LISBON SCHOOL OF ECONOMICS & MANAGEMENT
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MASTER IN
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MASTER'S FINAL WORK
DISSERTATION

THE EFFECTS OF THE INCREASE IN PARENTAL LEAVE BENEFITS ON WAGES

BÁRBARA SOFIA LOBO ALEXANDRINO

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SUPERVISION:
PROFESSOR ÁLVARO NOVO

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Bárbara Alexandrino

January 2017

THE EFFECTS OF THE INCREASE IN PARENTAL LEAVE BENEFITS ON WAGES

Bárbara Alexandrino

Abstract: This study uses 2007-2012 data from *Quadros de Pessoal* and a difference-in-differences methodology to analyze the effects of the increase in parental leave benefits introduced in 2009 by the revision of the Labor Code and Decree-Law 91/2009. Results show a persistent statistically significant negative effect of the policy, pointing to a 3.6% reduction of the hourly wages for the individuals targeted by the legislation. There is evidence of a larger effect for individuals with more qualifications, as well as for those with more years of schooling. Findings are consistent with the model of mandated benefits, as the increase in employer costs is shifted to wages. Results are robust to the use of different specifications of periods and groups.

JEL Classification: J3, J13, J18

Key Words: parental leave, parental benefits, mandated benefits, wages

THE EFFECTS OF THE INCREASE IN PARENTAL LEAVE BENEFITS ON WAGES

Bárbara Alexandrino

Resumo: O presente estudo utiliza a base de dados Quadros de Pessoal de 2007 a 2012 e a metodologia de diferenças-em-diferenças para a análise dos efeitos do aumento dos benefícios de licença parental introduzidos em 2009, através da revisão do Código de Trabalho e do Decreto-Lei 91/2009. Os resultados exibem um efeito negativo estatisticamente significativo da medida estabelecida, indicando uma redução de 3,6% da remuneração horária para os trabalhadores-alvo da alteração. Existem evidências de maiores efeitos para indivíduos com maiores qualificações, bem como para indivíduos com maior grau de habilitações. Estes resultados encontram-se em conformidade com os modelos teóricos de benefícios obrigatórios estipulados, onde o aumento do custo para o empregador é transferido para a remuneração do trabalhador. A robustez dos resultados foi testada com recurso a diferentes especificações de períodos e grupos.

Classificação JEL: J3, J13, J18

Palavras-Chave: licença parental, benefícios parentais, salários

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1. Introduction

This study aims to explore the labor market effects of the introduction of a new legal framework regarding parental leave in Portugal in 2009. More specifically, it is intended to assess how the increase in benefits through this change in legislation has affected wages.

The relevance of parental leave as a social policy tool is undeniable as the effects are transversal to several areas – health, fertility and the labor market. With the increase in women's participation in the labor market during the last century, combined with the marked decrease in fertility in this century, it is not surprising every country provides some type of arrangement for maternity protection, and, in recent years, arrangements have increasingly been made for fathers, as well.

Maternity leave, i.e. the permitted absence of women from employment around the time of childbirth, stems from social and economic changes in the 20th century, having been recommended by the International Labor Organization since 1919 (Akgunduz & Plantenga, 2012). The arrangements differ largely among countries, in their length, conditions and source of financing, with the emergence of shared entitlements for both parents, the most generous ones to be found in European countries.

The benefits of such leave arrangements include the retaining of workers that would otherwise abandon the workforce, allowing the retention of the human capital investment, while decreasing employer costs in training a new worker. Leave policies are also believed to have a positive effect on reducing the motherhood gap – that is, the wage differential for mothers in comparison with their male counterparts when controlling for observable variables (Waldfogel, 1998) – together with the general institutional environment, where other concerning variables include the quality of child care in the area.

In recent years, leave programs have been restructured as to encourage fathers to also take part in leave, in order to attempt a further decrease in the wage penalty for mothers, by strengthening the links of mothers to the labor force; several countries, such as Norway and Iceland have introduced leave periods reserved for fathers, the so called “daddy months”, with no strong evidence of considerable long-term labor market impact of this policy (Ekberg et al, 2013; Patnaik, 2014).

Parental benefits have their costs and challenges. Group benefits increase the cost of labor for the group, thus potentially leading to discrimination against the targets of the policy by employers (Ondrich et al, 2003). The penalty may be felt through a decline in the progression of wages for the group, which can be associated to a decrease in the likelihood of a promotion and to a hiring penalty, as employers will pass the costs of the benefits to the group (Baum, 2003). In addition, employees who value the increase in benefits will be willing to receive a lower payment, further decreasing wages (Summers, 1989).

In this study, we examine the effects on wages of the changes introduced by the revision of the Labor Code published in January 2009, covered by the Decree-Law 91/2009. Decree-Law 91/2009 represents fundamentally a shift towards a new parental leave paradigm, introducing a bonus month that can be used when the leave is shared between parents, that is, each parent must take 30 days exclusively to benefit from the bonus. The change is followed by a rise in take-up rates – 0.6% of parents shared leave up to 2009; in 2012, 28% of the parental leave subsidies granted were shared.

Additional benefits introduced by the reform include a longer mandatory initial leave for fathers and an optional extended leave at a lower pay.

The motivation for this study lies in the lack of literature on the effects of leave benefits for the Portuguese case, aiming to both fill the gap in the literature by applying the methods used in similar paradigms and inspire future works.

Microdata from Portuguese labor dataset *Quadros de Pessoal* is used for the years 2007-2012, employing a methodology of difference-in-differences. The main treatment group is comprised of individuals aged [25-40], while individuals aged [55-60] constitute the main control group. The choice of the groups results from an analysis of the potential and real main users of these benefits, through data on the use of leave and the percentage of live-births by age group in 2009. The possible treatment-control pair groups that follow are then held to the parallel trend assumption – controlling for the covariates available, it is verified whether the pair was following a similar common wage trend prior to the legislation change. The assumption here is simple: the pair would have kept the parallel trend if not for the policy change.

Results show a persistent statistically significant negative effect of the policy on hourly wages. The difference-in-differences (DD) estimation shows a negative effect of -3.6% for the treatment group that is statistically significant, with a greater effect for the male group (-4%). These findings are robust to the use of alternative group and period specifications. Findings are consistent with the theory of mandated benefits and illustrate the extent of the shift to wages following an increase in the cost for the employer. Subgroup analysis indicates larger negative results for individuals with higher education and those working in skilled positions; these happen to be the groups perceived to have a higher estimated cost for the employer following the policy change.

Additional subgroup analysis finds similar coefficients for permanent and non-permanent workers.

This study is divided in a total of six chapters. Chapter 2 establishes the Portuguese setting regarding family-work balance and introduces the new legislation, while Chapter 3 reviews the most relevant literature. Chapter 4 presents the data and methodology used in the experiment, while Chapter 5 is reserved for analysis and discussion of the obtained results. Chapter 6 concludes and suggests further studies.

2. Contextual Setting

2.1. Notes on the Portuguese setting

In 2009 the Portuguese synthetic fertility index (SFI) stood at 1.3 following a decrease from 2001's SFI of 1.5. The average EU-25 SFI at the time was significantly superior at 1.8. The situation in Portugal however is not one of *childlessness* – 95% of the Portuguese women at the time had one or more descendants – but one of a high rate of the only-child. The average age at childbirth was 29.7 in 2009, an increase from 28.7 in 2001 (Wall et al, 2010).

At the same time, Portugal in 2006 is above the average of the European Union when it comes to the participation of the parents in the labor market, with 76.9% of mothers working in a formal function, comparing to the average of the EU-27 of 67%. In general, data shows motherhood has, as expected, a negative effect on women's employment rate, with the reverse happening for men, who display a rise in the employment rate (Margherita et al, 2009).

