

Minimum wage, fringe benefits, overtime working and the gender pay gap ^{*}

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Abstract

This paper investigates the impact of an increase in the minimum wage on the gender pay gap and establishes a link with fringe benefits and overtime payments. Using the matched employer-employee panel data for the Portuguese labor market, we explore the 1998 amendment to the MW law that increased the minimum wage applied to employees younger than 18 years of age from 75% to 100% of the full minimum. Estimation results based on a difference-in-difference-differences (DDD) strategy indicate a widening of the gender wage gap, apparently caused by redistribution of fringe benefits and overtime payments from minor females to males following the amendment. However, the impact of the redistribution of the extra components of income remained limited; thus, both male and female employees had a significant increase in their total wages. These results are consistent with the previous findings on the limited impact of the MWs on fringe benefits. The results also show that the gender gap may be increasing with the wage level, as the "glass ceiling" hypothesis suggests.

Keywords: minimum wage, fringe benefits, gender gap

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1 Introduction

Does a minimum wage close the gender wage gap? Provided that the relative share of females at low wage levels is higher than males, which is still today the case for most of the countries investigated in the literature, the answer is *yes*. In that case, following a minimum wage (MW) legislation, the share of female workers covered by the MW level is higher than the share of males, which may have a role in narrowing the gender wage gap.¹

The impact on the wage gap may be limited, however, if employers redistribute fringe benefits and overtime payments in order to preserve the previous wage structure following a MW increase. There is a body of literature discussing whether employers reduce pecuniary and non-pecuniary benefits (e.g. health insurance, pension plans, meals, transportation, paid vacation, accommodation and on-the-job training) as a response to a rise in the MW.² However, to our knowledge, there is no study investigating whether they use the same tool to keep -or create- pay differentials among different groups of employees who work for a MW. Employers' willingness to keep the wage hierarchy among workers with different characteristics or discrimination may result in a redistribution of fringe benefits between male and female employees. On the other hand, employers may not be able or willing to cut/redistribute benefits for many reasons: the resulting decrease in worker productivity may be higher than the reduction in benefits; or it would be impossible to reduce benefits of a particular group of employees, either because of the nature of the working conditions or legal reasons; or simply because the existing amount of the benefits may not be high enough to make adjustments (Holzer *et al.*, 1991 and Simon and Kaestner, 2004).

In this paper, we investigate the impact of the MW on the gender pay gap and establish a link with fringe benefits and overtime payments. We explore the 1998 amendment to the Portuguese law that increased the MW applied to employees younger than 18 years of age from 75% to 100% of the full minimum. Such wage increase provides a natural experiment environment, which allows for disentangling the MW effects from the effects

¹The only exception to this case, to the best of our knowledge, is Hungary, where proportion of males working at MW is higher than females (see Eurofound, 2007).

²See Card and Krueger (1995: 168-70) and Simon and Kaestner (2004) for a summary of this discussion.

of other variables.

The analysis develops into two phases. Firstly, we analyze the gender wage gap and the wage distributions for the period between 1995 and 2007. At the adult level, our estimations indicate a stable wage gap for total wages around 18-20 percent range. Wage distributions are in line with the previous literature, suggesting a higher fraction of females working at the MW for all years. The results for minors, however, are striking: For the pre-amendment years the total wage gap between minor female and males is close to zero, or for some years, even positive. This holds for both the base wage (which is subject to the MW regulation) and total wage, which includes benefits and overtime payments. The gap increases sharply following the increase in MW in 1998. The increase in the total wage is higher than the increase in the base wage, indicating a redistribution of overtime payments and benefits from female to male employees.

Secondly, by taking sub-18 employees as the treatment and adult employees as the control groups, respectively, we estimate wage regressions based on a difference-in-difference-in-differences (DDD) estimator to investigate how a MW raise may affect gender wage differentials. We conduct this analysis for alternative wage categories, namely, base wage, benefits and overtime payments, separately. The ratio of overtime payments and benefits over base wage was around 20% for minor females, 22% for minor males and 27% for adults on average in 1998 (see Figure 7). Estimation results strongly support the widening of the gender pay gap among minor workers, through the following channels: (i) We detect a 1.3% increase in the gap for the base wage, which is statistically not significant 10%; (ii) the gap in the probability of getting benefits increased significantly; (iii) the gap in the amount of benefits widened about 6.2%; (iv) the gap in the overtime payments increased 24% after the MW increase. All of these factors contributed to an approx.3.2 percentage points increase in the total wage gap. On the other hand, we are not able to assert that there was an affect on working hours and employment.

Although we detect a significant increasing gap in the total wage, this increase was relative. In other words, average hourly real total wages of the minor females increased despite the redistribution of the fringe benefits and overtime payments, however, this increase was slower for the them (8% for females *vs.* 12% for males for adjusted wages). This is in line with Holzer *et al.* (1991), Card and Krueger (1994) and Simon and Kaestner

(2004), who found a small or no effect of MW increases on fringe benefits.

Our findings also give strong support to the notion of the "glass-ceiling effect" which asserts that the wage gap increases at the higher wage levels. Albrecht *et al.* (2003), de la Rica *et al.* (2006), and Arulampalam *et al.* (2007) observe this effect by running wage regressions for different quantiles for the wage distribution. The natural experiment we benefit from provides us an alternative way of observing the glass-ceiling, by increasing the wages of two different cohorts which are almost identical in their initial wages and individual characteristics. This leads us to assert that the resulting gap was not an effect of some unknown factor that we are not able to control for, but an effect of an increase of the wage itself, concerning the zero wage gap before the MW increase .

The plan of this work is as follows. Section 2 draws the basic relationships between the gender wage gap, benefits and the MW, based on the previous literature. Section 3.1 describes the Portuguese setting and it provides information on the dataset used in the analyses and some descriptives on the wage distributions in Portugal. Section 3.2 presents the estimation results on the wage gap for minor and adult employees, separately. Section 5 provides regression based evidence on the widening wage gap as a result of a minimum wage increase, using a difference-in-difference-in-differences (DDD) estimator. Detailed analysis on the gender gap in alternative wage categories as well as on the probability of receiving benefits and working extra hours is provided. The following section provides several robustness checks and the last section concludes.

2 The gender wage gap, benefits and the minimum wage: evidence from previous studies

There is some consensus in the literature regarding the fact that minimum wages affect the individuals in the bottom of the wage distribution. Normally, these tend to be youngsters and females. Rises in the minimum wage level are then expected to produce more effects on females' wages than on males'. It follows that any increase for those at the minimum wage will reduce the gender gap as long as more women remain at the minimum wage spike than men (Robinson, 2002). The theoretical model presented in Robinson (2002)

also predicts that the same absolute or relative increase for those at the minimum wage benefits women disproportionately narrowing the average gender pay gap, other things equal, concluding that the gender pay gap is expected to narrow at a faster rate than before the minimum wage if women are the main beneficiaries.

Nevertheless, the impact of minimum wage laws on gender wage differentials remains less explored. Among the few studies filling that gap in the literature are those by Shannon (1996) and Robinson (2002, 2005). Shannon (1996) applies a methodology, which was originally developed by Meyer and Wise (1983), to investigate the effect of MW on current wage distributions, by estimating the hypothetical distribution of wages in the absence of MW legislation. Meyer and Wise's methodology is based on some strong assumptions. First, it assumes that the distribution of wages without a MW legislation would be log-normal. Second, workers below the MW are all assumed to be equally probable to become unemployed following the legislation, no matter their initial wages are far below the minimum. The third and probably the strongest assumption is that they rule out any possibility of spill-over effects of MW. Based on these assumptions, Meyer and Wise conclude that women are more likely to become unemployed following the introduction of MW. Shannon (1996) extends their analysis to measure the impact on the gender wage gap and observes a reduction following the introduction of MW, which he attributes to adverse unemployment effects on females.

