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Distributive effects of a coordinated wage bargaining scheme

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Resumen

Utilizando datos administrativos pegado a nivel de empleador-empleado de Uruguay, analizamos los efectos distributivos de una política salarial con un salario mínimo nacional y más de doscientos salarios mínimos sectoriales. Esta política salarial reduce la desigualdad en la cola inferior de la distribución salarial para todos los trabajadores privados formales, principalmente entre los hombres, y durante un contexto macroeconómico más favorable. Para los hombres, encontramos derrames que afectan el extremo superior. Explorando los mecanismos que están operando se encuentra que un efecto distributivo más pequeño se asocia con un efecto de desplazamiento más grande dentro de los sectores en la parte inferior de la distribución y entre los sectores más afectados, pero no se encuentra evidencia en el desempeño del empleo total.

Palabras clave: Política salarial, negociación colectiva, salario mínimo, empleo formal y distribución salarial

Código JEL: J21, J31, J38, J58, K31

Abstract

Using matched employer-employee administrative data from Uruguay, we analyze the distributive effects of a wage policy with a national minimum wage and more than two hundred sectoral minimum wages. This wage policy reduces inequality in the lower tail of the wage distribution for all formal private workers, mainly among males, and during a most favorable macroeconomic context. For males, we find spillovers affecting the upper end. Exploring job mechanisms: a smaller distributive effect aligns with a higher displacement effect within sectors in the bottom distribution and among the more affected sectors, but no evidence is found in total employment performance.

Keywords: Wage policy, Collective bargaining, Minimum wage, Formal employment, Wage distribution

JEL Classification: J21, J31, J38, J58, K31

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1 Introduction

Over the last few decades, wage policies have been one of the main public instruments used to reduce both poverty and inequality (Engbom and Moser, 2021; Cengiz et al., 2019; Autor et al., 2016). Although these policies can theoretically affect several macroeconomic outcomes, their success depends primarily on their ability to reduce inequality without damaging employment (Clemens, 2021). There is, however, a lack of trustworthy evidence documenting all the potential effects of these policies (Dube, 2019). There is some agreement about the equalizing impact of the minimum wage on earnings, but the evidence is not conclusive regarding how it impacts the whole wage distribution or even the level of employment (Manning, 2016; Brown, 1999). Much of the evidence documents impacts among the directly affected population, but the extent to which spillovers exist is unclear (Card and Krueger, 1994; Dickens et al., 1999; Lee, 1999; Fortin and Lemieux, 2000; Autor et al., 2014, 2016; Dube, 2019). Moreover, the impacts of wage policies, including collective bargaining agreements, on wages, employment, and macroeconomic performance is a less lively debate (Card and Cardoso, 2021).

In this paper, we analyze a wage policy composed of both a national minimum wage (NMW) and a set of sectoral minimum wages (SMWs). We explore both what the effect of the policy is, and how that effect is produced This wage policy has been deployed in Uruguay since 2005. Between 2005 and 2014, there was a systematic increase in the NMW of 234% in real terms, making it binding (see Figure 1 and Figure 2). Additionally, the government introduced a wage bargaining scheme that sets additional minimum wages by sector and occupation. To know *what* is the effect of the policy, we consider an extension of the methodology of Lee (1999) and Autor et al. (2016), estimating the effect of a minimum wage on wage inequality through the impact of the gap between the SMW and the median wage. To analyze *how* this effect is produced, we investigate the mechanisms of this change through its effects on job displacement and employment. Following Dustmann et al. (2020), we exploit the existence of multiple SMWs to provide evidence of the impacts on job displacement and employment at the wage bins around the wage adjustment. Next, we analyze whether these effects are concentrated in those sectors where the NMW has a more binding impact on the bargaining process. To answer our research question, we use data from a representative sample of the social security administrative records at the individual level matched with firm characteristics for 2005-2014 and the SMWs. We consider two periods according to Uruguay's macroeconomic context: 2005-2009 and 2010-2014. In our data, we have the precise wage, the number of hours of work that the firm declares, and the exact timing and

coverage of the wage policy. We can therefore identify earnings and wage policy more effectively than other papers in the literature.

Our central hypothesis is that Uruguay's wage policy generates a contraction in the wage distribution, increasing the lowest sectoral percentiles with respect to the median. Our conjecture is supported by most of the literature and by the magnitude of the minimum wage increase. However, we expect heterogeneous sex, age group, and period effects. We expect a higher impact on females and young people because they are the populations for which the minimum wage is most binding and would therefore be most affected by the wage policy. Between 2005 and 2009, the increase in the NMW was paralleled by a recovery in Uruguay's principal economic indicators. On the other hand, since 2010, the economy has cooled, and after 2012,income inequality stopped decreasing (Salas and Vigorito, 2021). In this way, although the wage policy in the second period prioritizes lower salaries, we expect greater effects in the first period according to the macroeconomic context.

Based on our hypothesis about the mechanisms behind the wage contraction, we expect displacement effects both between and within sectors, but we do not expect employment effects. Again, we expect to observe heterogeneity by period and by the bindingness of the wage on the population. Jobs occupied by females and young people will be more frequently destroyed, but these workers will enter new jobs, neutralizing the employment effect.

This paper relates to different branches of economic research. First, it relates to the literature on the effects of a minimum wage, particularly the research that focuses on the distributive impacts of wage policies. Since DiNardo et al. (1996), minimum wages have been analyzed as an essential empirical feature of wage distributions, with a focus on isolating the causal effect of minimum wages on inequality. Exploiting the cross-sectional variation in the minimum wages across US states, Lee (1999) and Autor et al. (2016) estimate the effects of wage policy bindingness on the wage distribution. Their findings suggest that the minimum wage can explain much of the increased dispersion in the lower tail of the US wage distribution in the 1980s. Although Autor et al. (2016) confirm the distributive effect, when they corrected for simultaneity and endogeneity issues, they find that the impact was restricted to the lower percentiles only. Following the same estimation method but exploiting industries' wage variation rather than that of states, Vandekerckhove et al. (2020) observes that minimum wage increases from 2000 until 2015 in Belgium caused a two-sided compression of the wage distribution. Our paper also exploits sectoral variations in how binding the minimum wage is on the wage distribution in a context

in which there was an impressive increase in the wage policy's relevance.

Second, this paper relates to the literature that evaluates the employment effects of the minimum wage, by analyzing how displacement and employment can lead to these distributive changes. The potential impacts of wage policies on employment have generated multiple discussions since the beginning of the twentieth century (Fishback and Seltzer, 2021). From the seminal article of Card and Krueger (1994), began an enormous body of empirical economic literature on minimum wages, mainly in the US. In theory, a higher and more binding minimum wage in the context of competition should decrease employment. However, monopsony labor markets or equilibrium wages below the marginal productivity of labor justify the absence of adverse effects of the minimum wage on employment (Manning, 2003). Manning (2003, 2016) even raises the possibility that regulation could generate positive employment impacts. In the last lustrum, a group of papers has documented changes in market organization, mark-up, and labor share at a firm level, providing a better understanding of the role of regulations in labor markets and the lack of employment changes (De Loecker and Eeckhout, 2018; Autor et al., 2017; Azar et al., 2017; De Loecker et al., 2017). In the case of increases in minimum wage, firms can respond by increasing prices, increasing revenues, or decreasing mark-ups; by changing their wage structure; or by reducing hiring and the quality of the outcome, rather than responding with the canonical model prediction of employment destruction (Harasztosi and Lindner, 2019; Azar et al., 2019; Bodnár et al., 2018; Giupponi and Machin, 2018).

In our framework, we expect differential impacts on wages and employment due to variations in collective bargaining agreements by sector and differences in sector characteristics (Boeri et al., 2019; Flanagan, 1999). In schemes that allow firms or regions wider flexibility, we expect a higher dispersion of wages based on firm-specific characteristics and local economic conditions, as well as better adjustment to shocks (Boeri et al., 2019; Plasman et al., 2007; Cardoso and Portugal, 2004). Centralized schemes bind firms and have a distributive effect, but stricte coordination of adjustments can fade out this impact in the long run (Vandekerckhove et al., 2020; Rycx, 2003).

In a developing country, we expect a larger effect on both inequality and employment for at least three reasons (Neumark and Corella, 2019; Neumark, 2018; Grau et al., 2018; Ham, 2018; Broecke et al., 2017). First, a bigger share of low-skilled jobs with a binding minimum wage means more potential beneficiaries but, at the same time, more susceptibility to adverse consequences. Firms can decide to eliminate or not create this type of job and reduce the wage mass below the median. Second, low levels

of enforcement make the informal sector an option for firms to evade labor regulations, even if the firms themselves are formal, generating more substantial effects on the jobs with a binding minimum. Third, the standard explanation for the low impact on employment resulting from monopsonistic labor markets could be relaxed for developing countries because of the presence of low-productivity and informal firms (Azar et al., 2019; Bhaskar et al., 2002).

However, income inequality is the main concern in developing countries. Given the role of wages in incomes across almost the whole distribution, policymakers have an enlarged capacity to make an impact in this area.[1] Bosch and Manacorda (2010) studied the effects of the fall in the real minimum wage observed in Mexico between 1989 and 2001 on wage inequality. The authors find that a substantial part of the increase in inequality, particularly in the lower tail of the distribution, is due to the decrease in the real value of the minimum wage in that period.

Our results show that Uruguay's wage policy has effects on wage inequality, reducing the dispersion up to the 40^{th} percentile of the wage distribution. The magnitude of this contraction is between 4 and 5 log points when there is an increase of 10 log points in the gap between the median wage and the SMW. We find heterogeneous effects by gender, age group, and time period. Female workers' wage distribution has no significant changes in the low and high part of the distribution, but we find an impact of 2.5 log points between the 20^{th} and the 40^{th} percentiles. For male workers' distribution, we observe higher and significant effects of between 4 and 6 log points on both tails of the wage distribution. By time period, we observe a more relevant contraction in wage dispersion of between 5 and 11 log points in 2005-2009 as compared to 2010-2014.

We evaluate the potential role of job displacement and employment effects as a mechanism driving the distributive results. We find that the set of SMWs has a negative impact on jobs at the bottom of the wage distribution; those jobs at wage bins below the next SMW have a 2 percentage point lower probability of existing six months later. For female workers, and for the period 2010-2014, the impact is even greater, reducing the likelihood of the jobs existing six months later by 4 and 8 percentage points respectively at the lowest wage bin. However, those workers whose jobs are displaced are expected to find a new private job, neutralizing the employment effect of the policy. Another mechanism through which the policy can displace jobs and employment is the crowding of some SMWs by the NMW, mainly in those sectors with lower productivity, weaker workers' bargaining power, and a wage

[1] In Latin America, even after some decades of exceptional growth rates, Gini indexes are still above 0.4 and even above 0.5. Uruguay's income inequality, particularly its wage inequality, decreased significantly between 2005 and 2015.

distribution concentrated on the left. We also find a displacement effect on those sectors with more binding minimums, increasing over time, but there is no employment effect. Again, female workers are more affected by this job displacement, as are younger workers.

We make three contributions to the literature. First, we document the effects on wage inequality of a wage policy with an NMW and several SMWs resulting from a collective bargaining scheme in a developing country with high informality and inequality. Second, we analyze job displacement and employment mechanisms for all formal private labor markets and among sectors. We compare those workers in the wage bins around the next SMW with those in the 50% larger to analyze what happens in the bottom part of each sectoral wage distribution. We also explore how an increase in the NMW may push the SMWs of those sectors with lower productivity or weaker workers' bargaining power and constraints to destroy more jobs. Third, we contribute to the analysis of the populations for whom the minimum wage is most binding, exploiting gender and age of workers. Additionally, in 2009, there was a change in the collective bargaining regulations, placing greater emphasis on coordination between the negotiation guidelines and on the macroeconomic performance of the sector. So, more relevantly, we assess the changes in the negotiation scheme.

The remainder of the paper is organized as follows. Section 2 presents the background of the wage policy in Uruguay. Section 3 describes the database and main variables used in the analysis. Section 4 describes our empirical approach and estimates the distributive effects. Section 5 presents the potential role of job displacement and employment in the bottom part of the sectoral wage distribution as a mechanism that explains our findings. Section 5.2 analyzes whether sectors where the NMW binds more in the bargaining process lead to a displacement effect. Section 6 discuss our findings and Section 7 concludes.

2 Background

In the 1940s, the law established two instruments to the wage policy in Uruguay: a collective bargaining scheme in which labor unions and employer federations negotiate to establish SMWs for the private sector by industry, and an NMW, which the government set and is a general floor threshold for all wages, public and private. However, since the 1970s, many labor reforms have been introduced, and policymakers have not always used collective bargaining instruments. Focusing on the last thirty years, we highlight two main periods: first, between 1993 and 2004, the government eliminated collective

bargaining and fixed the NMW too low for it to be a binding minimum. After that, there were two main changes: the NMW started to increase faster than the rate of inflation in January 2005, and the government restored collective bargaining agreements in July 2005.[2]

In Table 1, we present the main characteristics of the scheme and each bargaining round. The government adjusts the NMW annually without any prior negotiation.[3] Then, the government establishes bargaining deadlines and guidelines for the structure and magnitude of wage increases.[4] In a second step, labor unions and employer federations bargain according to the general government guidelines until they reach an agreement, which has to be confirmed by the government in a national act.[5] The main outcome of the bargaining process is the establishment of SMWs and mandatory wages for all non-professional job categories. Agreements must include wage adjustment by occupation and can add other features of the jobs' conditions. There are 24 bargaining groups, split into subgroups.[6] We will work at the subgroup level with 19 out of the 24 groups and with a total of 80 SMWs.

Between 2005 and 2009, the main government objective was to raise wages after the severe 2002-2003 recession, then establish biannual agreements setting the SMW (and the wage adjustment) by occupation, based on the expected inflation rate plus a real wage increase that could reach 2.5%. In the second period, between 2010 and 2014, the government promoted long-term agreements (12 months, and then 24 or 30 months), setting differential and higher adjustments for the lowest wages and more wage coordination, with differential adjustments consistent with sectoral macroeconomic performance.[7]

The establishment of Uruguay's wage policy coincides with a big change in its wage inequality trend. In Figure 3, we show the evolution of inequality measured by the standard deviation of the log wages of our sample, the ratio of the 90^{th} to the 50^{th} percentile, and the ratio of the 50^{th} to the 10^{th} percentile. The main characteristic of the analyzed period is the change in the trend of wage inequality: up to 2004, inequality increased; 2005 began a new phase in which it decreased until the end of the period. The standard deviation and the upper and bottom tail of the distribution also follow

[2] See Figures 1 to 4.

[3] Between 2005 and 2008, the adjustment was biannual

[4] This first step occurs in the High Wage Council. This institution has seven members: three from the government, two representatives from labor unions, and two from the employer federations. However, the government has the right to impose its view on any decision.

[5] Since 2011, government confirmation has not been a necessary condition

[6] For example, the dairy industry and the sugar industry are subgroups of the food processing and preservation industries group.

[7] For example, in the 2012-2013 round, the national government guidelines depended on a macroeconomic performance (GDP growth rate) and a sectoral performance classification: dynamic, regular, or recessive. For dynamic sectors in a scenario of 4% of GDP growth, the real wage adjustment was 3%, and in the other extreme (recessive sector and GDP growth of less than 2%), there was no adjustment above the inflation rate.

this trend.[8] The fall in the standard deviation of earnings is similar to that reported by Engbom and Moser (2021) for Brazil, but over a shorter period.

3 Data and descriptive statistics

Our main database is a monthly unbalanced panel of Uruguayan firms and employees between April 1996 and April 2016. We work with a representative sample of 300,000 workers, matched with their firms with at least one month of activity from the social security administrative record, which is collected by the social security affairs agency.[9] At the worker level, the information includes the worker's date of birth, sex, and nationality, as well as whether the job is public or private, the type of contract, hours worked, tenure in the position, wage, and other compensation for all contemporaneous jobs. This information matches firm-level information, including industry class (5 digits, ISCI, fourth revision), the number of employees and owners, and tenure.

Additionally, we construct a novel database containing all SMWs, the timing of when each agreement was signed, and when it became compulsory. Each subgroup of collective bargaining maps to a specific industry class (5 digits, ISCI, fourth version). We can match this database with the administrative records, assigning each worker the lowest wage floor for each subgroup.

We exclude workers in the public sector in our final sample because a collective bargaining agreement does not set their wages. We excluded those workers in domestic service and rural work (agricultural, fruit, and forestry industries) because they were included from collective bargaining later on. Finally, we also exclude the textile sector because this sector almost disappeared during the period. Our final dataset has 10,024,301 observations corresponding to 105,021 individuals.

Between 2004 and 2014, the labor market experienced dynamic growth (see the second and third panels of Figure 1). The employment rate rose about 5 percentage points, and the number of registered jobs almost doubled, with remarkable growth between 2004 and 2011. From January 2005, the NMW increased above the median wage and the price index; the real NMW increased 234% for the whole period, while the real median wage in the economy grew 55% (Figure 1). The new NMW policy made it binding on the wage distribution. In Figure 2, we show the wage distribution compared with the NMW in 2004 and 2007. The NMW was not operative in the economy in 2004, but after only three

[8] In the Figures A.1 and A.2, we observe a similar trend by gender and age.
[9] In Spanish, Banco de Prevision Social (BPS)

years, in 2007, the wage distribution for formal workers became binding.

In Table 2 we show descriptive statistics for the distribution of wages for each sector in 2005 and 2014 for the 19 collective bargaining groups in our sample. In both years – at the beginning of the policy and the last year of our sample – SMWs are heterogeneous, with a difference of more than 75% between the extremes. If we construct three categories by SMW tertiles in 2005 and 2014, there is a shift in the density functions over the period, making the distance between densities smaller and reducing the differences between sectors. For all sectors, we see a relevant rise in the minimum wage, but there is substantial heterogeneity in the timing and magnitude of these increases, and we observe a contraction of the ratio of percentiles 90/50 and 50/10.[10]

Because collective bargaining establishes the set of SMWs, we want to control for bargaining power as a source of endogeneity. We construct a new database with two indicators of worker bargaining power: sector unionization level and rate of hours lost because of strikes. We also include a concentration index to capture large firms' power in employer federations. In Table 3, we present these three indicators by sector and for 2005 and 2014. We observed a slight increase in the average unionization level, but the variations are different by industry. [11] The increase in the unionization rate was accompanied by an increase in strike days, where the average number of days went from 0.55 to 1.86. Again, the situation was heterogeneous across sectors, with the construction industry standing out as having considerably increased the number of days lost to strikes. Finally, the last two columns of Table 3 show the value of the Herfindahl index for each industry in 2005 and 2014. On average, there is a drop in concentration, which means that there are more firms in the economy occupying a more significant share of workers.