On the other hand, the share of women aged 25-49 working part-time is, at 3.3%, significantly lower than the average EU-27 of 24.7% in 2006. The lower rates of part-time employment in Portugal and in Southern Europe can in general be explained through the lower wage levels and the shorter availability of part-time schemes, although certainly social and culture factors are at play (Margherita et al, 2009).

It is also relevant to notice that the Portuguese gender pay gap decreased by 0.3 pp from 2010 to 2011, being at 12.5% significantly lower than the average for the EU-27 (16.2%) (European Commission, 2013).

A relevant aspect to point out is the gap between the end of parental leave and the entitlement of the child to public childcare. Entitlement to placement in pre-school for children aged five years old was introduced in 2009 (Law no. 85/2009) – younger children may be left outside the formal system for unavailability of place. In 2006, 75% of children aged three to five were in the formal childcare service system while the percentage for children younger than three was 33% (Moss, 2009). In parallel to the formal system, informal childcare needs to be taken into account, with authors pointing the high rates of intensive childcare provided by the grandparents in Southern European countries such as Italy, Spain and Portugal (Janta, 2014).

2.2. A New Legal Framework for Parental Benefits

Prior to the 2009 legislation reform explored in this study, maternity leave was regulated by several disperse regulations, covering 120 or 150 days of absence. The former was paid at 100 per cent, while the latter had 80 per cent payment[1].

[1] See Law no. 18/98, Decree-Law 230/2000 and Decree-Law 77/2005.

The EU legislation in place at the time dated back to 1992[2], mandating a minimum 14 weeks with an adequate pay, comparable to sick leave. In 2009, longer leave periods (nine months or over) were provided in German, Eastern Europe and the Nordic countries (Moss, 2009).

The changes introduced are a shift to a legal framework that promotes the sharing of responsibilities between both parents and a better conciliation between professional and family life. The relevant legislation is found in the revision of the Labor Code (Law no. 7/2009, 12th of February 2009) regulated by the Decree-Law 89/2009 – applicable to public workers, and the Decree-Law 91/2009, the object of this study. The new framework came into effect in May 2009.

The changes in benefits we are considering for this study are the following:

- Increase of the Initial Parental Leave when shared between parents;
- Increase of the paternal exclusive leave;
- Increase of the extended parental leave.

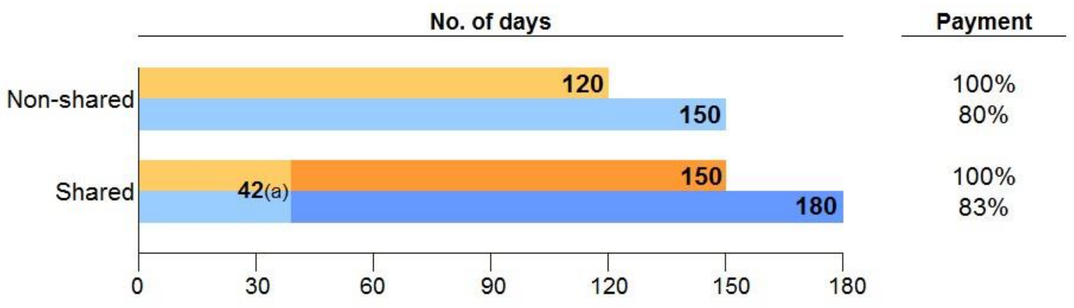
Decree-Law 91/2009 introduces a bonus month if the parental leave is shared – while parents can still opt for the former options (120 days at 100 per cent pay or 150 days at 80 per cent pay), they may now choose to share a 150-day leave with full payment or a 180-day leave with 83 per cent payment.

To benefit from the sharing option, each parent must take an exclusive leave period of at least 30 days[3], taking into account that the first 42 days post birth are reserved for the mother. Additionally, the mother is also able to use up to 30 days of the available leave period before birth.

[2] See Council Directive 92/85/EEC.
[3] Parents may choose between 30 consecutive days or two periods of 15 days.

Figure 1 displays the options available to the parents in terms of the number of days and respective payment, when both meet the requisites to apply for initial parental leave. The darker area represents the number of days that are available for sharing between parents, given that both qualify for shared leave.

Figure 1 – Initial Parental Leave options (shared and non-shared)



Source: Decree-Law 91/2009. **Notes:** Period marked with (a) is for the mother's exclusive use.

As to be eligible to take leave, the mother or father must have a record of six months of registered earnings, consecutive or interpolated at the time of the leave start. The payment of the leave subsidy is then computed through the average of the gross earnings for the first six months within the last eight months prior to taking the leave and funded through the Social Security System, for which employers and employees are required to contribute.

Parents who do not meet this requirement may still be granted the social parental leave, in the situation of a low family income, introduced in 2008. For the sharing option of the Initial Parental Leave to be available, both parents are required to be eligible for leave taking, either through past contributions or social leave.

Note that the new conditions for the Initial Parental Leave do not, in the end, extend the length of the initial leave available for mothers, since as to benefit from the 150/180 days of shared leave, at least 30 days are for the exclusive use of the father. Therefore, the available days for the mother in a shared leave scenario, with the father taking the minimum 30 exclusive days to qualify, are the 120 and 150 days, the same time period as the one established by the previous legislation.

The introduction of these benefits for parents is followed by interesting claim rates displayed in Table 1 – from May 2009 (the start of the legislation) to the end of the year, 28 per cent of Initial Parental Leave arrangements were shared.

Table 1 – Leave-Taking Statistics

	2007	2008	2009 (a)	2010	2011	2012
Number of Live-births	102 492	104 594	67 924	101 381	96 856	89 841
Number of Maternity/Parental Leave subsidies granted	75 297	82 380	53 831	80 494	81 300	75 553
Parental Leave coverage (%)	73.5	78.8	79.3	79.4	83.9	84.1
Shared Parental Leave (%) (b)			**27.6**	**24.7**	**25.0**	**27.5**
150 days (% of Shared PL)			42.2	42.5	40.7	41.2
180 days (% of Shared PL)			57.8	57.5	59.3	58.8

Source: Statistics Portugal (2013), Social Security Account 2012 - Part II (MTSS, 2012), Wall et al (2012). Author's calculations.
Notes: (a) As the new legislation start took place in May, for 2009 we are only considering the period May-December. (b) For this calculation we exclude Social Parental Leave. The no. of Parental leave subsidies considered are thus the following: 2009 - 42 548, 2010 - 63 575, 2011 - 65 292, 2012 - 59 995.

Table 1 displays both a decrease of live births in Portugal and an increase of percentage of parents covered by leave benefits, in the years 2007-2012, which is in part explained by the introduction of the social leave. Previous research found the renaming of benefits (in this case, from maternity and paternity leave to parental leave), on par with financial incentives, may increase leave-taking rates, as individuals appear to answer to “daddy-only” labels (Patnaik, 2014).

Decree-Law 91/2009 also increases the mandatory father-only parental leave, not accounted for in the 150/180 Initial Parental Leave scheme, from the previous 5 mandatory days after birth to 10 mandatory working days, to use in the 30 days following the birth of the child – 5 of which have to be taken consecutively following the birth. Conversely, the 15 additional optional days are reduced to 10 optional days – consecutive or not – that can be used simultaneously with the mother. This father-exclusive leave is paid at 100 per cent.

Furthermore, the reform adds an extended parental leave of three months that can be used by each parent.[4] The extended leave period is paid at 25 per cent of earnings. Claim rates for this option are the following – a total of 1 214 in 2009, 2 179 in 2010 and 2 415 in 2011.

