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Distributive and displacement effects of a coordinated wage bargaining scheme

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Resumen

El aumento de la desigualdad en los países desarrollados hace que las políticas salariales y sus implicancias sobre los mercados de trabajo vuelvan a estar en el centro de atención política y económica. En los países en desarrollo, sin embargo, las políticas salariales son uno de los principales instrumentos elegidos por los gobiernos para hacer frente a la desigualdad y la pobreza. Este artículo tiene como objetivo evaluar los efectos distributivos y efectos desplazamiento de una política salarial que presenta un esquema coordinado de negociación salarial colectiva y un salario mínimo nacional. Estimamos el impacto en la distribución salarial, el desplazamiento sobre puestos de trabajo y el empleo de esta política salarial, que consta de más de doscientos salarios mínimos sectoriales y un salario mínimo nacional. Encontramos que la política salarial reduce la desigualdad en la parte inferior de la distribución salarial para todos los trabajadores formales y afecta el extremo derecho para los trabajadores varones. Este efecto distributivo no se alinea con el efecto destrucción de puestos de trabajo en el extremo inferior de la distribución sectorial, y este pequeño efecto se desvanece cuando consideramos la entrada de nuevos trabajadores. Finalmente, cuando analizamos el impacto en toda la distribución, observamos que para aquellos sectores con la distribución salarial más a la izquierda, encontramos un mayor efecto de desplazamiento, pero nuevamente si evaluamos el desempeño del empleo total, encontramos impactos nulos.

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

Código JEL: J21, J31, J38, J58, K31

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Abstract

The rise in inequality in developed countries returns to the political and economic spotlight wage policies and their implications for labor markets. In developing countries, however, wage policies are one of the main instruments chosen by governments to deal with inequality and poverty. This paper aims to assess the distributive and displacement effects of a wage policy featuring a coordinated collective wage bargaining scheme and a national minimum wage. We estimate the impact on wage distribution, job displacement, and employment of this wage policy, which consists of more than two hundred sectoral minimum wages and a national minimum wage. We find that the wage policy reduces inequality in the lower tail of the wage distribution for all formal workers and affects the right bottom for male workers. This distributive effect does not align with the significant deployment effect in the bottom sectoral distribution, and this small effect fades out when we consider the entrance of new workers. Finally, when we analyze the impact on the whole distribution, we observe that for those sectors with the more left wage distribution, we find a bigger displacement effect, but again if we assess the performance of the total employment, we find null impacts.

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

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

1 Introduction

Wage policies have been one of the main public policy tools used to reduce both poverty and inequality in the last decades, although theoretically wage can affect several macroeconomic outcomes and there is a lack of trustworthy evidence of all potential effects of such policies (Clemens, 2021; Dube, 2019). For example, there is some agreement about the equalizing effect of a minimum wage on earnings, but the evidence is inconclusive regarding its impacts on the whole wage distribution or even on employment (Manning, 2016; Brown, 1999). Much of the evidence documents effects on employment or hours worked in the directly affected population, the binding lower-tail of the distribution; meanwhile, the presence of spillovers on the higher-tail is not clear a prior (Card and Krueger, 1994; Dickens et al., 1999; Lee, 1999; Fortin and Lemieux, 2000; Autor et al., 2014, 2016; Dube, 2019). Therefore, in this paper we ask how a set of wage policies impacts the labor market of a developing country: its wage distribution, job displacement, and employment.

The specific role of collective bargaining on wages, employment, and macroeconomic performance, although far from a closed issue, is a less lively debate, mainly because these types of institutions are not common in the US, and in Europe have lost relevance in the last decades. Calmfors and Driffill (1988) poses the idea that centralized (at a national or state level) and decentralized (at a firm level) bargaining schemes achieve better outcomes than those in between, such as industry-level bargaining. However, cross-national evidence does not clearly support this hump-shape hypothesis, and it is necessary to introduce into the analysis other dimensions of bargaining, such as coordination type or the degree of flexibility (Garnero, 2020; Traxler et al., 2001; Traxler and Brandl, 2012).

In the last decades, the increasingly popular highly decentralized bargaining scheme has led to a rise in heterogeneity among similar firms, boosting wage cushions paid to some workers (Card and Cardoso, 2021), and increasing overall wage inequality (Garnero, 2020; Devicienti et al., 2019; Bosch, 2015). By setting a minimum wage and even more, collective bargaining agreements play a key role in smoothing the rising trend of inequality that most economies have experienced (Autor et al., 2016; Dustmann et al., 2020).

Since the beginning of the twentieth century, wage policies have generated multiple discussions (Fishback and Seltzer, 2021), but it is from the seminal article of Card (1992) that the empirical economic literature about minimum wages in US proliferated. In theory, a higher and more binding minimum wage in the context of competition would 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, which helps to explain the role of regulations on 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 a minimum wage increase, firms can respond by increasing prices, revenues, or decreasing mark-ups; changing their wage structure; or reducing hiring and the quality of the outcome, instead of the canonical model prediction about employment destruction (Harasztosi and Lindner, 2019; Azar et al., 2019; Bodnár et al., 2018; Giupponi and Machin, 2018).

We also expect differential impacts on wages and employment as a result of collective bargaining agreements that vary by industry and their characteristics (Boeri et al., 2019; Flanagan, 1999). Centralized schemes bind firms and have a distributive effect, but stricter coordination of adjustments can diminish this impact over time (Vandekerckhove et al., 2018a; Rycx, 2003). In schemes that allow firms or regions wider flexibility, we expect 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).

Then, in a developing country we would expect a higher and consistent effect on wage distribution and employment. (Neumark and Corella, 2019; Neumark, 2018; Grau et al., 2018; Ham, 2018; Broecke et al., 2017). First, a bigger share of binding wage low-skilled jobs means more potential beneficiaries, but at the same time, these jobs are more susceptible to adverse consequences. Firms can decide to destroy or not create this type of job and reduce the wages of those located below the median. Second, low levels of enforcement make the informal sector an option for firms to evade labor regulations, even if they are formal. These features lead to more substantial impacts on binding wage jobs and generate spillover on others. Third, the standard explanation of the low impact through monopsonistic labor markets for developed countries could be relaxed by the presence of low-productivity and informal firms (Azar et al., 2019; Bhaskar et al., 2002). Finally, income inequality is the main problem in developing countries. Given the role of the wage in incomes across almost the whole distribution, this enlarges policymakers' potential impact.[1]

[1]In Latin America, even after some decades of exceptional growth rates, Gini indices are still above 0.4 and even above 0.5. There was a large decrease in Uruguay's income inequality, particularly in wage inequality, between 2005 and

Policymakers deal with significant challenges in improving low-income workers' conditions, increasing depressed wages, and maintaining macroeconomic performance (Belman and Wolfson, 2016). Moreover, in the context of a developing country with high levels of informality, low enforcement, and significant shares of low-skilled workers, we can expect more adverse consequences on jobs and employment among the potential beneficiaries, shrinking wage distribution among low-paid registered workers firstly (Lemos, 2009; Neumark and Corella, 2019; Soundararajan, 2019). Inequality can be reduced either because there is a drop in employment levels caused by the destruction of lower-income jobs or because of the rise of lower-paid workers' income when there is no effect on employment. If we only analyze formal workers, the concentration of income could increase only if higher-wage increases occur for those located in the distribution's right tail.