4 The distributive effects of wage policy

The main objective of this paper is to study the distributive effects of a coordinated wage bargaining scheme. First, we follow the methodology proposed by Lee (1999) to estimate the effect of the minimum

[10] In Figure A.3, we show the evolution of the real minimum wage and of the average wage in each sector. In some groups, the real increase in the whole period is more than 100%, and in others, only about 30% (the sawtooth shape shows the different timing of the adjustments). In Figure A.4, we show the estimated Kernel wage distribution for industries centered in the next SMW for the whole period, observing significant heterogeneity sector by sector in the extent to which the SMW is binding.

[11] There is a decrease in the percentage of unionized workers in some sectors, e.g., transport and storage and financial intermediation. However, in others, the share of unionized workers doubles, e.g., fishing, wood, cellulose, paper industry, and construction.

wage on wage inequality through the impact of the gap between the state minimum wage and the median wage on wage dispersion. This methodology, with variations, was applied among others in Autor et al. (2014) for the United States, Bosch and Manacorda (2010) for Mexico, and Vandekerckhove et al. (2020) for Belgium. We describe it in detail in the Appendix A.2.

First, we present equation 1 to estimate a simple OLS model, with the Kaitz index in a quadratic specification to capture the expected greater effect on those wages which are more affected by the wage policy.[12]

$$w_{st}(p) - w_{st}(50) = \beta_1(p)[w^m_{st} - w_{st}(50)] + \beta_2(p)[w^m_{st} - w_{st}(50)]^2 + X'_{st}\gamma + \epsilon_{st} \quad (1)$$

In our framework, we estimated ventiles of the wage distribution, and instead of using geographical variation as Lee (1999) does, we exploit the sectoral variation as in Vandekerckhove et al. (2020). In our specification, $w_{st}(p)$ indicates the wage percentile p for sector s at time t and w^m_{st} is the SMW at time t. The effectiveness of the minimum wages on wage dispersion depends on the degree to which the minimums are binding. Typically, the 50^{th} percentile is considered to be a sufficiently high income level such that wages at that percentile and above will not be affected by the minimum wage. The term $X'_{st}\gamma$ includes time-varying variables by sector, such as union density, working days lose by strikes, and market concentration.

This estimation can be biased when the average wage level of each state/sector is systematically correlated with the level of latent inequality (Autor et al., 2016).[13] To overcome this, we estimate a similar model but include fixed effects by sector and time (D_s and θ_t), and by sector-time ($D_s \times \theta_t$). We also include the same time varying control as before (X'_{st}). The second model we estimate is the FE model as in equation 2:

$$w_{st}(p) - w_{st}(50) = \alpha + \beta_1(p)\big(w^m_{st} - w_{st}(50)\big) + \beta_2(p)\big(w^m_{st} - w_{st}(50)\big)^2 + D_s + \theta_t + D_s \times \theta_t + X'_{st}\gamma + \epsilon_{st} \quad (2)$$

However, OLS and FE models suffer a division bias issue because of the inclusion of $w_{st}(50)$ on both sides of the equation, meaning it is included in the construction of the dependent and the independent variables at the same time. Models 3 and 4 take into account this problem. In model 3, we substitute

[12] The Kaitz index is defined as the difference between the sectoral minimum and the median, $w^m_{st} - w_{st}(50)$

[13] We discuss this bias in detail in the Appendix A.2

the Kaitz index $w^m_{st} - w_{st}(50)$ directly for the sectoral minimum wage (equation 3). We call this specification the FE_2 estimation.[14]

$$w_{st}(p) - w_{st}(50) = \beta_1(p)[w^m_{st}] + \beta_2(p)[w^m_{st}]^2 + \theta_t + \gamma_s + \gamma_s \times \theta_t + X'_{st}\alpha + \epsilon_{st} \tag{3}$$

Finally, our preferred model is an instrumental variable model (IV) proposed by Autor et al. (2016), which instruments the quadratic form of the Kaitz index with the sectoral minimum wage in a quadratic shape and the interaction between the sectoral minimum wage and the median.

$$\left\{w^m_{st} - w_{st}(50); \quad [w^m_{st} - w_{st}(50)]^2\right\} \rightarrow \left\{w^m_{st}; \quad [w^m_{st}]^2; \quad [w^m_{st}] * w_{st}(50)\right\} \tag{4}$$

As a first step, we test whether the wage policy caused the contraction of the wage distribution shown in Figure 3, and if these effects are concentrated on the populations for which the minimum is most binding and on the more favorable part of the economic cycle. We present our main results in Figures 5 and 6, showing how the collective bargaining scheme, through the set of SMWs it produces, affects the wage distribution, as measured by the gap between the wage ventiles and the median wage, sector by sector.[15] Therefore, a positive (negative) coefficient for those ventiles below (above) the median implies a wage distribution contraction (expansion). All of our results are presented by gender, age, and time period. We define our time periods as 2005-2009 and 2010-2014, first because the government changed the bargaining guidelines in 2010, increasing wage coordination and boosting meager wages, and second because in 2010, the economy started to grow at lower rates than in the the previous lustrum.

In the four panels of Figure 5, we show the results for the four models presented above: a simple OLS estimation; the same OLS model but including fixed effects by sector, time, and trends by sector; an IV model in one stage; and an IV estimation. Our preferred model (the IV in panel four) shows the marginal effect. We find a sharp contraction of the wage distribution in the left tail explained by the SMWs until the 40^{th} percentile. These effects decrease in the distribution with marginal effects of 50% up to the 10^{th} percentile, 40 % between the 15^{th} and 30^{th} percentile, and only around 10% in the 40^{th} percentile, as seen in Table 4. However, we do not find significant effects of the wage policy on the changes in the distribution's right tail. The magnitude of these effects are five-times higher than

[14] Vandekerckhove et al. (2020) called this specification Reduced Form

[15] We present the marginal effect $\beta_1(p) + 2\beta_2(p)(w^m_{st} - w_{st}(50))$.

the effects found in Vandekerckhove et al. (2020), twice that in Autor et al. (2016), and similar to that in Engbom and Moser (2021), but these papers find effects on different sides of the distribution than we do.

We perform the set of models by period, gender, and age; in Figure 6, we show only our preferred estimation. In the first row of graphs, we find a greater effect on the left tail of the distribution in the period 2005-2009 than in 2010-2014, but we observe contractive results in the right tail in both periods. The wage policy had an impressive impact during the first five years, with marginal effects above 40% up to the 30^{th} percentile; in the second five years, these effects were a bit lower, around 30% and not for all bins (Table 4).

The analysis by gender shows that the female wage distribution had almost no significant changes, with no effect at the bottom percentiles. However, we see an impact between the 20^{th} and 40^{th} percentiles relative to the median. For males, we observe significant and higher effects on both tails of the wage distribution. In the right tail of the distribution, we find spillovers above the 75^{th} percentile. The size of the contraction is similar at both ends of the distribution, between 25% and 50% (Table 4). The impact on male wages provides insights into how the reallocation effect operates along the distribution as a result of the wage policy.[16] During these years, there was a significant increase in formal jobs among females; changes in composition can hide effects on the wage distribution (Ceni and Merlo, 2021).

Finally, we find heterogeneous distributional effects by age group. The dispersion reduction on the left tail of the distribution is only significant for workers over 30 years old, while both groups see significant effects on the right tail. The impact at the higher tail of the wage distribution is more relevant for young workers (see Figure 6 and Table 4).

To ensure the robustness of our main findings, we perform alternative estimations. First, we show that the distributive results are robust for other benchmarks. We find that there is a sharp contraction of the wage distribution at higher percentiles (60^{th}, 70^{th}, and 80^{th}), and in the left tail up to the 40^{th} percentile (Figure A.5). We find little effect on the right tail with percentiles 60 and 70 as the benchmark.

In the second robustness exercise, we repeat our preferred distributive estimation, but we control for the rate of workers that quit the sector and split those who are longer-term workers in the firm

[16]Note, Autor et al. (2016) find bigger effects among female workers than among males.

from the others, as seen in Table 5. We find, first, similar coefficients when considering the quit rate, with a bigger and more significant contraction on the left side of the distribution. Among longer-term workers, we find a smaller effect on the lower end of the distribution and a quantitatively significant contractive impact in the 85^{th} percentile. We document distributively relevant implications of the wage policy that are not driven by displacement or unemployment. However, movements in jobs and employment and differences in coefficients provide insight into job reallocation along the distribution.

The evidence from Figures 5 and 6 suggests that the wage policy has a relevant effect of contracting the wage distribution on the left side. This contraction occurs more intensively in a high economic growth environment among males over 30 years old. Meanwhile, wage distributions for those who theoretically occupied jobs with more binding minimums show only small movements. Although we use the sectoral adjustment as an empirical strategy, this evidence does not suggest how the wage policy effect between the NMW and the multiple SMWs should be disentangled. Therefore, we will first analyze whether these changes in wage inequality were led by movements in job displacement and/or by employment effects. To do this, as distributive effects are in the left tail of the wage distribution, we concentrate on those jobs that are, before each adjustment, around the next SMW_{t+1} and their situation six months later. Our second hypothesis predicts a displacement effect in the left part of the distribution but without an employment effect.

Second, we assess the effect of job displacement and employment on those sectors that are more affected by the NMW. In those sectors with a more leftward wage distribution and weaker worker bargaining power, the increase in the NMW (centralized and fixed by the national government) pushes up the SMWs. As the third hypothesis, we expect more displacement and employment effects in those sectors because of the NMW's pressure on the SMWs.

5 Wage policy on the displacement and employment effects

5.1 Private formal labour market

We now turn to an assessment of the potential role of job displacement and employment in the lower part of the sectoral wage distribution as a mechanism that explains the previous section's findings. In this paper, job displacement is the destruction, after a minimum wage adjustment, of worker-firm matches. We measure the employment effect as whether the worker is out of formal employment after

the wage adjustment.

We construct wage bins centered on the next SMW to quantify these effects in order to estimate the displacement effect. Those workers above the current SMW and below the next one (SMW_{t+1}) belong to bins below one, while those whose wages are above SMW_{t+1} belong to bins above one.

We compute the impact on employment of collective bargaining in a similar way as Dustmann et al. (2020).Those bins below one are the treated group ([0.8-0.9), [0.9-0.95) and [0.95-1)), followed by a partially treated group (bins from [1-1.05) to [1.4-1.45)), and a control group ([1.45 - 1.5)). [17] We identify worker i who, before the adjustment, was in bin w and remained employed in the same firm (or in the private sector) six month after the adjustment as $y_{i_{w(t)}t+1} = 1$. We regress this outcome on $D_{i_{w(t)}t+1}$, which indicates whether worker i's wage at t belongs in bin w. The coefficients $\gamma_{w_t t+1}$ of equation 5 show the change in the probability of being employed conditional on being in the wage bin w at t, along with a set of individual characteristics of worker ($X_{i,t}$) and job, also at t.

$$y_{i_{w(t)}t+1} = \gamma_{w_t t+1} D_{i_{w(t)}t+1} + \beta X_{i,t} + e_{it} \tag{5}$$

We cannot estimate the coefficients $\gamma_{w_t t+1}$ with respect to other pre-policy benchmarks as in Dustmann et al. (2020), because the wage policy did not exist before 2005. Therefore, our identification strategy is constructed around the multiple sectoral minimum wages. However, the three assumptions required to ensure causal interpretation still hold: the mean reversion effect for each wage bin remains constant over time, the macroeconomic time effect does not vary across wage bins, and finally, as we show in the previous section, there is no effect of the minimum wages on the high end of the wage distribution.

In Figure 7, we show the probability of a worker remaining in the same job six months after the SMW adjustment by wage bins. All coefficients are with respect to a benchmark bin that represents 1.5 times the SMW_{t+1}. We observe a significant and negative effect until the 1.1 wage bin; then, there is no differential displacement effect between the 1.15 and 1.5 wage bins. Among our treated population (and part of the partially treated population), the probability of being employed in the same job six months after the adjustment decreases by between 1 and 2 percentage points. Job displacement is affected by how restrictive the government guidelines are. These effects are shown in Figure 8: between

[17] As explained above in our framework, we use only the SMW, but in each sector, there are a set of wages that are set as minimums for specific occupations. Therefore, our partially treated group can be treated by other sectoral wages, but it evolves below the minimum one.

2005 and 2009, with less coordinated government guidelines and higher economic growth, we do not find any displacement effect. Between 2010 and 2014, there were negative and quantitative effects, mainly in the treated bins with 6 to 8 percentage point higher displacement probabilities.

First, these results align with our distributive findings, in which most of the contraction in the distribution occurs in the first period. Moreover, there is a significant displacement effect of around 1 percentage point until the [1.4-1.45) wage bin. These results are also in line with the theoretical idea that the job displacement effect would be larger in a more restrictive economic environment.

The overall results also obscure gender heterogeneity. The main displacement effect is on those jobs that women occupied. In Figure 9, we show a negative impact on those jobs occupied by women among treated jobs, while there is no displacement for treated jobs occupied by men. However, we do not find evidence of differential job displacement by age (Figures 10). These findings are consistent with the distributive impacts, in which the men's wage distribution suffered a higher contraction.

If we change the outcome variable to be defined as those employed in the private sector six months after the adjustment, the negative effect disappears. There is no effect on any of the wage bins, as is observed in Figure 11. Moreover, there are no heterogeneous effects by period, gender, and age, disappearing or fading out.[18]

The evidence of displacement and employment effects at the lower end of the distribution tells us about the impact of the contraction in the wage distribution. More considerable contraction is associated with smaller job displacement, and those populations for whom the minimum is more binding, where wage contraction is not observed, suffer job displacement. But there are no employment changes; the wage policy seems to be neutral in distribution.

5.2 Sectoral mechanism

The final step is to analyze whether these displacement effects are concentrated on those sectors where the NMW is more binding on the bargaining process, pushing up the SMW and therefore the whole distribution. Thus, we want to assess whether the distributive and displacement effects are driven by those sectors in which the wage distribution is concentrated more on the left. To identify these effects, as in Dustmann et al. (2020); Dinkelman and Ranchhod (2012); Lee (1999), we define the wage gap in sector s as the difference between the next NMW and the first ventile current wage in the sector for each

[18]Employment effect are closest to zero also in the case of period, gender, and age; see Figures 8, A.7 and A.8.

round of collective bargaining agreements as described in Table 1: $GAP_s = log(NMW_{t+1}) - log(w_{st}(5))$.

$$Y_{ist} = \beta_0 + \beta_1 \text{POST}_t + \beta_2 \text{GAP}_s + \beta_3 \text{POST}_t * \text{GAP}_s + X'_{it}\gamma + \nu_{ist} \tag{6}$$

Y_{ist} indicates whether or not job i is occupied in sector s at time t; $POST$ takes a value of 1 six months after the adjustment, or zero otherwise; X_{it} is a vector of control variables: firm seniority, age group, real wage, number of workers at the firm, level of unionization, labor conflict (strikes), and concentration; and ν_{ist} are standard disturbance terms. In our case, we construct GAP by sector rather than by geography, so the treatment intensity depends on the sector in which the job is located. Sectors with very low wages before the wage adjustments, therefore, have large positive values for GAP_{st}. In this case, β_3 is the difference-in-differences parameter: how job stability changes after wage adjustments in sectors where the national minimum wage is more binding.[19] Therefore, we use the differences between the sectors to determine how the average sector would be affected if the GAP variable increases. [20]

In Figure 12, we show the job displacement effect of the NMW on jobs by sector. We consider those sectoral jobs occupied by workers who stayed at least three of the six months before each adjustment. We find a negative effect for each adjustment; on average, a gap of 1 percentage point generates an impact of between 0.05 and 0.16 percentage points between January 2004 and January 2013 (see Table A.1). Note that the first two points are before the wage policy started to be binding; therefore, job displacement is part of these sectors' job rotation process, but those adjustments are quantitatively lower than the following ones. Once the wage policy is active, displacement is higher and increases over time.

In Figure 13, we observe the estimated effects for females and males separately. We find similar (or even greater among males) negative effects before collective bargaining; after the wage policy starts, female displacement is greater. Finally, Figure 14 shows negative effects in both subgroups: young and older workers, with a bigger effect among young workers.

In this case, we change the outcome, including those who were working before the adjustment as well as those who entered the sector after the adjustment. Again, we also want to consider the jobs

[19] In Figure A.4, we show the heterogeneity between sector wage distribution and the SMW.

[20] Our concern is the fact that there are different trends in wage gaps in the post-period between high and low wage gap sectors, and these differences can confound the effects of the adjustments. To address this, we examine the evolution of the wage gaps, and if there are no differences between sector trends, it is unlikely to explain our results for jobs.

created in these sectors, new entrants, after the wage adjustment; we call this the employment effect by sector. In Figure 15 we do not find an employment effect in the general estimation, nor do we find it by gender or age (Figures A.9 and A.10.) Finally, we find similar results for job displacement when we change the gap definitions using the first decile instead the first ventile (Figure A.11) and when we consider each adjustment rather than each bargaining agreement (Figure A.12).

6 Discussion

Our findings are in line with the previous literature. We first find a contraction in the left part of the wage distribution, mainly among the population for whom the minimum is not binding and in the time period with a favorable macroeconomic environment.[21] At the same time the economy cooled down, there were changes in the collective bargaining procedure, increasing wage coordination according to the sectoral performance. In this second time period, the wage distribution did not undergo any change. Our second finding is that changes in employment do not accompany changes in the wage distribution. However, we do document changes in job displacement, mainly among females and in the period 2010-2014, whose wage distribution remained stable. Finally, displacement effects are greater in those sectors in which the wage distribution is closer to the NMW, those in which the coexistence of an NMW and collective bargaining is more binding.

The evidence for Latin America is relatively scant, but evidence from some countries shows that the decrease in inequality experienced in the region in recent decades followed changes in wage policies. For Argentina, at the beginning of 2000, there was a redistributive effect on income but no impact on job demand or job insecurity (Groisman, 2016; Arcidiácono, 2015). There was a fall in income concentration in Brazil due to changes in the labor market in the first decade of the 2000s, and the effects on employment were minor and negative, although not always significant (Engbom and Moser, 2021; Broecke et al., 2017; Saboia and Neto, 2017; Lemos, 2009, 2004). However, there was a negative effect on formality, mainly among more exposed groups (Saltiel and Urzúa, 2020). Chile's evidence suggests mixed effects of labor policies on different groups of workers. Minimum wages increase employment probability for informal workers and reduce it for formal ones, with a higher impact among young and unskilled workers (Wedenoja, 2013; Montenegro and Pagés, 2003). Bosch and Manacorda

[21] According to the World Bank, in the period 2005-2009 the average GDP growth was 5.9% with a flat trend; meanwhile, in 2010-2014 it was 4.8% but with a decreasing trend.

(2010) find an expansion in inequality in Mexico due to a fall in the real value of the minimum wage. For Uruguay, Borraz and González-Pampillón (2017), using household survey and only considering the national minimum wage, find a distributive contraction, but with weak robustness. Finally, Brum and Perazzo (2020) find that the wage policy from 2005-to 2015 was successful in pushing lower wages up and compressing the general wage distribution (both formal and informal).