Decree-Law 91/2009 also introduces a change that is out of the scope of this study, namely an increase in benefits for taking care of a sick child, by increasing the maximum established age of the dependent child to 12 years. Furthermore, these benefits were extended to grandparents, while 15 extra unpaid days were also added.

It is important to notice that for the layoff of a permanent worker who is pregnant, breastfeeding or using parental leave to be allowed, the employer has to previously require the approval of the competent administrative body, the Portuguese Commission for Equality in Labor and Employment (CITE)[5]. However, if the employee is working under a fixed-term contract the non-renewal of the contract is possible – the only condition being that the decision is notified to CITE. Therefore, as one of the possible outcomes of the introduction of benefits, employers may limit the access of the target group to permanent contracts. Additionally, employees working under a fixed-term contract may opt not to use their preferred option of the benefits available or to postpone the decision of having children.

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[4] The options for use of the extended leave are the following: (1) three months starting after the end of the initial parental leave, (2) twelve months with normal working hours reduced to half, (3) interpolated periods of leave or part-time work, where the total duration of the leave and time reduction is equal to the normal working period of three months and (4 – exclusive to workers under the collective labor bargaining agreement) non-consecutive absences from work amounting to the normal working period for three months.

[5] See Decree-Law 70/2000 and Decree-Law 230/2000.

3. Literature Review

3.1. Theoretical Background

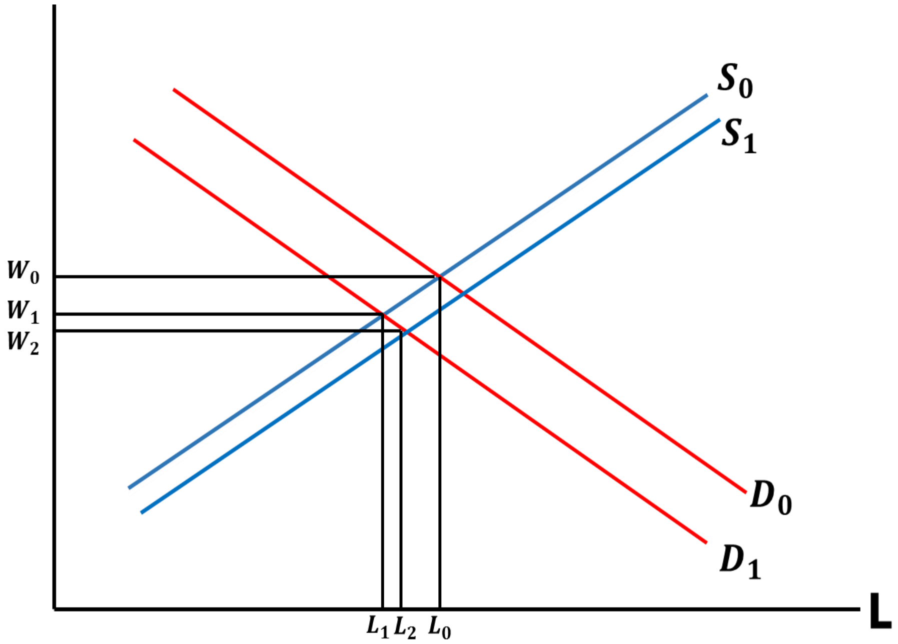
According to the theory, the predicted effects of leave benefits on wages and employment are ambiguous (Baum, 2003).

Ruhm (1998) states that as the access to parental leave depends on requiring employers to provide these arrangements when costs surpass benefits, these are intrinsically inefficient in economic terms, when considering perfect information and no externalities. Summers (1989) adds to the idea by arguing that were the value of the arrangement to be higher than the employer cost in providing it, the employer would provide it without the need of a mandate.

As this is not the case – it is mandatory that the employer offers the leave arrangements stated by the law, provided the worker meets the requirements – labor demand will shift down, decreasing wages and the level of employment. (Gruber & Krueger, 1991; Gruber, 1994; Ruhm, 1998; Summers, 1989) Figure 2 intends to visually display the mechanisms here described – as such, D_0 will shift to D_1.

The amount of contraction of the labor demand curve will be dependent on the employer costs. Costs of leave incurred by the employer include the replacement of the worker either by hiring a temporary worker or by demanding the remaining staff to substitute the parent away on leave. Temporary workers are linked to training costs and a possible loss of productivity as they have less human capital specific to the firm (Baum, 2003). When there is no replacement in place, there is an increase in the tasks for the remaining workers, with possible paid overtime, and/or a reduction of the activities during the period. In general, shorter periods of leave are associated with a

Figure 2 – The effects of a mandated benefit



lower replacement rate (Akgunduz & Plantenga, 2012). Accordingly, a European Parliament (2010) report shows a replacement rate in European countries of 30% for maternity leave and 0% for paternity leave for 2008 data.

On the other hand, it can be argued that the demand curve may shift to the right as parental leave is protecting the human capital that is specific to the firm, leading to an increase in the worker's productivity after the absence (Ruhm, 1998). This theory is further reiterated by Klerman & Leibowitz (1999) by arguing that the introduction of maternity benefits results in a retention of women who would otherwise leave the workforce and perhaps find a different firm and position in a future return. A withdrawal from the labor force represents a loss of human capital for the firm and for the mother who will not benefit from the job-specific experience accumulated prior to the birth (Waldfogel, 1998). Following this reasoning, an increase in the leave period would theoretically result in a positive effect on wages through the protection of firm-worker relationships (Klerman & Leibowitz, 1999). In further considerations of the relevance of individual human capital, it can be conversely argued that by promoting the absence of the worker, leave policies can reduce the experience of the worker, and thus their wage rate.

As the object of this study is a policy funded through contributions to social security, it is comparable to Summers' (1989) mandated benefits, in that there is an important link between the benefit and its cost. Past contributions of the worker are often used to finance programs such as unemployment insurance, sick leave and parental leave. Therefore, there will be an incentive for individuals who value the benefit to offer their labor at a lower reservation wage, increasing labor supply (Centeno & Novo, 2013). Additionally, individuals working in the informal sector who value parental leave may shift to the formal sector as to qualify for the benefits. The cost is consequently covering part of the benefit valued by the employee.

Therefore, parental leave may result in the increase of labor supply following 1) the willingness of workers who value the benefit to accept a lower wage and 2) the move of individuals to the formal labor force. In Figure 2 this is displayed by the shift to the right of s_0 to s_1. As reasoned by Ruhm (1998), the effect of the continuing link to the labor force of the worker after the use of benefits will also contribute to the increase of labor supply.

In the end, the extent of the shift in demand together with the change in supply will define the effects of the reform on wages and employment. The impact on employment is considered to be ambiguous (Baum, 2003), as the length of the leave periods may either result in the detachment of women from the labor market or in the strengthening of their ties (Klerman & Leibowitz, 1999; Waldfogel, 2008).

On the other hand, the effect on wages is generally a negative one for the group targeted by the introduction of benefits, taking however into account that a full shift to wages may not be possible due to antidiscrimination laws and low or minimum-wage earners with slight room for adjustment (Gruber, 1994).

3.2. Empirical Findings

The literature on the labor market effects of the introduction of parental leave benefits is wide and may be classified by data – aggregate or individual-level – and type of leave - paid or unpaid, the latter encompassing studies for the United States case. Most of the studies here discussed regard maternity leave; however, findings for further mandated benefits are also included.

