the monthly wage plus other remunerations received on a regular and irregular basis, in real terms (base year = 1993). (2) "Domestic" refers to a domestic acquisition; "Foreign" refers to a foreign acquisition – domestic bank acquired by a foreign bank or foreign bank acquired by another foreign bank. (3) Statistics are reported according to the participation of banks in M&A processes for the entire period (1993-2007) and do not rely on the year of acquisition.

Table 7 presents summary statistics for variables relating to size and compensation for acquired firms in the years before and following the acquisition. We observe that after the acquisition they increase in dimension, something that is expected considering that M&A constitutes an alternative to internal growth. In terms of compensation, we observe that while monthly wages tend to decrease, the total compensation presents a slight increase.

Table 7: Summary statistics for acquired firms

Variable	T= –1	T=0	T=1	T=2	T=3
Number of establishments					
Mean	119.79	124.27	148.33	239.86	263.00
Std. Dev.	*110.02*	*102.75*	*73.21*	*119.65*	*145.82*
Firm employees					
Mean	1788.64	1810.27	2330.83	2955.14	2818
Std. Dev.	*1733.41*	*1642.87*	*1584.90*	*1916.14*	*1944.89*
Monthly wage (real)					
Mean (euro)	795.18	804.96	806.63	771.01	776.92
Std. Dev.	*149.55*	*198.61*	*68.90*	*51.48*	*57.10*
Total compensation (real)					
Mean (euro)	1173.93	1215.82	1189.50	1179.44	1244.08
Std. Dev.	*237.95*	*263.83*	*151.99*	*111.44*	213.25
Observations	24 551	26 664	13 787	20 094	19 347
Banks	14	15	6	7	7

Source: computations from the author based on *Quadros de Pessoal*, 1993 – 2007.
Notes: Monthly wage corresponds to base salary and it is measured in real terms (base year = 1993); Total compensation is measured as the monthly wage plus other remunerations received on a regular and irregular basis, in real terms (base year = 1993) and do not rely on the year of acquisition.

4. Empirical methodology

Our empirical analysis follows the literature on employment effects of M&A. As pointed out by Oberhofer (2013), the impacts of M&A on wages and employment are modelled as a function of some explanatory variables for firms and individuals and a dummy variable that captures whether a firm or an individual experienced an ownership change. In our case, we have added to the wage equation worker and bank fixed effects.

To analyse the impact of M&A on wages we estimate the following model:

$$w_{ijt} = \boldsymbol{X}_{it}\beta_1 + \boldsymbol{Z}_{jt}\beta_2 + \beta_3 M_{it} + \beta_4 A_{it} + \alpha_i + \gamma_j + \mu_t + \varepsilon_{ijt} \quad (1)$$

where w_{ijt} represents the logarithm of the real total wage of worker *i* in year *t*. Total wages are computed as the monthly wage plus other payments received on a regular and irregular basis in real terms (1993 prices), using the Consumer Price Index from the *Instituto Nacional de Estatística* (INE). X is a vector of a worker's observable characteristics which include gender, years of schooling, tenure and experience and their squares.

Z is a vector of firm characteristics which refers to firm size, which we proxy by the logarithm of the number of workers. We may expect larger firms to pay more (Oi and Idson, 1999a; Oi and Idson, 1999b; Brown and Medoff, 1989) as workers are more productive in larger firms or, according to other theoretical explanations, larger firms are able to pay higher wages or hire higher quality workers.

M_{it} is a dummy variable that is equal to one if the worker experiences a M&A in year t and is equal to 0 if the worker did not participate in a M&A operation. The individual firm and time effects are captured by α_i, γ_j and μ_t, respectively, and ε_{ijt} is the error term.

We first examine the impact of M&A on wages and then proceed to analyse the impact of M&A on workers of acquired firms that represents our treated group. In order to do that, we define A_{it} as a dummy variable equal to one if the worker was employed in an acquired firm (after the M&A) and value zero if the worker was in a period before the M&A or not subject to M&A. This variable is the main variable of interest as it allows us to assess the effect of average treatment (acquisition).

We depart from a simplest specification using a pooled data model assuming that all coefficients are constant across time and units and that the error term captures the remaining differences between them, however, in this model the unobserved individual and firm heterogeneities are captured by the error term, which may imply a correlation between the error term and the explanatory variables.

The fixed effects model allows for the control of unobserved time-invariant heterogeneities that may be correlated with the explanatory variable A_{it}, therefore, we can avoid the omitted variable bias. The unobserved individual characteristics may be related with the workers' skills or abilities and affects their wages in the same way, no matter the firm where they are employed; the unobserved firm effects may reflect the firm's wage policy or management policies and capture the characteristics of the firm, which similarly affects its workers. The inclusion of time effects control for macroeconomic shocks that affect all the firms and their workers in the same way.

In our model there are three fixed effects: worker fixed effect α_i, firm fixed effect γ_j and year fixed effect μ_t. According to Cornelissen (2006, 2008) the model can be estimated by including one of the effects (the firm effect) as dummy variables, and removing the other effect (the worker effect) using the within transformation or the fixed effects transformation. The third effect (time effect) does not represent a major concern so it can also be incorporated as dummy variables. This method is equivalent to "fixed effects least squares dummy variables regression" (FEiLSDVj) proposed by Andrews et al. (2006), which combines the classical fixed effects (FE) model and the least squares dummy variable model (LSDV) as it sweeps out one effect by the fixed effects transformation and includes the other effect as dummy variables.

