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

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Abstract

This study contributes by analysing the effects of M&As at the individual level, considering the relationship between ownership change and workers. We examine the impacts of mergers and acquisitions (M&As) on workers of acquired firms for the period 1993-2007 using a matched employer-employee dataset known as *Quadros de Pessoal*. The identification of M&As was possible using data collected on an annual basis by the *Associação Portuguesa de Bancos* (APB) in their *Boletins Informativos*. We identify also all the entities that were not engaged in those processes.

We find from pooled data that there is a negative effect of M&As on wages. However, when controlling for unobserved individual and firm level characteristics the estimation leads us to conclude that there is a positive effect; however for workers of acquired firms, after the M&A and controlling for unobserved heterogeneity, it is observed a negative effect of M&A on wages of almost 1%. We observe also that the effects of acquisition differ over time suggesting that time dimension is an important element to consider as the positive effects disappears in the second year after the M&A.

The results suggest that for acquired firms there is a negative effect for all levels of qualification; however for highly qualified workers M&As seems to be positive for wages. M&As may produce also different effects in employees' wages according with 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 suggest a negative effect.

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

JEL Classification: G21, G34, J21, J31

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1. Introduction

Until the mid-1980s, the Portuguese banking sector was publicly owned and restricted by strong administrative and legal controls. In the following years several factors contributed for the development of this sector. The liberalization and the deregulation in the banking sector allied to globalization and technological development had promoted a new competitive environment. The harmonization of prudential regulation was implemented during the first half of the nineties and the creation in 1993 of the Single European Market for financial services was an important determinant 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 for many banks threats and opportunities and firms 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, so it represents an interesting opportunity to investigate the effects of M&As on wages. For Portugal, the research focusing on the banking labour market is scarce and, to our knowledge, the only study that presents evidence about the Portuguese banking industry is presented by Monteiro (2004, 2010) who tries to assess the impact of privatisation on wages. Additionally, a comprehensive dataset covering this period is available so it is possible to evaluate the impact of M&As operations on individuals whose firms where subject to ownership changes. The use of matched employer-employee data permits us to access to detailed information on individuals and doing so it is possible to control for differences at the worker level and to control for changes in the composition of workforce.

The literature on employment and wage effects of M&As is almost 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 individual worker. Using individual workers' wages rather than plant or firm wages will permit to handle with individual heterogeneity. Thus this study contributes by analysing the effects of M&As at the individual level, considering the relationship between ownership changes and workers. In this context the aim of the study is to evaluate the impacts of M&As on labour market for

[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*).

workers of acquired firms with the inclusion of unobservable firm and individual characteristics using the fixed effects least squares dummy variables regression as proposed by Andrews et al. (2006), moreover in addition to these standard techniques we use the spell fixed effects approach presented in Andrews et al. (2006) and implemented by Graham et al. (2012) in their study about managerial attributes and executive compensation.

The impacts of M&As may not happen immediately so this investigation also take into account the time dimension and examine the effect of M&As on wages in different years after the M&A. The investigation tries also to assess if the effects on wages differ according to the type of M&As[2] and the worker qualification level. Regarding the definition of M&As we adopt an all-embracing concept of M&A according to what matters 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 summaries the related 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 presents also the descriptive statistics for some of the variables used. Section 4 presents the empirical model and the corresponding results. Finally, the main conclusions are presented in section 5.

2. Literature review

2.1. Efficiency, employment and wages

The perception that M&As have negative effects on labour has been an interesting subject of investigation in recent years. The recognition of M&As 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 middle managers, staff and production workers, and reduced compensation.

In this sense labour market impacts are crucial since workforce adjustments are determinant in achieving M&As gains, therefore the efficiency motive represents one of the most important motivations for the prosecution of these operations, so in synergy-

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

promoting M&As 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 includes human capital and the downsizing of overlapping activities certainly will include the reduction in workforce (McGucking and Nguyen, 2001; Lehto and Böckerman, 2008). However, it may be not just the case that merging firms exploit short-run economies of scale by reducing overall employment in the new entity; it may be observed that efficiency gains would permit the newly combined entity to increase market power which will enhance labour demand that lead to an increase in employment. Oberhofer (2013) confirm 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 what according to the author provides evidence for the existence of efficiency gains.

Aiming at analysing the impact of these operations on labour market some studies investigate the impact of M&As on employment and they present ambiguous results. 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 they also find 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 job losses 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 period 1993-1996, and observe that hostile and friendly acquisitions are associated with a decrease in labour demand, so there is no evidence for distinguish between this 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, who consider that M&A represent a general device to restore 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 serve as well to renegotiate the existent 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 about 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 suspending the recruitment of new employees, or asking for voluntary retirement. In this sense firms try to avoid the dismissal of employees. They also found 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. 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).