7 Conclusions

This paper uses social security administrative records between 2004 and 2014 to estimate the distributive effects of a particular wage policy in Uruguay. The wage policy comprises a collective wage bargaining scheme that sets SMWs and an NMW. Exploiting the adjustment timing of about 80 of the 200 SMWs, we estimate the distributive effects of these minimum wages on the whole distribution. Then, as we find a contraction at the left end of the wage distribution, we focus on the displacement and employment effects around the SMWs. Lastly, we assess the impact of the coexistence of an NMW and multiple SMWs, quantifying the impact on those sectors with wage distributions more bound by the national minimum.

In our wage policy setting, we differentiate two time periods. First 2005-2009, when collective bargaining began and the NMW became binding, and 2010-2014, when government coordination rose and the economic growth rate moderated. In the first period, we observe a big wage contraction in the left tail of the distribution, and we observe no displacement or employment effects. From 2005 to 2009, there was a significant wage policy effect on the distribution and no effect on jobs. Specifically, we find a bigger contraction effect and no displacement or employment effect at the lower end of the distribution. In those years, formal employment and jobs increased; some jobs that were destroyed by the usual labor market dynamic were rapidly recomposed, creating more jobs overall (Ceni and Merlo, 2021). In the second period, between 2010 and 2014, distributive effects were moderate, and there was an increase in displacement. These small but significant effects decrease when we expand the analysis to employment. Examining worker characteristics, we find the wage distribution for female workers contracted more than that for males, and they suffered more displacement. At the same time, younger employees showed greater job displacement than older ones.

The analysis of displacement and employment by how binding the minimum wage is on each sector shows that on average, when the wage distribution is most concentrated on the left, there is significant

displacement, even when the national minimum wage was ineffective. For employment effects, including those jobs created after the wage adjustment, wage policy seems to be neutral.

Wage policy has contributed broadly to the decrease in wage inequality that Uruguay has experienced during recent years (Amarante et al., 2011). More specifically, we estimate that the effect of the minimum wage extends further up the wage distribution than would be initially predicted, as observed by Autor et al. (2016) and Vandekerckhove et al. (2020). Specifically, the minimum wage policy shows spillovers up to the 40^{th} percentile, which means that workers whose initial wages were above the minimum benefit from the policy. While the evidence suggests that the minimum wage reduces concentration, we cannot distinguish the effects generated by the collective bargaining scheme. However, the coexistence in the wage policy of national and sectoral minimums affects the employment performance of those with a relatively more leftward concentrated wage distribution.

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Table 1: Coordinated wage bargaining scheme

Round	Time		Adjustments	Time validity	Wage adjustment	Notes
	From	To				
1	Jul-05	Jul-06	biannual	12 months	% real adjustment + expected inflation rate	Real adjustment between 0 and 2 % biannually
2	Jul-06	Jul-08	biannual	24 months	% real adjustment + expected inflation rate	Real adjustment between 0 and 2 % biannually in the first semester and lower in the following ones
3	Jul-08	Jul-Dec 2010	biannual -annual	24 or 30 months	% real adjustment + expected inflation rate. Domestic workers (first time). Higher adjustment for lowest wages	Low wages define by bargaining group: 16 to 20% adjustment. Real adjustment rate between 1 and 3% annually with a cap of 5.5%
4	Jul - Dec 2010	Jul2012 - Dec2013	biannual (58%) annual	24 or 36 months	First round with the law 18566 % real adjustment (depend on the sectoral economic performance and aggregate economic performance) + expected inflation rate. Higher adjustment for lowest wages	Low wage definition: wage adjustment of 25% for wages between 1 and 1.16 National Minimum wage and 18% for those between 1.16 and 1.3 National Minimum wages
5	Jul2012 - Dec2013	Jul2015 - Dec2016	biannual (18%) - annual	36 months or more	Higher wage adjustment for lowest wages (60% of the agreements). Real wage adjustment with a cap of 3%	

Notes. Annual inflation rate in the period was between of 6% and 10%. Source: Ministry of labor and social security. https://www.gub.uy/ministerio-trabajo-seguridad-social/

Table 2: Wages descriptives by bargaining sector (2005 and 2014)

	2005						2014					
	SMW	p90/p50	p50/p10	p50	$\frac{SMW}{NMW}$	n	SMW	p90/p50	p50/p10	p50	$\frac{SMW}{NMW}$	n
Wholesale and retail trade	20.26	3.39	1.63	43.16	1.33	32,643	38.61	2.64	1.61	81.35	1.28	132,271
Food retail trade	19.18	2.00	1.31	28.82	1.06	1,326	39.90	1.94	1.30	58.08	1.21	7,119
Hotels, restaurants and bars	19.63	2.84	1.53	39.39	1.21	6,168	34.53	2.69	1.45	68.06	1.06	24,243
Transport and storage	18.82	2.89	1.96	59.58	1.25	8,880	34.53	2.64	2.02	119.15	1.22	22,467
Financial intermediation	23.69	3.88	2.71	80.04	1.43	2,779	38.89	3.34	2.07	106.40	1.22	4,799
Health services	21.71	2.95	1.96	117.19	2.11	11,715	35.50	2.72	2.27	149.12	1.40	48,549
Education services	21.71	2.90	2.95	126.96	3.11	4,559	34.46	3.26	2.45	177.65	2.16	18,642
Graphic industry	19.47	3.56	2.11	54.44	1.16	1,086	34.34	2.79	1.80	96.47	1.05	4,137
Cultural services and mass media	19.16	3.22	2.23	65.98	1.11	2,833	33.96	2.83	2.37	120.54	1.07	6,814
Professional and technical services	20.99	2.74	1.84	51.23	1.26	9,011	36.04	2.39	1.53	86.08	1.33	58,837
Food processing and preservation	19.18	4.83	1.86	42.26	1.54	7,261	33.47	4.02	1.86	78.29	1.34	20,494
Social and sports entities	26.05	3.38	2.19	70.51	1.44	3,248	47.14	2.82	1.94	126.76	1.55	9,916
Meal processing industry	21.71	2.93	2.96	76.90	1.20	1,129	45.73	2.32	2.36	167.38	1.30	2,857
Fishing	32.86	3.50	4.23	190.08	1.82	119	49.66	2.65	3.50	191.45	1.40	318
Leather industry	18.09	2.46	3.90	108.24	1.90	356	34.52	3.03	2.30	126.09	1.38	585
Wood, cellulose and paper industry	28.95	3.57	1.76	54.43	1.60	595	41.37	2.55	1.90	94.09	1.18	2,547
Chemical industry	25.33	2.96	2.48	132.83	2.03	2,907	42.22	2.74	2.03	168.66	1.65	8,181
Metal product industry	19.79	3.82	2.21	69.31	1.59	4,857	36.91	3.11	1.91	116.82	1.53	14,538
Construction industry	28.32	2.76	1.89	74.07	1.73	326	57.98	2.70	1.71	132.80	1.99	6,246
Mean	**22.36**	**3.19**	**2.30**	**78.18**	**1.57**	**5,358**	**39.46**	**2.80**	**2.02**	**119.22**	**1.38**	**20,714**

Notes. This table contains the minimum wage for each sector (SMW), the ratio of the top decile to the median (p90/p50), the ratio of the median to the bottom decile (p50/p10), the median decile of the wage distribution by sector, the ratio of the sectoral minimum wage to the national minimum wage (SMW/NMW), and the number of workers for the first and the last year of the database. We only consider private sector workers between 18 and 60 years old, whose wages are greater than or equal to the current minimum wage. All wages are in real terms. December 2010 Uruguayan pesos.

Table 3: Unions, strikes and concentration by bargaining sector (2005 and 2014)

	Unionization 2005	Unionization 2014	Strikes 2005	Strikes 2014	Herfindahl 2005	Herfindahl 2014
Wholesale and retail trade	0.29	0.16	0.42	1.96	0.04	0.02
Food retail trade	0.07	0.04	0.00	0.00	0.01	0.01
Hotels, restaurants and bars	0.08	0.03	0.00	0.00	0.08	0.05
Transport and storage	0.40	0.15	1.62	2.29	0.08	0.06
Financial intermediation	0.19	0.08	0.13	0.00	0.07	0.24
Health services	0.42	0.30	1.20	0.14	0.21	0.06
Education services	0.09	0.08	0.04	0.00	0.28	0.05
Graphic industry	0.50	0.93	0.52	0.00	0.06	0.04
Cultural services and mass media	0.34	0.16	0.08	0.08	0.13	0.07
Professional and technical services	0.02	0.00	0.66	2.00	0.12	0.07
Food processing and preservation	0.26	0.28	2.62	0.12	0.14	0.16
Social and sports entities	0.02	0.00	0.01	0.00	0.10	0.05
Meal processing industry	0.41	0.22	1.11	0.00	0.04	0.03
Fishing	0.23	0.78	0.01	0.00	0.68	0.42
Leather industry	0.25	0.53	0.09	0.30	0.13	0.21
Wood, cellulose and paper industry	0.06	0.38	0.00	0.00	0.02	0.02
Chemical industry	0.24	0.20	0.09	0.05	0.07	0.08
Metal product industry	0.39	0.25	0.77	0.84	0.06	0.06
Construction industry	0.22	0.56	1.14	27.63	0.17	0.18
Mean	**0.24**	**0.27**	**0.55**	**1.86**	**0.13**	**0.10**

Notes. This table contains the unionization rate as the union's number of registered members per number of estimated formal workers in the sector. Strikes are the ratio of the number of worker-days of striking to the number of workers- working days. We also compute a concentration rate (Herfindahl) as the percentage of workers in the sector's leading firm.

Table 4: SECTORAL MINIMUM WAGE ON WAGE INEQUALITY

Percentile	IV	IV	IV	IV	IV	IV	IV
	Full sample	Males	Females	Under 30	30 or more	2005-2009	2010-2014
p(5)	0.53***	0.59***	0.03	-0.38	0.71***	1.09**	0.36**
	(0.08)	(0.10)	(0.40)	(0.52)	(0.13)	(0.53)	(0.16)
p(10)	0.53***	0.49***	0.19	-0.45	0.53***	0.76**	0.35**
	(0.07)	(0.11)	(0.29)	(0.51)	(0.12)	(0.37)	(0.15)
p(15)	0.44***	0.44***	0.23	-0.35	0.38***	0.58***	0.15
	(0.07)	(0.10)	(0.21)	(0.42)	(0.10)	(0.22)	(0.14)
p(20)	0.44***	0.54***	0.26*	0.09	0.43***	0.63***	0.07
	(0.07)	(0.09)	(0.14)	(0.25)	(0.10)	(0.20)	(0.14)
p(30)	0.40***	0.27***	0.24*	-0.01	0.35***	0.45***	0.30**
	(0.06)	(0.08)	(0.13)	(0.25)	(0.08)	(0.11)	(0.13)
p(40)	0.11**	0.07	0.15*	-0.27	0.02	0.11	0.27***
	(0.05)	(0.06)	(0.08)	(0.23)	(0.06)	(0.13)	(0.11)
p(50)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
p(60)	0.07	-0.05	-0.09	-0.17	-0.05	0.00	-0.14
	(0.05)	(0.08)	(0.08)	(0.19)	(0.06)	(0.09)	(0.13)
p(70)	0.08	-0.02	0.09	-0.83**	-0.11	-0.07	0.15
	(0.07)	(0.10)	(0.12)	(0.42)	(0.09)	(0.13)	(0.18)
p(75)	0.11	-0.23**	-0.12	-0.10	-0.23**	-0.07	0.02
	(0.08)	(0.11)	(0.14)	(0.28)	(0.10)	(0.15)	(0.18)
p(80)	-0.04	-0.38***	0.03	-0.52	-0.16	-0.22	-0.11
	(0.08)	(0.12)	(0.12)	(0.40)	(0.11)	(0.15)	(0.19)
p(85)	-0.05	-0.27*	0.11	-0.95*	-0.02	-0.31**	-0.30
	(0.09)	(0.14)	(0.12)	(0.49)	(0.11)	(0.14)	(0.21)
p(90)	-0.07	-0.31*	-0.06	-1.24**	-0.33**	-0.34*	-0.33
	(0.11)	(0.17)	(0.16)	(0.60)	(0.17)	(0.19)	(0.26)
p(95)	-0.22	-0.41**	0.19	-2.23**	-0.16	-0.20	-0.97*
	(0.15)	(0.18)	(0.20)	(0.92)	(0.18)	(0.16)	(0.52)

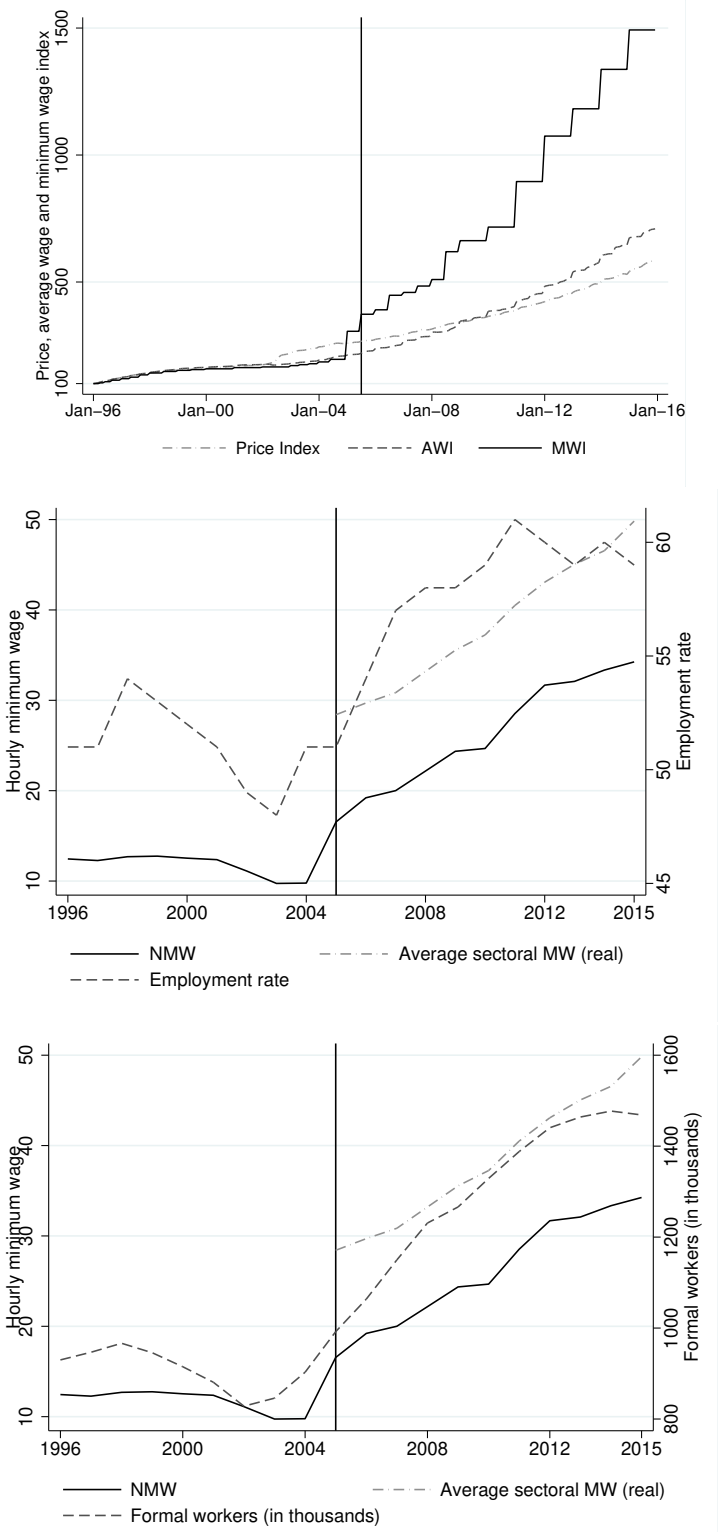
Notes. N=2166 for the first 5 estimations. N=1083 for the last two estimations. Each observation is a sector-month. The dependent variable is the gap between the sector minimum wage and the median on wage dispersion. All specifications are 2SLS, where the effective minimum and its square are instrumented by the log of the minimum, the square of the log minimum, and the log minimum interacted with the average real log median for the sector over the sample. Reported coefficients are the marginal effects of equation (5): $\beta_1(p) + 2\beta_2(p)(w^m_{st} - w_{st}(50))$.Fixed effects by sector, year, month, sector/year, and sector/month are included. We control by strikes, as the ratio of the number of worker-days of strikes to the number of workers-working days, and a concentration rate (Herfindahl) measured as the percentage of workers in the sector's leading firm. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 5: SECTOR MINIMUM WAGE ON WAGE INEQUALITY, ROBUSTNESS

	Full	Full+quit		Stable
	ME	ME	Lag quit	ME
p(5)	0.53***	0.54***	-0.05	0.43***
	(0.08)	(0.09)	(0.09)	(0.11)
p(10)	0.53***	0.54***	-0.05	0.37***
	(0.07)	(0.07)	(0.08)	(0.11)
p(15)	0.44***	0.44***	0.01	0.37***
	(0.07)	(0.07)	(0.08)	(0.10)
p(20)	0.44***	0.45***	-0.02	0.37***
	(0.07)	(0.07)	(0.09)	(0.10)
p(30)	0.40***	0.37***	0.20**	0.36***
	(0.06)	(0.06)	(0.10)	(0.08)
p(40)	0.11**	0.13***	-0.08	-0.02
	(0.05)	(0.05)	(0.06)	(0.06)
p(80)	-0.04	-0.05	0.05	-0.19
	(0.08)	(0.08)	(0.10)	(0.09)
p(85)	-0.05	-0.06	0.10	-0.26**
	(0.09)	(0.09)	(0.08)	(0.12)
p(90)	-0.07	-0.10	0.20*	-0.06
	(0.11)	(0.11)	(0.11)	(0.18)
p(95)	-0.22	-0.24	0.09	-0.00
	(0.15)	(0.15)	(0.11)	(0.22)