If we are not interested in estimating the unobserved effects of workers and firms, we can consider the combined individual and firm fixed effects and follow the spell fixed effects method, or FE(s), presented in Andrews et al. (2006) and adopted by Graham et al. (2012) in their study about the impact of managerial attributes on executive compensation, where they investigate the role of firm

and manager unobservable characteristics. This method creates a dummy variable, V_s, that represents a "spell" and it is a unique individual-firm combination, so it is possible to obtain consistent estimates of the parameters by time-demeaning within each spell. Equation (1) can be rewritten as

$$w_{ijt} = \boldsymbol{X}_{it}\beta_1 + \boldsymbol{Z}_{jt}\beta_2 + \beta_3 M_{it} + \beta_4 A_{it} + V_s + \mu_t + \varepsilon_{ijt} \quad (2)$$

The model is thus reduced to a two-way fixed effects model and it can be estimated by standard fixed effects approaches, as the within-group fixed effects and the least squares dummy variable approach (Graham et al., 2012)[1]. Notwithstanding that, this approach allows for the control of the influence of individual and firm effects, it is not possible to separate individual from firm effects.

In order to assess the wage impact differentials by different types of workers, we have included in our baseline equation, several interactions terms between the variable A_{it} and the worker qualification level (high, medium and low), Q_{it}. The interaction between these two variables, $A_{it}Q_{it}$, will capture the impact of M&A on individual wages for different qualification levels

$$w_{ijt} = \boldsymbol{X}_{it}\beta_1 + \boldsymbol{Z}_{jt}\beta_2 + \beta_3 M_{it} + \sum_{q=1}^{Q} \beta_{4q} A_{it}Q_{it} + \alpha_i + \gamma_j + \mu_t + \varepsilon_{ijt} \quad (3)$$

We also decompose the M&A wage impact differential between several types of acquisitions – domestic and foreign – and consider the following wage equation,

$$w_{ijt} = \boldsymbol{X}_{it}\beta_1 + \boldsymbol{Z}_{jt}\beta_2 + \beta_3 M_{it} + \beta_4 dom_{it}A_{it} + \beta_5 for_{it}A_{it} + \alpha_i + \gamma_j + \mu_t + \varepsilon_{ijt} \quad (4)$$

in which all the notation has the same meaning as in equations (1) and (2), $dom_{it}A_{it}$ is a dummy variable taking value one if the worker takes part of a domestic acquisition and is at the firm after the M&A ($dom_{it}A_{it} = 1$) and 0 if the worker is observed in a period before the M&A ($dom_{it}A_{it} = 0$); $for_{it}A_{it}$ is a dummy variable if the worker takes part of a foreign acquisition and is at the firm after the M&A ($for_{it}A_{it} = 1$) and 0 if the worker is observed in a period before the M&A ($for_{it}A_{it} = 0$).

[1] This method is presented by Abowd et al. (1999) as the consistent method.

5. Empirical results

5.1. Wages in acquired banks

Not only do the results vary according to the specification adopted, but also according to the level of unobserved heterogeneity that is considered. In the following analysis, we will mainly explore the results obtained from the fixed effects and the spell specifications.

We observe from Table 8 that larger firms pay more and that more educated and more experienced workers have higher wages. These results present the expected effects as suggested by the positive sign for education, on average workers who increase their education through labour working age, each additional year of education increases wages by 1%. Regarding experience, a non-linear impact on wages is observed, suggesting decreasing marginal returns.

Table 8: Impact of M&A on wages

Dependent Variable: Logarithm of the real total wage						
Variable	OLS-1	OLS-2	OLS-3	FE-1	FE-2	FE-3
M&A	-.090***	-.066***	-.162***	.057***	.021***	.035***
	(.002)	(.002)	(.006)	(.001)	(.003)	(.005)
Number of workers (log)	-.026***	-.027***	-.077***	-.010***	.027***	.027***
	(.001)	(.001)	(.003)	(.001)	(.001)	(.002)
Male	.137***	.143***	.150***	–	–	–
	(.002)	(.002)	(.002)			
Education (years)	.080***	.077***	.076***	.014***	.014***	.010***
	(.0005)	(.0005)	(.0005)	(.001)	(.001)	(.001)
Tenure (years)	-.015***	-.014***	-.014***	-.007***	-.007***	-.004***
	(.0004)	(.0004)	(.0005)	(.0002)	(.0002)	(.0003)
Tenure^2	.0004***	.0004***	.0004***	.0001***	.0001***	.00002***
	(.0000)	(.0000)	(.0000)	(.0000)	(.0000)	(.0000)
Experience (years)	.055***	.054***	.053***	.027***	.025***	.020***
	(.0004)	(.0004)	(.0004)	(.001)	(.001)	(.001)
Experience^2/100	-.067***	-.068***	-.067***	-.041***	-.035***	-.030***
	(.001)	(.001)	(.001)	(.0004)	(.0004)	(.001)
Year effects	No	Yes	Yes	Yes	Yes	Yes
Firm effects	No	No	Yes	No	Yes	Yes
Observations	741 408	741 408	741 408	741 408	741 408	741 408
Groups				117 580	117 580	150 695

Source*:* computations from the author based on *Quadros de Pessoal*, 1993 – 2007.