A staple in aggregate-level research on the topic, Ruhm (1998) investigates the labor market effects of (paid) parental leave using data for nine European countries over the period 1969-1993. All the countries analyzed had unsurprisingly important changes happening during the period considered, with significant variations in the length of leave across nations, ranging from 14 weeks in Ireland to 64 weeks in Sweden in 1993. The author uses a methodology of difference-in-difference-in-differences (DDD), controlling for time and country. As parental leave at the time was mainly used by women, men will form the control group for the experiment. Results suggest that for shorter periods of length of three months there is an increase in the level of employment and a minor effect on wages, while longer leave mandates, defined as nine months, result in a decrease in hourly earnings.

Akgunduz and Plantenga (2012) extend the study by using aggregate-level data from 1970 to 2010 for sixteen European countries. While keeping Ruhm's (1998) DDD model, the authors accommodate for the increase in the father's use of parental benefits by using older men (45-54) as the control group. Results show once again a positive effect on female participation rates, although there is now a lower increase in employment, followed by a decrease in wages that is larger for higher-skill positions and insignificant for lower-skilled, such as manufacturing jobs. The reasoning suggested is that the risk of depreciation of human capital during the leave period is higher for higher-skilled jobs; additionally, wages for lower-skilled jobs may be close to the minimum or starting wages not leaving much room for a shift to wages.

Regarding individual-level data studies, there exists a range of literature encompassing the US case for unpaid leave; in 1993, the Family and Medical Act (FMLA) offered 12 weeks of unpaid leave for eligible women. Waldfogel (1999) uses data from 1992 to 1995 to analyze the effects of the FMLA on employment and wages, by comparing the effects on states with and without some previous type of maternity leave implemented. Once again, the methodology used consists in a difference-in-differences estimator, taking young women as a treatment group, while men and older women form the control groups. Results do not find significant effects of the policy in either employment or wages.

Baum (2003) builds on Waldfogel's (1999) study to analyze the effects of the FMLA, by using a different panel database that allows the following of individuals from 1986 to 1994. The author suggests the insignificant effects found by Waldfogel (1999) are due to an inaccurate identification of the employers covered by the policy. As only employers with 50 or more employees are required to provide the benefit, many individuals included in the former study do not actually have access to the FMLA. The DDD estimation shows again an insignificant effect on employment and wages. The author suggests as potential explanations, the short length of the leave, the existence of parental leave benefits voluntarily provided by several employers prior to the reform, and finally, the fact that the leave introduced is unpaid.

Indeed, the effects of paid leave can be quite different. By being more accessible to less privileged employees who face financial constraints (for example, individuals with less years of schooling and single mothers), take-up rates have less disparities and are close to universal. Results show accordingly that when replacing an unpaid program to a paid one, effects are most significant in underprivileged individuals (Rossin-Slater et al, 2013; Baker & Milligan, 2008).

Rossin-Slater et al (2013) study the effects of the first paid family leave program in the US, the CA-PFL introduced in California in 2004, by using data from 1999 to 2010. The authors apply a difference-in-differences model comparing the period prior and post the policy implementation, using mothers with young children as a treatment group and several control groups: women with older children, or none at all, men with older children, women with young children living in other states. The study finds that CA-PFL more than doubled leave-taking, suggesting the expansion of the benefits to less advantaged individuals. Results show a significant increase in weekly work hours of 5 to 6% and an insignificant increase on wages, possibly related to the increase in work hours.

Baum & Ruhm (2016) extend the study by using longitudinal data to examine the effects of the CA-PFL, following a more precise information on the location and timing of births. The authors apply a difference-in-differences model, identifying parents with work experience during the period of pregnancy as the potential users of parental leave, thus forming the treatment group. The control group is formed by parents with older children. Findings are less expressive than the ones by Rossin-Slater et al (2013): there is a smaller estimated increase in hourly wages with confidence intervals that encompass zero or negative results.

Gruber (1994) explores the effects of the introduction of maternity mandates through the mandatory coverage of childbirth in the health insurance provided by employers. The treatment group used is formed by married women aged 20-40, while the control groups consist on individuals over 40 and single men aged 20-40. As the legislation was introduced in a first instance in certain states ("experimental states") prior to the nationwide implementation in 1978, the empirical strategy consists on a DDD model, comparing state and year effects. Results show a negative and statistically significant effect on wages, suggesting the target group of the policy is bearing the costs of the mandate. The shift of the costs to wages implies the targeted group values the policy and there were no obstacles in the adjustment of wages.

In turn, Fernández-Kranz & Rodriguez-Planas (2013) study the effects of Spanish Law 39/1999 that protects from dismissal workers who had previously applied for a part-time arrangement over parental responsibilities. The duality in permanent/fixed-term contracts in the Spanish labor market makes this a particularly interesting study due to the similarities with the Portuguese case. Although the program was open to both parents, the users of the optional arrangements were mostly women; as such, women of childbearing age form the treatment group. Findings show an increase in the likelihood of the transition from both permanent and fixed-term contract to unemployment, as well as a decrease in the likelihood of a promotion to a permanent contract from a fixed-term position. Results also show a negative adjustment in wages for the group.

The negative effect on wages resulting from the introduction of mandated benefits is not exclusive to the case of parental benefits – Anderson & Meyer (1997) find the introduction of unemployment insurance results in a decrease of wages, as the costs of the insurance are shifted to the workers' wages, while Gruber & Krueger (1991) find similar results for the introduction of compensation insurance to workers, with employees supporting the cost of the mandated benefit.

4. Data and Methodology

4.1. Data

The data source used is the *Quadros de Pessoal*, an administrative data set collected on an annual basis by the Ministry of Labor, Solidarity, and Social Security that provides a wide range of information on the matched employer-employee pairs. The survey is of compulsory participation for all the firms within the Portuguese private sector, thus being regularly used as a source of information for the empirical analysis of the national labor market. The information collected reports to the month of October of the reference year.

For each individual in the sample, it is selected the information regarding wage, age, gender, education, qualification, type of employment contract and occupation; in terms of employer data, the variables extracted are the district where the firm operates and its economic sector.

The dependent variable used is the hourly wage presented in a natural logarithm, as to allow for an effective analysis of the percentage effect in the dependent variable (Gelman & Hill, 2007). Wages are adjusted for inflation using the Consumer Price Index from Statistics Portugal and considering 2011 prices. Additionally, individuals with an hourly rate inferior to EUR 1 or higher than EUR 100 are excluded.

Moreover, observations are dropped for every individual that is not an *employee working for an employer*, including employers, family workers, members of a producer cooperative, as well as individuals in a different or non-specified situation.

Furthermore, individuals with unavailable social security number and age are excluded. For the purpose of the experiment, observations for employers operating in the primary sector of the economy are also removed.

4.2. Methodology

The Model

In order to explore the effects of the parental leave reform on the target group, it is employed a methodology of differences-in-differences, by selecting two groups – a treatment group targeted by the new legislation and a control group. The difference-in-differences model will have the following form:

$$\log(Y_{it}) = \alpha + \beta_1 treat_i + \beta_2 after_t + \beta_3 after_t \times treat_i + W_{it}\gamma + \varepsilon_{it} \qquad (1)$$

for individual i in year t. Y_{it} is our variable of interest – the real hourly wage and W_{it} is a set of observable characteristics for both the employee and the firm defined by the variables enumerated in 4.1. $after_t$ is a dummy set to one for the period covered by the legislation, from 2009 to 2012, and zero for the period before, 2007 and 2008. $treat_i$ is a dummy variable that equals 1 for treatment group, that is, the individuals that can be pointed as the users of the benefits (this will be explored below) and 0 for the control group, that is, the individuals that do not appear to be the target of the policy. $after_t \times treat_i$ is the interaction term of interest and $\hat{\beta}_3$, the coefficient, will measure the effects of the legislation change on the treated group.