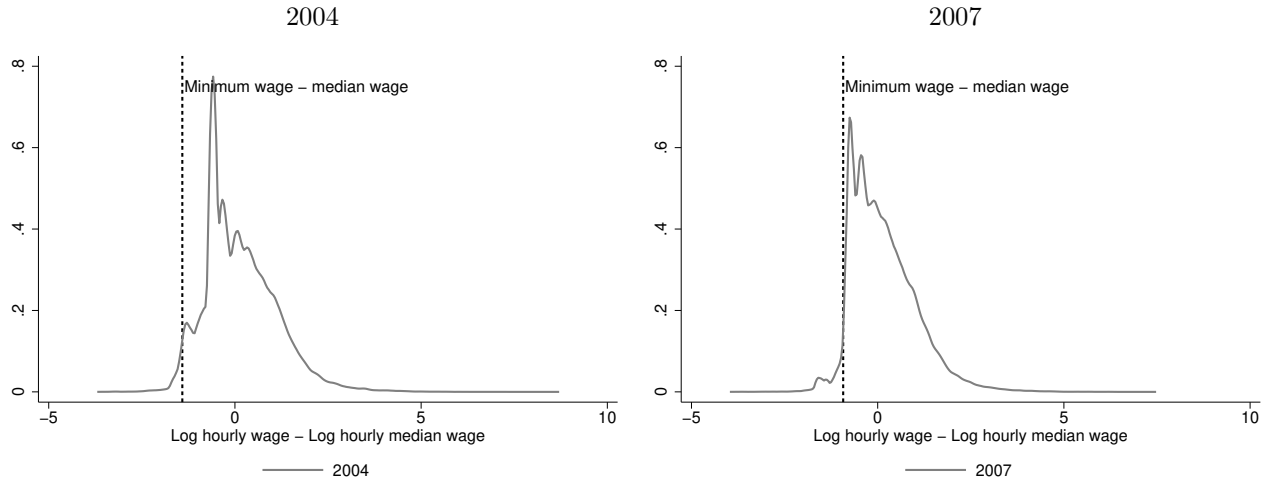
Notes. N=2166 for all estimations. Each observation is a sector-month. The dependent variable is the gap between the sector minimum wage and the median on wage dispersion. All specifications are 2SLS, where the effective minimum and its square are instrumented by the log of the minimum, the square of the log minimum, and the log minimum interacted with the average real log median for the sector over the sample. Reported coefficients as ME are the marginal effects of equation (5): $\beta_1(p) + 2\beta_2(p)(w^m_{st} - w_{st}(50))$. Fixed effects by sector, year, month, sector/year, and sector/month are included. We control by strikes, as the ratio of the number of worker-days of strikes to the number of workers-working days, and a concentration rate (Herfindahl) measured as the percentage of workers in the sector's leading firm. The first model is the same as column 1 of **??**. The second model adds as a control *lquit* (lag of percentage of quits in the sector in the last 6 months), whose coefficient is reported in the fourth column. The third model uses the same specification as the first one, but over the sample of workers who remain in their sector for at least the next 6 months. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Figure 1: Trends in average wages, minimum wages, prices and employment



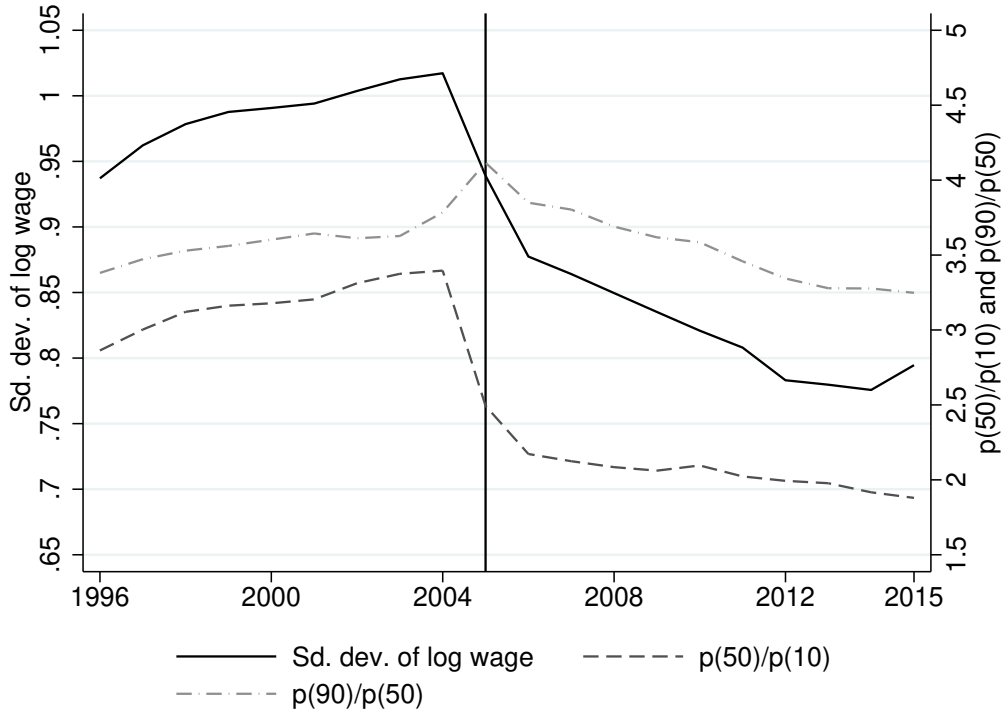
Notes. In the first panel, we estimate the monthly National Minimum Wage Index (MWI) with the current legal value taking January 1996 as 100. We estimate the monthly Average Wage Index (AWI) with the current value reported by the National Institute of Statistics, taking January 1996 as 100. The Price Index is the monthly Consumption Price Index taking January 1996 as 100. In the second and third panel, we show the yearly NMW, and the average sectoral MW (both in real values and in hours). The employment rate is estimated from the National Household Survey and shown in the second panel. In the third panel, the number of formal workers comes form the administrative records of the Social Security Agency (BPS).
Source: INE, BPS

Figure 2: Formal wage distribution and national minimum wage in 2004 and 2007



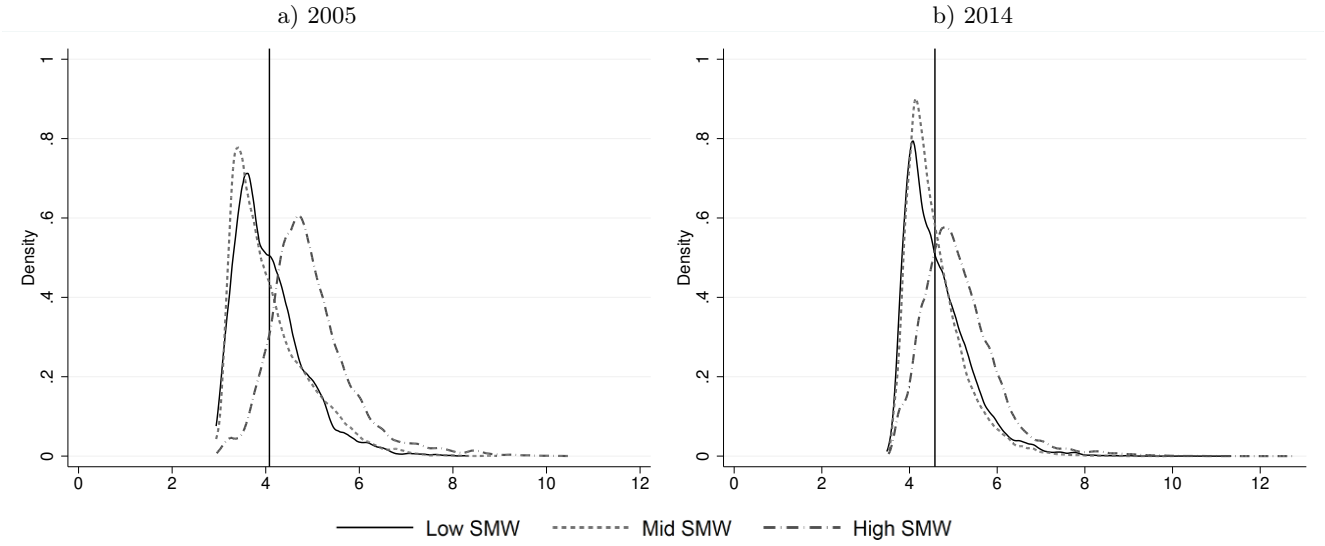
Notes. The difference between the log hourly wage and the median wage distribution is estimated with a Kernel density estimation. The gap between the hourly nation minimum wage and the median wage is estimated using a contract of 40 hours per week.
Source: INE, BPS

Figure 3: Evolution of wage inequality



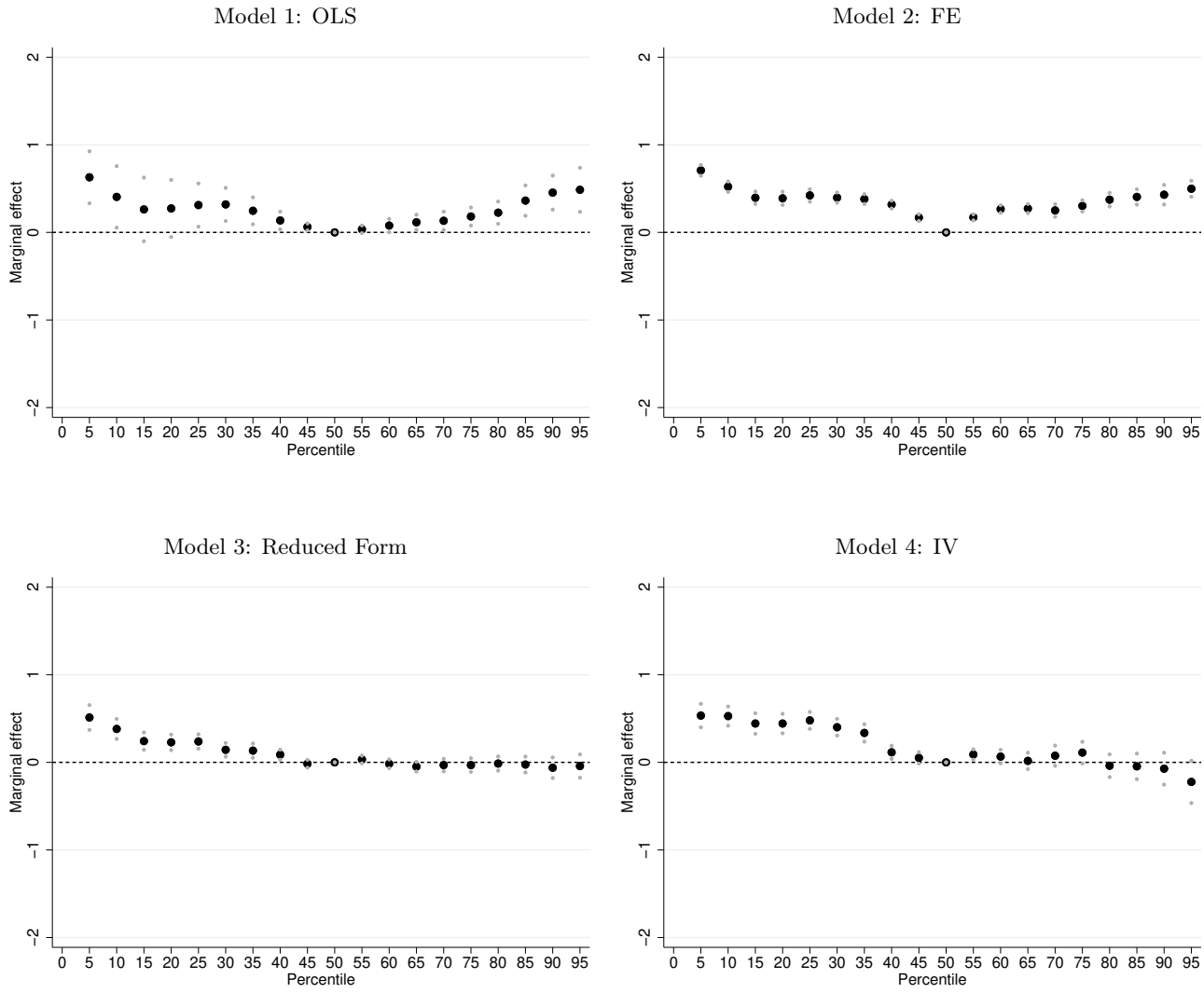
Notes. This figure shows the evolution of wage inequality, measured by the log of the real minimum wage, by the ratio of the value of the median decile to the bottom decile, and by the ratio of the value of the top decile to the median decile of the total wage distribution. Data are yearly averages. All wages are in December 2010 Uruguayan pesos.
Source: BPS

Figure 4: Kernel density estimates of the log wage distribution in 2005 and 2014 by minimum wage tertiles



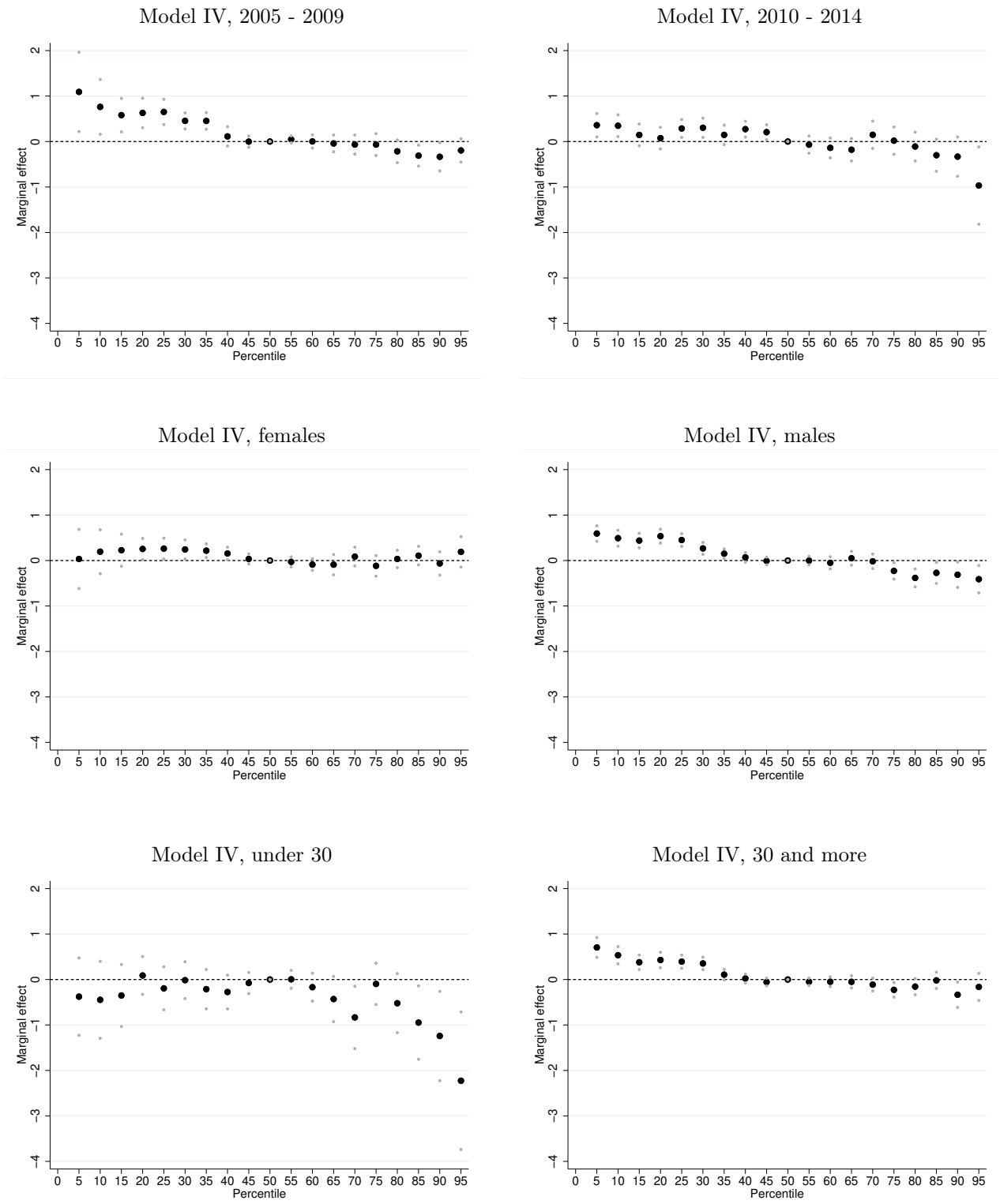
Notes. These figures show the sectoral wage distribution in logarithm, grouped according to sectoral minimum wage tertiles, and considering all private sector jobs with workers between 18 and 60 years of age whose wages are above the current sectoral minimum wage. The vertical line represents the median of the general wage distribution of each year. The composition of tertiles is as follow. Tertile 1 2006: Food retail trade; Hotels, restaurants and bars; Financial intermediation; Graphic industry; Cultural services and mass media; Professional and technical services; Meal processing industry. Tertile 2 2006: Wholesale and retail trade; Transport and storage; Food processing and preservation; Social and sports entities; Wood, cellulose and paper industry; metal product industry. Tertile 3 2006: Health services; Education services; Fishing; Leather industry; Chemical industry; Construction industry. Tertile 1 2014: Transport and storage and Wood, cellulose and paper industry. Tertile 2 2014: Professional and technical services; Meal processing industry, Fishing and Leather industry. Tertile 3 2014: Social and sports entities and metal product industry.

Figure 5: Wage inequality on the sectoral minimum wage, by wage percentile



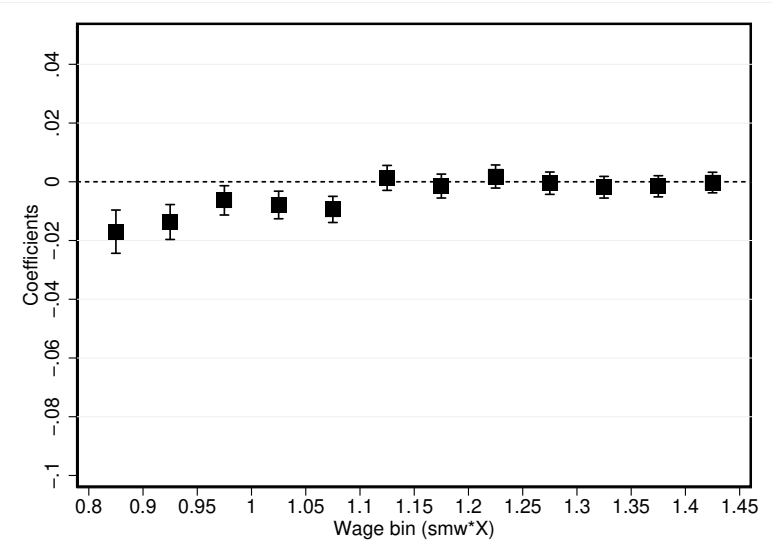
Notes. This figure shows in each plot the results of the marginal effects of our four specifications of the effect of the increase in minimum wages on the wage distribution. Black points correspond to point estimates of the effect of the increase in the sectoral minimum wage on the difference between each ventile and the median of the wage distribution. Grey dots correspond to ninety percent confidence intervals. The sample includes all private sector jobs with workers between 18 and 60 years old.