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 is resultant not just from an improved bargaining position but also from the increase in profitability, suggesting that there is an increase in labour efficiency.

The recognition that the type of transaction seems to influence the effect of M&A is also considered by Siegel et al. (2008). M&As transactions enhance 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&As 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 with the type of transaction and those who acquire just a part of the firm or those who enter in a new industry by purchase mechanism value more the existent 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 suggest 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 that 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&As enhance plant productivity, although they also result in downsizing of establishments and firms. Furthermore, they observe that M&As have a positive effect on workers' careers by improving the sorting and matching of workers and managers to firms and industries that best fit to their skills. In spite of the reduction of establishments and firms, the plants involved in M&As operations were subject to a quality improvement of their employees.

2.2. Foreign ownership, employment and wages

As cross-border M&As 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 UK manufacturing industry for the period 1989-1994, 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 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 (Girma and Görg, 2007). If foreign firms are more productive and if the efficient use of the firm specific asset require productive workers, then we may observe higher wages after the transfer of the firm specific asset to the target

firm. It may occur also that foreign firms pay higher wages to identical workers because they want to prevent labour turnover and incentive workers not to quit. 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 firm 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 this 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) share the same ideas from 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 represent a reasonable explanation for 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 is more evident as the level of schooling increase. She observes also 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 with some organizational changes that may occur in the firm that require time to be implemented. It may occur also that changes in average wages result from changes in employment composition of the workforce that create adjustment costs, so the changes are not immediate. Finally, the author considers also that measurement problems may create uncertainty about the right time for the acquisition.

It is, however, not clear if the increase on 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, she is also interested on the effects of acquisitions on labour reallocation as ownership changes are associated to the reallocation of resources to efficient uses.

The results show that foreign acquisitions have small effects on human capital and on average wages of 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 be acquired that have more educated workforce and pay higher wages.

The existence of pay differences between foreign and domestic firms is consistent with the idea that foreign firms possess firm-specific assets that enhance productivity and profitability for these firms. Thus the complex and risky organization will find it profitability to run business outside the domestic market if they are more productive and innovative. Foreign firms may also offer non-competitive wages that increase productivity and profitability in order to reduce worker turnover, motivate employees, enhance loyalty and select highly skilled workers (Bandick, 2011).

In his investigation of the effect of foreign acquisition on wages and productivity, the author observe the years following a takeover on Swedish manufacturing using firm-level data and concludes that foreign acquisitions have no effects in overall, skilled or less-skilled wage growth. 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 disappear, thus according to the authors firm level analysis tend to overestimate the foreign wage premium, so for an individual worker we can expect that foreign acquisition results in a reduction of wage growth. Similar conclusions for Portugal are obtained by Martins (2004) who consider that the overestimation of this wage premium is due to the lack of a good comparison between domestic and foreign firms; and to worker's 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 find also that there are different impacts according with 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 a following 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 wages dispersion, but it is the acquisition itself that affects wage dispersion. They find also that the positive effects are almost concentrated to 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

As Girma and Gorg (2007), 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 acquisitions process. Therefore, wages will increase for high-skilled workers and remain constant to other type of workers. The authors assume also 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 so 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 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 virtually 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 former 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 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 and hours worked.

To assess the impacts of ownership change on workers longitudinal data on firms and their employees from 1985 to 2007[3] is used. The dataset is restricted to 2007 as the Financial Crisis took place in 2008. The existence of unique (time-invariant) identifiers allows matching firms and workers in each year and following them over time. The dataset contains information on the industry in which firms operate and on 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 Central Bank[4].

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 of all banks in Portugal and reports the transformations occurred in the banking sector. Beyond accounting information the dataset reveals information on firm (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, *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 one were involved in process of M&As, so it allows finding on *Quadros de Pessoal* those entities by matching some information with that obtained from APB. We identify also all the entities

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

[4] Three revisions of CAE have occurred in the span of 1985 – 2007. The methodology for CAE uniformization and the entities included on "other monetary intermediation" are described in Appendix (Tables A.1.1 and A1.2).

that were not engaged in those processes. Table 1 enlightens the major transformations occurred in the banking sector of the banks listed on *Boletins Informativos*, between 1993 and 2006[5]. The remaining banks that were not subject to M&As transformations are displayed in Appendix (Table A.2.1).

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 APB is only available since 1993; it was possibly to compare the evolution of this variable on *Quadros de Pessoal* and on *Boletins Informativos* throughout the period under analysis. The existent information permitted to identify the entities and in those cases where the comparison was uncertainly a third source of information was used. The information contained on 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 entities and institutions completed since the second quarter of 2000. For some but few cases it was necessary to use this source of information.