Notes: (1) M&A is a dummy variable equal to one if the worker experiences a M&A and 0 if the worker did not participate in a M&A operation. (2) FE-3 is a spell fixed effects regression, including both individual and firm effects. (4) Robust standard errors in brackets. (5) * significant at 10%; ** significant at 5%; *** significant at 1%.

Controlling for worker and firm observable characteristics and analysing the impact of M&A on wages, the pooled data model presents a wage decrease of 9%, but when considering time and firm effects the negative wage impact of M&A increases to nearly -16%. The estimation with worker fixed effects suggests a positive effect on wages, but when we control for both unobserved individual and firm level differences, we find a less but still positive wage effect of 2% and 4%. These results correspond to the fixed effects method and to the spell method, respectively.

Assuming that some type of endogeneity may be a possible explanation for the signal change in our previous results, we may reformulate our analysis and treat that endogeneity as a case of omitted variables. For instance, one could argue that a worker's ability is an omitted variable, then

$$wage = \beta_0 + \beta_1 M\&A + \beta_2 Ability + \varepsilon \tag{5}$$

and also,

$$wage = \hat{\beta}_0 + \hat{\beta}_{1OLS} M\&A + \varepsilon, \qquad \text{with } \hat{\beta}_{OLS} < 0 \tag{6}$$

If $Ability$ is unobserved, then the formula for omitted variable bias in linear regression is:

$$\operatorname{plim} \hat{\beta}_{1OLS} = \beta_1 + \beta_2 \frac{Cov(Ability, M\&A)}{Var(M\&A)} \tag{7}$$

Therefore, the bias is proportional to the correlation of $Ability$ and $M\&A$ and to the effect of $Ability$ (the omitted variable) on $wage$. Taking the predicted fixed effect from the fixed effects and spell specifications, we observe a negative correlation between the fixed effects and M&A (-0.0996 and -0.3453, respectively).

This result signals an interesting finding, in a way, we may relate the fixed effects with the propensity to be acquired, as banks with lower worker fixed effects are more prone to be acquired in a M&A. Thus, it may be the case that for banks with workers that are not as productive as identical workers from other banks, present conditions that make them more susceptible to take part of a restructuring process.

When analysing the effects of M&A on wages after the M&A, we observe from Table 9, and controlling for worker and firm characteristics, that the pooled data model presents a wage decrease of about 9.5%, but when considering time and firm effects negative effect of M&A on wages is approximately 1.6%. Controlling for both unobserved individual and firm level differences, the results suggest a positive effects on wages of almost 4%. For workers of acquired banks it is important to note

that the variable $After$ suggest negative effect, thus reflecting that in spite of the positive effect that can be expected from a M&A, this effect will depend on the type of workers. In this case, for workers of acquired banks the positive impact will be lower. We observe also that workers with more years of schooling and experience earn more and that firm size has a positive effect on wage for workers employed in acquired firms.

Considering that the effect of M&A may not occur immediately, we estimate the impact in the following years after the integration. In fact it is observed that the M&A has a truly positive effect for the first year after the acquisition, which means that workers observe an increase in wages of nearly 4% and 5%, depending on the fixed effects (FE-4) or spell specification (FE-5).

Notwithstanding the positive effect in the first year of the acquisition, we observe that for the subsequent years this positive effect is reduced and this reduction is more pronounced in the third year after the M&A. For workers of acquired banks it is observed that, in the third year after the acquisition, the positive effect is only 0.3% and 1.9% for the fixed effects or spell specification (FE-5), respectively. This result may suggest that a time dimension is important, as pointed out by Huttunen (2007), when she considers that there are adjustment costs that must be considered and that are related to hiring and firing workers and for this reason the effect on wages is not immediate. Figure 1 depicts a clear picture of the effects of M&A over time.

If we consider that inefficient banks are more prone to be acquired, the apparent increase in wages is reduced over time after the acquisition, signalling the effects of a restructuring process that occurs gradually.