Figure 6: Wage inequality on the sectoral minimum wage, by wage percentile. Heterogeneity by period, age and gender



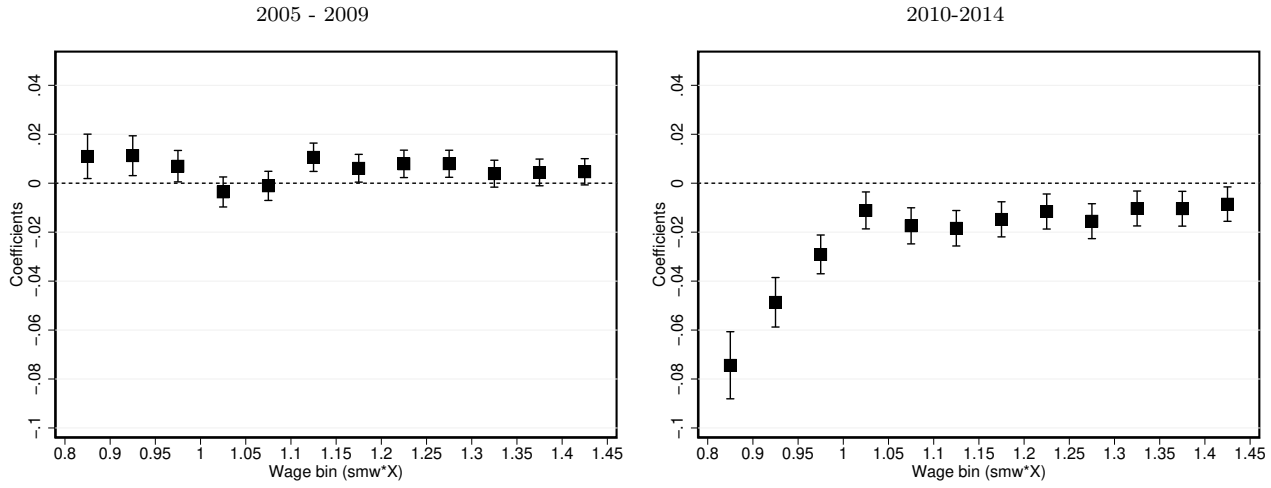
Notes. This figure shows in each plot the results of the marginal effects of our IV specification of the effect of the increase in minimum wages on the wage distribution. Black points correspond to point estimates of the effect of the increase in the sectoral minimum wage on the differences between each ventile and the median of the wage distribution. Grey dots correspond to ninety percent confidence intervals. The sample includes all private sector jobs with workers between 18 and 60 years old.

Figure 7: Job displacement effects at the bottom end of the distribution



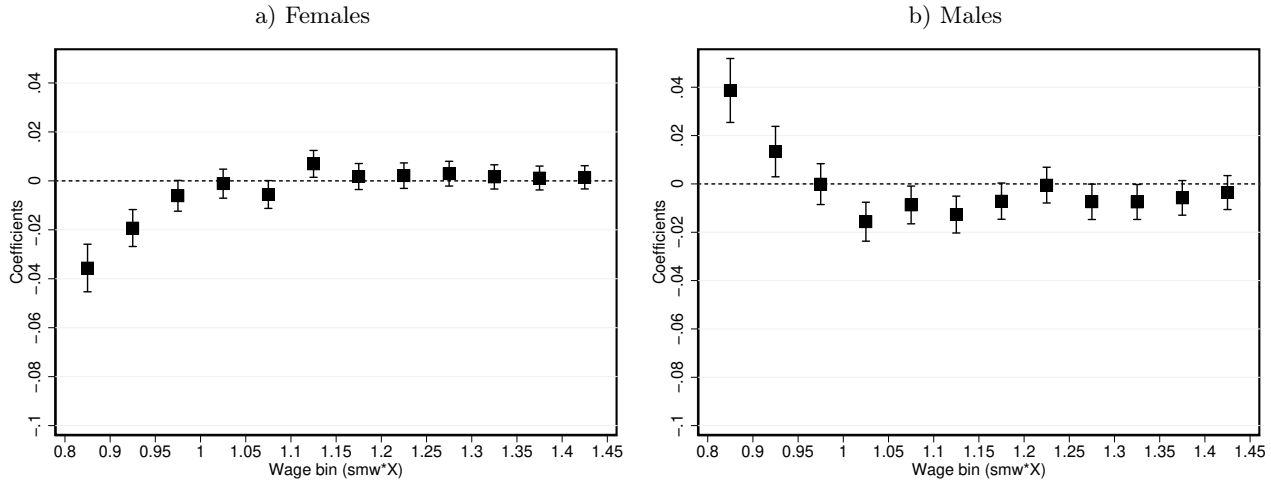
Notes. Estimates refer to coefficients $\gamma_{w_t t+1}$ in equation 5, when the outcome of interest is whether the worker remained employed at the same firm six months after the adjustment. The omitted bin is integrated by jobs whose wage before the adjustment was between 1.45 and 1.5 of the sectoral minimum wage after the adjustment. The estimation includes controls by age, real wage in levels, firm's seniority, sector of activity, the number of employees in the firm, rate of unionization, rate of strikes, Herfindahl rate, dummies by month and year, and worker fixed effects. Dots show point estimates, and bars represent ninety percent confidence intervals. We pool individuals earning between 0.8 and 0.9 of the sectoral minimum wage after the adjustment into one bin, since few individuals fall into this group.

Figure 8: Job displacement effects at the bottom end of the distribution, heterogeneity by period



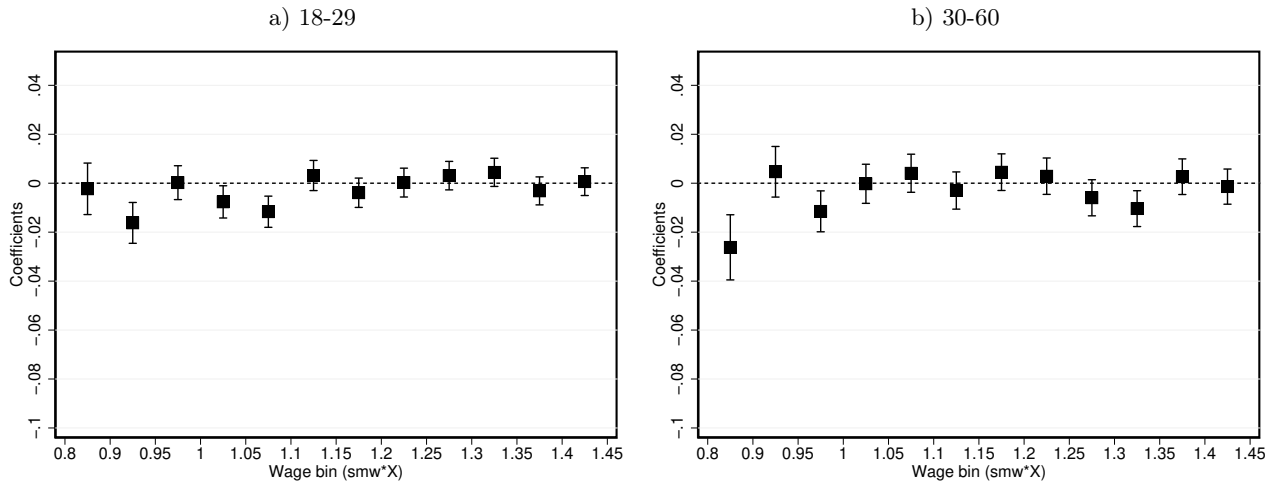
*Notes.*Estimates refer to coefficients $\gamma_{w_t t+1}$ in equation 5, when the outcome of interest is whether the worker remained employed at the same firm six months after the adjustment. The omitted bin is integrated by jobs whose wage before the adjustment was between 1.45 and 1.5 of the sectoral minimum wage after the adjustment. The estimation includes controls by age, real wage in levels, firm's seniority, sector of activity, the number of employees in the firm, rate of unionization, rate of strikes, Herfindahl rate, dummies by month and year, and worker fixed effects. Dots show point estimates, and bars represent ninety percent confidence intervals. We pool individuals earning between 0.8 and 0.9 of the sectoral minimum wage after the adjustment into one bin, since few individuals fall into this group.

Figure 9: Job displacement effects at the bottom end of the distribution, heterogeneity by gender



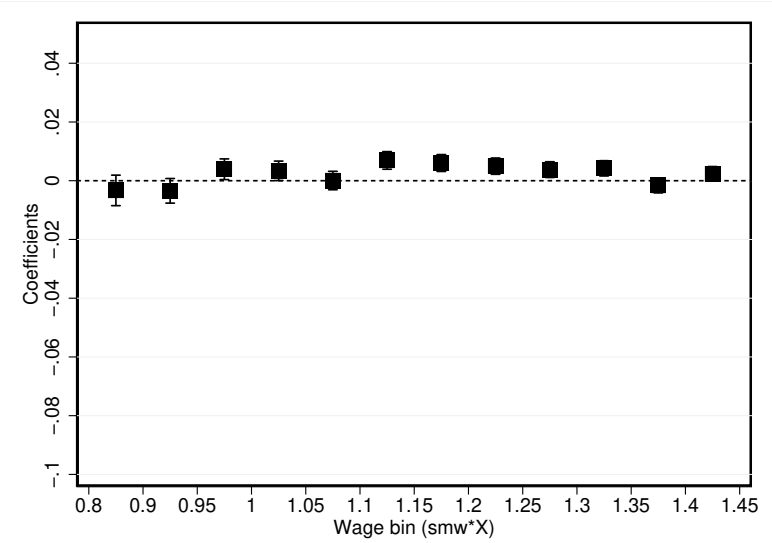
*Notes.*Estimates refer to coefficients $\gamma_{w_t t+1}$ in equation 5, when the outcome of interest is whether the worker remained employed at the same firm six months after the adjustment. The omitted bin is integrated by jobs whose wage before the adjustment was between 1.45 and 1.5 of the sectoral minimum wage after the adjustment. The estimation includes controls by age, real wage in levels, firm's seniority, sector of activity, the number of employees in the firm, rate of unionization, rate of strikes, Herfindahl rate, dummies by month and year, and worker fixed effects. Dots show point estimates, and bars represent ninety percent confidence intervals. We pool individuals earning between 0.8 and 0.9 of the sectoral minimum wage after the adjustment into one bin, since few individuals fall into this group.

Figure 10: Job displacement effects at the bottom end of the distribution, heterogeneity by age



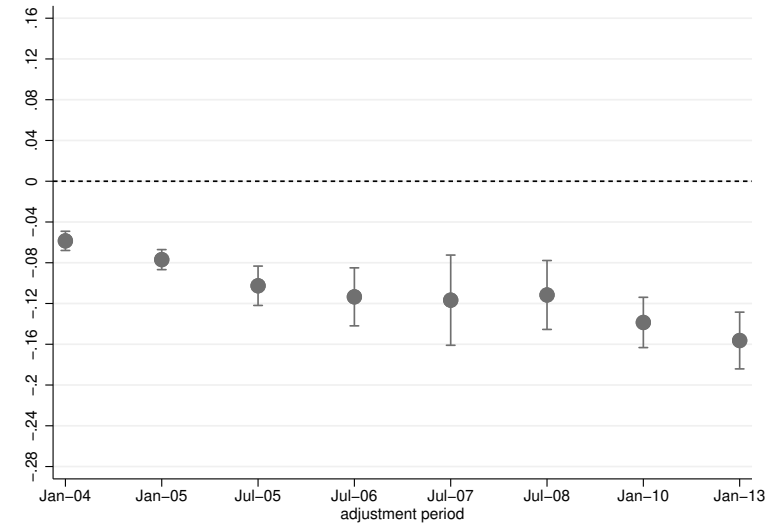
*Notes.*Estimates refer to coefficients $\gamma_{w_t t+1}$ in equation 5, when the outcome of interest is whether the worker remained employed at the same firm six months after the adjustment. The omitted bin is integrated by jobs whose wage before the adjustment was between 1.45 and 1.5 of the sectoral minimum wage after the adjustment. The estimation includes controls by age, real wage in levels, firm's seniority, sector of activity, the number of employees in the firm, rate of unionization, rate of strikes, Herfindahl rate, dummies by month and year, and worker fixed effects. Dots show point estimates, and bars represent ninety percent confidence intervals. We pool individuals earning between 0.8 and 0.9 of the sectoral minimum wage after the adjustment into one bin, since few individuals fall into this group.

Figure 11: Employment effects at the bottom end of the distribution



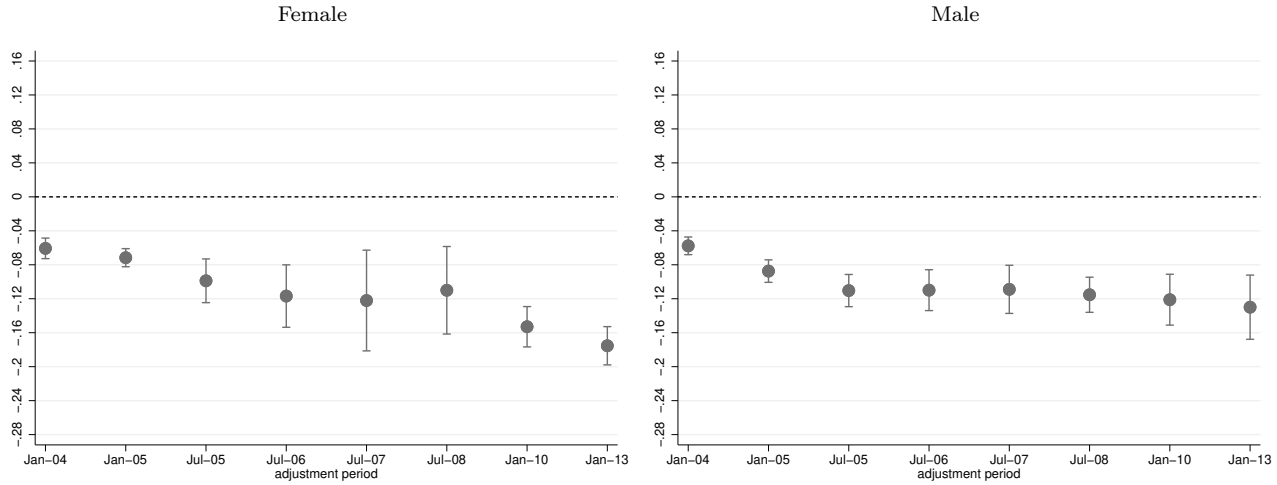
Notes. Estimates refer to coefficients $\gamma_{w_t t+1}$ in equation 5, when the outcome of interest is whether the worker remained employed in the private sector firm six months after the adjustment. The omitted bin is integrated by jobs whose wage before the adjustment was between 1.45 and 1.5 of the sectoral minimum wage after the adjustment. The estimation includes controls by age, real wage in levels, firm's seniority, sector of activity, the number of employees in the firm, rate of unionization, rate of strikes, Herfindahl rate, dummies by month and year, and worker fixed effects. Dots show point estimates, and bars represent ninety percent confidence intervals. We pool individuals earning between 0.8 and 0.9 of the sectoral minimum wage after the adjustment into one bin, since few individuals fall into this group.

Figure 12: Job displacement effects



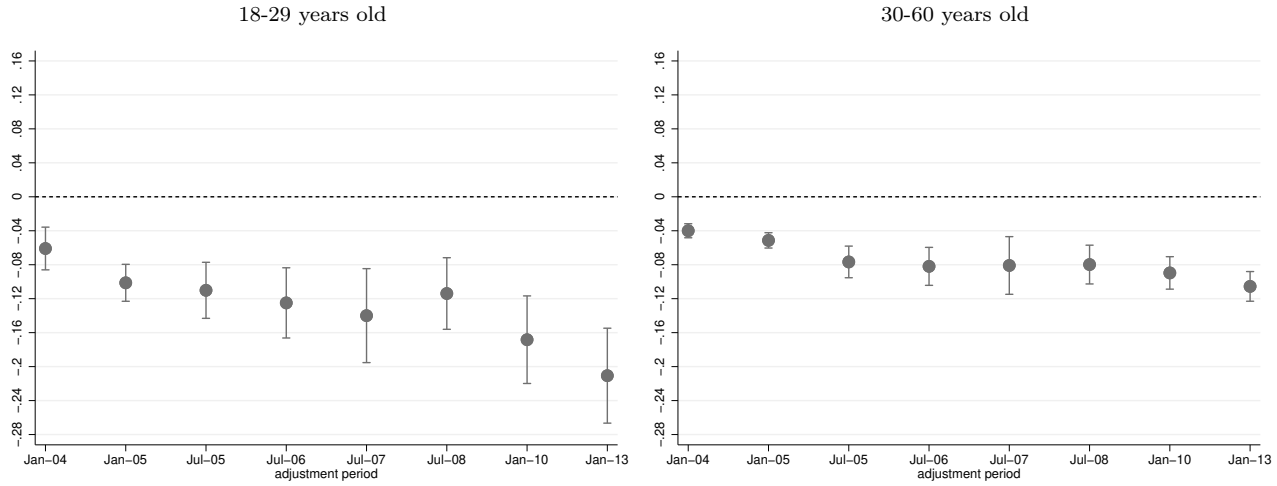
Notes. We estimate a Difference-in-Difference model, between before and after the national minimum wage adjustment, and the gap between the national minimum wage and the wage in the first ventile of the sectoral wage distribution. In order to assign for the sector before, we consider those who stay at least three months in the same sector. The dependent variable takes the value 1 in the pre-adjustment period and 1 or 0 in the post-adjustment period, depending on whether the job is maintained in the sector or not.

Figure 13: Job displacement, heterogeneity by gender



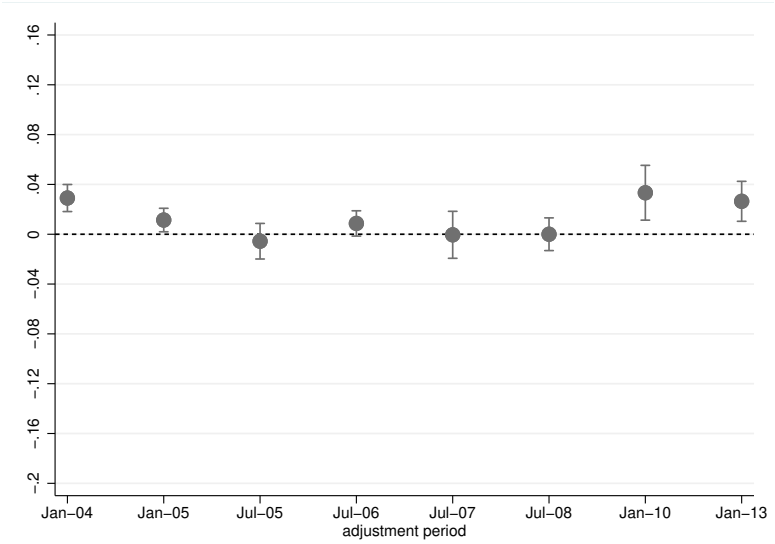
Notes. We estimate a Difference-in-Difference model, between before and after the national minimum wage adjustment, and the gap between the national minimum wage and the wage in the first ventile of the sectoral wage distribution. In order to assign for the sector before, we consider those who stay at least three months in the same sector. The dependent variable takes the value 1 in the pre-adjustment period and 1 or 0 in the post-adjustment period, depending on whether the job is maintained in the sector or not.