Robinson (2002) investigates the impact of the introduction of MW on the gender wage gap in Britain. She concludes for a moderate effect of the MW, contributing to a decrease of the mean gender gap by about 2 percentage points. She asserts that such relatively small impact on the pay gap was a result of the low level of the introduced MWs. In her following study, Robinson (2005) investigates the effect of the MW for the different regions of Britain using a difference-in-differences approach. Her findings show that the larger the share of women among low paid workers in a region and the longer the regional distance between the MW and the average wage before its introduction, the bigger the reduction in the gender pay gap after the introduction of the MW.

In a recent study, Arulampalam *et al.* (2007) investigate the gender wage gap throughout the wage distribution for European countries and conclude that the wage gap increases at the upper quantiles of the distribution, which they explain with a glass-ceiling effect.

The authors also investigate whether the gap in the lower quantiles decreases with institutions such as collective bargaining and MW, which compress the wage distribution. They conclude that the gender gap at the lower quantiles is smaller in countries where the wage-compression is higher.

The gender gap effect is also probable to occur at the extra components of income, which a MW law does not cover. Wessels (1980) was first to suggest that firms may respond to a MW increase by reducing fringe benefits, although the total impact he found was small. Among other studies which found a negative impact of MWs on fringe benefits are Alpert (1986) and Sicilian and Grossberg (1993). On the other hand, later studies usually conclude that increases in MWs are not offset by reductions in fringe benefits (Card and Krueger, 1994; Simon and Kaestner, 2004 and Grossberg and Sicilian, 2004). More recently, Lowen and Sicilian (2009) studied the relation between the fringe benefits and the gender wage gap. They conclude that men and women are equally probable to receive family-neutral benefits, while women are more likely to receive family-friendly benefits in addition.

Summing up, empirical evidence on the role of MW in narrowing the gender wage gap is rather moderate. Few existing works on the subject examined the gender gap for the base wages only, while the gap is more likely to widen in the extra components of income. The present paper aims at analyzing gender pay gap and how it relates to the fringe benefits and overtime payments.

3 The Portuguese setting

3.1 Context and data

Since 1974 when the MW was first introduced, Portugal moved from an initial stage with several exemptions to the full minimum depending on the age of the worker, the sector, and the firm size, to a stage where most workers are entitled for it. There have been several amendments to the law that put an end to the exemptions.³ Namely, the 1998 amendment abolished youngsters' MW differentials, by establishing full minimum

³See Almeida (2008) for a list of amendments in the MW law since 1974.

for workers younger than 18 years old. It is also worth mentioning that the MW is set for monthly wages, but the law also includes a formula for the calculation of the MW for those who work less than the contractual hours.⁴ These may include employees with part-time contracts, absentees because of the reasons such as sickness, etc.

Apart from benefiting from the natural experiment environment created by the 1998 change, our analysis also benefits from a comprehensive, linked employer-employee data set on the Portuguese labor market: *Quadros de Pessoal (QP)*. It covers the 1986-2007 period, while no data is available for years 1990 and 2001. The Portuguese Ministry of Labour and Social Solidarity collects these data through questionnaires, which all firms are obliged by law to fill-in. It includes information on firms (such as location, industry, sales, number of employees, date of constitution, legal setting, ownership type), establishments (e.g. location, industry, number of workers) and all wage earners (e.g. gender, age, education, hours of work, labor earnings, date of admission into the firm). Civil servants and domestic service workers are not covered, and the coverage of fisheries and agriculture is low given its low share of wage-earners.

QP contain four different wage categories. These are: (i) base wage; (ii) overtime payments; (iii) regular benefits, which may include meal plans, transportation, accommodation, as well as compensation for seniority, productivity, attendance, hard work, nightshift; and (iv) any irregular benefits such as distributed profits, stock shares, Christmas subsidies, among others. Because the MW law regulates the first two categories only, any wage gap is more probable to occur at the remaining payment categories. However, we are not able to extend our analysis to the effect on on-the-job training, because of data limitations. Neither do we conduct any analysis on the effects on health insurance and pensions, concerning the fact that firms are obliged to pay the costs of these benefits by law.

In 1998, the year of the amendment, the share of minor employees among the total labor force was 0.7%, only. This small share of minors is the reason why we do not expect the amendment to have spillover effects on the adult wage distribution and consider adults as the control group.⁵ The shares of females among minor and adult employees

⁴Which is $HMW = (MW * 12)/(CWH * 52)$, where HMW is hourly MW, and CWH is contractual weekly working hours at industry level.

⁵We also test our results with an alternative control group with a narrower age range in

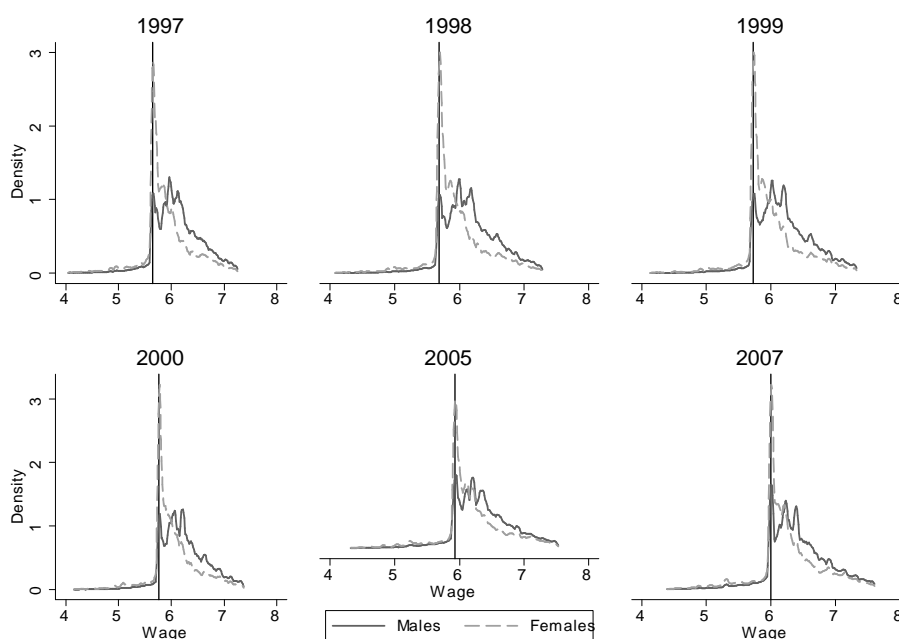


Figure 1: Wage distributions for the adults (Epanechnikov kernel densities). Source: Computations based on Portugal, MTSS. Notes: 1. The vertical line indicates the MW 2. Figures refer to log nominal monthly base wage in Euros.

were 44.85% and 41.57%, in 1998, respectively. The share of females increased constantly over time for the adults. Average education was 6.34 years for minors and 7.19 years for adults in that year, and average experience of the same groups were 1.35 and 20.74 years, respectively (see the tables in the Appendix).