Considering Decree-Law 91/2009 had its effective start in May 2009, the *after* period is considered as 2009-2012 (Period Specification 1). Additionally, and considering the changes taken place during the second trimester, while the information collected by the *Quadros de Pessoal* regards the month of October, the model is applied for the after period 2010-2012 (Period Specification 2) and an after period starting in 2010 with observations from 2009 excluded from the sample (Period Specification 3). The choice of periods close to the reform has the intent of minimizing possible policy interactions.

Following Bertrand et al (2004), standard errors were clustered at the individual level.

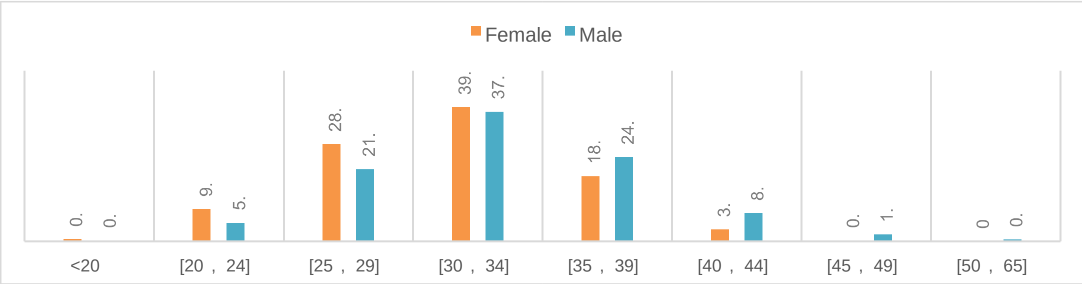
Identification Strategy

As the changes introduced by the new legal framework target both genders, the identification strategy will not be as forward as commonly understood in the literature, where typically for a reform of leave benefits, women of childbearing age will form the treatment group while their male cohorts are used as a control group.

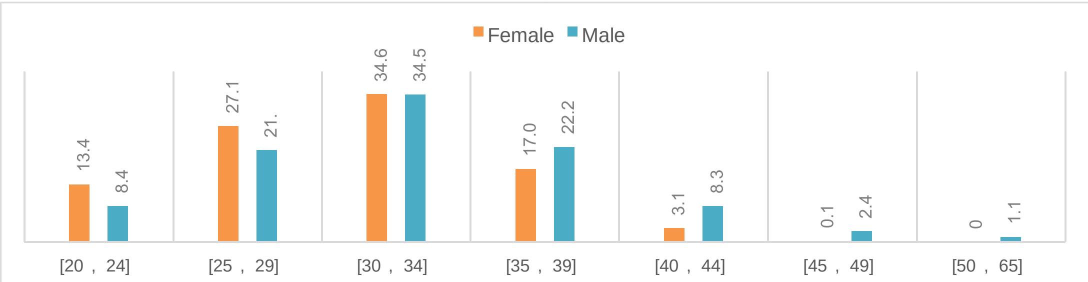
Through the analysis of data on live births by age group of females and males in 2009 and on the beneficiaries of the policy (see Figure 3) it shall be clearer which population groups appear to be the object of the new legislation. As such, for both genders, the age group [30-34] is shown to be paired with the highest number of live births. The patterns for both female and male display great resemblance, the main difference stemming clearly from biological differences – the female distribution of live births by age group is naturally less scattered. Additionally, for both groups it would be reasonable to negate the group formed by individuals older than 50 years old as the target of the reform. In sum, we may generally point to the age group comprised of individuals aged [20, 40] as a reasonable treatment group, with individuals aged [50, 65] as the control group.

Figure 3 – Use and Potential use of Leave Benefits

Panel A - Parental Leave beneficiaries by age group in 2009



Panel B - Live-births by age group of parents in 2009



Source: Statistics Portugal, Social Security Account 2009 - Part II (MTSS, 2009). Author's calculations.

In appropriately identifying the treatment and control groups, there is the need to conform to the common trend assumption, also known as the parallel paths (Angrist & Krueger, 1999). According to this assumption, trends for the treated and control groups should not differ prior to the implementation of the new legislation, hence pointing to the assumption that, had the reform not been implemented, both groups would have maintained identical trends.

To test for the conformity of the group pairs to the parallel trend assumption, it is used the information from *Quadros de Pessoal* for the period 2002-2008, applying the adjustments to the data set described in 4.1.. The test can be summarized in equation (2) below:

$$\log(Y_{it}) = \beta_1 treat_i + \beta_2 time_t + \beta_3 treat_i \times time_t + W_{it}\gamma + \varepsilon_{it} \qquad (2)$$

where i denotes the individual and t the time; Y_{it} is the variable of interest – the real hourly wage, W_{it} is the set of observable characteristics for both the employee and the firm, $treat_i$ is a dummy variable that equals 1 for treatment group and 0 for control group, $time_t$ stands for the trend.

The regression is employed twice, with and without the set of observable characteristics W_{it} . The $\hat{\beta}_3$ coefficient shall thus be zero when there is a common trend between the groups.

Following the test results for possible pairs to be used in the experiment, the main pair 1 is selected, formed by a treatment group comprised of individuals aged [25-40] and a control group comprised of individuals aged [55-60], as well as four alternative treatment-control pairs. The results for the validation of the common trend for the pairs are listed in Table 2.

Table 2 – Parallel trend validation

Pairs	Treatment	Control	(1) No Covariates	(2) With covariates
1	**[25-40]**	**[55-60]**	0.026	0.0003
			(0.000)	(0.000)
2	[20-40]	[55-65]	0.022	-0.0009
			(0.000)	(0.000)
3	[25-40]	[50-55]	0.020	0.0004
			(0.000)	(0.000)
4	[20-40]	[50-60]	0.016	0.0004
			(0.000)	(0.004)
5	[20-40]	[50-65]	0.018	-0.0006
			(0.000)	(0.000)

Notes: Coefficients for Treat X Time; P-values in parentheses.

The test displays statistically significant coefficients for the pairs selected, indicating a trend differential in the pre-reform period; however, the negligible differences in economic terms when controlling for the elected covariates point to the parallel trend requirement being met, thus allowing the difference-in-differences estimation.

Summary statistics for the main sample of treatment and control groups, taken from *Quadros de Pessoal,* are presented in Table 3. The control group has, in both the before and after period, a higher hourly wage than the treatment group. In comparison, the treatment group is formed by a higher percentage of women, which is explained by the higher participation rate of younger women in the labor market.

It is in the education variable that the differences are more staggering, as the treatment group is comprised of individuals who had a larger access to formal education, for there is a share of 45% in both periods with secondary and post-secondary education. In comparison, in the control group more than 50% of the individuals, in both periods, had access to the 1st cycle of basic education or no formal education at all.

Regarding the type of employment, the share of the permanent contract is, as expected, higher in the control group. More than 80% of the workers in the control group have a permanent position in both periods, while the percentage stays at 72% for the treatment group is the post period. Workers in the younger age range are thus more likely to work in a non-permanent position.

For both groups and periods, the majority of individuals (more than 95%) are working under a full-time contract. More than a third of the individuals are working in Lisbon.