Figure 14: Job displacement, heterogeneity by age



Notes. We estimate a Difference-in-Difference model, between before and after the national minimum wage adjustment, and the gap between the national minimum wage and the wage in the first ventile of the sectoral wage distribution. In order to assign for the sector before, we consider those who stay at least three months in the same sector. The dependent variable takes the value 1 in the pre-adjustment period and 1 or 0 in the post-adjustment period, depending on whether the job is maintained in the sector or not.

Figure 15: Employment effects



Notes. We estimate a Difference-in-Difference model, between before and after the national minimum wage adjustment, and the gap between the national minimum wage and the wage in the first ventile of the sectoral wage distribution. In order to assign for the sector before, we consider the last sector before the adjustment, and we add those who are only employed after the adjustment. The dependent variable takes the value 1 in the pre-adjustment period and 1 or 0 in the post-adjustment period, depending on whether the job is maintained in the sector or not for jobs that already existed in the pre-adjustment period. Secondly, it takes the value 0 in the pre-adjustment period and 1 in the post-adjustment period for jobs created in the sector after the adjustment.

A.1 Appendix: Tables and Figures

Table A.1: Job displacement effect

VARIABLES	(1) Jan-2004	(2) Jan-2005	(3) Jul-2005	(4) Jul-2006	(5) Jul-2007	(6) Jul-2008	(7) Jan-2010	(8) Jan-2013
$Post_t$	-0.126***	-0.109***	-0.140***	-0.145***	-0.162***	-0.136***	-0.162***	-0.177***
	(0.006)	(0.005)	(0.010)	(0.008)	(0.009)	(0.006)	(0.005)	(0.007)
WG_s	0.012***	0.013***	0.006	0.014**	0.018***	0.018**	0.020***	0.019***
	(0.003)	(0.004)	(0.007)	(0.006)	(0.007)	(0.007)	(0.006)	(0.005)
$Post_t \times WG_s$	-0.059***	-0.077***	-0.103***	-0.113***	-0.117***	-0.112***	-0.139***	-0.156***
	(0.006)	(0.006)	(0.012)	(0.017)	(0.027)	(0.021)	(0.015)	(0.017)
Age	0.001***	0.002***	0.002***	0.002***	0.002***	0.002***	0.002***	0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Sex	0.003	0.003	-0.002	0.006*	0.003	0.006*	0.006**	0.004*
	(0.002)	(0.003)	(0.006)	(0.003)	(0.005)	(0.003)	(0.002)	(0.002)
Unionization	0.032***	0.019	-0.018	0.039	0.031*	0.038**	0.021	0.011
	(0.012)	(0.018)	(0.036)	(0.026)	(0.017)	(0.014)	(0.018)	(0.011)
Herfindahl	0.019	0.026*	0.049**	0.062**	-0.033	-0.040	-0.047**	-0.016
	(0.020)	(0.015)	(0.019)	(0.026)	(0.026)	(0.037)	(0.022)	(0.018)
Strikes	-0.197	-0.276*	-0.832	-0.835**	0.010	1.332	-0.314	-1.456***
	(0.322)	(0.160)	(0.561)	(0.360)	(0.039)	(0.825)	(0.250)	(0.379)
Constant	0.941***	0.923***	0.941***	0.915***	0.914***	0.910***	0.911***	0.914***
	(0.005)	(0.007)	(0.021)	(0.007)	(0.008)	(0.007)	(0.007)	(0.007)
Observations	76,211	40,039	84,518	88,634	94,510	101,048	115,957	127,575
R-squared	0.070	0.081	0.092	0.092	0.097	0.088	0.095	0.097

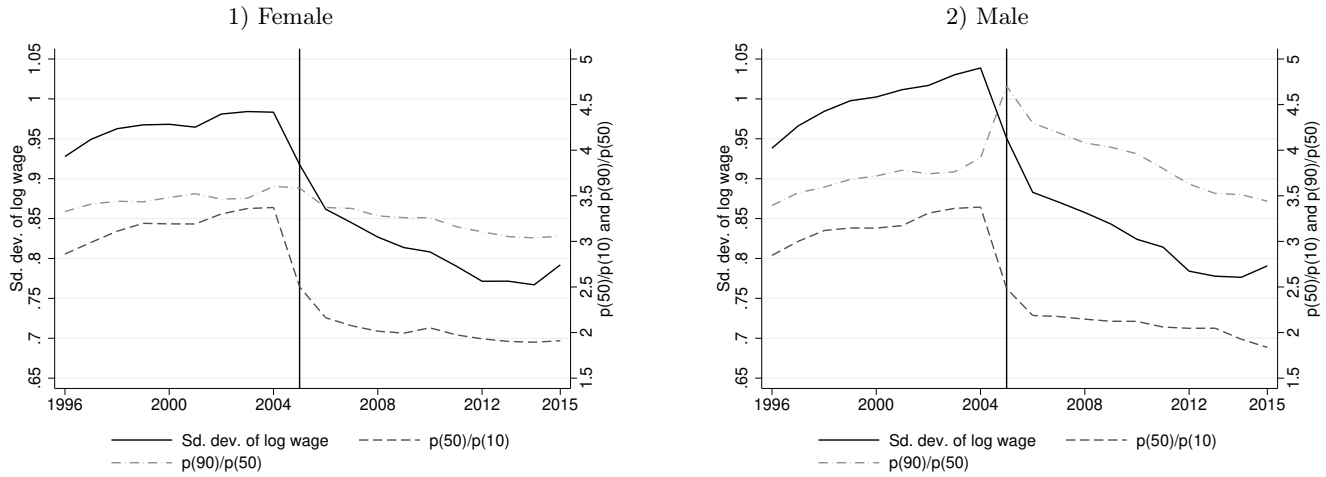
Notes. Difference in Difference estimation with the sector definition: being in the same sector at least three months. The dependent variable indicates whether job i is or is not occupied in sector s at time t. Post takes a value of 1 after the national minimum wage adjustment or 0 otherwise. Wage gap (WG) is the gap between the national minimum each and the wage in the first ventile of the sectoral wage distribution. In order to assign for a sector before, we consider those who stay at least three months in the same sector. Standard errors clustered at the sectoral level are in parentheses. Unionization is the rate of the number of union's registered members per number of estimated formal workers in the sector. Strikes are the ratio of the number of worker-days of strikes the number of workers-working days. Herfindahl is a concentration rate expressed as the percentage of workers in the sector's leading firm. *** p<0.01, ** p<0.05, * p<0.1

Table A.2: Employment effects

VARIABLES	(1) Jan-2004	(2) Jan-2005	(3) Jul-2005	(4) Jul-2006	(5) Jul-2007	(6) Jul-2008	(7) Jan-2010	(8) Jan-2013
$Post_t$	0.035***	0.029***	0.013	0.015***	0.017***	0.021***	0.032***	0.030***
	(0.004)	(0.004)	(0.010)	(0.004)	(0.006)	(0.004)	(0.007)	(0.005)
WG_s	-0.049***	-0.041***	-0.056***	-0.063***	-0.051***	-0.050***	-0.096***	-0.105***
	(0.006)	(0.006)	(0.008)	(0.007)	(0.017)	(0.014)	(0.008)	(0.013)
$Post_t \times WG_s$	0.029***	0.011**	-0.006	0.009	-0.000	0.000	0.033**	0.026***
	(0.007)	(0.006)	(0.009)	(0.006)	(0.011)	(0.008)	(0.013)	(0.010)
Age	0.003***	0.003***	0.003***	0.003***	0.004***	0.004***	0.004***	0.004***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Sex	0.005	0.004	0.004	0.011***	0.009*	0.016***	0.015***	0.012***
	(0.004)	(0.004)	(0.006)	(0.004)	(0.005)	(0.004)	(0.003)	(0.003)
Unionization	0.053***	0.058***	0.014	0.076***	0.064***	0.075***	0.054*	0.039
	(0.018)	(0.021)	(0.036)	(0.028)	(0.020)	(0.024)	(0.029)	(0.025)
Herfindahl	0.040	0.052*	0.092***	0.099**	0.041	-0.056	-0.046	-0.014
	(0.041)	(0.031)	(0.032)	(0.039)	(0.060)	(0.044)	(0.033)	(0.026)
Strikes	-0.161	-0.321	-0.522	-0.941**	0.060	-0.009	0.170	-1.338*
	(0.321)	(0.312)	(0.671)	(0.442)	(0.048)	(1.139)	(0.640)	(0.753)
Constant	0.751***	0.733***	0.755***	0.724***	0.703***	0.713***	0.684***	0.678***
	(0.009)	(0.011)	(0.022)	(0.010)	(0.010)	(0.012)	(0.012)	(0.012)
Observations	87,982	47,127	98,722	103,738	111,416	117,806	136,744	150,279
R-squared	0.020	0.026	0.019	0.024	0.024	0.027	0.031	0.031

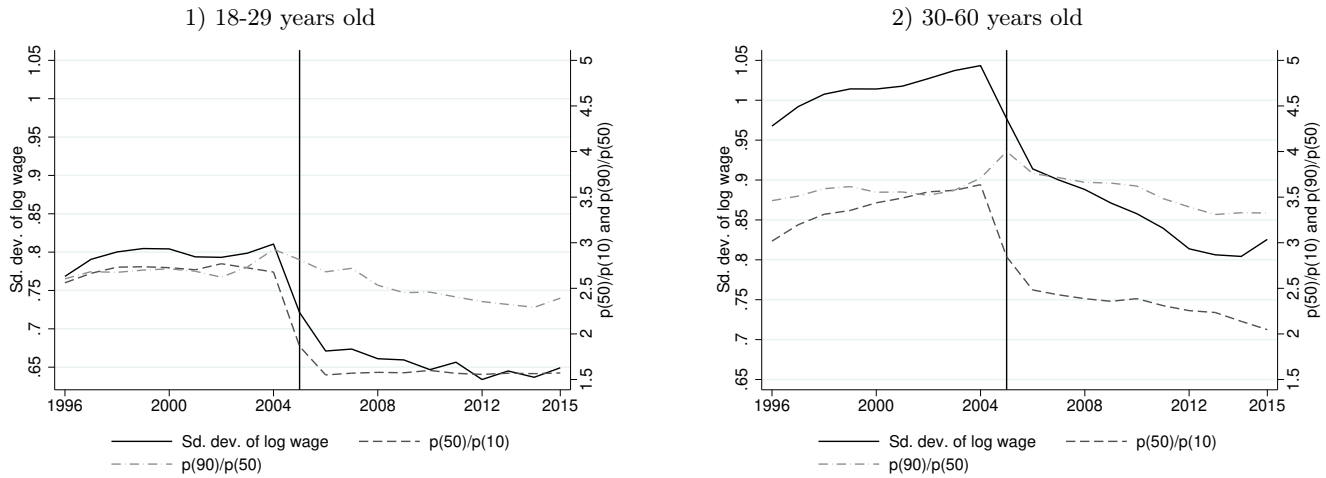
Notes. Difference in Difference estimation with sector definition: the last sector before the adjustment and first sector after the adjustment. The dependent variable indicates whether job i is or is not occupied in sector s at time t. Post takes a value of 1 after the national minimum wage adjustment or 0 otherwise. Wage gap (WG) is the gap between the national minimum each and the wage in the first ventile of the sectoral wage distribution. In order to assign for a sector before, we consider the last sector before the adjustment and we add those who are only employed after the adjustment. Standard errors clustered at the sectoral level are in parentheses. Unionization is the rate of the number of union's registered members per number of estimated formal workers in the sector. Strikes are the ratio of the number of worker-days of strikes to the number of workers-working days. Herfindahl is a concentration rate expressed as the percentage of workers in the sector's leading firm. *** p<0.01, ** p<0.05, * p<0.1

Figure A.1: Evolution of wage inequality by gender



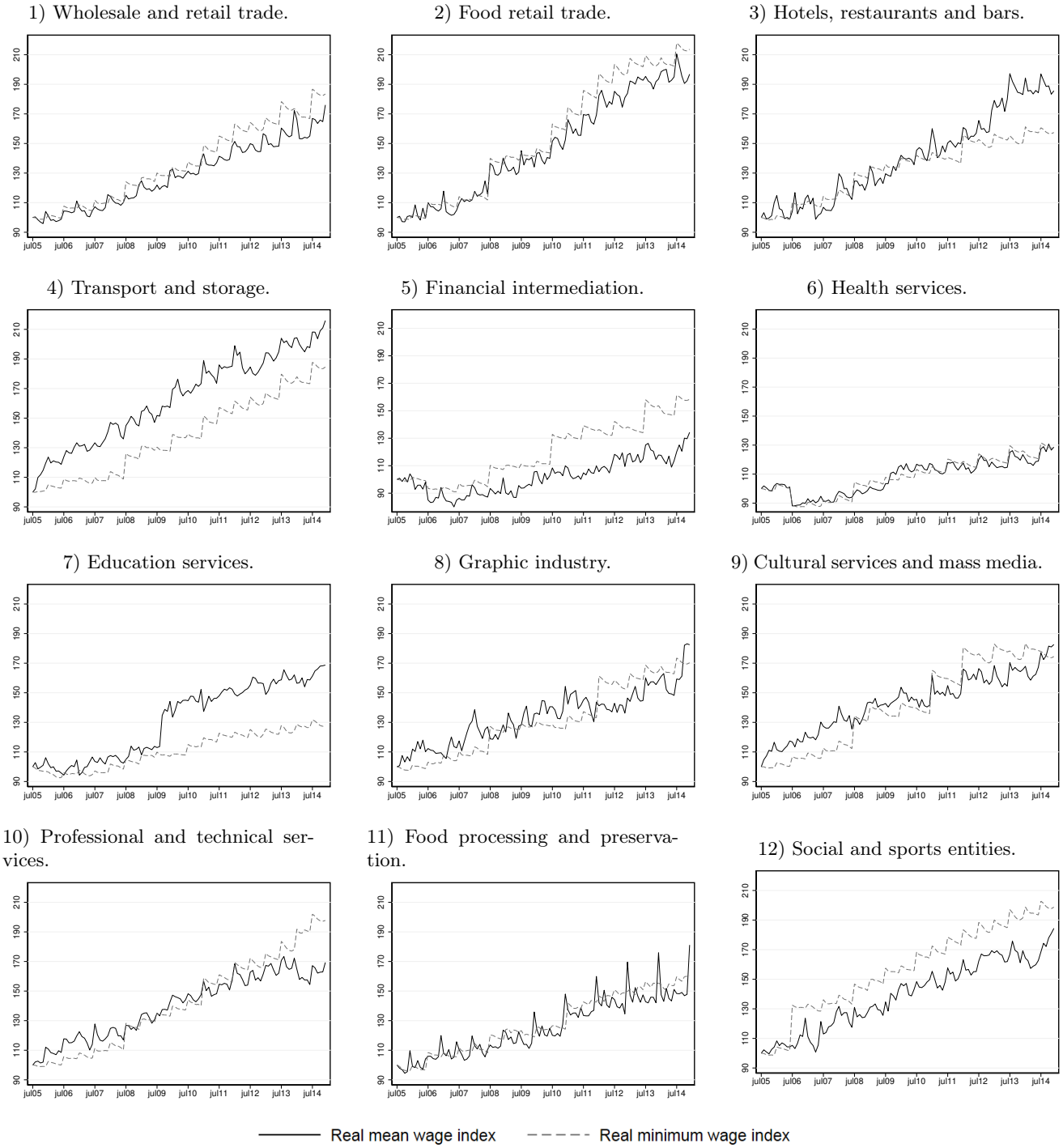
Notes. This figure shows the evolution of wage inequality, measured by the log of the real minimum wage, by the ratio of the value of the median decile to the bottom decile, and by the ratio of the value of the top decile to the median decile of the total wage distribution. Data are yearly averages. All wages are in December 2010 uruguayan pesos.
Source: BPS

Figure A.2: Evolution of wage inequality by age



Notes. This figure shows the evolution of wage inequality, measured by the log of the real minimum wage, by the ratio of the value of the median decile to the bottom decile, and by the ratio of the value of the top decile to the median decile of the total wage distribution. Data are yearly averages. All wages are in December 2010 uruguayan pesos.
Source: BPS

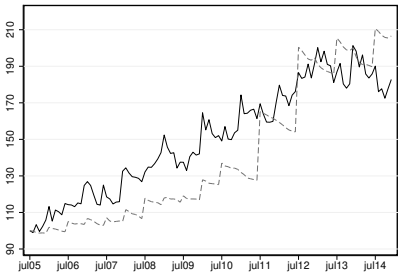
Figure A.3: Evolution of the Real Minimum Wage and Average Wage in each sector. Index =100 in July 2005



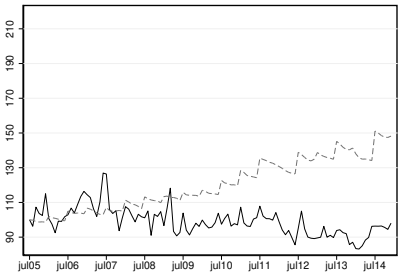
Notes. This Figure shows the evolution of the real minimum wage and the average wage in each sector (Index =100 in July 2005). The sample considers private sector workers between 18 and 60 years old whose wages are above the current minimum wage. Source: BPS.

Figure A.3: Evolution of the Real Minimum Wage and Average Wage in each sector. Index =100 in July 2005*(cont.)*

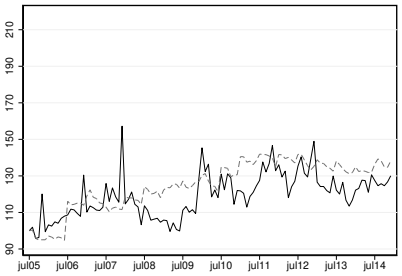
13) Meal processing industry.



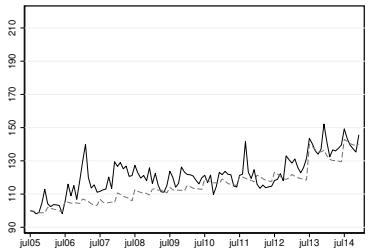
14) Fishing.



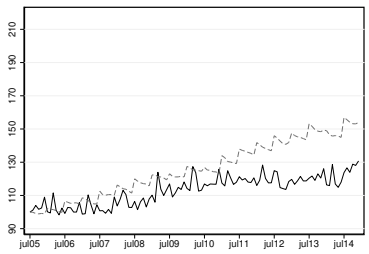
15) Leather industry.