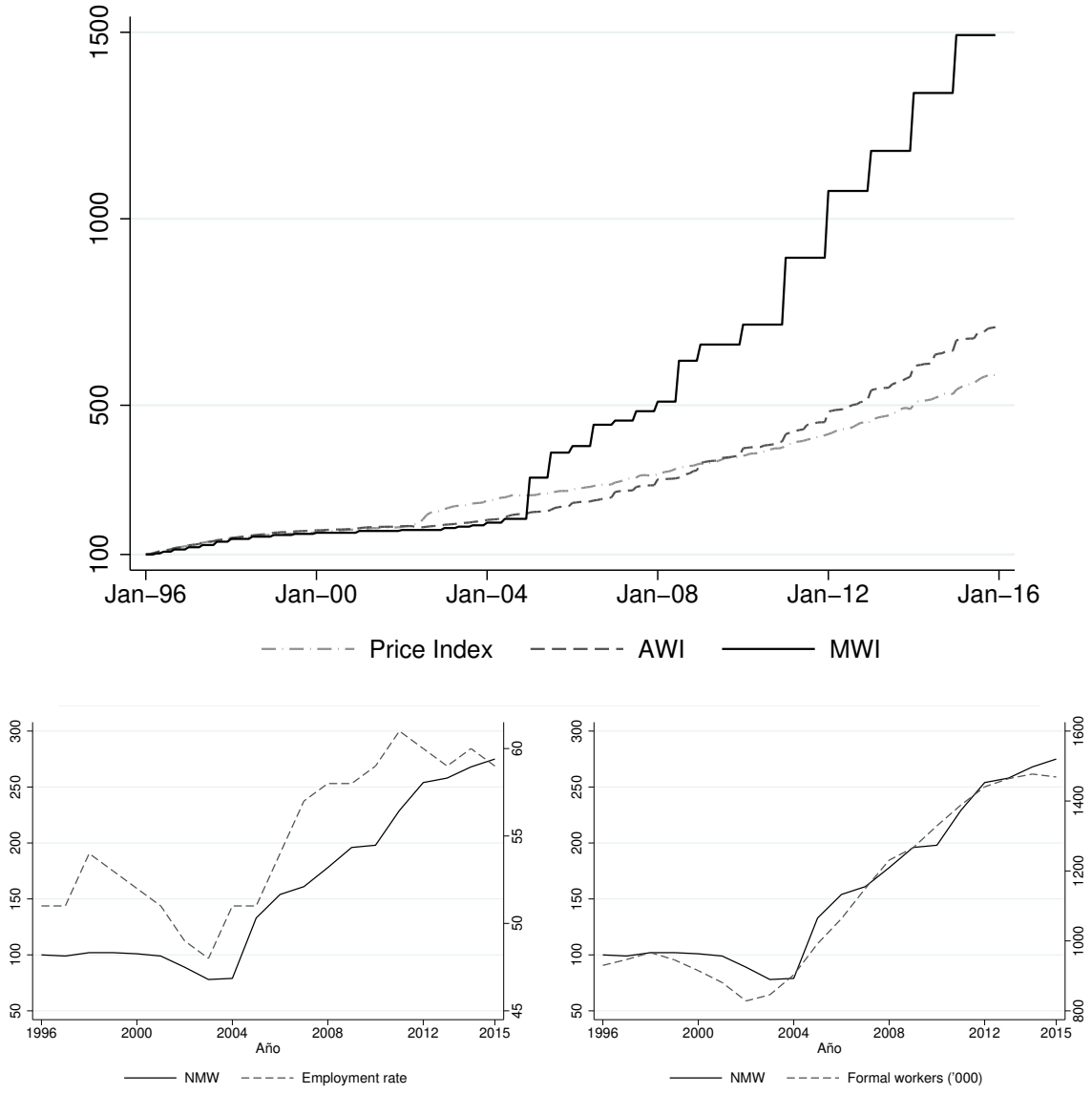
In this paper, we assess the effect of wage policies on wage dispersion and jobs in the private sector in Uruguay between 2004 and 2014. Two main changes in Uruguay's wage policies occurred: first, a systematic rise in the national minimum wage (NMW) of 234% in real terms, making it binding (see Figure 1 and Figure 2), and second, the introduction of a wage bargaining scheme that sets minimum wage by industry and occupation. Periodically, more than two hundred sectors set salaries depending on government boundaries, sectoral performance, and the bargaining power between workers' unions and employers' federations. We use data from a representative sample of the social security administrative records at the individual level, matched with firm characteristics for 2004-2014 and sectoral minimum wages (SMW). Our central hypothesis is that this coordinated wage collective bargaining scheme affects the wage distribution more than only an increase in the national minimum wage would have. We also expect a higher displacement effect due to the movement of the set of sectoral minimum wages. We expect these results to be smoother between 2005-2009 with high growth in formal employment, and afterwards between 2010-2014 with slower growth, but a higher degree of coordination.[2] We also expect major effects on populations for whom minimum wages are more binding: female and young workers, and on those sectors with wage distributions further to the left.

Our results show that the implemented wage policy has generated distributional effects; we analyze the wage-setting by bargaining scheme, which reduces dispersion in low and high percentiles of the

2015.

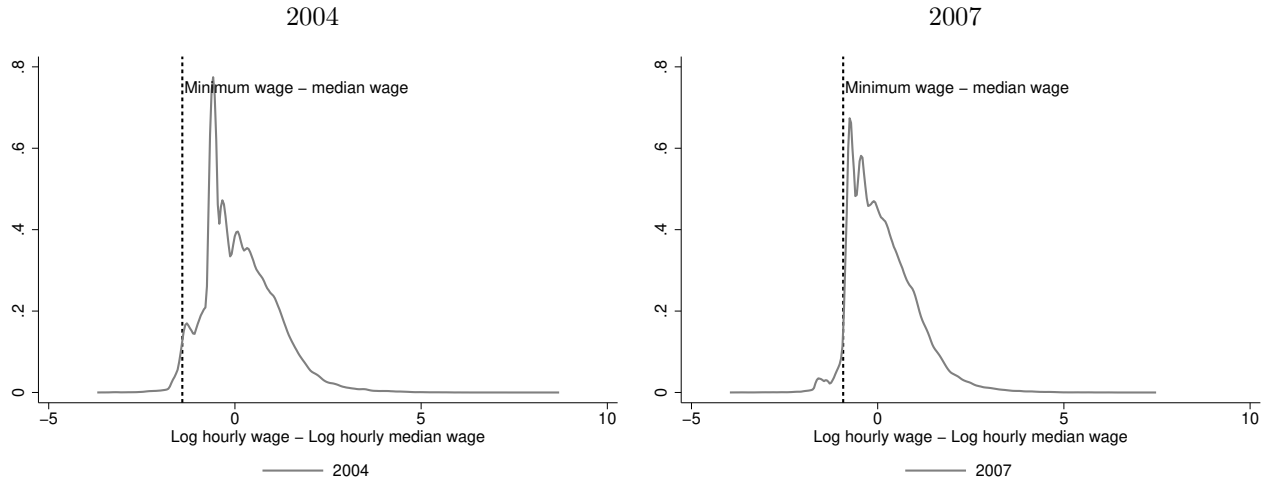
[2]Informality can have different impacts on distribution, displacement, and employment. We expect informality to amplify the effect on displacement and employment, because there is a greater room for firms to decide to pay workers informally before the lay-off. Informality can also mediate the effects on distribution, displacement, and employment can affect the sorting wages in firms and sectors, impacting the final distribution.

Figure 1: Average Wage Index, Minimum Wage Index and Price Index



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 panel, we estimate the yearly NMW taking 1996 as 100. Employment rate is estimated from the National Household Survey. In the third panel, the number of formal workers comes from 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 national minimum wage and the median wage is estimated considering a contract of 40 hours per week. Source: INE, BPS

wage distribution. First, this reduction is higher in the left tail and much more relevant during 2005-2009. There are no significant changes in the upper part of the wage distribution in the case of women. We find a negative impact of the SMN on bottom wage distribution jobs in 2010-2014, mainly among female workers. As the wage policy also raises the NMW, we estimate the gap between the NMW and the fifth centile of the sector wage distribution on job displacement. We find a negative but minor impact on those more binding sectors during the whole period, with higher effect on females and those workers below the thirties. But, in any case, when we consider the impact on employment, all these effects disappear.