Table 3 – Summary Statistics by treatment status and period

	Treatment		Control	
Variables	Before	After	Before	After
Hourly wage rate	6.32	6.84	7.45	7.79
	(5.30)	(5.52)	(7.60)	(8.09)
Age	31.25	33.86	55.70	58.22
	(4.41)	(4.57)	(1.75)	(1.93)
Female (%)	47.07	47.38	38.04	39.24
Education (%)				
1st cycle of basic education or under	9.18	7.31	55.17	52.67
2nd cycle of basic education	19.80	16.87	14.28	14.09
3rd cycle of basic education	24.91	25.60	15.04	16.59
Secondary & post-secondary non-tertiary	26.33	22.80	9.05	8.39
Higher education	19.02	22.60	6.03	6.97
Unknown	0.76	4.81	0.42	1.28
Occupation (%)				
Upper Administration	2.92	3.66	5.93	6.90
Specialist in intellectual profession	8.59	12.45	3.81	4.85
Technicians	12.54	12.02	9.52	10.88
Administrative staff	17.27	16.16	12.18	10.89
Services workers and sellers	18.28	19.76	14.36	17.16
Machinery and installation workers	9.10	10.25	13.37	12.79
Factory workers and related	20.21	16.19	23.71	19.84
Non-qualified workers	11.08	9.50	17.12	16.69
Permanent employee (%)	65.03	72.18	83.30	85.85
Full time (%)	96.31	96.34	96.09	95.10
Tenure	4.41	5.64	13.95	15.07
	(4.66)	(5.40)	(12.25)	(12.57)
Qualification (%)				
Upper Management	6.95	8.69	7.15	8.26
Middle management	5.55	6.73	4.31	4.86
Coordinators, team managers	2.83	4.65	6.17	6.69
Highly qualified professionals	8.55	9.06	7.68	7.61
Qualified professionals	40.77	40.05	39.53	38.65
Skilled professionals	15.49	17.42	16.44	18.19
Unskilled workers	10.05	8.47	13.70	13.34
Trainees and interns	4.81	3.34	0.45	0.51
Other	5.01	1.60	4.57	1.88
District (%)				
Lisbon	34.68	37.64	35.61	36.31
Other districts	65.32	62.36	64.39	63.69
Sector (%)				
Manufacturing	23.68	22.25	26.85	25.05
Electricity, gas and water supply	0.31	0.42	1.18	1.38
Construction	11.91	9.69	13.28	11.71
Wholesale, retail trade, repair motor	21.58	20.95	15.93	15.84
Accomodation and food service	6.50	6.15	7.31	7.79
Transportation and storage	5.54	6.31	7.90	7.66
Financial and insurance	3.21	3.97	3.55	3.35
Real Estate	14.14	15.53	9.94	10.80
Public administration	0.62	0.56	1.15	0.62
Education	2.56	2.27	2.10	2.05
Health and Social Work	6.36	7.96	7.17	9.20
Other service activities	3.59	3.93	3.64	4.54
Extraterritorial organisations and bodies	0.00	0.00	0.00	0.00
No. of observations	2 659 140	4 206 621	390 548	473 058

Notes: Mean values reported for the main pair - treatment group comprised of individuals aged [25-40] and control group comprised of individuals aged [55-60]. Before Period: 2007-2008, After Period: 2009-2012. Standard deviation reported in parenthesis.

5. Results and Discussion

In this section, the effects of the 2009 increase in parental leave benefits on the real hourly wages for the target group shall be presented and discussed.

Table 4 presents the difference-in-differences estimates using the main pair, comprised of treated individuals aged [25-40] and control individuals aged [55-60]. All models control for covariates, following the best results for the common trend validation when using this set of variables.

Estimates are reported for both the fixed-effects (FE) model and the pooled Ordinary Least Squares (OLS). As shown by Angrist & Pischke (2009), these estimators produce identical results when using a balanced panel set; however, the data used in this study consists of an unbalanced panel, in which case these estimators would thus provide different results. We follow Lechner et al (2015), who argue that OLS may be more appropriate for the case of an unbalanced panel.

Results show a negative impact of the policy on real hourly wages of 3.6% for the full treatment group, that is statistically significant, when considering the FE model and the first period specification (Table 4.1., Panel A). The effect is larger when considering the second period specification, where the "after" period starts in 2010 (-5%), and even larger with the third specification, where 2009 is removed from the data (-6%).

The larger effects can be explained by the small amount of time between the legislation change, in May, and the collection of *Quadros de Pessoal* data, in October. Five months might not have been enough time for the wage shifting mechanisms to fully take place. It may also be argued that, at the time the policy was introduced, there was no previous experience with "daddy months" in Portugal and therefore, employers were not aware of the costs they would expectably face as a result of the new rules.

Indeed, empirical evidence shows the potential unawareness of a new benefits policy even years after its introduction (Appelbaum & Milkman, 2011).

Table 4 – Difference-in-differences estimates
Pair 1 – T: [25-40], C: [55-60]

	Panel A - Individual FE			Panel B - Pooled OLS		
	[1]	[2]	[3]	[1]	[2]	[3]
1. Full Sample						
After	0.101	0.023	0.108	0.026	-0.010	0.007
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Treat	-0.389	0.126	-0.331	-0.001	0.045	0.030
	(0.000)	(0.000)	(0.000)	(0.700)	(0.000)	(0.000)
After X Treat	-0.037	-0.050	-0.061	-0.031	-0.023	-0.030
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Covariates	Yes	Yes	Yes	Yes	Yes	Yes
No. of observations	7 729 036	7 729 036	6 263 298	7 729 036	7 729 036	6 263 298
2. Female						
After	0.103	0.023	0.107	0.034	-0.005	0.014
	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)
Treat	-0.316	0.208	-0.266	0.004	0.052	0.037
	(0.000)	(0.000)	(0.000)	(0.381)	(0.000)	(0.000)
After X Treat	-0.035	-0.047	-0.055	-0.034	-0.027	-0.033
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Covariates	Yes	Yes	Yes	Yes	Yes	Yes
No. of observations	3 578 637	3 578 637	2 901 667	3 578 637	3 578 637	2 901 667
3. Male						
After	0.102	0.026	0.112	0.023	-0.011	0.004
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.045)
Treat	-0.410	0.108	-0.347	0.005	0.050	0.035
	(0.000)	(0.001)	(0.000)	(0.304)	(0.000)	(0.000)
After X Treat	-0.040	-0.055	-0.070	-0.032	-0.025	-0.032
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Covariates	Yes	Yes	Yes	Yes	Yes	Yes
No. of observations	4 150 399	4 150 399	3 361 631	4 150 399	4 150 399	3 361 631

Notes: Estimates are reported for the main pair - treatment group comprised of individuals aged [25-40] and control group comprised of individuals aged [55-60]. [1] Before Period: 2007-2008, After Period: 2009-2012; [2] Before Period: 2007-2009, After Period: 2010-2012; [3] Before Period: 2007-2008, After Period: 2010-2012. P-values adjusted for clustering are reported in parentheses.

However, leave taking statistics display relevant take-up rates for the new options introduced by the legislation. This implies that workers value the benefit, and that employers consider higher perceived labor costs for the target group. Therefore, findings pointing to negative effects are not surprising: the potential receivers of the policy are bearing (at least part of) its costs, in line with Gruber (1994).

The estimates using the pooled OLS model, in Panel B, also display negative coefficients, albeit smaller in size. Following Fernandez-Kranz & Rodrigues-Planas (2013), a smaller coefficient in the OLS model suggests the existence of positive unobserved heterogeneity.

Regressions are conducted for the full sample (4.1.) and by gender (4.2. and 4.3.), as the specifications of the policy are different for female and male users. The analysis by gender is also justified by the different labor market behavior of the gender groups. There is once again a negative effect on wages for both genders that is larger when excluding the first year in which the legislation took force. The impact is greater for male employees, with a negative effect of 4% for the main period specification, using the FE model. This can be justified by the fact that this reform truly consisted in a change of paradigm, by stimulating take up of parental benefits by the fathers (rather than only the mothers), which appears to have been widely embraced.