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 finding on *Quadros de Pessoal* those entities by matching some information with that obtained from APB. For its precision nature the share capital was used as the primary matching variable.

It was possible to identify in our final dataset almost all the entities that are listed on tables 1 and A.2.1.. The merged dataset with 914 754 observations contained all the banks, including those that only appear on the *Quadros de Pessoal* dataset and those that only

[5] The year 2007 was not considered as it was not reported important transformations for our analysis in that year.

appear on the APB dataset. It was possible to identify by 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 and 2007 for the acquirer and acquired entities and for all entities, including those not involve in M&As.

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 on each year. As an example, in 1993 we identify 16 banks that participated in M&A, however the acquisitions has occurred throughout the period of analysis; in the same way we observe that for 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 in other banks.

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

Table 3 – Summary Statistics (workers from acquirers, acquired and non-merging firms)

Variable	M&A		Not M&A	All
	Acquirer	Acquired		
Number of establishments				
Mean	606.8	233.8	131.5	404.9
Std. Dev.	*228.0*	*126.0*	*104.1*	*273.1*
Firm employees				
Mean	7917.0	3643.6	1373.7	5447.4
Std. Dev.	*3071.3*	*1628.2*	*1018.4*	*3516.9*
Monthly wage (real)				
Mean (euro)	847.6	768.2	939.5	832.1
Std. Dev.	*390.8*	*330.3*	*765.7*	*449.5*
Total compensation (real)				
Mean (euro)	1266.8	1160.6	1345.1	1239.8
Std. Dev.	*873.3*	*715.7*	*1399.0*	*920.2*
Schooling (years)				
Mean	12.3	11.05	13.0	11.9
Std. Dev.	*3.3*	*3.5*	*3.2*	*3.5*
Age				
Mean	39.6	42.0	36.4	40.0
Std. Dev.	*9.6*	*9.8*	*9.2*	*9.8*
Tenure (years)				
Mean	12.3	15.3	8.3	12.8
Std. Dev.	*9.1*	*9.4*	*8.1*	*9.3*
Observations	372 189	269 197	106 525	747 921

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&As processes for the entire period (1993-2007) and do not rely on the year of acquisition.

Table 3 provides information on the characteristics of employees from acquirer, acquired firms and non-merging firms. In terms of dimension, acquirer firms are bigger. 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 comparing to merging firms. With more detail table 4 presents the means by different levels of education. We can observe that 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 presents also information about qualifications and suggest 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" and "supervisors".

Table 4 – Sample means, 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				
Mean	0.0002	0.004	0.001	0.015
Std. Dev.	*0.01*	*0.06*	*0.03*	*0.39*
Primary school				
Mean	0.016	0.046	0.019	0.272
Std. Dev.	*0.13*	*0.01*	*0.14*	*0.16*
Preparatory school				
Mean	0.054	0.078	0.016	0.057
Std. Dev.	*0.23*	*0.27*	*0.13*	*0.23*
Lower secondary school				
Mean	0.195	0.316	0.141	0.231
Std. Dev.	*0.40*	*0.46*	*0.35*	*0.42*
Secondary school				
Mean	0.454	0.369	0.461	0.424
Std. Dev.	*0.50*	*0.48*	*0.50*	*0.49*
Upper secondary school				
Mean	0.039	0.030	0.049	0.37
Std. Dev.	*0.19*	*0.17*	*0.22*	*0.19*
College				
Mean	0.242	0.158	0.312	0.221
Std. Dev.	*0.43*	*0.36*	*0.46*	*0.42*
Qualification Level				
Top Executives				
Mean	0.081	0.065	0.147	0.085
Std. Dev.	*0.27*	*0.25*	*0.35*	*0.28*
Intermediary executives				
Mean	0.124	0.098	0.117	0.114
Std. Dev.	*0.33*	*0.30*	*0.32*	*0.32*
Supervisors				
Mean	0.031	0.023	0.028	0.028
Std. Dev.	*0.17*	*0.15*	*0.17*	*0.16*
Highly skilled workers				
Mean	0.671	0.699	0.590	0.670
Std. Dev.	*0.47*	*0.46*	*0.49*	*0.47*
Semi-skilled and unskilled workers				
Mean	0.044	0.038	0.074	0.046
Std. Dev.	*0.21*	*0.19*	*0.26*	*0.21*
Apprentices				
Mean	0.00	3.71e-06	0.02	0.0003
Std. Dev.	*0.00*	*0.002*	*0.04*	*0.16*
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&As 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 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, have younger workforce and have a shorter employment relation along time with their employees. The most prevailing differences against merging firms are observable in wages and total

compensation for high and medium levels. Comparing acquirer to acquired firms, acquirer firms pay more, in general. However workers of acquired banks with high qualifications are better remunerated than their pairs of acquirer firms.