3.2 Some evidence on wages

Figure 1 shows the distribution of log hourly wages for adult male and female employees.⁶ The pattern of distributions in these selected years gives us the general picture of the gender wage gap and how MW affects it in the Portuguese economy. The mode wage of males is higher than the MW, which is also the level where the distribution for females has a spike. Males are visibly more concentrated at higher wage levels. The wages at the lower tail of the distribution, which are swept up to the MW, belong mostly to females.

Section 6.

⁶Employees earning less than 20% and more than 5 times of the MW are excluded from the density graphs to keep the tails short.

This suggests the equalizing impact of MWs at the adult level.

This paper benefits from the natural experiment provided by the 1998 amendment in the MW law to measure the effect of a raise of the MW on the gender pay gap. With this amendment, minimum wages of minor employees increased approximately 33% more than adults. The fraction of minor employees earning in the range of $\pm 2\%$ of the full MW increased from 15.9% to 24.57% in one year period.

Considering the above-mentioned wage distributions for males and females and the higher fraction of minors working below the full MW level, one might expect a very strong equalizing impact of such an increase in the wage floor. Nevertheless, it is worth mentioning that wage distributions for minor males and females never differed substantially before 1998. Figure 2 shows the wage distributions for two years before and some selected years after the amendment took effect. Because male and female distributions before 1998 overlap almost perfectly, we do not expect an equalizing effect from an increase in the MW. But, can a MW increase bring up a gender wage gap? We seek for answers to this question in the following sections.

The spikes in the 1997 and 1998 graphs correspond to 75% and full MW levels, respectively. This indicates that a considerable fraction of minors were still earning pre-legislation wages in 1998.⁷ Since the amendment passed in August, and up to that moment minors were actually earning 75% of the minimum, it is possible that in November -the month when questionnaires were filled in-, some firms reported pre- and others post-legislation wages. The switch between the heights of the 75% and 100% level spikes from 1997 to 1998 is in line with this explanation. After 1998, the lower spike shifts to the 80% level, which was applied to apprentices⁸.

4 The wage gap over time

In this section, we analyze the gender wage gap in Portugal and its evolution over time. We limit the analysis for the post-1995 period, considering several changes in the legis-

⁷It is also notable from the graphs that, although it was not a binding wage floor for minors before 1998, employers paid the full MW to a high fraction of this age group - possibly showing a *numéraire* effect of the MW.

⁸Before 1998, the MW for apprentices was binding for the adult employees, only.

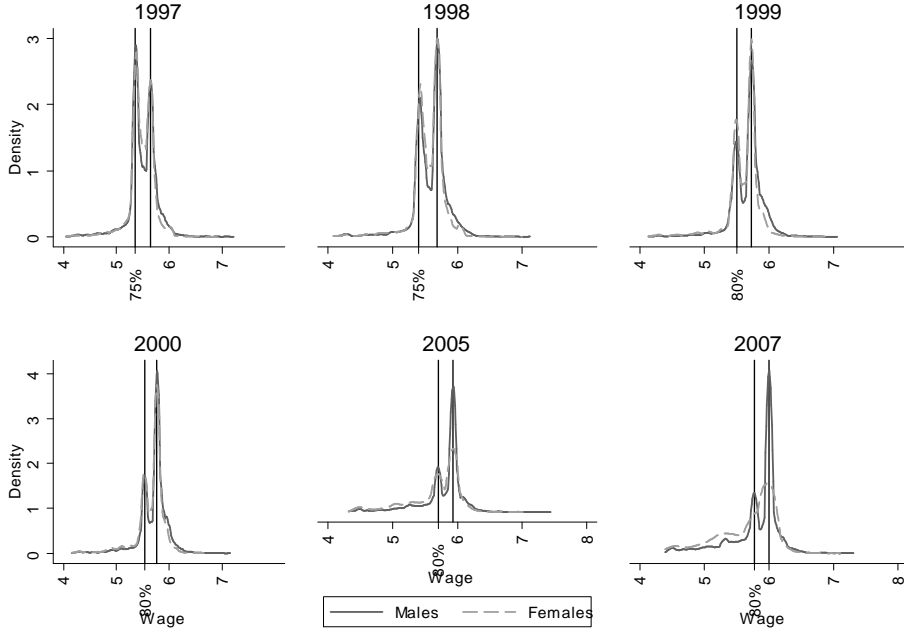


Figure 2: Wage distributions for the minors (Epanechnikov kernel densities). Source: Computations based on Portugal, MTSS. Notes: 1. The first vertical line indicates MW for apprentices (minors for 1997) and the second line indicates full MW. 2. Figures refer to log nominal monthly base wage in Euros.

lations on schooling as well as MWs for teenagers before that date, which are expected to affect labor market equilibrium for minors. After 1995, however, the mandatory years of schooling remained the same. The only change in the MW law which might affect the minors was the one in 1998.

The wage equation is

$$W_{it} = \beta_0 + \beta_1 Female_i + \beta_{2t} Year_t + \beta_{3t} Female_i \times Year_t + \beta_4 X_{it} + \varepsilon_{it}, \quad (1)$$

where W is log real wage, $Female$ is a dummy variable taking the value 1 for females, $Year$ is a set of dummy variables for each year; X is a vector of control variables including education, experience and its square, firm size, dummies for occupation, industry classification, and firm location; i stands for individuals and t stands for year (1995-2007). We estimate this equation for minors and adults as well as monthly and hourly wages separately.

The coefficient of $Female$, β_1 , gives the wage gap for 1995, which is the baseline year;

β_2 is the estimate for the yearly changes in real wages; β_3 captures the change in the wage gap relative to the baseline year. Figures 3 and 4 show the estimation results for the gender wage gap based on monthly and hourly wages, respectively. As these figure show, the wage gap may differ between monthly and hourly levels substantially, depending on the differences in actual working hours of male and female employees. These figures also show the wage gap for base and total wages separately. For the adults, gender gap becomes approx. 5 percentage points higher for total wages, while the difference is smaller but more volatile for the minors.

It is visible from Figure 3 that there is a difference in the trends of gender gap for the adults and minors at monthly wages. During the period of analysis, the gap for minors increased from zero to more than 10%, while the gap at adult wages remained relatively stable. The fast decrease in working hours (either contractual or actual) of minor females is apparently an important contributing factor to this outcome (see Figures 5 and 6). This general trend on the working hours prevents us from drawing any conclusions on the employment effects of the MW increase in 1998.

As Figure 4 shows, the wage gap for minor and adult groups at hourly level have similar and more stable trends. For the minors, there is a visible widening of the hourly-wage gap following 1998, especially for total wages: the total wage gap increased from -0.09% in 1997 to 1.7% in 1998 and, further to 2.4% in 1999. The question is, how much of this 3.3 percentage points widening in two years can be explained by the increase in MW? To answer this question, we should compare the increase in the gap for minors and the wage distribution for our control group, adults.

The adjusted hourly-wage gap for adults was much stable during the period of amendment. It increased from 18.3% to 19.5% in 1999. The difference between the courses of the wage gap for adult and minor employees following the amendment is striking: in two years period, the gap for the minors increased an additional 2.1 percentage points compared to adult employees, which is very substantial, considering the positive wage gap for the minors prior to the amendment.

The analyses carried above show that the adjusted gender gap for minor employees at hourly total wages did not exist before 1998, and it occurred following the amendment. In the remaining parts of the paper we seek answers to the following questions: Is the



Figure 3: Monthly adjusted wage gap. Control variables include education, experience and its square, firm size, occupation dummies, industry dummies and firm location dummies. Source: Estimations based on Portugal, MTSS.

difference between the changes in the gap for minors and adults after 1998 statistically significant? If it is, at which components of total wage mentioned in Section 3.1 did the differentiation occur? What is the impact of the MW increase on the overtime payments and benefits in total?