In Table 5, this effect is estimated for four alternative pairs, as to test the robustness of the results. These groups survived the common trend analysis in the previous chapter, when using the set of covariates.

Table 5 – DD Estimates for alternative treatment-control pairs

FE Model, (1) B: [2007-2008]; A: [2009-2012]

	Full	Female	Male
A. Pair 2 - T: [20-40], C: [55-65]			
After	0.102	0.103	0.102
	(0.000)	(0.000)	(0.000)
Treat	-0.427	-0.344	-0.464
	(0.000)	(0.000)	(0.000)
After X Treat	-0.038	-0.036	-0.042
	(0.000)	(0.000)	(0.000)
Covariates	Yes	Yes	Yes
No. of observations	9 142 553	4 215 985	4 926 568

B. Pair 3 - T: [25-40], C: [50-55]			
After	0.090	0.091	0.090
	(0.000)	(0.000)	(0.000)
Treat	-0.262	-0.232	-0.260
	(0.000)	(0.000)	(0.000)
After X Treat	-0.026	-0.024	-0.028
	(0.000)	(0.000)	(0.000)
Covariates	Yes	Yes	Yes
No. of observations	8 269 016	3 830 436	4 438 580

C. Pair 4 - T: [20-40], C: [50-60]			
After	0.089	0.090	0.089
	(0.000)	(0.000)	(0.000)
Treat	-0.282	-0.244	-0.282
	(0.000)	(0.000)	(0.000)
After X Treat	-0.026	-0.023	-0.029
	(0.000)	(0.000)	(0.000)
Covariates	Yes	Yes	Yes
No. of observations	10 078 433	4 619 041	5 459 392

D. Pair 5 - T: [20-40], C: [50-65]			
After	0.087	0.089	0.086
	(0.000)	(0.000)	(0.000)
Treat	-0.301	-0.252	-0.309
	(0.000)	(0.000)	(0.000)
After X Treat	-0.023	-0.022	-0.026
	(0.000)	(0.000)	(0.000)
Covariates	Yes	Yes	Yes
No. of observations	10 359 329	4 727 923	5 631 406

Notes: Estimates are reported for four alternative treatment-control group pairs. Before Period: 2007-2008, After Period: 2009-2012. P-values adjusted for clustering are reported in parentheses.

The first column reports estimates for the full sample, while the next ones present the effects for each gender. Across all the pairs used, the effects of the policy in the different treated groups are negative, with coefficients ranging from -0.023 to -0.038 for the full sample. The impact of the policy is estimated to be more expressive for men, with a largest effect of -4% for the treated male individuals of Pair 2.

Table 6 provides information for the subgroup estimates of *After X Treat*, by the level of schooling, qualification and type of contract of the worker.

In A, coefficients are presented for workers with no more than high school and for those with higher education, thus excluding workers in a non-specified situation regarding their level of schooling. Estimates display a larger effect for individuals with higher education, estimated to be -9%, compared to -2.5% for individuals with high school level or below. A possible explanation is the following: as employers discriminate against the potential target of the new leave options, following Gruber (1994), they will do so more against individuals with higher education, since these are, according to Rossin-Slater et al (2013), generally more likely to use these benefits.

In a similar fashion, for B, subgroups are created according to their qualifications. In the group *Qualified to Upper Management*, the following labor situations are included: upper management, middle management, coordinators and team managers, highly qualified and qualified professionals. In the group *Trainees and Interns to Skilled* there are included skilled professionals (also denominated semi-qualified professionals), unskilled workers and trainees and interns. Findings show a difference of about 2 percentage points between these groups, with a larger effect of -4% for the qualified group. The reasoning presented above can be applied once again, as qualified workers are more likely to use the benefits than the less qualified, thus representing a higher

Table 6 – Subgroup Difference-in-differences Estimates

FE Model. Pair 1 – T: [25-40], C: [55-60]

	Full	Female	Male
A. By education			
High School or under	-0.025	-0.023	-0.028
	(0.000)	(0.000)	(0.000)
No. of observations	5 985 774	2 602 222	3 383 552
Higher Education	-0.092	-0.081	-0.111
	(0.000)	(0.000)	(0.000)
No. of observations	1 513 045	865 480	647 565
B. By qualification			
Qualified to Upper Management	-0.040	-0.039	-0.043
	(0.000)	(0.000)	(0.000)
No. of observations	5 194 522	2 218 860	2 975 662
Trainees and Interns to Skilled	-0.020	-0.020	-0.023
	(0.000)	(0.000)	(0.000)
No. of observations	2 034 875	1 129 359	905 516
C. By contract			
Permanent	-0.031	-0.029	-0.034
	(0.000)	(0.000)	(0.000)
No. of observations	5 496 726	2 538 749	2 957 977
Non-permanent	-0.037	-0.041	-0.038
	(0.000)	(0.000)	(0.000)
No. of observations	2 232 310	1 039 888	1 192 422

Notes: Estimates for After X Treat are reported for the specified subgroups of Pair 1 - T: [25-40] C: [55-60]. Before Period: 2007-2008, After Period: 2009-2012. P-values adjusted for clustering are reported in parentheses.

estimated cost to an employer. Additionally, it can be argued that the estimated costs of the loss of human capital due to the participation in parental benefits may be higher for more qualified workers (Akgunduz & Plantenga, 2012). Furthermore, there may be potential obstacles to the wage adjustment for the less qualified group, such as workers earning minimum-wage (Gruber, 1994).

In C, the full sample is split by the type of contract, i.e. permanent or non-permanent. Findings display a negative effect in both cases, albeit larger for the latter. Non-permanent workers may be less likely to use the preferred option of the benefit than permanent workers, as there is a large gap in the protection offered: recalling Chapter 2, a fixed-term worker who intends to use the lengthier option may be dissuaded to do so, as he is not protected from his fixed-term contract not being renewed. Also, the protection generally granted in permanent contracts, regarding both wage level and job security may hinder the wage adjustment mechanism. Furthermore, as most of the new jobs are fixed-term contracts, these are easier to adjust by offering from the start a lower wage, thus covering the increase in expected costs (Centeno & Novo, 2013). It should however be taken into account the limitations in this particular subgroup analysis, as permanent (non-permanent) workers belonging to the younger treatment group may generally have a different profile from permanent (non-permanent) workers in the more experienced control group.

As unobserved factors may have different impacts on the treatment and control groups, a falsification exercise is conducted, to further test for the robustness of the obtained results. Placebo-treatment groups are used, composed of individuals aged [50-55] and [55-60]. As shown in Figure 2, these individuals should not be considered neither as the target of the policy nor as potential users of these benefits.

A variation of equation (1) is estimated for this exercise:

$$\log(Y_{it}) = \alpha + \beta_1 ptreat_i + \beta_2 after_t + \beta_3 after_t \times ptreat_i + W_{it}\gamma + \varepsilon_{it} \qquad (3)$$

for individual i in year t. Y_{it} is the real hourly wage, W_{it} is a set of observable characteristics, $after_t$ is a dummy set to one for the period covered by the legislation, from 2009 to 2012, and zero for the period before, 2007 and 2008. $ptreat_i$ is a dummy variable that equals 1 for the placebo-treatment group and 0 for the control group (see below). $after_t \times ptreat_i$ is the interaction term of interest.

The placebo-treated and control groups used are listed below:

- Pair F1 – Placebo treatment: [50-55], Control: [60-65]
- Pair F2 – Placebo treatment: [50-55], Control: [56-65]
- Pair F3 – Placebo treatment: [50-55], Control: [56-60]
- Pair F4 – Placebo treatment: [55-60], Control: [61-65]

The results, presented in Table 7, show statistically significant coefficients of the $after_t \times ptreat_i$ estimator, albeit less expressive than the results of the experiment.