If we consider different types of acquisition, table 6 presents the sample means for domestic and foreign acquisitions. We observe that firms that engaged in foreign acquisitions present a slight higher compensation level, however the same does not occur when analysing monthly wage level. We note also that workers from foreign acquisitions are younger, more educated and register a shorter relation with their employer in terms of tenure.

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

	M&A						Not M&A			All		
	Acquirer			Acquired								
Variable	**Low**	**Medium**	**High**	**Low**	**Medium**	**High**	**Low**	**Medium**	**High**	**Low**	**Medium**	**High**
Monthly wage (real)												
Mean (euro)	770.9	803.5	968.6	619.8	746.0	950.8	614.5	845.4	1129.4	680.7	787.4	996.0
Std. Dev.	*263.6*	*293.4*	*553.9*	*212.4*	*229.4*	*556.1*	*388.3*	*459.0*	*1093.7*	*258.6*	*301.7*	*699.0*
Total compensation (real)												
Mean (euro)	1084.1	1191.9	1485.5	898.7	1109.9	1525.6	870.2	1216.3	1608.3	972.1	1164.2	1520.3
Std. Dev.	*516.8*	*809.4*	*1032.2*	*476.2*	*545.2*	*1142.4*	*597.3*	*711.1*	*2103.2*	*509.4*	*709.0*	*1340.7*
Schooling (years)												
Mean	5.5	11.1	16.7	5.2	10.6	16.7	4.8	11.3	16.7	5.3	11.0	16.7
Std. Dev.	*0.9*	*1.4*	*0.7*	*1.1*	*1.5*	*0.7*	*1.1*	*1.3*	*0.7*	*1.0*	*1.4*	*0.7*
Age												
Mean	48.8	40.2	35.9	48.9	42.2	36.5	46.6	37.4	33.6	48.7	41.0	35.6
Std. Dev.	*6.7*	*9.4*	*8.6*	*6.7*	*9.5*	*9.7*	*9.5*	*9.5*	*7.5*	*6.9*	*9.6*	*8.8*
Tenure (years)												
Mean	20.4	13.0	8.5	20.9	15.9	9.1	15.7	9.7	5.2	20.4	13.7	8.0
Std. Dev.	*8.1*	*9.0*	*7.7*	*6.7*	*9.1*	*8.9*	*9.3*	*8.6*	*5.5*	*7.6*	*9.2*	*7.8*
Observations	26 115	241 443	104 631	34 466	184 370	50 361	3 880	64 207	38 438	64 461	490 026	193 434

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: Low – Semi-skilled and unskilled workers, and apprentices; Medium – Supervisors and highly skilled and skilled professionals; High – Top executives and intermediary executives. (3) Statistics are reported according to the categorization of banks in terms of participation or not in M&As processes for the entire period (1993-2007) and do not rely on the year of acquisition.

Table 6 - Sample means, by type of acquisition (worker level)

Variable	Domestic	Foreign
Number of establishments		
Mean	246.4	209.6
Std. Dev.	*136.0*	*83.9*
Firm employees		
Mean	4014.4	2839.1
Std. Dev.	*1618.6*	*1231.4*
Monthly wage (real)		
Mean (euro)	768.7	766.8
Std. Dev.	*327.2*	*331.7*
Total compensation (real)		
Mean (euro)	1151.7	1183.3
Std. Dev.	*731.5*	*676.6*
Schooling (years)		
Mean	10.9	11.5
Std. Dev.	*3.6*	*3.3*
Age		
Mean	42.9	39.7
Std. Dev.	*9.7*	*9.8*
Tenure (years)		
Mean	16.3	13.1
Std. Dev.	*9.4*	*9.0*
Observations	188 774	78 383

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 acquisitions. (3) Statistics are reported according to the participation of banks in M&As processes for the entire period (1993-2007) and do not rely on the year of acquisition.

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

Table 7 - Summary statistics for workers of acquired firms

Variable	T= –1	T=0	T=1	T=2	T=3
Number of establishments					
Mean	212.20	206.51	186.41	303.97	346.09
Std. Dev.	*83.07*	*73.57*	*68.11*	*120.28*	*159.35*
Firm employees					
Mean	3352.83	3204.84	3229.26	4021.98	3965.7
Std. Dev.	*1331.54*	*1222.74*	*1395.29*	*1867.0*	*2085.96*
Monthly wage (real)					
Mean (euro)	770.36	783.82	811.56	762.54	763.47
Std. Dev.	*282.52*	*374.53*	*496.34*	*303.56*	*346.98*
Total compensation (real)					
Mean (euro)	1094.29	1170.82	1182.39	1170.98	1183.45
Std. Dev.	*636.06*	*693.79*	*762.65*	*631.95*	756.96
Observations	24 551	26 664	13 787	20 094	19 347

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. Wages in acquired firms

4.1. Econometric method

Our empirical analysis follows the empirical literature on employment effects of M&As that is well established by labour economists. As pointed out by Oberhofer (2013) the impacts of M&As on wages and employment are modelled as a function of some explanatory variables for firms and individuals and a dummy variable that capture whether a firm or individual experienced an ownership change.