5 The impact of the MW increase: wage categories, the working hours and the gender gap,

For the fact that wages are set in a yearly basis in Portugal, and most of the employers were still paying pre-amendment wages until August 1998, we do not expect to observe the effect of the amendment on the wage distributions immediately in 1998 data. To account for the delayed effects, we estimate a wage equation for 1997-1999 period, including one year before and after the amendment and combining adults and minors.⁹ This is basically a dif-in-dif-in-dif setting which compares the wages of males and females, and minors and

⁹See Neumark and Wascher (2006) for a summary on the discussion of the delayed effects of the MWs.



Figure 4: Hourly adjusted wage gap. Control variables include education, experience and its square, firm size, occupation dummies, industry dummies and firm location dummies. Source: Estimations based on Portugal, MTSS.



Figure 5: Contractual Hours (Monthly)

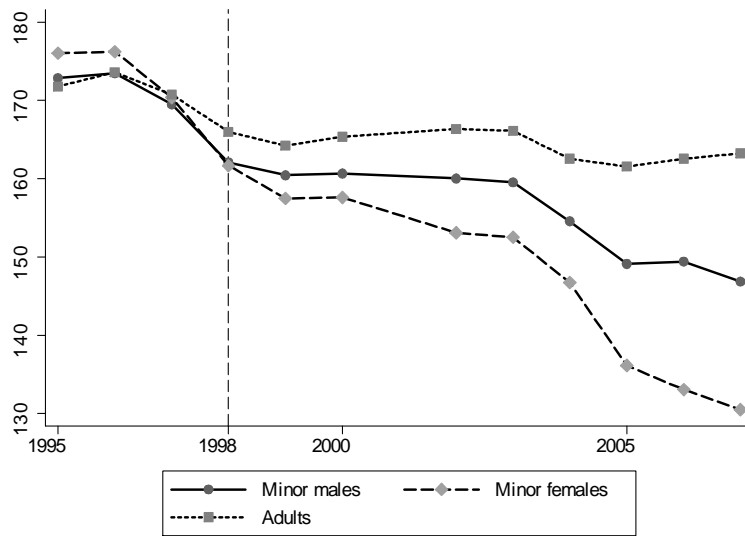


Figure 6: Actual Hours (Normal + Extra, Monthly)



Figure 7: Benefits and overtime payments as a share of base wage (monthly). Source: Calculations based on Portugal, MTSS.

adults, before and after the amendment:

$$\begin{aligned}
W_{it} = & \beta_0 + \beta_1 Minor_i + \beta_2 Female_i + \beta_3 Aft98_t + \beta_4 Minor_i * Female_i \\
& + \beta_5 Minor_i * Aft98_t + \beta_6 Female_i * After98_t + \beta_7 Female_i * Minor_i * Aft98_t \\
& + \beta_8 X_{it} + \varepsilon_{it}.
\end{aligned} \tag{2}$$

In this setting, *Minor* is a dummy variable taking the value 1 if the employee is younger than 18 years of age, *Af98* is the period dummy, which is 1 for 1998 and after, while the other variables are the same of Equation (1). The estimates for the gender wage gap before the amendment for adults and minors, are β_2 and $(\beta_2 + \beta_4)$, respectively. The wage increase for male adults between the two periods is captured by the coefficient of *Af98*. The coefficient of *Female * Aft98* compares the gender gap for adults before and after the amendment, while the analogous difference for minors is captured by $(\beta_6 + \beta_7)$. The coefficient of interest is β_7 , which compares the increases in the wage gap of minors and the control group, adults.¹⁰ Therefore, the DDD estimator compares the change in the wage gap for minors before and after the 1998 amendment with the change in the wage gap before and after the amendment for adults.

Table 1 reports the results for estimations on monthly wages, working hours, probability of working extra hours and receiving benefits. Because all dependent variables -except the ones in probability equations- are in logs, employees receiving zero overtime payment and/or benefit are dropped from respective equations and this is reflected on the differences in observation numbers. Thus, besides measuring the effect on the gender wage gap for those already earning positive overtime payments and benefits, it is also important to test if there is an increasing gap on the probability of receiving these extra incomes. The last four columns of Table 1 report these results.

¹⁰In a clearer expression, β_7 gives us the following:

$$\begin{aligned}
& [E(W|Female = 0, Minor = 1, After98 = 0, X) - E(W|Female = 1, Minor = 1, After98 = 0, X)] \\
& - [E(W|Female = 0, Minor = 1, After98 = 1, X) - E(W|Female = 1, Minor = 1, After98 = 1, X)] \\
& - \{[E(W|Female = 0, Minor = 0, After98 = 0, X) - E(W|Female = 1, Minor = 0, After98 = 0, X)] \\
& - [E(W|Female = 0, Minor = 0, After98 = 1, X) - E(W|Female = 1, Minor = 0, After98 = 1, X)]\}
\end{aligned}$$

where the first term is the wage gap before 1999 for minors. The second term is the wage gap after 1998 for minors. The difference between them is the change in the wage gap for minors. And the third term is the change in the gap for adults.

The coefficient of *Female * Minor * Aft98* is significant and negative for all wage definitions, meaning that the gender wage gap for minors increased following the amendment. For total wages, the increase in the gap was around 4.8 percentage points. The estimations for hours the indicate that increase in the working hour gap (1.5 percentage points approx.) partly explains the widening gap in monthly wages. However, concerning the general trend of decreasing working hours of minor females, we are hesitant to assert that this is an effect of the MW increase (Figures 5 and 6).

Table 1: Regressions on monthly wages and working Hours: 1997-1999

Dep.Var.	Wages				Working hours						
	Base wage (i)	Overtime payments (ii)	Benefits (iii)	Total wage (iv)	Contractual hours (v)	Actual hours (vi)	Extra hours (vii)	Prob.of working ext.h. (viii)	Marginal effects (ix)	Prob.of receiving benef. (x)	Marginal effects (xi)
minor	-.0995*** (.0064)	-.3386*** (.0850)	-.0631*** (.0197)	-1.193*** (.0071)	-.0085*** (.0026)	-.0101** (.0042)	-.0426 (.0500)	-2.462*** (.0319)	-.0333*** (.0022)	-.0062 (.0215)	.0168*** (.0037)
female	-.1990*** (.0006)	-.3134*** (.0067)	-.3080*** (.0019)	-.2438*** (.0007)	-.0332*** (.0003)	-.0493*** (.0004)	-.1299*** (.0035)	-1.725*** (.0027)	-.0345*** (.0003)	-1.725*** (.0022)	-.0656*** (.0005)
aft98	.0230*** (.0005)	.1151*** (.0041)	.0295*** (.0014)	.0265*** (.0005)	-.0122*** (.0002)	-.0338*** (.0003)	.0205*** (.0023)	.0440*** (.0019)	.0079*** (.0044)	.0480*** (.0016)	.0180*** (.0073)
min*fem	.1416*** (.0096)	.3589*** (.1328)	.2449*** (.0285)	.1920*** (.0107)	.0065* (.0039)	.0171*** (.0064)	.1524** (.0712)	.2493*** (.0468)	.0442*** (.0046)	.2397*** (.0332)	.0609*** (.0074)
min*aft98	.0470*** (.0080)	.3980*** (.1051)	-.0297 (.0245)	.0434*** (.0090)	-.0024 (.0033)	-.0185*** (.0053)	.0919 (.0628)	-.0591 (.0399)	-.0119*** (.0006)	-.0218 (.0268)	-.0262*** (.0075)
fem*aft98	-.0027*** (.0007)	-.0194** (.0077)	-.0128*** (.0022)	-.0014* (.0008)	.0008*** (.0003)	.0071*** (.0005)	-.0219*** (.0040)	-.0084*** (.0031)	-.0032*** (.0006)	-.0009 (.0025)	-.0004 (.0001)
min*fem*aft98	-.0319*** (.0121)	-.2746* (.1607)	-.0670* (.0357)	-.0482*** (.0135)	-.0105** (.0049)	-.0157** (.0080)	-.1020 (.0896)	-.0153 (.0585)	-.0009 (.0093)	-.1169*** (.0413)	-.0444*** (.0152)
Obs.	5043744	441289	3492707	5043752	5054225	5368524	1113771	5691320	5691320	5691320	5691320
R ²	.524	.1739	.256	.5213	.1216	.0593	.0637	.2699		.01797	
LogLikelihood	-2303660	-658183.8	-4637537	-2857496	2232194	-309139.7	-1505484	-2054163	-2054163	-3114375	-3114375
RMSE	.3821	1.0753	.9129	.4264	.1556	.2563	.935				