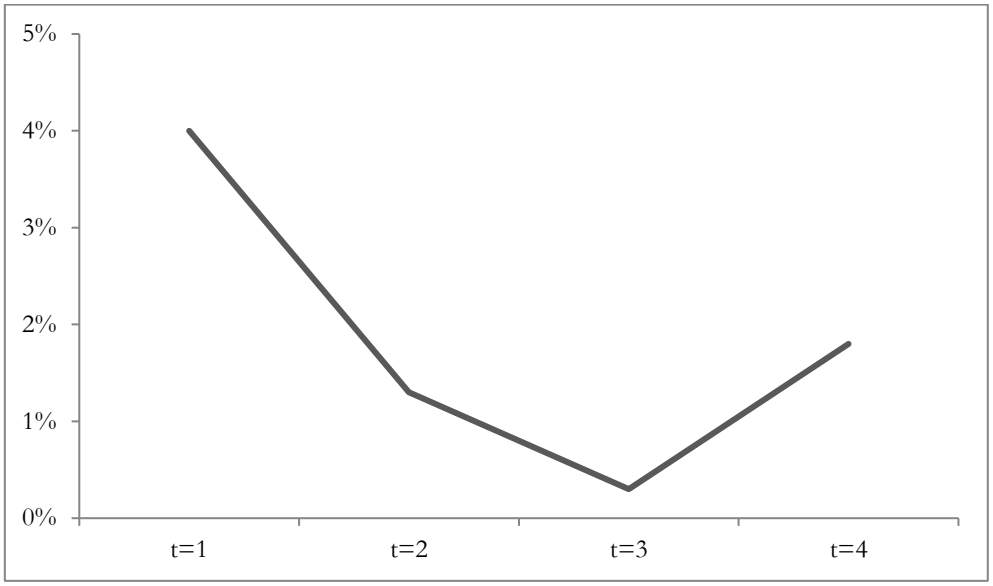
Table 9: Impact of M&A on wages

Dependent Variable: Logarithm of the real total wage								
Variable	OLS-1	OLS-2	OLS-3	FE-1	FE-2	FE-3	FE-4	FE-5
After	.013***	-.015***	-.014***	-.014***	-.009***	-.008***	–	–
	(.002)	(.002)	(.002)	(.001)	(.001)	(.002)		
M&A	-.095***	-.059***	-.158***	.066***	.024***	.038***	.028***	.042***
	(.002)	(.003)	(.006)	(.001)	(.001)	(.005)	(.005)	(.005)
Number of workers (log)	-.027***	-.027***	-.077***	-.009***	.026***	.027***	.026***	.027***
	(.001)	(.001)	(.003)	(.001)	(.001)	(.002)	(.002)	(.002)
Male	.137***	.143***	.150***	–	–	–	–	–
	(.002)	(.002)	(.002)					
Education (years)	.079***	.077***	.076***	.015***	.014***	.010***	.014***	.010***
	(.0005)	(.0005)	(.0004)	(.001)	(.001)	(.001)	(.001)	(.001)
Tenure (years)	-.015***	-.014***	-.014***	-.008***	-.007***	-.004***	-.007***	-.004***
	(.0004)	(.0004)	(.0004)	(.0002)	(.0002)	(.0003)	(.0003)	(.0003)
Tenure^2	.0004***	.0004***	.0004***	.0001***	.0001***	.00002***	.0001***	.00002***
	(.0000)	(.0000)	(.0000)	(.0000)	(.0000)	(.0000)	(.0000)	(.0000)
Experience (years)	.055***	.054***	.053***	.027***	.025***	.020***	.025***	.020***
	(.0004)	(.0004)	(.0004)	(.001)	(.001)	(.001)	(.001)	(.001)
Effect at t=1							.012***	.010***
							(.002)	(.002)
Effect at t=2							-.015***	-.015***
							(.002)	(.002)
Effect at t=3							-.025***	-.023***
							(.002)	(.002)
Effect at t=4							-.010***	-.008***
							(.002)	(.002)
Year effects	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm effects	No	No	Yes	No	Yes	Yes	Yes	Yes
Observations	741 408	741 408	741 408	741 408	741 408	741 408	741 408	741 408
Groups				117 580	117 580	150 695	117 580	150 695

Source*:* computations from the author based on *Quadros de Pessoal*, 1993 – 2007.

Notes: (1) M&A is a dummy variable equal to one if the worker experiences a M&A and 0 if the worker did not participate in a M&A operation. (2) After is a dummy variable taking value 1 if the worker was employed in an acquired firm (after the M&A) and value zero if the worker was in a period before the M&A or not subject to M&A. (3) FE-4 and FE-5 assess the impact of M&A on wages at time t=1, t=2, t=3 and t=4 (one, two, three and four years after the M&A, respectively). (4) FE-3 and FE-5 are spell fixed effects regressions including both individual and firm effects). (5) Robust standard errors in brackets. (6) * significant at 10%; ** significant at 5%; ***significant at 1%.

Figure 1: Effects of M&A over time



Source: computations from the author based on *Quadros de Pessoal*, 1993 – 2007.
Notes: (1) Effects of M&A on wages at time t=1, t=2, t=3 and t=4 (one, two, three and four years after the M&A, respectively). (2) Coefficients from FE-4 (Table 9) and significant at 1% level.

5.2. Wage impact comparison between high-medium-low qualified workers

As was previously mentioned, M&A can be used to break implicit contracts with employees at the acquired firm, laying off workers or reducing their wages. However, it may be the case that this mechanism, or even the effects of these processes, may not be the same depending on the type of workers under consideration.

In this section, we assess the wage impacts of M&A by qualification levels. We consider three levels of a worker's qualification: "high" (top and intermediary executives), "medium" (supervisors and highly skilled and skilled professionals) and "low" (semi-skilled and unskilled workers, and apprentices) for merging and non-merging firms.

The analysis of M&A effects on wages for different levels of qualifications presents different conclusions. According to Table 10, for workers of acquired banks, we can expect a reduction of the positive effect for almost all levels of qualification. The only exception is observed in our fixed effects specification, for those with high qualifications (top and intermediary executives), however, a slightly increase of the positive effect of near 0.6.

It seems that the M&A processes are less favourable for workers of acquired banks, especially for lower levels of qualification, however, they have a slightly positive effect on highly qualified workers, who may earn more when participating in M&A.

In this analysis, we have excluded from the sample those individuals whose information regarding qualification was not available. As a robustness check, we estimate the same regressions including those individuals and considering their qualification as "non-defined", as reported by *Quadros de Pessoal*. The results are presented in Table A.3. from Appendix.