To analyse the impact of M&As 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 *Instituto Nacional de Estatística* (INE). $\boldsymbol{X}$ is a vector of worker characteristics that includes years of schooling, tenure and its square, and experience and its square. These characteristics have been identified in the literature as influencing wage levels.

$\boldsymbol{Z}$ 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 that larger firms pay more (Oi and Idson, 1999a; Oi and Idson, 1999b; Brown and Medoff, 1989) as workers are more productive in large firms or, among others theoretical explanations, because larger firms are able to pay higher wages or hire higher quality workers. M_{it} 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. 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 the sample of acquired firms that represents our treated group. In order to do that we define A_{it} is 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 correlation between the error term and the explanatory variables.

The fixed effects model permits the separation of unobserved time-invariant heterogeneities from the error term, so we can avoid the omitted variable bias. We may observe for instance that individual heterogeneity may be correlated with the explanatory variable A_{it} and this may reflect a self-selection bias. The inclusion of individual and firm effects captures the time-invariant unobserved worker and firm characteristics. The unobserved individual characteristics may be related with 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 wage policy or management policies and capture the characteristics of the firm that similarly affect 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 a_i, firm fixed effect γ_j and year fixed effect μ_t. According to Cornelissen (2006, 2008) the model can be estimated including one of the effects (the firm effect) as dummy variables, and removing the other effect (the worker effect) using the within transformation or 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 an 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

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

The spell level heterogeneity, V_S, is equal to $\alpha_i + \gamma_j$. 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 permits to control the influence of individual and firm effects, it is not possible to separate individual from firm effects.

In order to evaluate the wage impact differentials by different types of workers, we include in our baseline equation several interactions terms between the variable A_{it} and worker qualification level (high, medium and low), Q_{it}. The interaction between those 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 as the same meaning as in equations (1) and (2), $dom_{it}A_{it}$ is a dummy variable taking value one if the worker take 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 take 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 ($for_{it}A_{it} = 0$).

4.2. Results

The results differ according not only with the specification adopted but also with the level of unobserved heterogeneity that is considered. We observe that when we control for unobserved heterogeneity the wage variation explained by some observables characteristics, namely years of schooling and years of experience, is reduced. In our analysis, we will mainly explore the results obtained from the fixed effects and the spell specifications.

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

Table 8 – Impact of M&As on wages

	Dependent Variable: Logarithm of the real total wage					
Independent 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

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&As increase 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.

Table 8 also reports the coefficients for other variables of interest. We observe that more educated and more experienced workers, as well as larger firms pay more.

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 increase of about 1%, but when considering time and firm effects we observe a negative effect of M&A on wages of 1.4%. Controlling for both unobserved individual and firm level differences the negative effect is still evident and it is almost 1%. We observe 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. Notwithstanding the positive effect in

the first year of the acquisition of nearly 1%, we observe that for the subsequent years this positive effect disappears and there is a negative impact of M&A on wages that is more pronounced in the third year after the M&A. This may suggest that time dimension is important as Huttunen (2007) points out when she considers that there are adjustment costs that must be considered and that are related with hiring and firing workers and for this reason the effect on wages is not immediate.

Table 9 - Impact of M&As on wages

	Dependent Variable: Logarithm of the real total wage							
Independent 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)
Experience^2/100	-.067***	-.068***	-.067***	-.041***	-.035***	-.030***	-.035***	-.030***
	(.001)	(.001)	(.001)	(.0004)	(.0004)	(.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

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 evaluate 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%.

The analysis of M&As effects on wages for different levels of qualifications present different conclusions. According with table 10, we can expect a negative effect for almost all levels of qualification. The only exception is observed in our fixed effects specification for those who have high qualifications (top and intermediary executives), however the positive effect is small, 0.6%.

It seems to be that the M&As processes have a negative impact on wages that is more pronounced for low levels of qualification and even with a slightly positive effect highly qualified workers may earn more when participating in M&A.