We make three contributions to the literature: first, we contribute to documenting the effects of a wage policy with several SMWs from a collective bargaining scheme and a NMW on the wage distribution, formal jobs, and employment level in a developing country with high informality and inequality. We compute the quantitative impact of this wage policy on the wage distribution, analyzing changes in the regulatory scheme and those workers with different degrees of bindingness. Second, we use a novel database of social security administrative records matching workers and firms and the SMW from a collective bargaining scheme over ten years. We can identify better than other papers in the literature both earnings and wage policy. In our data, we have the precise wage and the number of hours that the firm declares for each worker, and the exactly timing and coverage of the wage policy. As we exploit the heterogeneity by sector and time, we can match the exact moment that the new wage

agreement became active. Finally, we contribute to the discussion of government market regulations and the design of collective bargaining. Government guidelines change the degree of coordination and decentralization of collective bargaining to preserve the employment level in the least dynamic sectors but fix stricter adjustments for the lowest wages to avoid poverty risks.

2 Institutional setting

Since 1948, Uruguay has had a collective bargaining scheme in which workers' unions and employers' federations negotiate and set minimum wages for the private sector by industry, with a NMW serving as the general floor threshold for all wages, public and private.

The scheme design is tripartite, bargaining with government, workers' unions, and employers' federations, who set minimum wages consistently above the NMW. In the last decades, there have been many labor reforms and wage policy changes. We highlight two main periods: first, between 1993 and 2004, the government interrupted collective bargaining, and the NMW level was too low and therefore not binding. During that period, there was a completely decentralized scheme, and firms and their workers bargained to set wages. In 2005, there were two main changes: the NMW started to rise above the inflation rate and collective bargaining agreements were restored.

The government set the NMW to adjust annually without any required negotiation.[3] Then, above the NMW, collective bargaining has many steps. First, as in a centralized and coordinated scheme, the government sets bargaining deadlines and guidelines on the structure and magnitude of wage increases.[4] Second, workers' unions and employers' federations bargain until they reach an agreement in accordance with the general government guidelines, which has to be confirmed by the government in a national act.[5] Through bargaining, they set the SMW and all mandatory wages for all non-professional job categories of workers. Agreements must include wage adjustment by occupation, and can also include other features of job conditions. There are 24 bargaining groups split into subgroups.[6] So, the current bargaining scheme sets minimum wage floors at a group or subgroup level higher than the NMW, and wage increases are set with high coordination. In this paper, we work at the subgroup-level with only

[3]Between 2006 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 workers' unions, and two from the employers' federations. However, the government has the right to impose its view in any decision.

[5]Since 2011, this government confirmation has been excluded as a necessary condition

[6]For example, Group number one is Food processing and preservation industries, one subgroup is the Diary industry, and another is the Sugar industry.

19 of the 24 groups and 80 SMW.

In Table 1, we present the main characteristics of the scheme and each bargaining round. Between 2005 and 2009, there were biannual agreements that only set the SMW (and the wage adjustment) by occupation, based on the expected inflation rate plus a percentage of real wage increase that reaches in some cases 2.5%. In this period, the main objective was to raise wages after the severe 2002-2003 recession. In the second period, between 2010 and 2014, the government promoted long-term agreements (12 months and then 24 or 30 months), set differential and higher adjustments for the lowest wages, and implemented much more wage coordination with differential adjustments consistent with sectoral macroeconomic performance.[7]

[7]For example, in the 2012-2013 round, the national government guidelines depended on macroeconomic performance (GDP growth rate) and a sectoral performance classification: dynamic, regular, or recessive. For those 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 real adjustment.

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 defined 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/

To summarize, between 2005 and 2014, Uruguay had a scheme of setting minimum wages that combined an NMW with SMWs that arose from the collective bargaining process. In turn, the bargaining system was characterized by a high level of coordination (between sectoral agreements, with the NMW adjustments, and consistent with the sectoral macroeconomic performance) and coverage, and an intermediate degree of centralization (at the sectoral level).

3 Data

The main database is an unbalanced panel of Uruguayan firms and employees, consisting of a monthly firm and employee level for April 1996 through April 2016. The data set is a representative sample of 300,000 workers, matched with their firms with at least one month of activity in the period, and all data from workers in those firms comes from the social security administrative record conducted by the social security affairs agency in Uruguay.[8]

The available worker-level information includes the date of birth, sex, the nationality of the individual, as well as if the job is public or private, the type of contract (e.g., training, short-term), hours worked, tenure in the position, and wage and other compensations for all contemporaneous jobs. This information is matched with firm-level information that includes industry class (5 digits, ISCI, fourth revision), employment, number of employees and owners, and firm tenure. In short, we can construct the employment trajectories of 300,000 individuals along almost 20 years.

Each subgroup of collective bargaining can be mapped with a specific industry class (5 digits, ISCI, fourth version), and we can match this database with the relevant administrative records. Then, we construct a novel database that contains all the minimum wages by industry and the exact month that the agreement became compulsory, matched with the administrative records. This allows us to control more precisely the reference binding salary for each worker. The SMW refers to the lowest wage floor in each sector, corresponding to the lowest category of activity.

We do not consider jobs in domestic service and those linked to rural work (agricultural, fruit, and forestry industries). In turn, the textile sector is excluded because of its particular behavior in the period we examine. Nor do we consider workers that were employed at the same time in the public sector. Finally, we have a dataset with 10,024,301 observations, corresponding to 105,021 individuals.

[8] In Spanish Banco de Prevision Social (BPS)

4 Descriptive statistics

The minimum wage can affect the wage distribution and employment. The effectiveness of the minimum wage in reducing salary inequality depends on the salary structure of the economy and its binding capacity.

During the years considered in this study, the NMW increased more rapidly than the median wage or the price index. Specifically, between 2004 and 2014, the rate of the real NMW increased 234%, while the rate of the real median wage in the economy grew 55% (Figure 1). At the same time, the labor market showed a dynamic performance. The employment rate had strong growth until 2011, while the number of registered workers continued to increase throughout the period (see the second and third panels of Figure 1).

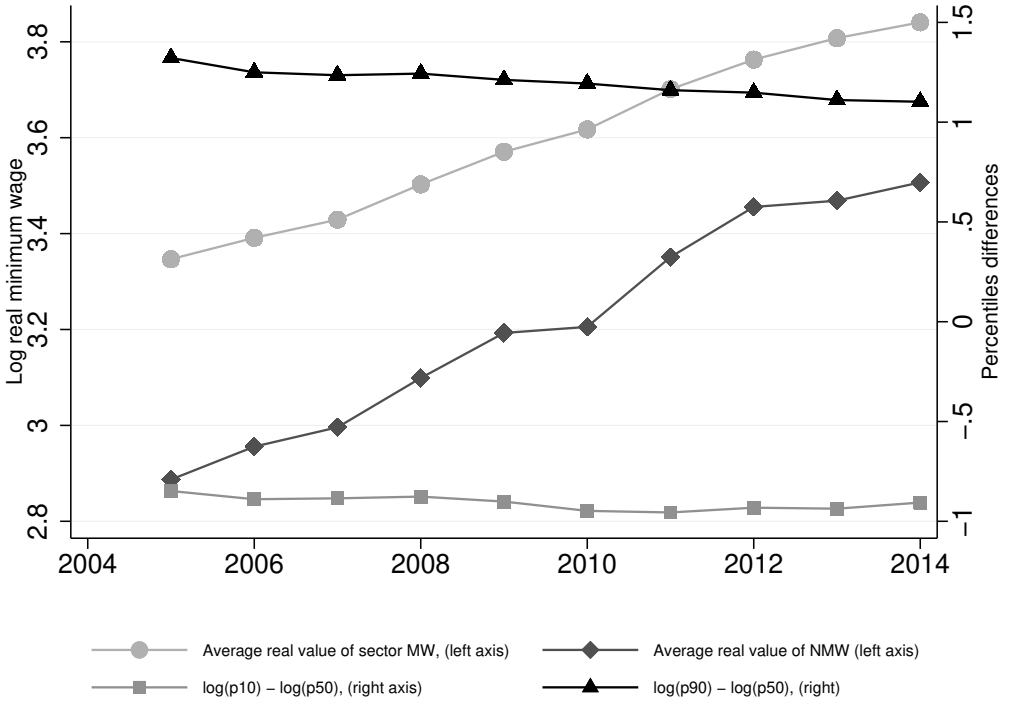
Figure 2 shows that, while in 2004 the minimum wage was not operative in the economy, in 2007 the distribution of wages of formal workers is based on the value of the minimum wage. That is, in just three years it became operative. The sustained increase in the minimum wage in real terms allowed it to play a key role in the labor market.