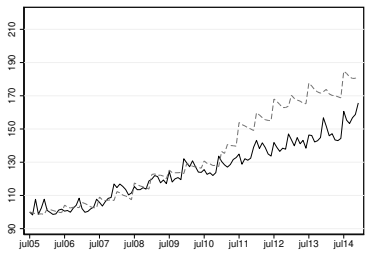
16) Wood, cellulose and paper industry.



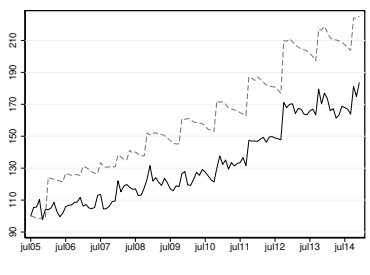
17) Chemical industry.



18) Metal product industry.

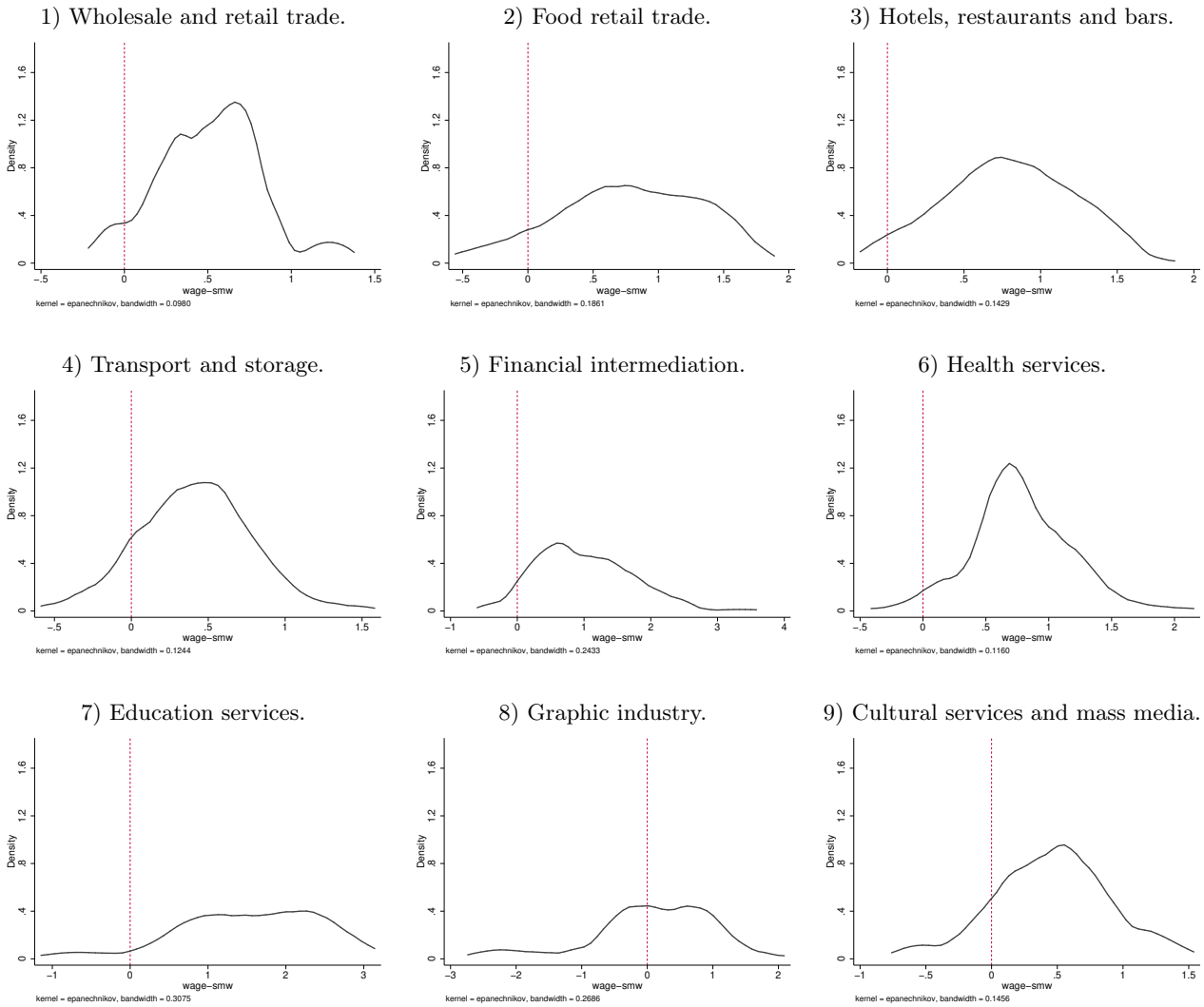


19) Construction industry.



Notes. This Figure shows the evolution of the real minimum wage and the average wage in each sector (Index =100 in July 2005). The sample considers private sector workers between 18 and 60 years old whose wages are above the current minimum wage. Source: BPS.

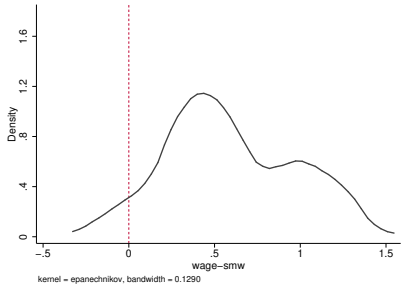
Figure A.4: Wage distribution centered in the next minimum wage by sector



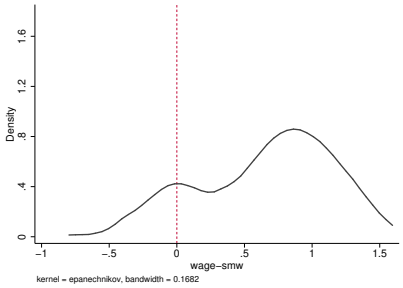
Notes. This Figure shows the estimated Kernel wage distribution by group centered in the next sectoral minimum wage.

Figure A.4: Wage distribution centered in the next minimum wage by sector *(cont.)*

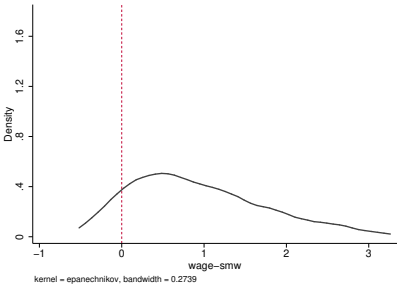
10) Professional and technical services.



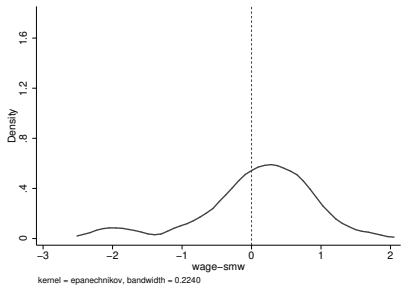
11) Food processing and preservation.



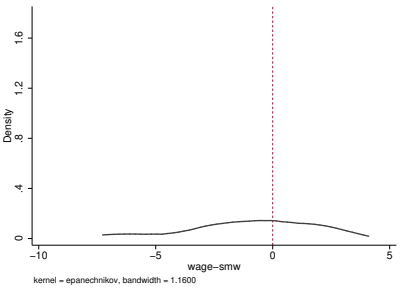
12) Social and sports entities.



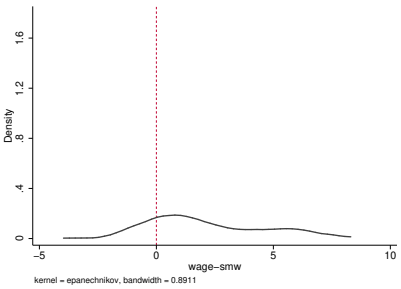
13) Meal processing industry.



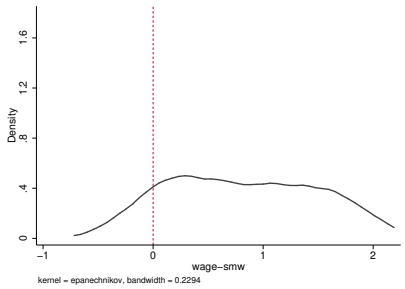
14) Fishing.



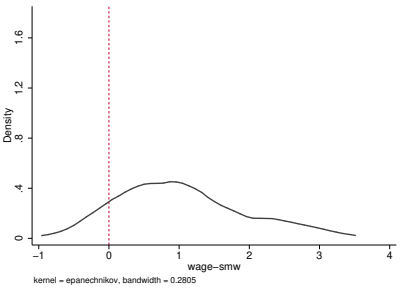
15) Leather industry.



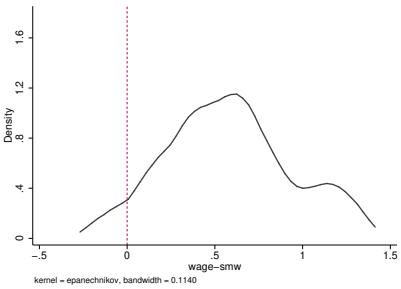
16) Wood, cellulose and paper industry.



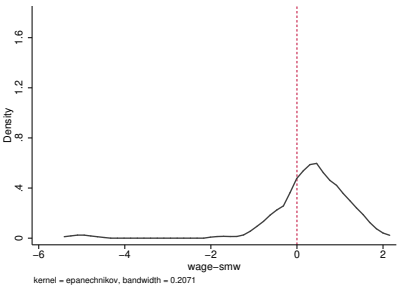
17) Chemical industry.



18) Metal product industry.

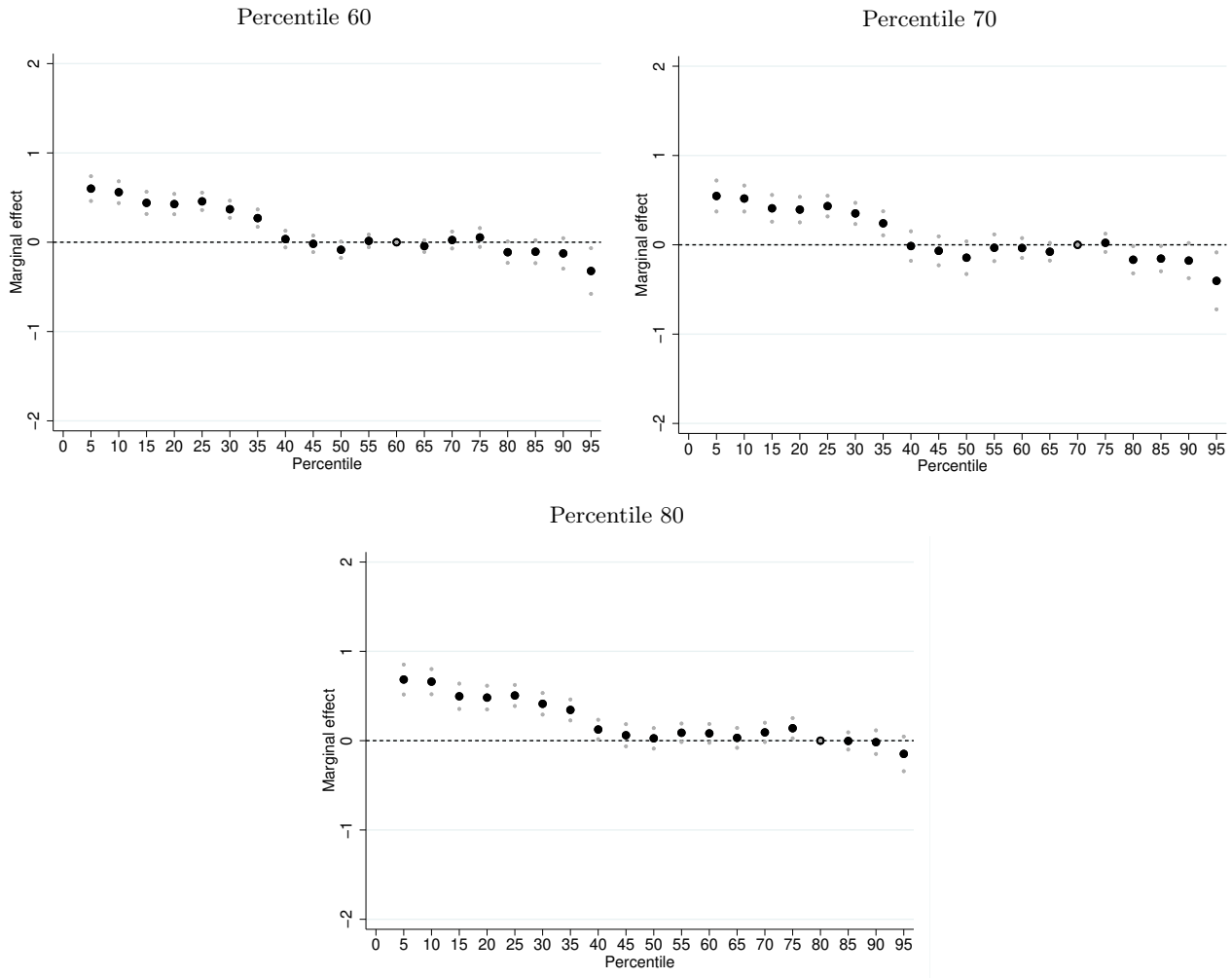


19) Construction industry.



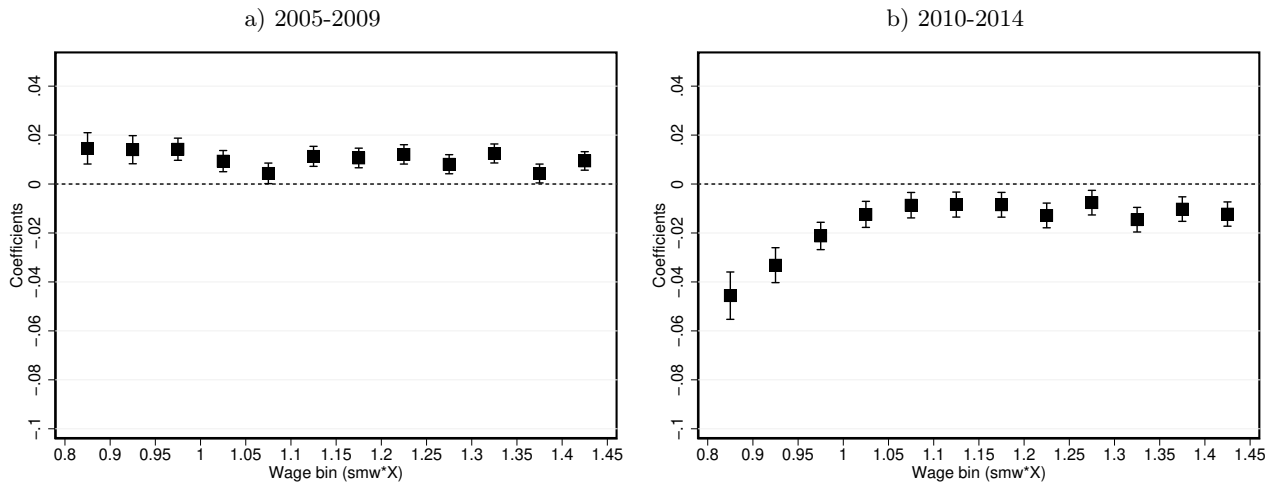
Notes. This Figure shows the estimated Kernel wage distribution by group centered in the next sectoral minimum wage.

Figure A.5: Wage inequality on the sectoral minimum wage by wage percentile. Robustness



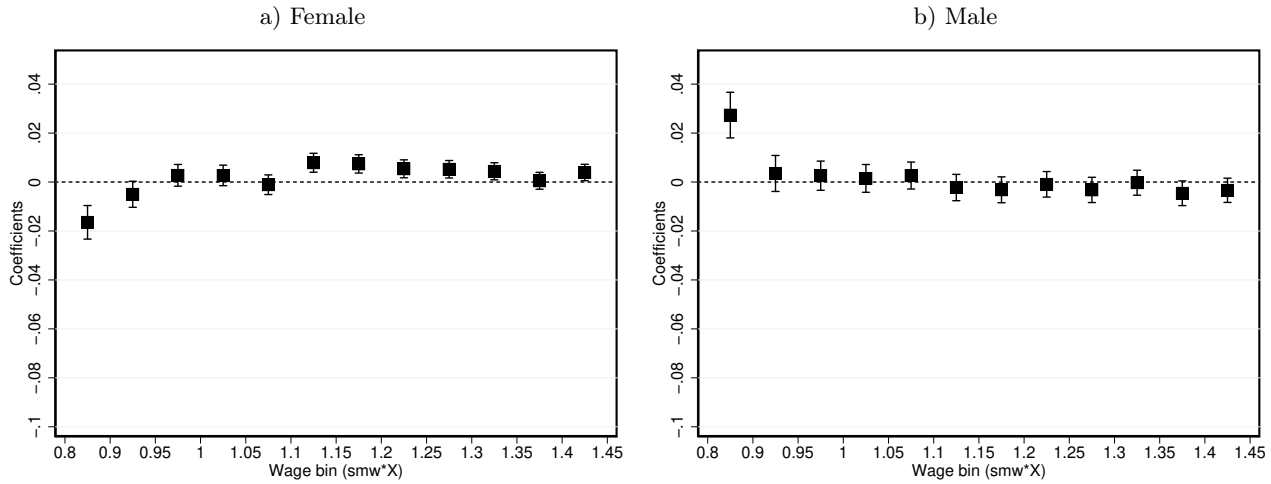
Notes. This figure shows in each plot the results of the marginal effects of our four specifications of the effect of the increase in minimum wages on the wage distribution, for the period between 2005 and 2014. Black dots correspond to point estimates of the effect of the increase in sectoral minimum wage on the differences between each ventile and the percentile 60, 70 and 80 of the wage distribution. Grey dots correspond to ninety percent confidence intervals. The sample includes all private sector jobs with workers between 18 and 60 years old.