In this analysis we exclude from the sample those individuals for whom information about 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&As (by qualification levels)

	FE estimation	Spell estimation
Low	-.029***	-.016***
	(.005)	(.005)
Medium	-.012***	-.008***
	(.002)	(.002)
High	.006**	-.017***
	(.003)	(.003)
Year effects	Yes	Yes
Firm effects	Yes	Yes
Observations	699266	699266
Groups	115576	146628

Notes: (1) Qualifications levels: Low – Semi-skilled and unskilled workers, and apprentices; Medium – Supervisors and highly skilled and skilled professionals; High – Top executives and intermediary executives. (2) Individuals for whom information about qualification is not available were excluded. (3)* significant at 10%; ** significant at 5%; ***significant at 1%.

We observe from table 11 that the type of acquisition seems to influence the wage impact differentials. Domestic acquisitions tend to have a positive effect on wages of 2.1% and 2.5%, according with 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 of almost 5%.

Table 11 – Wage impacts of M&As (domestic and foreign acquisitions)

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

Notes: (1) To classify a bank as a foreign entity we consider in our analysis a 50% threshold of foreign participation. (2) *significant at 10%; ** significant at 5%; ***significant at 1%

The results suggest a positive effect of M&A on wages; however for workers that have participated in M&A, after the operation, it seems to appear 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 to eliminate the unobserved worker, firm and match heterogeneity. However, the impossibility to identify all the time-invariant unobserved effects, separately, constitutes a limitation as the mobility of workers could happen not randomly. This may constitute an explanation for the difference on wage effects as the job mobility may be related with the match between workers and firms, thus a good match would be positively reflected on wages. It would be the case that successful matches may lead to increasing earnings while bad matches lead to a decrease in earnings or even to worker's dismissals.

The observation of positive wage effects for workers of acquired banks is in accordance with the results obtained by Conyon et al. (2004) and McGuckin and Nguyen (2001) as well as Kubo and Saito (2012) who observe a wage increase that can be explained by labour efficiency gains. However, after the M&A it is observed that the positive effect disappears in the second year after the M&A and there is a negative impact of M&As on wages that is more severe for workers in the third year after the M&A.

The positive relationship between pay and size is well demonstrated by our results which suggest that largest firms pay more. Education and experience are also important in the determination of wages. 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 qualification. So we may expect, in accordance with Siegel and Simons (2010), that M&As promote a quality improvement of human capital or it may be the case that there is a wage premium to highly skilled workers.

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 worker's wages. These negative effects are in line with that 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. So 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 affect wages significantly.

5. Conclusion

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

We find from pooled data that there is a negative effect of M&As on wages. However, when controlling for unobserved individual and firm level characteristics the estimation leads us to conclude that there is a positive effect (2% and 4%, according with the fixed and spell specification, respectively).

For workers of acquired firms, after the M&A, we observe a wage increase of about 1%. However, when controlling for unobserved heterogeneity, it is observed a negative effect of M&A on wages of almost 1%.

The inclusion of the time dimension seems to be important. There is a positive effect on the first year of nearly 1% that disappears in the following years where we observe a negative effect that is more severe in the third year. This may reflect an adjustment process related with M&A, thus in spite of the expected positive effect of M&A on wages, when we observe those workers that were subject to an integration process in the following years after the operation, the expected M&A wage premium disappears.

The analysis of the M&As wages effects on different levels of qualification lead us to conclude that there is a negative impact on wages for all levels of qualification, but it is observed a small positive effect for highly qualified workers using our fixed effects specification.

We also find that M&As may produce different effects in employees' wages according with 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 suggest a negative effect.

We depart from a simplest specification that establishes a relationship between pay and some determinants that have been recognized as important in the determination of wage

levels. The heterogeneities among individual and firms could result from differences in workers' skills or abilities and in the firm 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 longitudinal nature of our dataset enables us to analyse the impact of M&As on employees and consider the time dimension of those effects. In particular we analyse the effect of M&As operations on wages for workers of acquired firms and for different levels of qualification. Furthermore, we measure the differential effects of several types of acquisitions using individual level data.

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

Appendices

A.1. Construction of the dataset – CAE uniformization

According to *Instituto Nacional de Estatística* (INE) the category "other monetary intermediation" corresponds to those institutions that are principally engaged in receiving deposits and/or close substitutes for deposits and, on their own account, granting loans and/or investing in securities. This group in Portugal is made up of the Bank of Portugal, all other banks, saving 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	– Saving 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 2 presents the transformations occurred since CAE–rev.1 to CAE–rev.3

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

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

	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 just to "Financial Intermediation" (code 65), according with 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 were the correspondence were not possible and for those were inconsistencies were detected that the prevailing classification was that reported more frequently.