Beyond the NMW increase, each industry increased its minimum wage. In Figure 3, it can be observed that just as the NMW increased steadily, so did the average wage of the different sectors. The same figure shows the evolution of the differences between the value of the lower decile and the median of the total wage distribution, and the difference between the value of the top decile and the median of the total wage distribution. While the first does not present large movements, the second shows a decrease. That is, the difference between the value of the top decile and the median of the total distribution was reduced, which would explain part of the distributional improvement.

Beyond the mean, there are differences between sectors that can be seen in the wage distributions in Figure 4. In this case, we group the sectors into tertiles according to the minimum wage in 2005 and 2014. We observe that there is a shift in the density functions over the period. In other words, there is a smaller distance between these densities, which indicates a reduction in the wage differences between sectors.

In this paper, we work with 19 sectors or industries. In Table 2, we show the descriptive statistics on the distribution of wages for each industry in 2005 and 2014. In both years, the SMW is heterogeneous, with a difference of more than 50% between the extremes, although this difference decreases during the period. We also observe this pattern throughout the distribution; the heterogeneity in the relationship

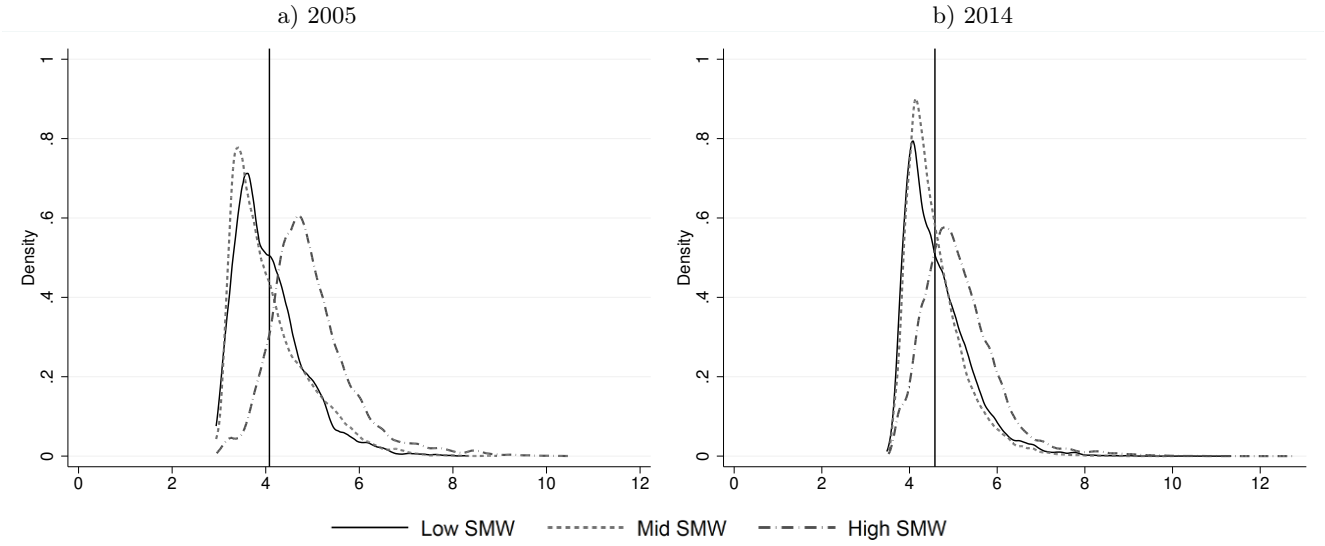
Figure 3: Trends in Sectoral and National Minimum Wages and Lower- and Upper-Tail Inequality



Notes. This figure shows the evolution of National Minimum Wage, the average sectoral minimum wage, and the differences between the value of the bottom decile and the median of the total wage distribution, and the difference between the value of the top decile and the median of the total wage distribution. Data are monthly averages. All wages are in December 2010 uruguayan pesos.

between the 90th and 50th percentiles is reduced in almost all sectors over the period, and we observe a similar situation in the bottom part of the distribution (50th/10th), where the difference between the extremes of the median falls from more than six times to three times. We observe that all sectors present a relevant rise of the minimum wage, but there is substantial heterogeneity in timing and magnitude among them. In some groups, the real increase in the whole period is more than 100%, in others, only about 30% (the sawtooth shape indicates the different timing of the adjustments). The mean wage also presents significant differences by sector. In Figure A.1, we show the evolution of the real minimum wage and the average wage in each sector. Figure A.2 shows the estimated Kernel wage distribution for industries centered in the next SMW.

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 consider all private jobs with workers between 18 and 60 years 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.

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 of each sector (SMW), the ratio between the top decile and the median (p90/p50), the ratio between the median and the bottom decile (p50/p10), the median decile of the wage distribution by sector, the ratio between the sectoral minimum wage and 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 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. Uruguayan pesos of December 2010.

In Table 3, we present heterogeneities between sectors regarding their level of unionization, labor conflict (strikes), and concentration. Unionization and strikes allow us to approximate the level of conformity of the workers in each industry as well as the organizational capacity of their unions, elements that are linked to wages. Here, there was a slight increase in the average unionization level, but the variations were different by industry. Comparing 2005 with 2014, while some saw a decrease in the percentage of unionized workers (e.g. Transport and storage and Financial intermediation), others more than doubled the share of their unionized workers (e.g. Fishing; Wood, cellulose, and paper; and Construction). 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 between sectors, with the Construction industry standing out as one that considerably increased the number of days lost. Finally, the last two columns of Table 3 show the value of the Herfindahl index for each industry in 2005 and 2014. The Herfindahl index in this case summarizes the employment concentration of the companies in each industry. On average, there is a drop in the concentration of the number of employed persons per company. The sectors that stand out for having registered an increase in concentration are Financial intermediation and the Leather industry.

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 number of union registered members per number of estimated formal workers in the sector. Strikes are the rate of the number of worker-days of strikes over the number of workers- working days. We also compute a concentration rate (Herfindahl) as the percentage of workers in the sector's leading firm.

To summarize, we observe a minimum wage that increases both generally and in all individual

sectors throughout the period, becoming more binding. In addition, there is a reduction in wage dispersion throughout the entire distribution based on a variety of indicators. Likewise, behavior at the union level shows a slight increase in the level of unionization without major alterations. These changes occur in a heterogeneous way among the different sectors studied.

5 Methodology

The main objective of this paper is to study the distributive effects of a centralized bargaining scheme. First, we follow the methodology proposed by Lee (1999) to estimate the effect of the minimum wage on wage inequality through the impact of the gap between the state minimum wage and the median wage on wage dispersion.[9] The equation we estimate is a simple OLS model with the following specification:

$$w_{st}(p) - w_{st}(50) = \beta(p)[w^m_{st} - w_{st}(50)] + \epsilon_{st} \tag{1}$$

In our framework, instead of using geographical variation, we exploit sectoral variation as in Vandekerckhove et al. (2018b), where $w_{st}(p)$ indicates the wage percentile p for sector s at time t and w^m_{st} is the SMW at time t. The effectiveness of minimum wages on decreasing wage dispersion depends on the degree of bindingness. Typically, the 50th percentile is considered a sufficiently high income level such that wages at that percentile and above will not be affected by the minimum wage.