Notes: Significance levels: * : 10% ** : 5% *** : 1%. R² is pseudo for probit regression. All regressions include education, experience and its square, firm size, occupation dummies, industry dummies and firm location dummies. The Stata command inteff3 written by Cornelissen and Sonderhof (2009) was used to calculate marginal effects at the mean values and their standard errors.

The coefficient of the triple interaction term in the probability equation for working extra hours is not significant at 10%. However, the same coefficient for the extra hours payments is significant and -.27 (col. viii). This means that following the minimum wage increase, the gender pay gap for overtime payments increased 27 percentage points, while there was not a significant change in the probability of working extra hours between minor males and females following the amendment. We should also stress that despite the high value of the coefficient, overtime payments should have a limited effect on the increasing wage gap concerning the fact that only 8% of the minors were working overtime.

Another reason of the increasing wage gap in monthly wage is the opposite trends in the shares of minor females and males receiving extra benefits. We report our estimations on the probability of receiving benefits in columns (x) and (xi) of Table 1. Probability of getting extra benefits of minor females decreased relatively after the amendment; but despite this fact, they still remained as the main receivers of benefits as Table 10 in the Appendix shows. The total increase in the gender gap for those already receiving monthly benefits, is 6.7 percentage points (col. (iii)).

Table 2: Hourly Wages: 1997-1999

	Base wage (i)	Overtime payments (ii)	Benefits (iii)	Total wage (iv)
minor	-.0895*** (.0054)	-.2396*** (.0322)	-.0576*** (.0198)	-.1044*** (.0063)
female	-.1492*** (.0005)	-.2247*** (.0025)	-.2927*** (.0019)	-.1892*** (.0006)
aft98	.0583*** (.0004)	.0329*** (.0016)	.0457*** (.0014)	.0596*** (.0005)
min*fem	.1222*** (.0081)	.2628*** (.0504)	.2381*** (.0287)	.1655*** (.0095)
min*aft98	.0644*** (.0068)	.2039*** (.0399)	-.0237 (.0246)	.0621*** (.0080)
fem*aft98	-.0122*** (.0006)	.0430*** (.0029)	-.0167*** (.0022)	-.0095*** (.0007)
min*fem*aft98	-.0136 (.0103)	-.2387*** (.0610)	-.0618* (.0359)	-.0316*** (.0120)
Obs.	5043681	441289	3492707	5043689
R ²	.6102	.4537	.2485	.5734
LogLikelihood	-1484526	-230412.4	-4657615	-2272242
RMSE	.3248	.4079	.9181	.3797

Continued on next page...

... table 2 continued

Base wage (i)	Overtime payments (ii)	Benefits (iii)	Total wage (iv)
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Notes: Significance levels: * : 10% ** : 5% *** : 1%.
 RMSE is root mean squared error. All regressions include education,
 experience and its square, firm size, occupation dummies, industry
 dummies and firm location dummies.

Because it is highly probable that these monthly estimates are driven by the long-term reduction in working hours, we also estimate the same wage equation using hourly wages report the results in Table 2. When we use hourly wages, the coefficient of *Female * Minor * Aft98* becomes insignificant for base wage, while the signs and significance for all remaining wage definitions remains similar. In other words, following the amendment, the gender gap for the minors increased significantly in all wage categories but the base wage. The increase in the gap in total is around 3.2 percentage points and significant at 1%. The insignificant result on the base wages is something expected concerning the fact that the employers are obliged to pay the MW to all employees, but there is no law regulating the distribution of benefits.¹¹

Combining these results with the ones that we obtained from probit estimations reported in Table 1, we are able to assert that the 3.2 percentage increase in the hourly pay gap from 1997 to 1999 is a result of multiple factors including: (i) the increasing gap in overtime payments per working hour (23.9%); (ii) the increasing gap in regular and irregular benefits (6.7%); (iii) the decrease in the probability of receiving benefits of the

¹¹Aver and Hotchkiss (1995) and Oyer (2005) establish a link between working hours and benefits. In case of a positive link between the two, one may still assert that increasing gender gap on hourly wages after the amendment may be a result of decreasing working hours of the minor females. To control for this, we ran Eq. (2) for monthly and hourly benefits separately, by also including log of contractual working hours as an explanatory variable. The coefficient of working hours is significant and .56 for monthly and -.43 for hourly benefits. This suggests that, benefits are positively correlated with working hours indeed, but they are determined on a monthly, instead of an hourly basis. The reason for the negative value on the hourly wage is, the variable working hours becomes both a regressand and the denominator of the dependent variable. Despite the fact that benefits and working hours are correlated, the coefficient of the triple interaction term is still significant with a value of -.067 in both equations, meaning that results we obtained are robust to controlling for working hours. Estimation details are available from the authors upon request.

minor females.¹² There is also an increasing gap the on base wage, however, this increase is not statistically significant.

To decompose the widening gap in the overtime payments and benefits further, we also calculate and check the significance of the increases in the wages of the minor females and males, separately and report the results in Table 3. The null of equality to zero for the changes in overtime payments for females, and benefits for males were not rejected. On the other hand, there is a significant 23.7% increase in the overtime payments for the minor males, while their benefits remained stable after the amendment. This means that, the widening gap in the overtime payments was a result of an increase for the minor males after the amendment. Regarding the benefits, however, the reductions in the payments for females, as well as the probability of getting them contributed the increasing gap.

Table 3: Changes in the hourly wage categories of the minor workers

	Base wage	Overtime payments	Benefits	Total wage
<i>Females</i> ($\beta_3+\beta_5+\beta_6+\beta_7$)	.097	.041	-.057	.081
Joint significance (Prob. value)	.000	.372	.030	.000
<i>Males</i> ($\beta_3+\beta_5$)	0.123	0.237	0.022	0.122
Joint significance (Prob. value)	.000	.000	.372	.000

Note: The null hypothesis is the equality of the sum of the coefficients to zero in the joint significance tests

Despite the redistribution of benefits and overtime payments against the minor females after the amendment, their adjusted hourly real total wage increased around 8.1%. The same increase for the minor males was 12.2%. In other words, the reduction in and redistribution of the fringe benefits was not large enough to dominate the effect on the real wage of the either sex.