In this process, it was first created a new variable – *caemp_2* – with the purpose of creating an unique CAE for all the years under analysis (1985 – 2006), but the inclusion in a later stage of the year 2007 obliged us to consider the revision operated in that year. According to the new classification the entities operating on "Financial Intermediation" correspond to the code 64 and those classified as "other monetary intermediation" are registered as 64190. At this stage it was created the variable *caenew* 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* just exist 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 continuing the CAE standardization. Finally, it was possibly to create the variable – *caenew3* – which is originated from *caenew* but it is defined in terms of the new codes created (CAE–rev.3). As made before we use the correspondence tables to guarantee the harmonization of CAE, but for the purpose of the analysis and when considering the period 1985 – 2007 we need to use not just the CAE 65120 but also the CAE 64190 (the CAE 65120 is equivalent under rev3 to CAE 64190) but as mentioned for some entities that just appear in 2007 we need to consider this classification also.

A.2. Banks not involved in M&A

Table A.2.1 – Banks listed on *Boletins Informativos* from 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.*
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 on *Quadros de Pessoal*, so it was not possible to proceed with the match process.

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

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

	FE estimation	Spell estimation
Low	-.030***	-.016***
	(.005)	(.005)
Medium	-0.16***	-.010***
	(.002)	(.002)
High	.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) "All" refers to the entire sample; "restricted" when considering only the sample of acquired firms (2) Qualifications levels: Low – Semi-skilled and unskilled workers, and apprentices; Medium – Supervisors and highly skilled and skilled professionals; High – Top executives and intermediary executives. (3) "Non-defined" correspond to those individuals for whom information about qualification is not available. (3) * 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 are expressed in 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 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.
Numbers of workers	Logarithm of total employment.
Male	1 if male, 0 if female.
Education	Years of schooling
Education level	
No education	1 if worker has less than primary school, 0 otherwise.
Primary education	1 if worker has primary school, 0 otherwise.
Preparatory education	1 if worker has preparatory school, 0 otherwise.
Lower secondary	1 if worker has lower secondary school, 0 otherwise.
Secondary	1 if worker has secondary school, 0 otherwise.
Upper secondary	1 if worker has upper secondary school, 0 otherwise.
College	1 if worker has college, 0 otherwise.
Tenure	The number of years that 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 worker is a top executive, 0 otherwise.
Intermediary executive	1 if worker is an intermediary executive, 0 otherwise.
Supervisor	1 if worker is a supervisor, 0 otherwise.
Highly skilled and skilled	1 if worker is a highly skilled and skilled professional, 0 otherwise.
Semi-skilled and unskilled	1 if worker is a semi-skilled and unskilled professional, 0 otherwise.
Apprentice	1 if worker is an apprentice, 0 otherwise.
Non-defined	1 if 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

References

Abowd, J. M., Kramarz, F. and Margolis, D. N. (1999), "High wage workers and high wage firms", *Econometrica*, 67(2), pp. 251-333.

Abowd, J. M., Creecy, R. H. and Kramarz, F., (2002), "Computing person and firm effects using linked longitudinal employer-employee data", Longitudinal Employer-Household Dynamics Technical Papers, Center for Economic Studies, U.S. Census Bureau.

Almeida, R. (2007), "The labor market effects of foreign owned firms", *Journal of International Economics*, 72, pp. 75-96.

Andrews, M., Shank, T. and Upward, R. (2006), "Practical fixed-effects estimation methods for three-way error component model", *The Stata Journal*, 6(4), pp. 461-481.

Bandick, R. (2011), "Foreign acquisitions, wages and productivity", *The World Economy*, 34(6), pp. 931-951.

Brown, C. and Medoff, J. (1989), "The employer size wage effect", *Journal of Political Economy*, 97(5), pp. 1029-57.

Conyon, M. J., Girma, S., Thompson, S. and Wright P. (2001), "Do hostile mergers destroy jobs?", *Journal of Economic Behavior & Organization*, 45, pp. 427-440.

Conyon, M. J., Girma, S., Thompson, S. and Wright P. (2002a), "The impact of mergers and acquisitions on company employment in the United Kingdom", *European Economic Review,* 46, pp. 31-49.

Conyon, M. J., Girma, S., Thompson, S. and Wright P. (2002b), "The productivity and wage effects of foreign acquisition in the United Kingdom", *The Journal of Industrial Economics*, 50(1), pp. 85-102.

Conyon, M. J., Girma, S., Thompson, S. and Wright P. (2004), "Do Wages Rise or Fall Following a Merger?, *Oxford Bulletin of Economics and Statistics,* 66(5), pp. 847-862.

Cornelissen, Thomas (2006), "Using Stata for a memory saving fixed effects estimation for the three-way error component model", FDZ-Methodenreport, 03/2006, Nuremberg.

Cornelissen, Thomas (2008), "The Stata command felsdvreg to fit a linear model with two high-dimensional fixed effects", *The Stata Journal*, 8(2), pp. 170-189.