Table 10: Wage impacts of M&A on workers of acquired banks (by qualification levels)

	FE estimation	Spell estimation
M&A	.027***	.040***
	(.005)	(.005)
QUAL-L	-.029***	-.016***
	(.005)	(.005)
QUAL-M	-.012***	-.008***
	(.002)	(.002)
QUAL-H	.006**	-.017***
	(.003)	(.003)
Year effects	Yes	Yes
Firm effects	Yes	Yes
Observations	699266	699266
Groups	115576	146628

Source*:* computations from the author based on *Quadros de Pessoal*, 1993 – 2007.
Notes: (1) M&A is a dummy variable equal to one if the worker experiences a M&A and 0 if the worker did not participate in a M&A operation. (2) Qualifications levels: QUAL-L: Semi-skilled and unskilled workers, and apprentices; QUAL-M: Supervisors and highly skilled and skilled professionals; QUAL-H: Top executives and intermediary executives. (3) Individuals regarding whom information about qualification is not available were excluded. (4)*significant at 10%; **significant at 5%; ***significant at 1%

5.3. Wage impact comparison between domestic and foreign M&A

In order to decompose the M&A effect according to the type of acquisition – domestic or foreign – we observe from Table 11 that the type of acquisition seems to influence the wage impact differentials. For workers of acquired banks, domestic acquisitions tend to have a positive effect on wages of 5.9% and 8%, according to the fixed effects and spell specification, respectively. When analysing the impact for workers that participate in foreign acquisitions, we observe a negative effect of these processes on wages as workers of acquired banks observe a decrease in the expected positive effect of a M&A of almost 5.1 and 5.6 percentage points, according to the fixed effects and spell specification, respectively.

Table 11: Wage impacts of M&A on workers of acquired banks (domestic and foreign acquisitions)

	FE estimation	Spell estimation
M&A	.038***	.055***
	(.005)	(.005)
Domestic	.021***	.025***
	(.001)	(.002)
Foreign	-.051***	-.056***
	(.003)	(.003)
Year effects	Yes	Yes
Firm effects	Yes	Yes
Observations	741408	741408
Groups	117580	150695

Source*:* computations from the author based on *Quadros de Pessoal*, 1993 – 2007.
Notes: (1) M&A is a dummy variable equal to one if the worker experiences a M&A and 0 if the worker did not participate in a M&A operation. (2) To classify a bank as a foreign entity we consider in our analysis a 50% threshold of foreign participation. (3) *significant at 10%; ** significant at 5%; ***significant at 1%

The type of acquisition seems to influence the wage impact differentials. Domestic acquisitions tend to have a positive effect on wages. In the case of foreign acquisitions, we observe a negative effect on a worker's wages. These negative effects are in line with those obtained by Heyman et al. (2007) in their fixed effects estimations for Swedish firms, which suggest a negative impact from foreign acquisitions. Notwithstanding the recognition of a foreign wage premium, the analysis at the individual level does not support the existence of a wage increase. Therefore, it may be the case that the individual analysis does not overstate the foreign wage premium. Similar conclusions are obtained by Martins (2004) and Martins and Esteves (2008) who find that foreign acquisitions have no positive effect on wages or do not have a significant effect on wages.

6. Discussion and Final Remarks

This paper investigates the impact of M&A on the wages of workers from acquired firms during the 1993-2007 period. We have provided new evidence on the impact of these operations on wages by using detailed Portuguese data from *Quadros de Pessoal*.

We depart from a simplest specification that establishes a relationship between pay and some determinants that have been recognized as important in determining wage levels. The heterogeneities among individuals and firms could result from differences in workers' skills or abilities and in the firm's wage policy or management policies, so it is important to account for these unobserved characteristics. We observe that the inclusion of these individual and firm characteristics alters the magnitude of other explanatory variables.

The results suggest a positive effect of M&A on wages; however, for workers that have participated in M&A, after the operation, and that have been acquired it seems that M&A has a detrimental effect on wages. The inclusion of firm dummies in the fixed effects and spell specifications may pick up a variety of effects, such as organizational effects or management practices that may influence wages. Moreover, the inclusion of firm and worker effects, as well as the combination of these two effects, does not separately identify firm and individual effects and we cannot isolate them. To separate these effects, it is important to restrict our sample to a panel of workers that move between firms. Abowd et al. (2002) identify these effects using the fixed effects approach, creating groups of connected workers and firms.

As Ferreira (2009) points out, the within-groups fixed effects approach permits the elimination of the unobserved worker, firm and match heterogeneity. However, the impossibility to separately identify all the time-invariant unobserved effects constitutes a limitation, as the mobility of workers could happen non-randomly. This may explain the difference in wage effects, as the job mobility may be related to the match between workers and firms, thus a good match would be positively reflected on wages. In this case, successful matches could lead to increased earnings, while bad matches could lead to a decrease in earnings or even to a worker's dismissal.

Controlling for both unobserved individual and firm level differences, the results suggest a positive effect of M&A on wages of almost 4%. Positive wage effects for workers of acquired banks is in accordance with the results obtained by Conyon et al. (2004), McGuckin and Nguyen (2001), Kubo and Saito (2012) as well as Amess et al. (2014), who observe a wage increase that can be explained by labour efficiency gains. For workers of acquired banks, after the M&A, the results suggest that the wage premium related to a M&A is not so manifest as the positive impact will be lower. We observe also that workers with more years of schooling and experience earn more and that firm size has a positive effect on wage for workers employed in acquired firms.