As this estimation can be biased if the average wage level of each state/sector is systematically correlated with the level of latent inequality in it (Autor et al. (2016)), we estimate a similar model but include fixed effects by sector and time (γ_s and θ_t), fixed effects by sector-time ($\gamma_s \times \theta_t$), and controls that vary by sector and time (X'_{st}). The second model we estimate is a FE model:

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

However, both OLS and FE models suffer from a division bias issue with the inclusion of $w_{st}(50)$ on both sides of the equation, meaning it is used in the construction of both the dependent and the independent variable. Models 3 and 4 take account this problem. In model 3, we substitute the relative

[9] This methodology, with variations, was applied in Autor et al. (2014) for United States, Bosch and Manacorda (2010) for Mexico and Vandekerckhove et al. (2018b) for Belgium.

minimum wage $w^m_{st} - w_{st}(50)$ for the absolute minimum wage; this is the Reduced Form estimation.

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

Model 4, proposed by Autor et al. (2016), is an instrumental variable model (2SLS IV) whose instrument is the relative minimum wage with the SMW.

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

Finally, we compute the marginal effects as:

$$\beta_1(p) + 2\beta_2(p)(w^m_{st} - w_{st}(50)) \tag{5}$$

Models from Equation 2 to Equation 4 include fixed effects by sector, time, time-sector trends, and other controls like union density, strikes, and a concentration index by sector. We estimated the three equations for ventiles of the wage distribution. We now explore the minimum wage's impact on jobs to explain the distributional effects, and as the literature is not conclusive about the impact of the minimum wage on employment, we follow two alternative approaches.

In the first approach, we focus exclusively on the lowest tails of the sectoral distributions. Those jobs with wages in t below the SMW in $t+1$ would receive a higher adjustment than those jobs with a similar wage in t but that exceeds the minimum legal wage in $t+1$. Indeed, in Figure 5 we observe that the difference in the adjustments is higher for those jobs with wages below the next minimum wage than for those jobs which have a higher salary. We define as treated those jobs with wages below the next SMW ($w^m_{st} \leq w_{ist} < w^m_{st+1}$), and the control group we compare them with are those jobs with wages 10% or more above the next minimum wage ($w^m_{st+1} \leq w_{ist} \leq 1.1 \times w^m_{st+1}$) (see Figure 6). The strategy is to estimate the regression model:

$$y_{it+n} = \theta + \beta V_{ist} + Z'_{it}\alpha + X'_{st}\gamma + \eta_i + \epsilon_{it} \;\; i = 1, ..., N; \;\; t = 1, ..., T \tag{6}$$

$$V_{ist} = \begin{cases} \left(w^m_{st+1} - w_{ist}\right)^\delta & \text{if } w^m_{st} \leq w_{ist} < w^m_{st+1} \\ 0 & \text{if } w^m_{st+1} \leq w_{ist} \leq 1.1 \times w^m_{st+1} \end{cases}$$

with $\delta = \{0, 1, 2\}$

y_{it+n} indicates whether job i is occupied or not at time $t + n$, with n being six months after each adjustment; Z_{it} represents a vector of personal control variables: age group and sex; X_{st} is a vector of sectorial characteristics: level of unionization, labor conflict (strikes), and concentration; η_i are fixed effects that reflect unobservable individual specific characteristics; and ϵ_{it} are standard disturbance terms, assumed to be *iid* with a zero mean and constant variance. We define the treatment with the set of violation indices proposed by Bhorat et al. (2013) in the spirit of FGT measures of poverty. In our case, if $\delta = 0$, the treatment V is a dichotomous variable that indicates whether a job's wage is below the next adjustment. If $\delta = 1$, the treatment V is the gap between the wage and the next adjustment, and if $\delta = 2$, we put more weight in a larger deviation.[10]

We present in Table 4, rows one and three, the size of our treatment and control groups, respectively, in each year of analysis (row two is an alternative definition of the treatment group). The significant difference between the number of workers in each group between 2005 and subsequent years is a result of the fact that the increase in SMW started in July of 2005.

Table 4: Jobs in each group 2005-2014

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
				Panel A: Treatment group						
Between minimums	1832	6651	6159	10675	6155	11212	10468	6408	11322	9765
Exact SMW_t	388	766	727	909	873	1051	1009	750	720	997
				Panel B: Control group						
10% threshold	4409	10272	11395	13251	12938	13911	14839	14165	14926	11990

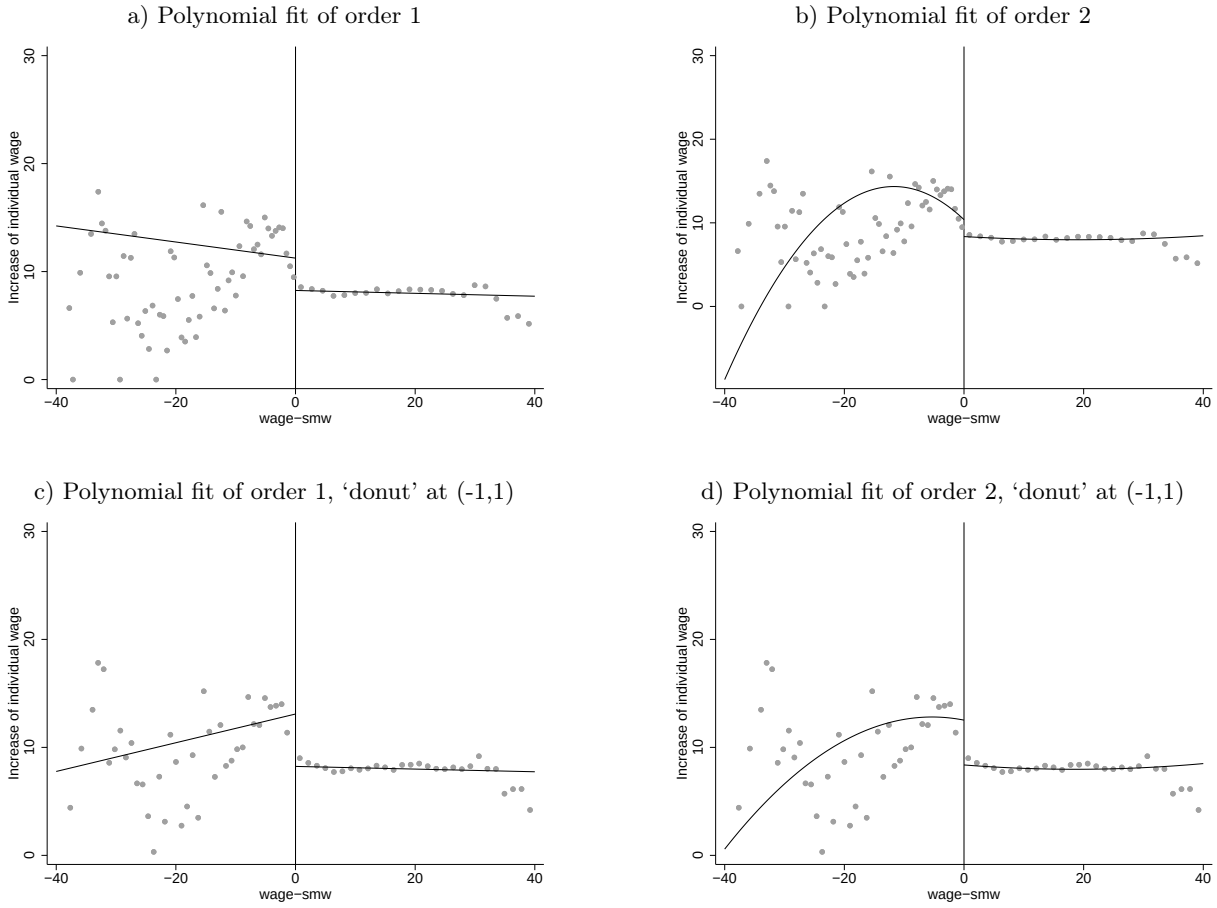
Notes. The sample has all private jobs with workers between 18 and 60 years old. The treatment group *between minimums* refers to jobs whose wages are greater than or equal to the current sectoral minimum wage, but less than the next sectoral minimum wage. The treatment group *Exact* SMW_t refers to jobs whose wages are equal to the current sectoral minimum wage. Controls are those jobs whose salary is as much 10% greater than the next sectoral minimum wage.