6 Robustness Checks

In this section, we report the results of several robustness checks that we executed on our results. Because the analysis carried above is based on DDD methodology, it is essential

¹²Results with alternative time settings are similar and we report them in Table 11 .

that the wage gap of the treatment (minors) and the control group (adults) were similar in the absence of a change in the MW. Although Figure 4 shows that this is the case, we also created an alternative control group, consisting of employees who are older than 20 and younger than 30 years of age. This way, we expect to eliminate the young employees who might be affected by the amendment through substitution and senior employees who might have different wage trends. Furthermore, concerning the part-time working law which was passed in July 1999 and provided tax exemptions to firms which hired new workers with part-time contracts after that date, we dropped employees who were in coverage of the law.

As Table 4 shows, our observation of an increasing gender gap for the minors following 1998 is robust to a selection of an alternative control group. The coefficient of the triple interaction term is still significant, although it gets smaller in absolute number for monthly wages (from 4.8% to 3.1%). The relatively big difference between on monthly estimations is most probably a result of the working hour trend differences between the minors and the seniors. However, on hourly wages, the choice of an alternative control group makes a 0.2 percentage point difference, only.

The most important difference that the change of the control group makes is on the coefficient of *female*, the gender wage gap for the adult group. Its absolute value decreases from 19% to 14% after the change, which indicates that the gender gap is much higher among the employees whose age is above 30 years. Instead of being the effect of the age, it is more likely that the wage gap increases at the higher levels of income, which is positively correlated with experience (thus, age), an explanation which is in line with our observation on the widening gender gap after the MW increase.

Table 4: Total-wage regressions with an alternative control group: 1997-1999

	Monthly wage	Hourly wage
	(i)	(ii)
minor	-.0882*** (.0075)	-.1291*** (.0067)
female	-.1727*** (.0019)	-.1384*** (.0017)
aft98	.0518*** (.0014)	.0712*** (.0013)
min*fem	.1317***	.1177***

Continued on next page...

... table 4 continued

	Monthly wage	Hourly wage
	(i)	(ii)
	(.0108)	(.0097)
min*aft98	.0263*** (.0092)	.0497*** (.0082)
fem*aft98	.0068*** (.0021)	-.0004 (.0019)
min*fem*aft98	-.0309** (.0139)	-.0298** (.0125)
Obs.	793920	793917
R^2	.4085	.456
LogLikelihood	-416966.7	-332468.3
RMSE	.4091	.3678

Notes: Significance levels: * : 10% ** : 5% *** : 1%. RMSE is root mean squared error. The dependent variable is log hourly total real wages. All regressions include education, experience and its square, firm size, occupation dummies, industry dummies and firm location dummies.

We also check the validity of our findings by applying placebo amendments to the other years in the panel. By doing so, we test if the DDD methodology we employ produces negative significant coefficients for the triple interaction term for the years when there was no increase in the MW. We run regressions based on the equation (2) by replacing the dummy *aft98* with *aft*, taking the value 1 for the year of the placebo amendment and after. We run each equation for two-year periods, except for 2000 and 2002 due to the unavailability of data for year 2001. In each equation, the dependent variable is the log hourly real total wage, the main variable which we base our analysis on. Table 5 show that, there is not any year but 1998 which the triple interaction term has a negative significant coefficient. There are two significant coefficients, which are both positive, for years 1997 and 2003. There is apparently at least one other external factor -which is not a decrease in the MW- which narrowed the gender gap significantly for those years; a factor that we are not able to control for.

Table 5: Placebo amendments for the other years in panel

	1996	1997	1999	2000	2002	2003	2004	2005	2006
	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)
minor	-.1225*** (.0069)	-.0820*** (.0078)	-.0329*** (.0070)	-.0326*** (.0066)	-.0195*** (.0064)	-.0200*** (.0059)	-.0184*** (.0068)	-.0258*** (.0066)	-.0184*** (.0057)
female	-.1869*** (.0007)	-.1902*** (.0007)	-.1963*** (.0006)	-.1981*** (.0006)	-.1976*** (.0006)	-.1978*** (.0006)	-.1988*** (.0006)	-.1924*** (.0006)	-.1852*** (.0006)
aft	.0265*** (.0005)	.0281*** (.0006)	.0269*** (.0005)	.0148*** (.0005)	-.0086*** (.0005)	-.0144*** (.0004)	.0070*** (.0004)	-.0158*** (.0004)	-.0258*** (.0004)
min*fem	.1612*** (.0103)	.1423*** (.0115)	.1299*** (.0104)	.1317*** (.0100)	.1076*** (.0099)	.1047*** (.0091)	.1239*** (.0108)	.1365*** (.0108)	.1423*** (.0093)
min*aft	.0266*** (.0085)	-.0271*** (.0102)	.0010 (.0083)	.0093 (.0091)	-.0123 (.0085)	-.0195*** (.0074)	-.0138* (.0080)	.0080 (.0078)	.0135* (.0072)
fem*aft	-.0024*** (.0008)	.0024*** (.0009)	-.0043*** (.0007)	-.0043*** (.0008)	.0021*** (.0008)	.0010 (.0007)	.0044*** (.0007)	-.0001 (.0007)	-.0062*** (.0007)
fem*min*aft	.0001 (.0128)	.0321** (.0152)	-.0089 (.0125)	-.0217 (.0140)	.0004 (.0132)	.0251** (.0117)	.0139 (.0128)	.0042 (.0127)	-.0032 (.0117)
Obs.	4600656	3113460	5251576	3588872	3803375	6206915	6576980	6889601	7177214
R ²	.591	.5538	.5834	.5854	.5752	.5549	.5425	.5314	.5209
LogLikelihood	-2265615	-1538817	-2263681	-1543411	-1690828	-2975352	-3311254	-3596231	-3837197

Notes: Significance levels: * : 10% ** : 5% *** : 1%. The dependent variable is log hourly total real wages. All regressions include education, experience and its square, firm size, occupation dummies, industry dummies and firm location dummies. Each column show results for one year before and after the placebo amendment; except for column (ii) and column (iv), which show results only one year; and column (v), which compares years 2000 and 2002.

If the widening wage gap is a result of the MW increase, as we assert in this paper, the effect should be stronger on regions and/or industries where the share of minors who are affected by the MW increase among all minors is higher than the others. To test for this, we create clusters based on the district and the industry of the firm and calculate the share of minors highly affected by the MW increase among all minors for each cluster for 1997.¹³ We consider a minor "highly affected" if her/his wage is higher than 73% percent and less than 95% of the full MW in 1997. Then, we split the panel in two, based on the share of the "highly affected" minors, taking a 40% level as a threshold, and run the regression in equation (2) for log hourly real total wages. As Table 6 shows, the effect on the wage gap becomes stronger for the highly affected group, while the coefficient is not significant with the same sign for the less affected group. This observation is valid for both monthly and hourly wages. For the highly affected clusters, the increase in the wage gap is becomes 3.4 and 5.5 percentage points for hourly and monthly wages, respectively, which are both higher than the values we report in Tables 1 and 2.