The inclusion of the time dimension seems to be important. We observe a positive effect of M&A for workers of acquired banks in the first year of the acquisition. However, we observe also that for the subsequent years this positive effect is reduced and this reduction is more pronounced in the third year after the M&A. For workers of acquired banks it is observed that, in the third year after the acquisition, the positive effect is only 0.3% and 1.9% for the fixed effects or spell specification (FE-5), respectively.

This may reflect an adjustment process related to the M&A, thus, in spite of the expected positive effect of M&A on wages, when we observe workers that were subject to an acquisition

process in the following years after the operation, the expected M&A wage premium disappears, thus validating the hypothesis that M&A serve as a mechanism of restructuring. If banks that are less efficient tend to be acquired, the apparent increase in wages is reduced over time after the acquisition, signalling the effects of a restructuring process that occurs gradually.

The positive relationship between pay and size is well demonstrated by our results, which suggest that larger firms pay more. Education and experience are also important in determining wages. The analysis of the M&A wage effects on different levels of qualification, lead us to conclude that the effects differ. For workers that have been acquired the positive effects are not so large as the acquisition itself reduces the expected positive effect on wages, however for highly qualified workers, using our fixed effects specification, we observe an incremental positive effect on wages. Thus, as Siegel et al. (2009) suggest, there is a positive relation between earnings and the quality of human capital, namely in what concerns experience and the percentage of workers with high qualifications. Therefore, we may expect that M&A promote a quality improvement of human capital or it may be the case that there is a wage premium for highly skilled workers.

Considering that M&A may constitute a mechanism of restructuring, especially for inefficient banks, the effects of M&A may differ according to the type of workers, thus, in line with Smeets et al. (2016), the restructuring process may be negatively reflected on workers with less firm-specific human capital and be positive for highly skilled workers.

We also find that M&A may produce different effects on employees' wages according to the type of operation we are analysing. Domestic acquisitions tend to have a positive effect on wages, but when analysing the impact for workers of foreign acquisitions, the results do not support the existence of a foreign wage premium.

There are some questions that deserve further development. First, it may be important to assess, in more detail, the effects of acquisitions on highly skilled workers for whom we have obtained a positive effect in comparison to other levels. In doing so, it may also be interesting to try to assess the employment effects, in terms of mobility, for this type of workers.

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Appendix

A.1. The "Quadros de Pessoal" and "Associação Portuguesa de Bancos" Datasets

This appendix describes the data sources used in this paper and the methodology used for the construction of the dataset.

Quadros de Pessoal, is an annual mandatory survey conducted by the Portuguese Ministry of Labour, Solidarity and Social Security since 1982 which gathers information on all firms located in Portugal with wage-earners. Its mandatory nature, as well as the fact that the information is provided by the employer and is made available to every worker in a public space of the establishment, reduces measurement errors and contributes to the reliability of the data.

This longitudinal database provides information at the firm (such as location, industry, sales, legal setting, year of constitution, share of the firm's equity owned by foreign parties, number of establishments and number of employees) and at the establishment level (such as location, industry and number of workers, among others). The set of workers characteristics includes age, education, tenure, wages and hours worked.

In our analysis, we use information for the 1985 to 2007 period with the exception of 1990 and 2001, because data was not collected in those years. The dataset is restricted to 2007 as the Financial Crisis took place in 2008. The existence of unique (time-invariant) identifiers allows for matching firms and workers in each year and for following them over time. The dataset contains information on the industry in which firms operate and on a worker's occupation, so it is possible to identify the banking entities and the workers of those firms.

The entities in our sample were restricted to those operating on "other monetary intermediation" (code 65120), according to the Portuguese Classification of Economic Activities – CAE–rev 2.1 (1995 version) and they include all monetary institutions, excluding the Central Bank. Three revisions of CAE have occurred between 1985 and 2007. The methodology for CAE uniformization and the entities included in "other monetary intermediation" is described as follows: According to the *Instituto Nacional de Estatística* (INE) the category "other monetary intermediation" refers to those institutions that are principally engaged in receiving deposits and/or close substitutes for deposits and, on their own account, in granting loans and/or investing in securities. This group in Portugal is made up of the Bank of Portugal, all other banks, savings banks and agricultural mutual credit funds (including the central mutual agricultural fund).

Table A.1.1: CAE 651 rev.2 (Monetary Intermediation, excluding Central Bank)

Code	Descriptive
6512	Other Monetary Intermediation:
65121	– Banking Institutions
65122	– Savings Banks
65123	– Agricultural Mutual Credit Funds
65124	– Other Monetary Intermediation

Source: Instituto Nacional de Estatística.

In the period under analysis there were three revisions in CAE (from CAE–rev.1 to CAE–rev.2 and to CAE–rev.2.1[1] and then to CAE–rev.3), thus the dataset was manipulated in order to transform the classification under CAE–rev.1 on the 2007 classification – CAE–rev.3 –, which requires the use of correspondence tables. These tables catalogue the CAE codes and their equivalent on the new categorization and they were obtained from INE and. Table A.1.2 presents the transformations occurred since CAE–rev.1 to CAE–rev.3.

[1] The transformations from CAE–rev.2 to CAE–rev.2.1 were not significant in comparison to others.