However, when tested for the parallel trend (Table 8), the groups display a trend differential in the pre-reform period that may have continued through the after period.

This undermines the validity of these findings, which would otherwise suggest a possible overestimation of the effects of Decree-Law 91/2009 in our model.

Table 7 — DD Estimates for placebo-treated and control pairs

FE Model, (1) B: [2007-2008]; A: [2009-2012]

	Full	Female	Male
Pair F1 – Placebo-treated: [50-55], Control: [60-65]			
After	0.080	0.083	0.079
	(0.000)	(0.000)	(0.000)
Treat	-0.160	-0.134	-0.217
	(0.000)	(0.000)	(0.000)
After X Treat	-0.012	-0.012	-0.013
	(0.000)	(0.000)	(0.000)
Covariates	Yes	Yes	Yes
No. of observations	1,784,325	732,229	1,052,096
Pair F2 – Placebo-treated: [50-55], Control: [56-65]			
After	0.077	0.079	0.076
	(0.000)	(0.000)	(0.000)
Treat	-0.091	-0.083	-0.110
	(0.000)	(0.000)	(0.000)
After X Treat	-0.010	-0.009	-0.011
	(0.000)	(0.000)	(0.000)
Covariates	Yes	Yes	Yes
No. of observations	2,361,222	954,984	1,406,238
Pair F3 – Placebo-treated: [50-55], Control: [56-60]			
After	0.079	0.081	0.078
	(0.000)	(0.000)	(0.000)
Treat	-0.076	-0.072	-0.087
	(0.000)	(0.000)	(0.000)
After X Treat	-0.012	-0.012	-0.013
	(0.000)	(0.000)	(0.000)
Covariates	Yes	Yes	Yes
No. of observations	2,080,326	846,102	1,234,224
Pair F4 – Placebo-treated: [55-60], Control: [61-65]			
After	0.074	0.076	0.074
	(0.000)	(0.000)	(0.000)
Treat	-0.105	-0.088	-0.127
	(0.000)	(0.000)	(0.000)
After X Treat	-0.009	-0.008	-0.010
	(0.000)	(0.000)	(0.000)
Covariates	Yes	Yes	Yes
No. of observations	3,638,135	1,543,287	2,094,848

Notes: Estimates are reported for the chosen placebo-treated - control group pairs. Before Period: 2007-2008, After Period: 2009-2012. P-values are reported in parentheses.

Table 8 — Parallel trend test for placebo-treated and control pairs

Pairs	Treatment	Control	(1) No Covariates	(2) With covariates
F1	[50-55]	[60-65]	0.013	-0.0053
			(0.000)	(0.000)
F2	[50-55]	[56-65]	0.009	-0.0028
			(0.000)	(0.000)
F3	[50-55]	[56-60]	0.006	-0.0009
			(0.000)	(0.000)
F4	[55-60]	[61-65]	0.008	-0.0027
			(0.000)	(0.000)

Notes: Coefficients for Treat X Time; P-values in parentheses.

In addition, it must be ensured that no other policy changes had a differential impact on the treatment group used in the experiment. During the period in study, several measures targeting families were introduced, such as:

- An increase in the period and scope of absence to care for a sick child to grandparents (Decree-Law 91/2009);
- The introduction of an adoption leave of 120/150 days, with added sharing bonus (Decree-Law 91/2009);
- The correspondence of ranks from the Child Allowance to the School Social Action (Legislative Order 20956/2008), leading to an increase of student beneficiaries of this support;
- The introduction of a “student pass” for public transportation, offering a 50 percent reduction for secondary or basic school students with ages up to 18 years old (Decree-Law 186/2008) and later on extended to higher education students with ages up to 23 years old (Decree-Law 203/2009);
- Entitlement to placement in pre-school for children aged five years old (Law no. 85/2009).

These policies are considered to either have targeted both groups selected for the study or to have at most a small and/or indirect impact on wages, for which reason they should not undermine our findings.

It should be further noted that the period considered, between 2007 and 2012, is marked by particularly adverse macroeconomic conditions, with two recessions in 2009 and (again) in 2011. Therefore, there may be a possible bias resulting from the turbulence in Portugal at the time. In the end, it is not possible to entirely remove the potential biases macroeconomic and policy changes may introduce, by differently affecting the control and treatment groups, for both theoretical and empirical reasons. Nonetheless, this challenge was addressed in the study, through the use of several alternative comparison and control groups as to attest the robustness of the results.

6. Conclusion

The mandated benefits model predicts that wages fall after the introduction of benefits associated with increased costs for employers. The mechanism is clear: as the predicted costs for the employer rise, labor demand will fall, consequently decreasing wages. It can thus be said that the cost of those benefits is shifted to workers, through lower wages. On the other hand, if workers value the benefit, there will be an increase in labor supply, further decreasing wages.

An increase of parental leave benefits in Portugal, in 2009 gives the setting for the experiment. Employing a difference-in-differences methodology and the use of several treatment-control pairs, findings display a persistent and statistically significant negative effect on real hourly wages, across different period and group specifications, endorsing the theoretical predictions.

The significant effects found for male employees reflect relevant take-up rates for the father-specific benefits that were introduced and support the reasoning of a worker who values the benefit, bearing the cost of the mandate.

Subgroup analysis reinforces these conclusions, as larger effects are displayed for the groups more likely to use the benefits, thus representing higher estimated costs for the employer, namely groups of workers with more education and in performing higher-skilled jobs. Factors such as barriers to the adjustment of wages, such as the minimum wage, have to be taken into account. Evidence also shows workers with fixed-term contracts bear more costs of the mandate, as compared to workers with permanent contracts. As the former are not obvious users of the policy, this difference can be justified by easier wage adjustment for fixed-term contracts.

These results must however be carefully interpreted, due to some properties of this study: the dataset used does not include information that might eventually be relevant such as nationality (not available for all periods), the use of the benefits introduced, the civil status of the individuals (relevant as 62% of children born in 2009 were born to married parents) and the number and age of children. These elements would provide a more efficient delimitation of the treated group. Other possible shortcomings include the macroeconomic conditions of the period in study, with two recession periods, along with the decreasing fertility rates in Portugal.

However, as robustness was tested through the use of several different specifications in terms of groups and periods, one may safely argue for the existence of an effect: a persistent and statistically significant negative impact on wages for the target group, that attests for the capacity of the labor market to adjust to an increase of benefits (costs) for the worker (employer) arising from a legislation change.

It is important to stress that this work focuses on the impact on wages of the increase in parental leave benefits in 2009, thus ignoring possible externalities of the policy and its long-term effects. As such, these results are not – and do not intend to be – a cost-benefit analysis of the policy nor an assessment of its effectiveness.

There is vast room for additional research on changes (increases) to parental benefits in the Portuguese labor market regulation, to which this work aims to provide a modest contribution. Issues to be addressed in further studies include:

- The effects on the hours worked, employment level, likelihood of securing a permanent contract;
- A better identification of the treatment group through the cross gathering of missing data, by using different sources together with Quadros de Pessoal;
- The labor market effects of a 2015 increase in the length of maternity leave;
- The effects on child health of an increase in benefits – see Ruhm (2000) and Berger et al. (2005) for inspiration.

In brief, the results support theoretical considerations, meeting their predictions that the increase in benefits was met by a reaction in the labour market, illustrated by the impact on wages, hopefully adding to the understanding of the mechanisms for the Portuguese case. Regardless of whether this is or not in line with policy objectives – and of any fairness considerations – that results also seem to show workers indeed valued the benefit can be seen as encouraging further work – to possibly support further policy in this field.

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