For a correct estimation of the results, at least two assumptions must be verified. First, that there is no manipulation of individuals on the variable that determines one group or another in the chosen environment.[11] Second, there must be no jumps in the density of the assignment variable around the cut-off point. The different panels in Figure 5 illustrate the continuity of the density function of

[10] To provide further robustness to the results, they are estimated considering different affected groups and comparison groups. Figure 6 specifies the alternatives discussed; the preferred specification is such that the treated jobs are between *minimums*, and the group of those who earn up to 10% more than w_s^m as $V = 0$.

[11] A correlation analysis is performed between salary and a set of characteristics of the individuals at different periods of time; results in Table A.1 show no significant systematic differences between the groups.

Figure 5: Mean of individual wage increases by bin of the difference between wage and sectoral minimum wage



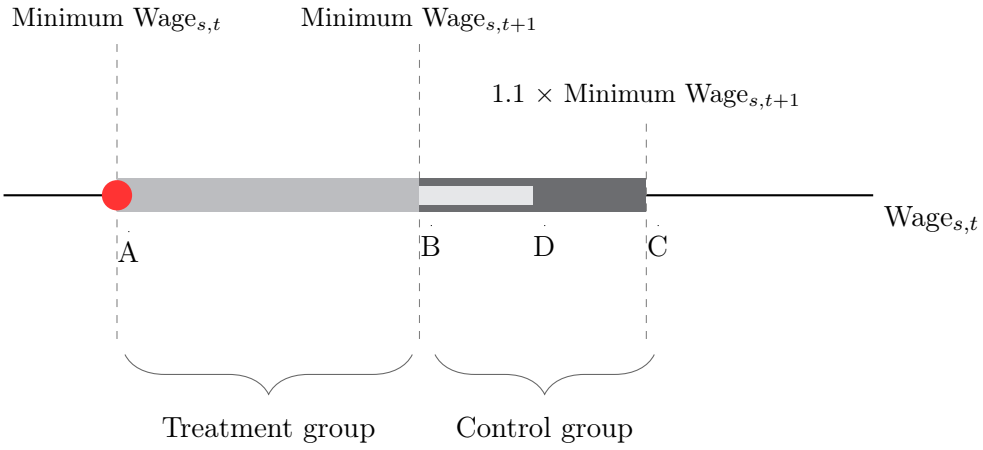
*Notes.*This graph shows the mean individual increase in wages by category of wage less sectoral minimum wage. To plot this graph we take the mean of all individual wage variations between minimum wage increases, and then we plot the mean increase by category.

the targeting instrument, contributing evidence in support of the non-manipulation of individuals and giving validity to the fact that people are randomly distributed around the threshold.

In the second approach, we work with the effect of NMW changes on jobs by sector.[12] As each change coincides with some sectoral adjustments, we work with the gap between the next NMW (NMW_{t+1}) and the current first sectoral decile for wage ($w_{st}(10)$), and the effect on the probability of keeping a job six month after the adjustment. Thus, we estimate the following difference-in-differences

[12]We use the significant increase in the minimum wage that happened in Uruguay between 2004 and 2014, and we exploit the heterogeneous increases by sector to estimate the effect of a centralized bargaining scheme on registered jobs. During these years, due to the reinstatement of collective bargaining, it is not possible to differentiate the effect of the national minimum wage policy from that of collective bargaining; therefore, we will estimate the impact on job displacement of the general changes in wage regulations.

Figure 6: Treatment definitions



$\overline{AB} \longleftrightarrow \overline{BC}$ Treatment group between $MW_{s,t}$ and $MW_{s,t+1}$ vs 10% threshold above $MW_{s,t+1}$

$A \longleftrightarrow \overline{BC}$ Treatment group exact $MW_{s,t}$ vs 10% threshold above $MW_{s,t+1}$ *Notes.* The scheme presents the treatment definition to analyze job and employment displacement in the bottom tail of the distribution. We define as treated those jobs whose wage in the sector s is between the current minimum wage at time t and the minimum wage in the sector s in the next adjustment $t+1$. In the control group, there are those jobs whose wage is between the minimum wage in the sector in the next adjustment and a cushion of 10% above. We also estimate our models with exactly the minimum wage (A) as job treated and a cushion of 10% above as a control group for the robustness check.

regression model:

$$Y_{ist} = \beta_0 + \beta_1 \text{POST}_t + \beta_2 \text{GAP}_s + \beta_3 \text{POST}_t * \text{GAP}_s + X'_{it}\gamma + \nu_{ist} \tag{7}$$

Y_{ist} indicates whether or not the job i is occupied in sector s at time t, $POST$ takes a value of one six months after the adjustment or zero otherwise; X_{it} is a vector of control variables: firm's seniority, age group, real wage, quantity of workers on the firm, level of unionization, labor conflict (strikes) and concentration; and ν_{ist} are standard disturbance terms. To construct a measure of the intensity of the minimum wage, we define the GAP_t as $log(NMW_{t+1}) - log(w_{st}(10))$ as in Dinkelman and Ranchhod (2012); Lee (1999). In our case, we construct GAP by sector rather than geography, so the intensity of the treatment depends on the sector in which the job is located. Sectors with very low wages prior to the wage adjustments therefore have a large positive value for GAP_{st}. In this case, β_3 is the difference-in-differences parameter: how job stability changes after wage adjustments in sectors in which the national minimum wage is more binding.[13] Therefore, we use the differences between the

[13]In Figure A.2, we show the heterogeneity between sector wage distribution with respect to the SMW.

sectors to determine how the average sector would be affected if the GAP variable increases.[14]

6 Results

Our first hypothesis is whether Uruguay's wage policy is related to the contraction of the wage distribution and job displacement on the lower tail of the distribution. In the literature, there is evidence about the squeeze of wage policies in the lower tail of the distribution, but there are no conclusive results about the whole distribution and job displacement. We start by describing these expected impacts of the wage policy: the set of sectoral minimum wages established by the collective bargaining scheme, and the NMW.

Our second hypothesis is about the effect of the wage policy on the bindingness of wages on different populations. To assess this hypothesis, we estimate deferentially, female and youth wages and jobs, and then we split our period in two, considering first a period of high economic growth and relatively low government coordination, and a second period with the opposite situation.[15] Finally, we include explicitly the other piece of the wage policy, the national minimum wage and its effect on those sectors whose wage distribution is more binding.

6.1 Wage policy on distributive effects

We estimate the distributive impact by ventiles and sectors following the four models in Autor et al. (2016) including worker, firm, and sectoral controls. We present a set of graphs that show the effect of the collective bargaining scheme through the set of SMWs on the wage distribution by the gap between the wage ventiles and the median wage, sector by sector. Thus a positive (negative) coefficient for those ventiles below (above) the median implies a wage distribution contraction. All our results are presented by gender, age, and two periods. We split our period in two, 2005-2009 and 2010-2014, because the government changed guidelines for 2010 bargaining to increase wage coordination and boost meager wages.