Table A.1.2: Correspondence tables for CAE-rev.2, CAE rev.2.1 and CAE rev.3

CAE - rev.1 (original code)	CAE - rev.2 (revised code)	CAE - rev.2 (original code)	CAE - rev.2.1 (revised code)	CAE - rev.2.1 (original code)	CAE - rev.3 (revised code)
8101.1.0	65110	65110	65110	65110	64110
8101.2.0	65121	65121	65120	65120	64190
8101.3.0	65121	65122	65120	65210	64910
8101.4.0	65121	65123	65120	65221	64923
8102.1.0	65121	65124	65120	65222	64991
	65122	65210	65210	65223	64922
8102.2.0	65123	65221	65221	65224	64921
8102.3.0	65124	65222	65222		64923
8102.4.1	65230	65223	65223	65230	64201
8102.4.9	65210	65224	65224		64300
	65222	65230	65230		64992
	65223				
	65224				
	65230				
8102.5.0	65230				
8102.6.0	65221				
	65224				
	65230				
8102.9.0	65124				
	65224				
	65230				
8103.1.0	67110				
	67120				
	67130				
8103.2.0	67130				
8103.3.0	67130				
8103.9.0	67130				

Source*: Instituto Nacional de Estatística.*

Note: Adapted from *INE's Tabelas de Correspondência* restricted to "Financial Intermediation" (code 65), according to the two digits sector classification of the Portuguese Classification of Economic Activities - CAE (1995 version).

Extensive checks were made to guarantee the correspondence, assuming for those cases where the correspondence was not possible and for those where inconsistencies were detected that the prevailing classification was that which was reported more frequently.

In this process, a new variable was first created– *caemp_2* – with the purpose of creating a unique CAE for all the years under analysis (1985 – 2006), but the inclusion in a later stage of 2007, forced us to consider the revision operated in that year. According to the new classification,

the entities operating in "Financial Intermediation" correspond to code 64 and those classified as "other monetary intermediation" are registered as 64190. At this stage, the variable *caenew* was created, which corresponds to the mode of the variable *caemp_2*. Taking into account that the inclusion of 2007 would originate missing values that result from the fact that *caemp_2* only exists until 2006, the variable *caenew* was recoded using the classification of rev3 and transforming these on the corresponding classification of rev2.1. This procedure was important to continue the CAE standardization. Finally, it was possible to create the variable – *caenew3* – which originated from *caenew,* but it is defined in terms of the new codes created (CAE–rev.3). As was done before, we have used the correspondence tables to guarantee the harmonization of CAE, but for the purpose of the analysis and when considering the period 1985 – 2007 we needed to use not just the CAE 65120, but also the CAE 64190 (the CAE 65120 is equivalent under rev3 to CAE 64190), however, as was previously mentioned, for some entities that just appeared in 2007 we also needed to consider this classification.

After de creation of the main dataset it was important to identify all domestic acquisitions. The identification of domestic acquisitions was possible using data collected on an annual basis by the *Associação Portuguesa de Bancos* (APB) in their *Boletins Informativos.* This dataset contains information on all banks in Portugal and reports the transformations occurred in the banking sector. Besides accounting information, the dataset reveals information on firms (such as age, ownership, size, number of employees and branches and localization) and employees characteristics (qualifications, type of activity and occupation in each bank). Another important fact is that, every year, the *Boletim Informativo* presents a synthesis of the evolution in the banking sector in comparison to the previous year, mentioning which banks entered or exited in the banking sector or which were involved in the process of M&As, so it allows us to find those entities in *Quadros de Pessoal,* by matching some information with that obtained from the APB. We have also identified all the entities that were not engaged in those processes. Table 1 highlights the major transformations occurred in the banking sector of the banks listed in *Boletins Informativos*, between 1993 and 2006. The year 2007 was not considered, since no important transformations were reported for our analysis in that year. The remaining banks that were not subject to M&A transformations are presented in Appendix A.2 (Table A.2).

The *Boletins Informativos* present information on share capital (*capital social*) as well as *Quadros de Pessoal*, thus it was possible to match the information and identify the entities. Notwithstanding that the information provided from the APB is only available since 1993; it was

possible to compare the evolution of this variable in *Quadros de Pessoal* and in the *Boletins Informativos* throughout the period under analysis. The existing information allowed us to identify the entities and in those cases where the comparison was uncertain, a third source of information was used. The information contained in the "Information Disclosure System" of the *Comissão do Mercado de Valores Mobiliários (CMVM)* was valuable, since it was possible to find information on the registries of the entities and institutions completed since the second quarter of the year 2000. In a low number of cases it was necessary to use this source of information.

A.2. Banks not involved in M&A

Table A.2: Banks listed in *Boletins Informativos* (APB) that were not engaged in M&A