Ferreira, Priscila (2009), "Returns to job mobility: the role of observed and unobserved factors", ISER Working Paper Series, No. 2009-12.

Girma, S., Thompson, S. and Wright P. (2006), "The impact of merger activity on executive pay in the United Kingdom", *Economica*, 73, pp. 321-339.

Girma, S., and Görg H. (2007), "Evaluating the foreign ownership wage premium using a differences-in-differences matching approach", *Journal of International Economics*, 72, pp. 97-112.

Graham, J., Li, S. and Qiu J. (2012), "Managerial attributes and executive compensation", *Review of Financial Studies*, 25(1), pp. 144-186.

Gugler, K. and Yurtoglu B. (2004), "The effects of mergers on company employment in the USA and Europe", *International Journal of Industrial Organization*, 22(4), pp. 481-502.

Heyman, F., Sjöholm, F. and Tingvall, P. (2011), "Multinationals, cross-border acquisitions and wage dispersion", *Canadian Journal of Economics*, 44(2), pp. 627-650.

Heyman, F., Sjöholm, F. and Tingvall, P. (2007), "Is there really a foreign ownership wage premium? Evidence from matched employer–employee data", *Journal of International Economics*, 73, pp. 355-376.

Hijzen, A., Martins, P., Schank, T. and Upward, R. (2013), "Foreign-owned firms around the world: A comparative analysis of wages and employment at the micro-level", *European economic Review*, 60, pp. 170-188.

Huttunen, K. (2007), "The effect of foreign acquisition on employment and wages: evidence form Finnish establishments", The Review of Economics and Statistics, 89(3), 497-509.

Jensen, M. (1988), "Takeovers: their causes and consequences", *Journal of Economic Perspectives*, 2(1), pp. 21-48.

Kubo, K. and Saito T. (2012), "The effects of mergers on employment and wages: evidence from Japan", *Journal of the Japanese and International Economies*, 26, pp. 263-284.

Lehto, E. and Böckerman, P. (2008), "Analysing the employment effects of mergers and acquisitions", *Journal of Economic Behavior & Organization*, 68, pp. 112-124.

Martins, P. (2004), "Do foreign firms really pay higher wages? Evidence from different estimators", IZA Discussion Paper 1388.

Martins, P. and Esteves L. (2008), "Foreign ownership, employment and wages in Brazil: evidence from acquisitions, divestments and job movers", IZA Discussion Paper 3542.

McGuckin, R. and Nguyen S. (2001), "The impact of ownership changes: a view from labour markets", *International Journal of Industrial Organization*, 19(5), pp. 739-762.

Monteiro, N. P. (2010), "Using propensity matching estimators to evaluate the impact of privatisation on wages", *Applied Economics*, 42(10), pp. 1293-1313.

Monteiro, N. P. (2004), "The impact of privatisation on wages: evidence from the Portuguese banking industry", NIPE – WP 11.

Oberhofer, H., Stöckl, M., and Winner, H. (2012), "The Wage Premium of Globalization: Evidence from European Mergers and Acquisitions", Economics Discussion Papers, No 2012-6, Kiel Institute for the World Economy.

Oberhofer, H. (2013), "Employment effects of acquisitions: evidence from acquires European firms", *Review of Industrial Organization*, 42(3), pp. 345-363.

Oi, W.Y. and Idson, T.L. (1999a), "Firm-size and wages", in Ashenfelter, O. and Card, D. (Eds), *Handbook of Labor Economics*, 3, North Holland, Amsterdam, pp. 2166-214.

Oi, W.Y. and Idson, T.L. (1999b), "Workers are more productive in large firms", *American Economic Review* (Papers and Proceedings), 89(2), pp. 104-8.

Shleifer, A. and Summers L. (1989), "Breach of trust in hostile takeovers", NBER Working Papers 2342, National Bureau of Economic Research.

Siegel, D. and Simons K. (2008), "Evaluating the Effects of Mergers and Acquisitions on Employees: Evidence from matched employer-employee data", working paper 0804, *Rensselaer Working Papers in Economics*, Rensselaer Polytechnic Institute.

Siegel, D., Simons K., and Lindstrom T. (2009), "Ownership change, productivity and human capital: New evidence from matched employer-employee data in Swedish manufacturing" in Dunne, T., Jensen, J. and Roberts M. (eds.), *Producer Dynamics: New Evidence from Micro Data*, University of Chicago Press, pp. 397-442.

Siegel, D. and Simons K. (2010), "Assessing the effects of mergers and acquisitions on firm performance, plant productivity, and workers: new evidence from matched employer-employee data", *Strategic Management Journal*, 31, pp. 903-916.