Table 6: Total-wage regressions for highly- and less-affected clusters: 1997-1999

	Monthly wage		Hourly wage	
	Highly affected (i)	Less affected (ii)	Highly affected (iii)	Less affected (iv)
minor	-.1819*** (.0090)	-.0781*** (.0106)	-.1956*** (.0079)	-.0383*** (.0095)
female	-.2253*** (.0011)	-.2533*** (.0010)	-.1873*** (.0009)	-.1888*** (.0008)
aft98	.0271*** (.0008)	.0260*** (.0007)	.0652*** (.0007)	.0566*** (.0006)
min*fem	.2271*** (.0126)	.1072*** (.0178)	.1898*** (.0111)	.1344*** (.0159)
min*aft98	.0478*** (.0114)	.0400*** (.0132)	.0654*** (.0101)	.0549*** (.0118)
fem*aft98	-.0054*** (.0012)	.0025** (.0011)	-.0112*** (.0011)	-.0079*** (.0010)
min*fem*aft98	-.0547*** (.0161)	-.0145 (.0220)	-.0338** (.0142)	-.0218 (.0196)
Obs.	1826254	3217498	1826191	3217498
R ²	.4176	.5262	.4518	.5756

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¹³260 clusters in total, composed of 20 districts and 13 industries.

... table 6 continued

	Monthly wage		Hourly wage	
	Highly affected (i)	Less affected (ii)	Highly affected (iii)	Less affected (iv)
LogLikelihood	-835080.1	-1975403	-604768.9	-1613059
RMSE	.3823	.4471	.337	.3995

Notes: Significance levels: * : 10% ** : 5% *** : 1%. RMSE is root mean squared error. The dependent variable is log hourly total real wages. All regressions include education, experience and its square, firm size, occupation dummies, industry dummies and firm location dummies.

7 Conclusion

This paper provides new insights on the wage gender gap following an increase on the MW, and relates it with fringe benefits and overtime payments. In doing so, we explore the 1998 amendment of the Portuguese MW law, which have increased minors' MW from 75% to 100% of the full minimum.

We start describing the evolution of the gender pay gap in Portugal, for the period 1995-2007. Results suggest a sharp increase of the gap on total wage after the amendment, while the effect on the base wage, which is subject to the MW law, is moderate. In a second stage, we estimate wage regressions based on a difference-in-difference-in-difference estimator. We conduct separate analysis for base wage, overtime payments and fringe benefits, as well as the probability of receiving benefits and working overtime. Estimation results reveal a widening of the gap among minor workers, apparently caused by redistribution of fringe benefits and overtime payments following the amendment. These extra components of income kept rising after the MW increase for both sexes on average, however, the increase was stronger for males.

These set of results show that, (i) there is a small impact of the MW increase on overtime payments and fringe benefits, which may be used as a tool to create wage differentials among different types of workers; and (ii) discrimination may be a function of the wage level, as the previous studies on the "glass-ceiling effect" suggest. In this sense, the MW increase of 1998 revealed, if not caused, the underlying gender discrimination at

higher wage levels of the distribution for the minor employees.

A Appendix: Descriptive Statistics

Table 7: Means of the selected dummy variables

	minor	female	min*fem
	(i)	(ii)	(iii)
1995	0.0092	0.3972	0.0042
1996	0.0073	0.4019	0.0033
1997	0.0069	0.4070	0.0030
1998	0.0061	0.4111	0.0026
1999	0.0049	0.4177	0.0021
2000	0.0046	0.4208	0.0019
2002	0.0043	0.4186	0.0017
2003	0.0029	0.4249	0.0011
2004	0.0029	0.4255	0.0011
2005	0.0036	0.4310	0.0014
2006	0.0030	0.4362	0.0011
2007	0.0030	0.4399	0.0012

Table 8: Descriptive statistics for the minors (Means and standard deviations)

Year	Monthly wages				Hourly wages				Characteristics		
	Log real base wage (i)	Log real benefits (ii)	Log real overtm. paym. (iii)	Log real total wage (iv)	Log real base wage (v)	Log real benefits (vi)	Log real overtm. paym. (vii)	Log real total wage (viii)	Education (ix)	Age (x)	Experience (xi)
1995	5.717	4.118	3.173	5.848	0.587	-1.014	1.294	0.711	5.654	17.175	1.253
	0.337	0.753	1.087	0.366	0.278	0.751	0.501	0.328	1.569	0.606	0.503
1996	5.771	4.258	3.014	5.917	0.642	-0.876	1.256	0.780	5.905	17.232	1.273
	0.356	0.794	1.067	0.389	0.310	0.806	0.447	0.368	1.741	0.553	0.493
1997	5.773	4.285	3.331	5.936	0.674	-0.811	1.321	0.829	6.089	17.282	1.302
	0.343	0.780	1.117	0.375	0.288	0.787	0.490	0.346	1.856	0.490	0.457
1998	5.820	4.271	3.617	5.986	0.773	-0.777	1.392	0.931	6.445	17.313	1.324
	0.325	0.790	1.076	0.360	0.228	0.800	0.370	0.305	2.008	0.473	0.446
1999	5.860	4.270	3.616	6.024	0.831	-0.759	1.464	0.986	6.515	17.355	1.362
	0.324	0.796	1.093	0.362	0.206	0.798	0.366	0.292	2.089	0.449	0.431
2000	5.878	4.335	3.640	6.049	0.855	-0.696	1.403	1.015	6.717	17.333	1.342
	0.351	0.785	1.064	0.385	0.200	0.774	0.375	0.284	2.094	0.475	0.450
2002	5.844	4.420	3.510	6.033	0.846	-0.594	1.349	1.024	7.094	17.327	1.335
	0.392	0.784	0.972	0.420	0.185	0.786	0.384	0.295	2.164	0.473	0.449
2003	5.821	4.382	3.609	6.015	0.824	-0.618	1.371	1.008	7.214	17.352	1.355
	0.390	0.793	1.058	0.415	0.170	0.790	0.339	0.285	2.123	0.457	0.442
2004	5.801	4.285	3.569	5.988	0.849	-0.657	1.312	1.027	7.486	17.321	1.323
	0.423	0.803	0.939	0.428	0.180	0.795	0.348	0.277	2.090	0.482	0.470
2005	5.738	4.243	3.648	5.931	0.865	-0.623	1.326	1.049	7.611	17.306	1.305
	0.499	0.848	0.929	0.503	0.200	0.817	0.346	0.300	2.109	0.479	0.468
2006	5.714	4.290	3.761	5.919	0.852	-0.582	1.370	1.048	7.931	17.312	1.307
	0.510	0.827	0.996	0.525	0.196	0.802	0.332	0.304	2.065	0.483	0.478
2007	5.689	4.318	3.774	5.908	0.860	-0.523	1.370	1.072	8.133	17.320	1.308
	0.550	0.864	0.947	0.555	0.183	0.842	0.302	0.309	2.077	0.489	0.480

Table 9: Descriptive statistics for the adults (Means and standard deviations)