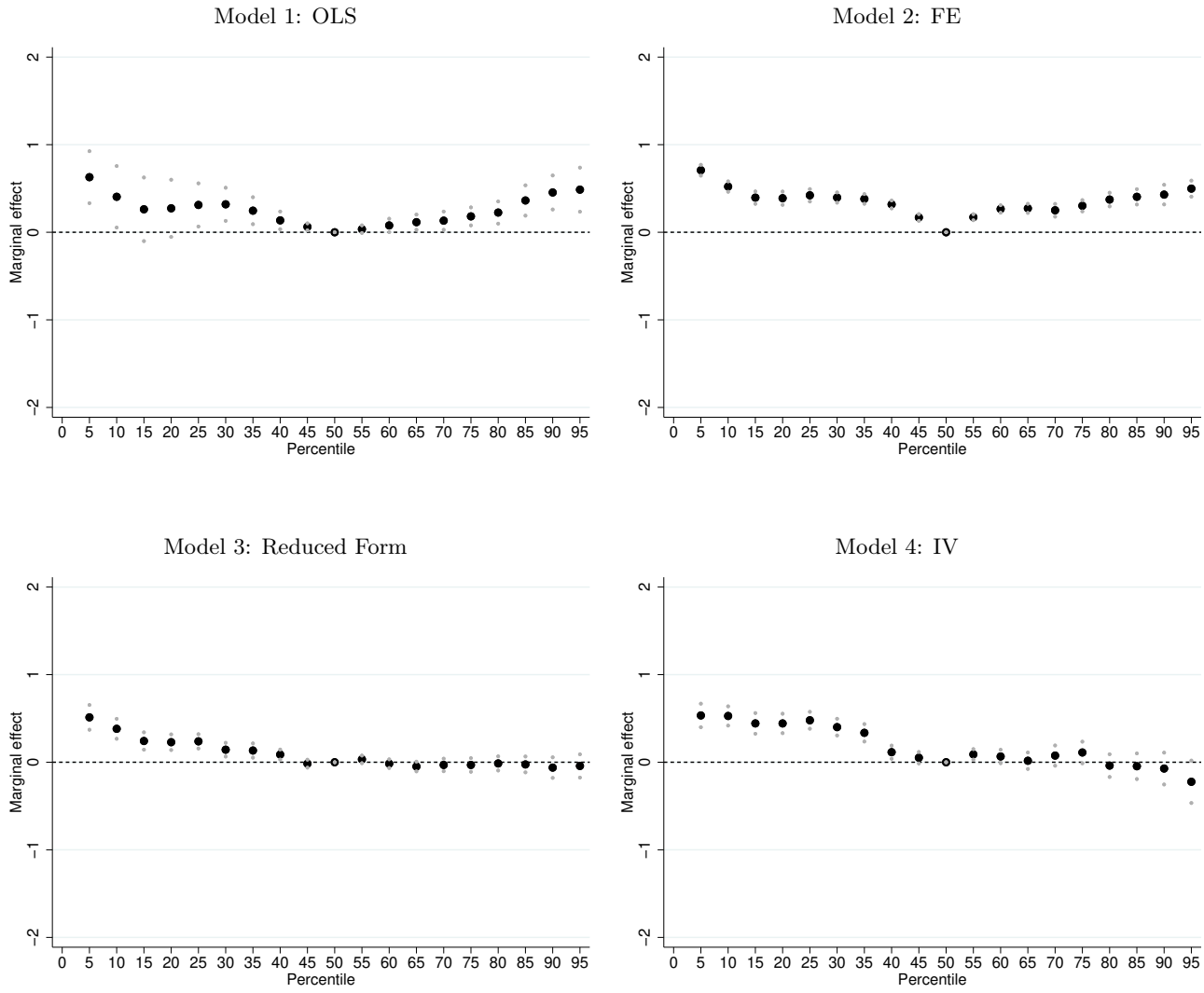
In the four panels of Figure 7, we show the results for the four models presented above: a simple OLS estimation, the same OLS model but including fixed effects by sector and time trends by sector,

[14] 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 on jobs.

[15] 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.

an IV model in one stage, and an IV estimation. Our preferred model, the IV in panel four, shows the marginal effect $(\beta_1(p)+2\beta_2(p)(w^m_{st}-w_{st}(50)))$. We find a sharp contraction of the wage distribution in the left tail explained by the SMW until the 40th percentile. These effects decrease in the distribution with marginal effects of 50% up to the 10th percentile, 40 % between the 15 and 30 percentile, and only around 10% in the 40th percentile, as seen in Table 5. However, we did not find significant effects of the wage policy on the changes in the distribution's right tail.

Figure 7: 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 specification of the effect of the increase on minimum wages on the wage distribution. Black points corresponds to punctual estimation of the effect of the increase in sectoral minimum wage on the differences between each ventile and the median of the wage distribution. Grey points correspond to ninety percent confidence intervals. The sample includes all private jobs with workers between 18 and 60 years old.

We perform the set of models by gender, age, and period; in Figure 8 we show only our preferred

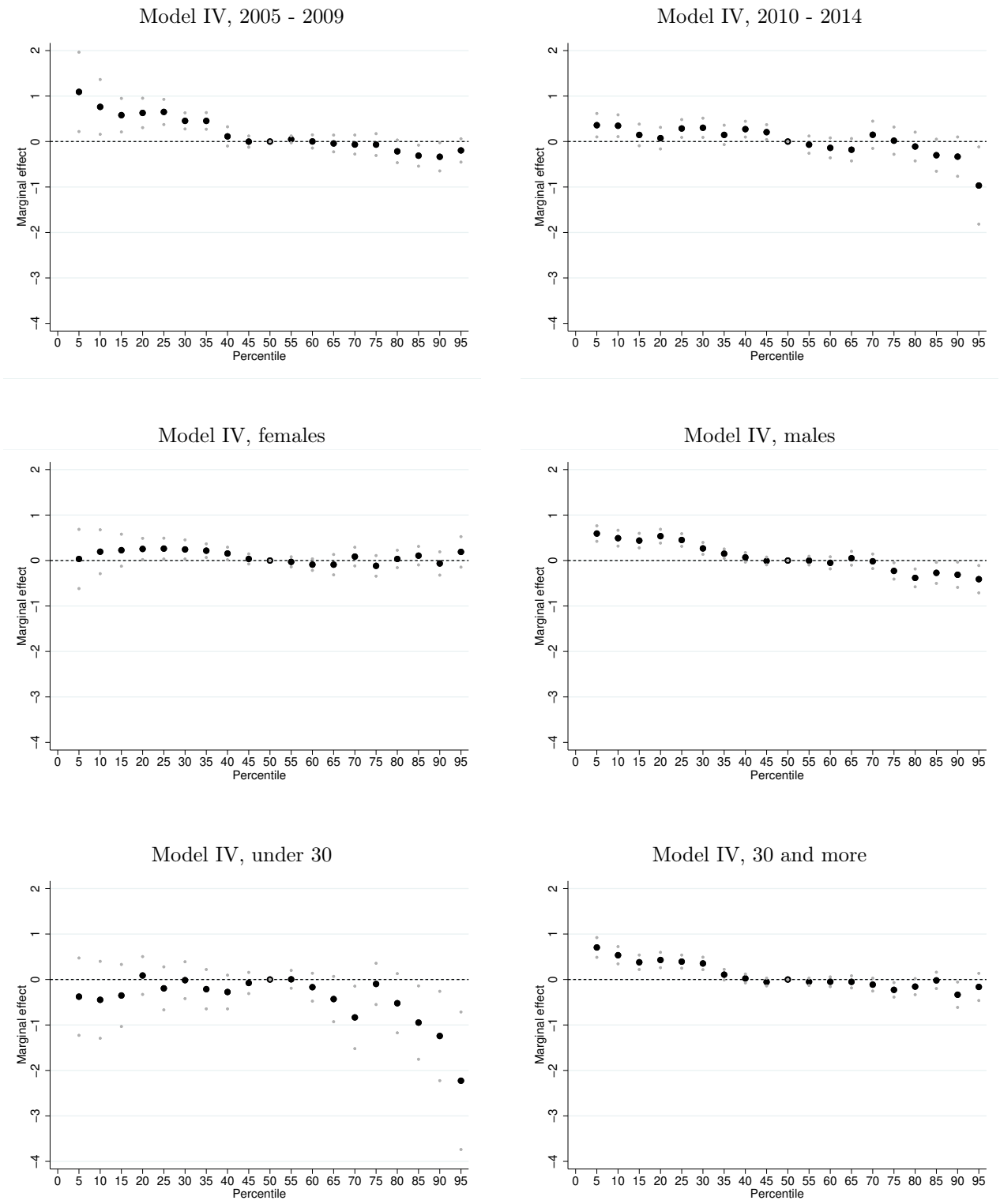
Table 5: SECTORAL MINIMUM WAGE ON WAGE INEQUALITY

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 for strikes as the rate of the number of worker-days of strikes over the number of workers- working days, and a concentration rate (Herfindahl) measured as the percentage of workers in the sectorâ€™s leading firm. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

estimation. In the first row of graphs, we find a higher effect on the left tail of the distribution in the period 2005-2009 than between 2010-2014, but we observe contractive results in the right bottom in both periods. Wage policy has an impressive impact during the first five years, with marginal effects above the 40% up to the 30th percentile; in the five years, these effects were a bit lower, around 30% and not for all categories (Table 5).