Figure A.6: Employment effects at the bottom end of the distribution by period. Robustness



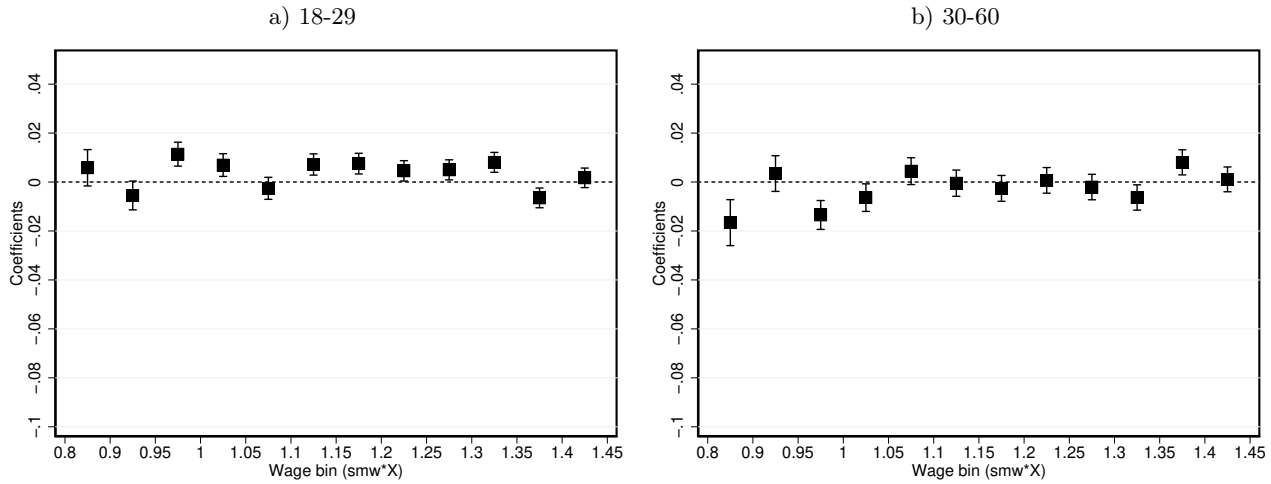
Notes. Estimates refer to coefficients $\gamma_{w_t t+1}$ in equation 5, when the outcome of interest is whether the worker remained employed in the private sector firm six months after the adjustment. The omitted bin is integrated by jobs whose wage before the adjustment was between 1.45 and 1.5 of the sectoral minimum wage after the adjustment. The estimation includes controls by age, real wage in levels, firm's seniority, sector of activity, the number of employees in the firm, rate of unionization, rate of strikes, Herfindahl rate, dummies by month and year, and worker fixed effects. Dots show point estimates, and bars represent ninety percent confidence intervals. We pool individuals earning between 0.8 and 0.9 of the sectoral minimum wage after the adjustment into one bin, since few individuals fall into this group.

Figure A.7: Employment effects at the bottom end of the distribution by gender. Robustness



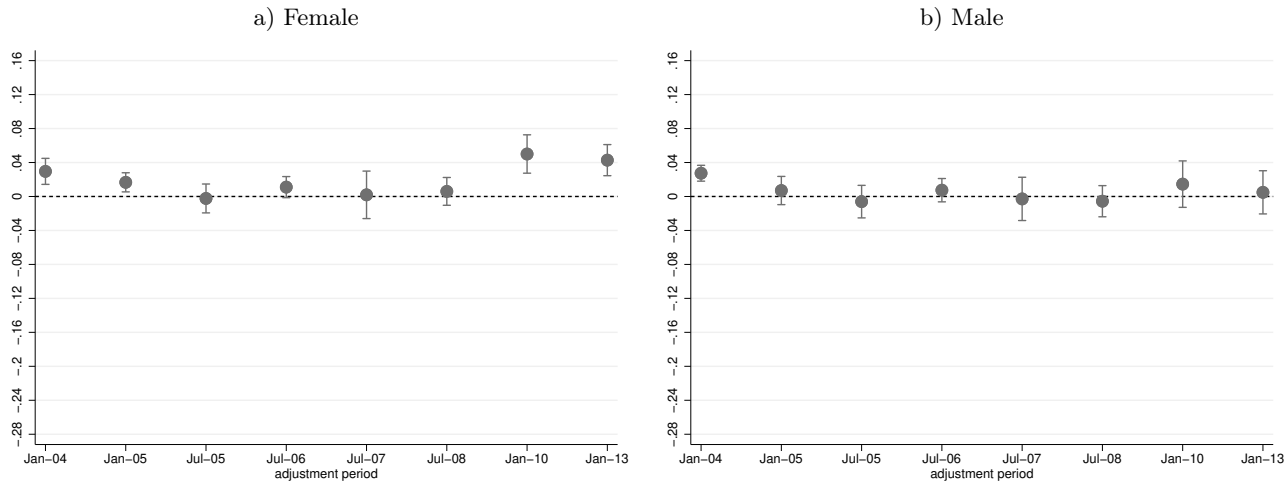
Notes. Estimates refer to coefficients $\gamma_{w_t t+1}$ in equation 5, when the outcome of interest is whether the worker remained employed in the private sector firm six months after the adjustment. The omitted bin is integrated by jobs whose wage before the adjustment was between 1.45 and 1.5 of the sectoral minimum wage after the adjustment. The estimation includes controls by age, real wage in levels, firm's seniority, sector of activity, the number of employees in the firm, rate of unionization, rate of strikes, Herfindahl rate, dummies by month and year, and worker fixed effects. Dots show point estimates, and bars represent ninety percent confidence intervals. We pool individuals earning between 0.8 and 0.9 of the sectoral minimum wage after the adjustment into one bin, since few individuals fall into this group.

Figure A.8: Employment effects at the bottom end of the distribution by age. Robustness



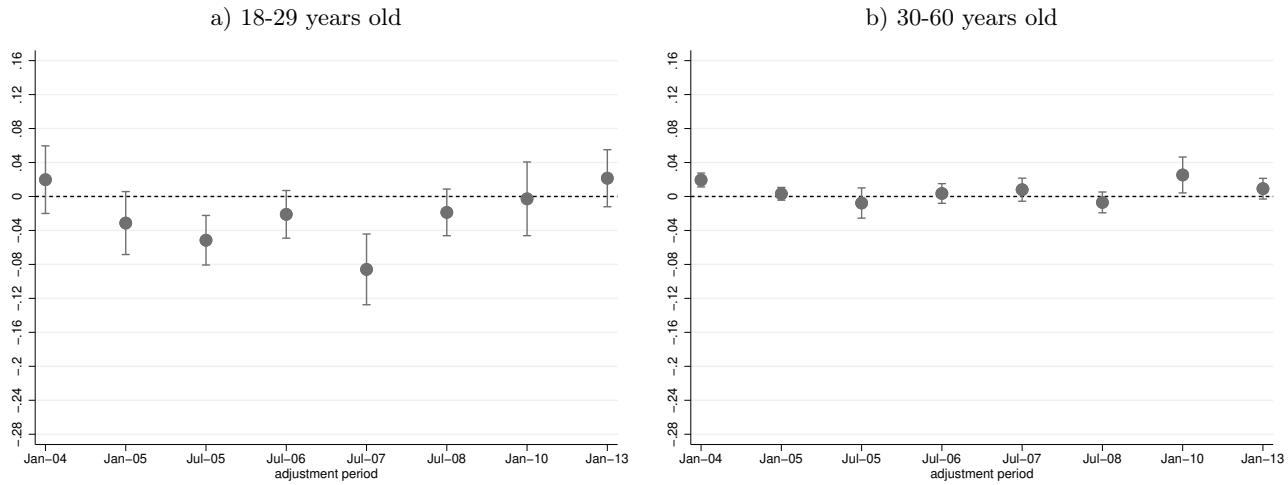
Notes. Estimates refer to coefficients $\gamma_{w_t t+1}$ in equation 5, when the outcome of interest is whether the worker remained employed in the private sector firm six months after the adjustment. The omitted bin is integrated by jobs whose wage before the adjustment was between 1.45 and 1.5 of the sectoral minimum wage after the adjustment. The estimation includes controls by age, real wage in levels, firm's seniority, sector of activity, the number of employees in the firm, rate of unionization, rate of strikes, Herfindahl rate, dummies by month and year, and worker fixed effects. Dots show point estimates, and bars represent ninety percent confidence intervals. We pool individuals earning between 0.8 and 0.9 of the sectoral minimum wage after the adjustment into one bin, since few individuals fall into this group.

Figure A.9: Employment effects, heterogeneity by gender



Notes. We estimate a Difference-in-Difference model, between before and after the national minimum wage adjustment, and the gap between the national minimum wage and the wage in the first ventile of the sectoral wage distribution. In order to assign for a sector before, we consider the last sector before the adjustment, and we add those who are employed only after the adjustment. The dependent variable takes a value of 1 in the pre-adjustment period and 1 or 0 in the post-adjustment period, depending on whether the job is maintained in the sector or not for jobs that already existed in the pre-adjustment period. Secondly, it takes a value 0 in the pre-adjustment period and 1 in the post-adjustment period for jobs created in the sector after the adjustment.

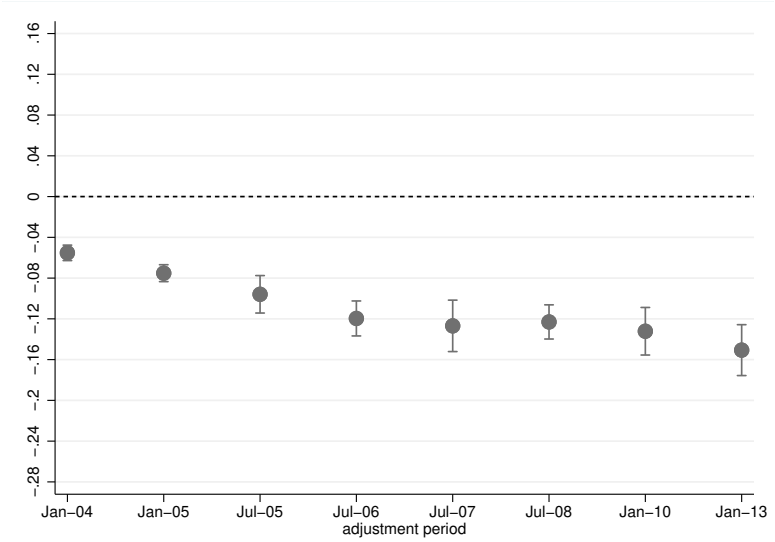
Figure A.10: Employment effects, heterogeneity by age



Notes. We estimate a Difference-in-Difference model, between before and after the national minimum wage adjustment, and the gap between the national minimum each and the wage in the first ventile of the sectoral wage distribution. In order to assign for a sector before, we consider the last sector before the adjustment, and we add those who are employed only after the adjustment. The dependent variable takes a value 1 in the pre-adjustment period and 1 or 0 in the post-adjustment period, depending on whether the job is maintained in the sector or not for jobs that already existed in the pre-adjustment period. Secondly, it takes a value 0 in the pre-adjustment period and 1 in the post-adjustment period for jobs created in the sector after the adjustment.

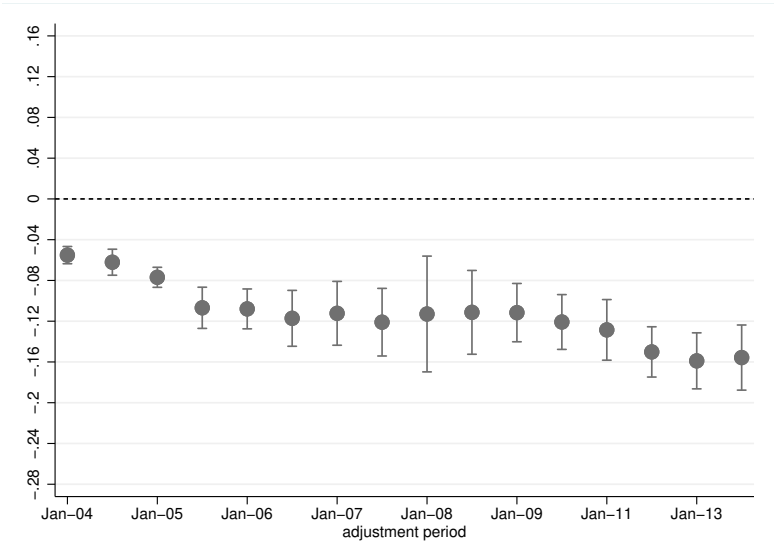
A.2 Appendix: Model

Figure A.11: Job displacement. Robustness



Notes. We estimate a Difference-in-Difference model, between before and after the national minimum wage adjustment, and the gap between the national minimum each and the wage in the first decile of the sectoral wage distribution. In order to assign for a sector before, we consider those who stay at least three months in the same sector.

Figure A.12: Job displacement. Robustness



Notes. We estimate a Difference-in-Difference model, between before and after the national minimum wage adjustment, and the gap between the national minimum each and the wage in the first ventile of the sectoral wage distribution. In order to assign for a sector before, we consider those who stay at least three months in the same sector.

A.3 Appendix

In this Appendix we explain the implications of change from geographical to sectoral minimum wage variations as in (Vandekerckhove et al., 2020). In the seminal paper of Lee (1999) propose use the variation in a cross sectional data using the Kaitz index by regions. He defines a relative minimum wages, as the difference between the national minimum wage and the median wage of the different regions.

$$w_{st}^{l} = w_{t}^{m} - w_{st}(50) \tag{B.1}$$

As in the paper of (Vandekerckhove et al., 2020), our first specification is a OLS model in the spirit of Lee (1999) in which instead of working with geographical divisions, we consider sectoral variations. Here $w_{st}(p)$ is the wage at percentile p in sector s at time t and, w_{st}^{m} the respective sectoral minimum wage. In our paper this is the OLS Model, we include a quadratic specification to capture the idea of those percentiles closed to the minimum would be more affected by the policy.

$$w_{st}(p) - w_{st}(50) = \alpha + \beta_1(p)\big(w_{st}^{m} - w_{st}(50)\big) + \beta_2(p)\big(w_{st}^{m} - w_{st}(50)\big)^2 + X_{st}'\gamma + \epsilon_{st} \tag{B.2}$$

The coefficient $\beta(p)$ takes different sign if the percentile p is below or above the median, e.g. a positive sign implies a reduction below and a expansion above. We can define the error term ϵ as the sum of sectoral unobserved deviation $\nu_s(p)$, time variation $\phi_t^{\nu}(p)$ and an error term.

$$\epsilon_s t = \nu_s(p) + \phi_t^{\nu}(p) + \eta_{st}^{\nu} \tag{B.3}$$

The coefficient $\beta(p)$ would be consistent if the observable are not correlated with the relative minimum wage by sector.

$$Cov\big(w_{st}^{m} - w_{st}(50), \nu_s(p)\big) = 0 \tag{B.4}$$

The coefficient can be inconsistent if both w_{st}^{m} and $w_{st}(50)$ are correlated with unobservables leading an endogeneity bias. First, we can decompose the median sectoral wage in the median wages in the sector κ_s, the time trend ϕ_t^{κ} and, an error term eta_{st}^{κ}.

$$w_{st}(50) = \kappa_s + \phi_t^{\kappa} + \eta_{st}^{\kappa} \tag{B.5}$$

This bias can be distinguish in a downward and upward bias depending in the part of the distribution respect to the median. Both Lee (1999); Autor et al. (2016) discuss about the endogeneity of the OLS specification, and to overcome it Autor et al. (2016) include sector-fixed effects in the estimation.

$$\begin{aligned} Cov(\kappa_s, \nu_s(p)) &< 0 \quad \text{for} \quad p < 50 \\ Cov(\kappa_s, \nu_s(p)) &> 0 \quad \text{for} \quad p > 50 \end{aligned} \tag{B.6}$$

In our paper this is the FE Model:

$$w_{st}(p) - w_{st}(50) = \alpha + \beta_1(p)\big(w_{st}^{m} - w_{st}(50)\big) + \beta_2(p)\big(w_{st}^{m} - w_{st}(50)\big)^2 + D_s + \theta_t + D_s \times \theta_t + X_{st}'\gamma + \epsilon_{st} \tag{B.7}$$

To analyze the second source of bias, w_{st}^{m} is decomposed in the average minimum wage ω_s, time trend ϕ_t^{ω} and an error term η_{st}^{ω}, as in the following equation.

$$w_{st}^{m} = \omega_s + \phi_t^{\omega} + \eta_{st}^{\omega} \tag{B.8}$$

Again here, there would be a downward and upward bias, depending in the part of the distribution

respect to the median

$$\begin{aligned} Cov(\omega_s, \nu_s(p)) < 0 \quad \text{for} \quad p < 50 \\ Cov(\omega_s, \nu_s(p)) > 0 \quad \text{for} \quad p > 50 \end{aligned} \tag{B.9}$$

This source of bias was not analyzed in depth in papers that works with a geographical division. To overcome this bias, we include in all the specifications: the union density, working days loss due to strikes and a concentration index by sector (these variables are included in the vector X_{st}). Union density control the union power between firms in the bargaining process, the second one, is how the bargaining process could be affected by strikes and conflict, and the concentration index, if in sector a little bunch of firms concentrate all the market.

The third source of bias documented in Autor et al. (2016) due to the presence of $w_{st}(50)$ on both sides in OLS specification. To overcome this bias they instrument $w^m_{st} - w_{st}(50)$ with w^m_{st}

$$Cov(w_{st}(p) - (w_{st}(50) + \eta^{w(50)}_{st}), \epsilon + \eta^{w(50)}_{st}) < 0 \quad \text{for all} \quad p \tag{B.10}$$

In our paper, we consider first the fixed effect model substituting $(w^m_{st} - w_{st}(50))$ for only w^m_{st}, this is the FE2 Model:

$$w_{st}(p) - w_{st}(50) = \alpha + \beta_1(p)\big(w^m_{st}\big) + \beta_2(p)\big(w^m_{st}\big)^2 + D_s + \theta_t + D_s \times \theta_t + X'_{st}\gamma + \epsilon_{st} \tag{B.11}$$

Similarly as in Autor et al. (2016) we instrument $\big(w^m_{st} - w_{st}(50)\big)$ and $\big(w^m_{st} - w_{st}(50)\big)^2$ by w^m_{st}, $\big(w^m_{st}\big)^2$, and $\big(w^m_{st}] * w_{st}(50)\big)$. The in our paper, the IV Model is

$$w_{st}(p) - w_{st}(50) = \alpha + \beta_1(p)\big(w^m_{st} - w_{st}(50)\big) + \beta_2(p)\big(w^m_{st} - w_{st}(50)\big)^2 + \theta_t + D_s + D_s \times \theta_t + X'_{st}\gamma + \epsilon_{st} \tag{B.12}$$

The first and the second step are defined as follow:

$$\begin{aligned} \big(w^m_{st} - w_{st}(50)\big) &= \delta^1_0 + \delta^1_1 w^m_{st} + \delta^1_2\big(w^m_{st}\big)^2 + \delta^1_3\big(w^m_{st} * w_{st}(50)\big) \\ \big(w^m_{st} - w_{st}(50)\big)^2 &= \delta^2_0 + \delta^2_1 w^m_{st} + \delta^2_2\big(w^m_{st}\big)^2 + \delta^2_3\big(w^m_{st} * w_{st}(50)\big) \end{aligned} \tag{B.13}$$

$$w_{st}(p) - w_{st}(50) = \alpha + \beta_1(p)\big(w^m_{st} \widehat{-\, w_{st}}(50)\big) + \beta_2(p)\big(w^m_{st} \widehat{-\, w_{st}}(50)\big)^2 + D_s + \theta_t + D_s \times \theta_t + X'_{st}\gamma + \epsilon_{st} \tag{B.14}$$

To compute finally the marginal effects as:

$$\beta_1(p) + 2\beta_2(p)(w^m_{st} - w_{st}(50)) \tag{B.15}$$