Credit institution
ABN AMRO, Bank N.V. (sucursal) *
Banco Invest, S.A. (previous Banco Alves Ribeiro, S.A.)
Banco de Negócios Argentaria *
Banco Espírito Santo dos Açores, S.A.
Banco Africano de Investimentos, S.A.R.L (Sucursal) *
Banco Mais, S.A.
Banif – Banco de Investimento, S.A. *
Banco Internacional do Funchal, S.A.
Barclays Bank PLC (Sucursal)
Banco do Brasil, S.A.
Banco Comercial dos Açores, S.A.
Banco Espírito Santo de Investimento, S.A. (previous Banco ESSI)
BEST – Banco Electrónico de Serviço Total, S.A.
Banco de Investimento Global, S.A.
Banco de Investimento Imobiliário
Banco Nacional de Investimento, S.A.*
Banque Nationale de Paris (Sucursal) *
BANKBOSTON Latinoamericano S.A.
Banco Português de Gestão, S.A.
Banco Português de Negócios – SGPS, S.A.
Banco Privado Português*
Banco Santander de Negócios Portugal, S.A.
Caixa Galicia – Caja de Ahorros de Galícia (Sucursal) *
Caixa Vigo – Caixa de Aforros de Vigo, Ourense e Pontevedra (Sucursal) *
The Bank of Tokyo - Mitsubishi, Ltd (Sucursal) *
Caixa Central de Crédito Agrícola Mútuo *
Central – Banco de Investimento, S.A.*
Banco Cetelem, S.A. *
Caixa – Banco de Investimento, S.A. (previous Banco Chemical Finance, S.A. and Banco Totta e Sottomayor de Investimento, S.A.)
BCP Investimento – Banco Comercial Português de Investimento (previous CISF – Banco de Investimento and BCPA – Banco de Investimento, S.A.)
Citibank Portugal, S.A.
Credifin – Banco de Crédito ao Consumo, S.A.*

Continued on next page

Table A.2. – continued from previous page

Deutsche Bank (Portugal), S.A.
Banco Efisa, S.A.
Banco Finantia, S.A.*
Finibanco, S.A.
Fortis Bank – sucursal (previous Generale Bank – sucursal)
SanPaolo IMI BANK (Internacional), S.A.*
Interbanco, S.A.
Banco Itaú Europa, S.A.
Banco Madesant Sociedade Unipessoal, S.A.*
Banco ACTIVOBANK (Portugal), S.A. (previous Banco Mello de Investimentos, S.A.)
Banco Central Hispano Portugal, S.A. *
Caixa Económica – Montepio Geral
Banco Rural Europa, S.A.
Banco Sabadell, S.A.*

Source: *Associação Portuguesa de Bancos.*

Note: * These banks could not be found in *Quadros de Pessoal*, so it was not possible to proceed with the match process.

A.3. Wage impact of M&A (by qualification levels) – Estimation results for the sample, including individuals with a "Non-defined" level of qualification

Table A.3: Wage impact of M&A (by qualification levels)

	FE estimation	Spell estimation
M&A	.026***	.040***
	(.002)	(.005)
QUAL-L	-.030***	-.016***
	(.005)	(.005)
QUAL-M	-0.16***	-.010***
	(.002)	(.002)
QUAL-H	.005*	-.018***
	(.003)	(.003)
Non-defined	.027***	.028***
	(.003)	(.003)
Year effects	Yes	Yes
Firm effects	Yes	Yes
Observations	741408	741408
Groups	117580	150695

Notes: (1) M&A is a dummy variable equal to one if the worker experiences a M&A and 0 if the worker did not participate in a M&A operation. (2) Qualifications levels: QUAL-L: Semi-skilled and unskilled workers, and apprentices; QUAL-M: Supervisors and highly skilled and skilled professionals; QUAL-H: Top executives and intermediary executives. (3) Individuals regarding whom information about qualification is not available are included. (4)*significant at 10%; **significant at 5%; ***significant at 1%

A.4. Definition of variables

Table A.4: Definitions of variables in the model

Variables	Definition
Real total wage	Logarithm of the real total wage, computed as the monthly wage plus other payments received on a regular and irregular basis. The real total wage was deflated using the Consumer Price Index (CPI) and is expressed in the 1993 prices.
After	1 if the worker was employed in an acquired firm (after the M&A), 0 if the worker was in a period before the M&A or not subject to the M&A.
M&A	M_{it} is a dummy variable equal to one if the worker experiences a M&A, 0 if the worker did not participate in a M&A operation
Effect at t=1	1 if one year after M&A, 0 otherwise.
Effect at t=2	1 if two years after M&A, 0 otherwise.
Effect at t=3	1 if three years after M&A, 0 otherwise.
Number of workers	Logarithm of total employment.
Male	1 if male, 0 if female.
Education	Years of schooling
Education level	
No education	1 if the worker has less than primary school, 0 otherwise.
Primary education	1 if the worker has primary school, 0 otherwise.
Preparatory education	1 if the worker has preparatory school, 0 otherwise.
Lower secondary	1 if the worker has lower secondary school, 0 otherwise.
Secondary	1 if the worker has secondary school, 0 otherwise.
Upper secondary	1 if the worker has upper secondary school, 0 otherwise.
College	1 if the worker has college, 0 otherwise.
Tenure	The number of years that the worker is employed in the current firm.
Experience	Computed as age minus years of schooling minus six.
Experience^2/100	Quadratic of experience divided by 100.
Qualification level	
Top executive	1 if the worker is a top executive, 0 otherwise.
Intermediary executive	1 if the worker is an intermediary executive, 0 otherwise.
Supervisor	1 if the worker is a supervisor, 0 otherwise.
Highly skilled and skilled	1 if the worker is a highly skilled and skilled professional, 0 otherwise.
Semi-skilled and unskilled	1 if the worker is a semi-skilled and unskilled professional, 0 otherwise.
Apprentice	1 if the worker is an apprentice, 0 otherwise.
Non-defined	1 if the worker has a non-defined qualification, 0 otherwise.
High	1 if top executives and intermediary executives, 0 otherwise.
Medium	1 if supervisors and highly skilled and skilled professionals, 0 otherwise.
Low	1 if semi-skilled and unskilled workers and apprentices, 0 otherwise

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