Year	Monthly wages				Hourly wages				Characteristics		
	Log real base wage (i)	Log real benefits (ii)	Log real overtm. paym. (iii)	Log real total wage (iv)	Log real base wage (v)	Log real benefits (vi)	Log real overtm. paym. (vii)	Log real total wage (viii)	Education (ix)	Age (x)	Experience (xi)
1995	6.338	4.777	4.280	6.510	1.240	-0.330	2.045	1.390	6.632	37.464	20.928
	0.565	1.087	1.217	0.626	0.545	1.102	0.626	0.605	3.538	11.638	11.800
1996	6.358	4.852	4.213	6.540	1.248	-0.268	2.008	1.408	6.789	37.674	21.096
	0.568	1.071	1.215	0.628	0.540	1.081	0.641	0.601	3.590	11.613	11.802
1997	6.361	4.874	4.328	6.552	1.269	-0.231	2.080	1.438	6.906	37.653	21.043
	0.572	1.060	1.194	0.631	0.531	1.058	0.618	0.590	3.623	11.614	11.827
1998	6.392	4.884	4.398	6.586	1.327	-0.192	2.124	1.498	7.097	37.852	21.188
	0.552	1.057	1.181	0.615	0.513	1.055	0.515	0.574	3.686	11.621	11.872
1999	6.407	4.880	4.400	6.599	1.351	-0.184	2.108	1.521	7.217	37.911	21.214
	0.547	1.061	1.183	0.610	0.513	1.063	0.532	0.576	3.716	11.581	11.852
2000	6.414	4.916	4.421	6.623	1.353	-0.155	2.042	1.539	7.396	38.029	21.280
	0.553	1.074	1.171	0.618	0.510	1.067	0.543	0.576	3.762	11.554	11.855
2002	6.413	4.986	4.361	6.636	1.348	-0.090	1.976	1.550	7.733	38.181	21.330
	0.584	1.028	1.171	0.638	0.520	1.016	0.556	0.581	3.851	11.448	11.801
2003	6.396	4.987	4.378	6.625	1.335	-0.085	1.940	1.542	7.909	38.374	21.475
	0.598	1.047	1.172	0.652	0.521	1.032	0.550	0.585	3.867	11.367	11.736
2004	6.404	4.949	4.372	6.629	1.367	-0.098	1.923	1.569	8.111	38.525	21.567
	0.598	1.051	1.167	0.649	0.533	1.043	0.557	0.593	3.889	11.317	11.710
2005	6.396	4.965	4.389	6.625	1.368	-0.075	1.918	1.576	8.340	38.427	21.392
	0.612	1.050	1.172	0.662	0.538	1.041	0.552	0.598	3.921	11.344	11.767
2006	6.395	5.000	4.468	6.628	1.358	-0.051	1.977	1.572	8.612	38.651	21.527
	0.613	1.021	1.131	0.660	0.539	1.015	0.510	0.596	3.939	11.313	11.777
2007	6.396	5.033	4.487	6.640	1.355	-0.021	1.952	1.581	8.853	38.882	21.675
	0.616	1.046	1.130	0.664	0.534	1.034	0.497	0.595	3.947	11.340	11.843

Table 10: Shares of extra income receivers

	Adults				Minors			
	Males		Females		Males		Females	
	Overtime workers (i)	Benefit receivers (ii)	Overtime workers (iii)	Benefit receivers (iv)	Overtime workers (v)	Benefit receivers (vi)	Overtime workers (vii)	Benefit receivers (viii)
1995	0.210	0.581	0.151	0.537	0.058	0.496	0.096	0.612
1996	0.214	0.592	0.154	0.543	0.069	0.489	0.114	0.562
1997	0.211	0.617	0.156	0.576	0.075	0.573	0.100	0.675
1998	0.216	0.630	0.160	0.588	0.077	0.590	0.107	0.674
1999	0.212	0.631	0.163	0.590	0.085	0.602	0.100	0.651
2000	0.207	0.657	0.165	0.632	0.087	0.627	0.121	0.654
2002	0.199	0.675	0.163	0.657	0.096	0.666	0.133	0.664
2003	0.198	0.690	0.167	0.671	0.089	0.682	0.120	0.702
2004	0.200	0.699	0.168	0.679	0.095	0.695	0.118	0.710
2005	0.196	0.700	0.165	0.674	0.089	0.704	0.108	0.693
2006	0.192	0.707	0.158	0.676	0.086	0.709	0.088	0.707
2007	0.181	0.713	0.147	0.688	0.066	0.727	0.066	0.706

Table 11: Wage estimations with alternative time spans

	Monthly wage											
	Base wage				Total wage				Hourly wage			
	1997-1998	1997-1999	1997-2000	1997-1998	1997-1999	1997-2000	1997-1998	1997-1999	1997-2000	1997-1998	1997-1999	1997-2000
minor	-.0995*** (.0065)	-.1201*** (.0072)	-.0995*** (.0064)	-.1193*** (.0071)	-.0989*** (.0064)	-.1134*** (.0071)	-.0915*** (.0055)	-.0895*** (.0054)	-.0899*** (.0054)	-.1067*** (.0064)	-.1044*** (.0063)	-.0994*** (.0063)
female	-.2006*** (.0007)	-.2452*** (.0007)	-.1990*** (.0006)	-.2438*** (.0007)	-.1983*** (.0006)	-.2428*** (.0007)	-.1501*** (.0006)	-.1492*** (.0005)	-.1487*** (.0005)	-.1898*** (.0007)	-.1892*** (.0006)	-.1885*** (.0006)
aft98	.0189*** (.0006)	.0224*** (.0006)	.0230*** (.0005)	.0265*** (.0005)	.0258*** (.0005)	.0360*** (.0005)	.0482*** (.0005)	.0583*** (.0004)	.0602*** (.0004)	.0498*** (.0006)	.0596*** (.0005)	.0678*** (.0004)
min*fem	.1408*** (.0097)	.1911*** (.0108)	.1416*** (.0096)	.1920*** (.0107)	.1419*** (.0096)	.1915*** (.0107)	.1237*** (.0083)	.1222*** (.0081)	.1221*** (.0081)	.1668*** (.0096)	.1655*** (.0095)	.1645*** (.0095)
min*aft98	.0451*** (.0097)	.0422*** (.0108)	.0470*** (.0080)	.0434*** (.0090)	.0491*** (.0075)	.0411*** (.0083)	.0658*** (.0082)	.0644*** (.0068)	.0721*** (.0063)	.0639*** (.0096)	.0621*** (.0080)	.0654*** (.0074)
fem*aft98	-.0044*** (.0009)	-.0037*** (.0010)	-.0027*** (.0007)	-.0014* (.0008)	-.0035*** (.0007)	-.0034*** (.0008)	-.0106*** (.0007)	-.0122*** (.0006)	-.0128*** (.0006)	-.0085*** (.0009)	-.0095*** (.0007)	-.0113*** (.0007)
min*fem*aft98	-.0125 (.0145)	-.0305* (.0161)	-.0319*** (.0121)	-.0482*** (.0135)	-.0421*** (.0113)	-.0597*** (.0126)	-.0136 (.0124)	-.0136 (.0103)	-.0206** (.0095)	-.0327** (.0144)	-.0316*** (.0120)	-.0397*** (.0111)
Obs.	3282936	3282944	5043744	5043752	6871901	6871911	3282921	5043681	6871791	3282929	5043689	6871801
R ²	.5168	.516	.524	.5213	.5233	.5212	.6008	.6102	.6133	.5667	.5734	.5769
LogLikelihood	-1548502	-1896313	-2303660	-2857496	-3142527	-3903642	-1019354	-1484526	-1969797	-1511684	-2272242	-3061653
RMSE	.3878	.4311	.3821	.4264	.3823	.427	.3301	.3248	.3223	.3835	.3797	.3778

Notes: Significance levels: * : 10% ** : 5% *** : 1%. RMSE is root mean squared error. All regressions include education, experience and its square, firm size, occupation dummies, industry dummies and firm location dummies.

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