Figure 8: 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 on minimum wages on the wage distribution. Black points correspond to point estimates of the effect of the increase in sectoral minimum wage on the differences between each ventile and the median of the wage distribution. Grey points correspond to the ninety percent confidence intervals. The sample includes all private jobs with workers between 18 and 60 years old.

The analysis by gender shows that the female wage distribution has almost no significant changes, and no effect at the bottom percentiles. However, we saw an impact between the 20th and the 40th percentiles relative to the median. For males, we observe significant and higher effects on both tails of the wage distribution. In the right bottom of the distribution, we find spillover above the 75th percentile. The size of the contraction is similar at both ends of the distribution, between 25% and 50% (Table 5). Male wage impacts provide insights into how the extent of the reallocation effect along the distribution resulting from the wage policy. During these years, there was an impressive rise in formal jobs among females; changes in the composition can hide the effect 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 the two groups have significant effects on the right tail. The impact at the higher tail of the wage distribution is more relevant for young workers (see Figure 8 and Table 5).

Female and young workers occupied jobs with more binding wages, but their wage distributions present small movements, and it is the wage distributions for male and adult workers that push the changes in the overall distribution. We next assess the displacement dynamic for a better understanding of these results.

6.2 Wage policy on employment effects

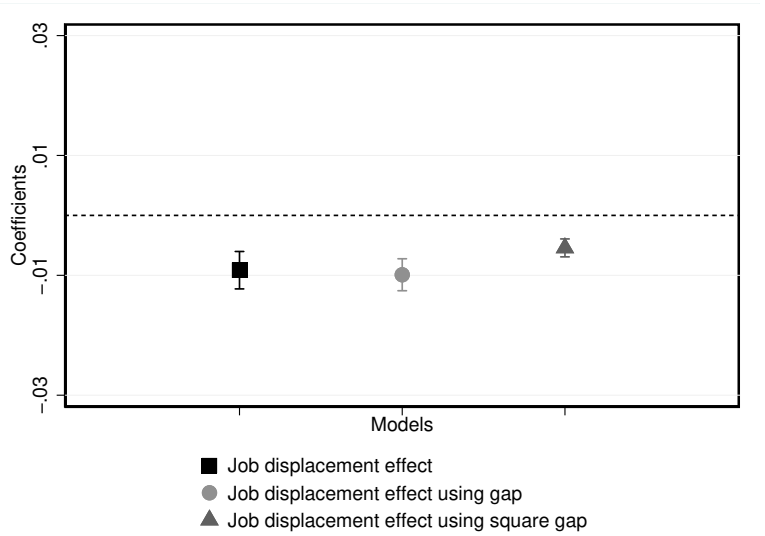
We move now to the second part of the first hypothesis about the effects of collective bargaining on job displacement and employment. To operationalize it, we estimate the impact of a set of 80 minimum wages by sector on the extreme bottom tail of the distribution. We define as treated workers those who earn an hourly wage above the current SMW and below the next one. The control workers are those whose earnings are above the next SMW with up to 10% of cushion. First, we focus on the job displacement effect through the probability of maintaining the same job six month after the adjustment occurs. Then, we estimate the effect on employment in the private sector, allowing transitions between firms.

We analyze the results with three different outcomes: a dichotomous variable to compute the probability, the gap, and the squared gap to weight more heavily those jobs further from the next minimum. We assess the results by period, considered the change in government guidelines in the

bargaining process; and to analyze bindingness populations, by gender and age.

In Figure 9, we show the overall effect for the whole period of the three outcomes. We observed a significant and negative effect in the three specifications, which indicates that employees in jobs whose wages were in the treatment area have 1 point less probability of continuing six months after the adjustment. A similar displacement effect was found using the gap and the squared gap.

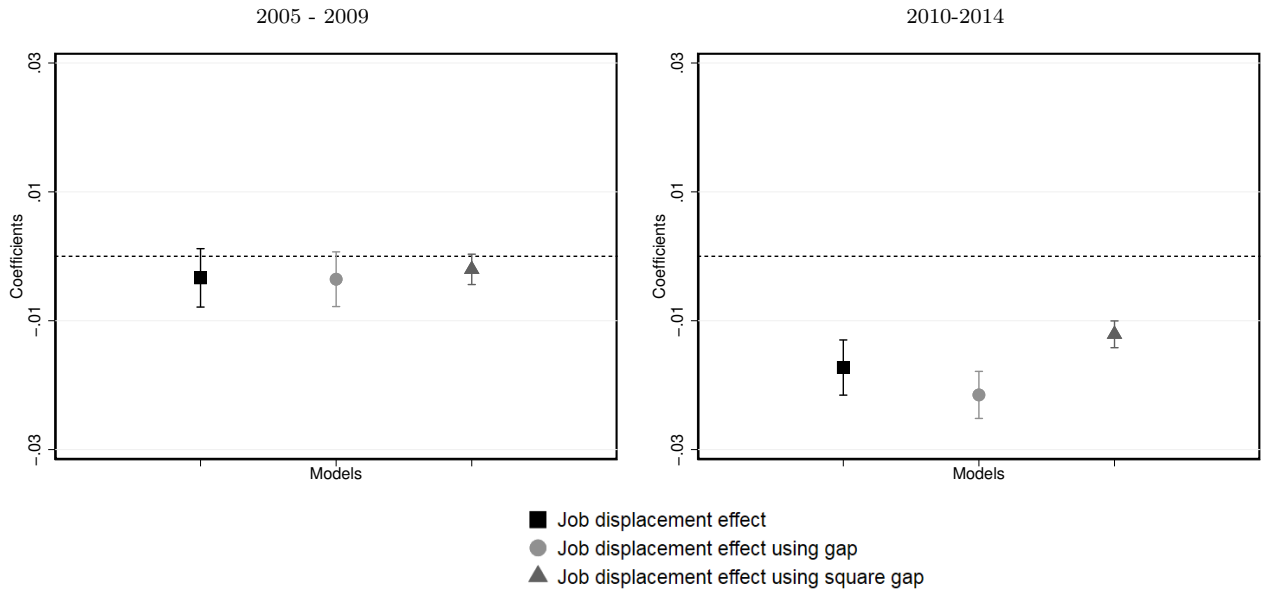
Figure 9: Job displacement effects at the bottom end of the distribution



Notes. The sample includes all private jobs with workers between 18 and 60 years old and whose wage is greater than or equal to the current sectoral minimum wage. The treatment group is defined by those jobs whose wages are between the current sectoral minimum wage and the next sectoral minimum wage. The control group is jobs whose salary is at most 10% greater than the following sectoral minimum wage. The estimation includes controls by age, real wage in levels, firm seniority, sector of activity, number of employees in the firm, rate of unionization, rate of strikes, Herfindahl rate, dummies by month and year, and workerÂ´s fixed effects. The points in each graph reveal point estimates, and the bars represent ninety percent confidence intervals.

Job displacement is affected by the restrictiveness of government guidelines; these effects are shown in Figure 10. Between 2005 and 2009, with less coordinated government guidelines and higher economic growth, we do not find any displacement effect. Between 2010 and 2014, there are negative and quantitative effect almost three times higher than the overall effects. These results are in line with the theoretical idea that the job displacement effect would be more significant in a more restrictive economic environment.

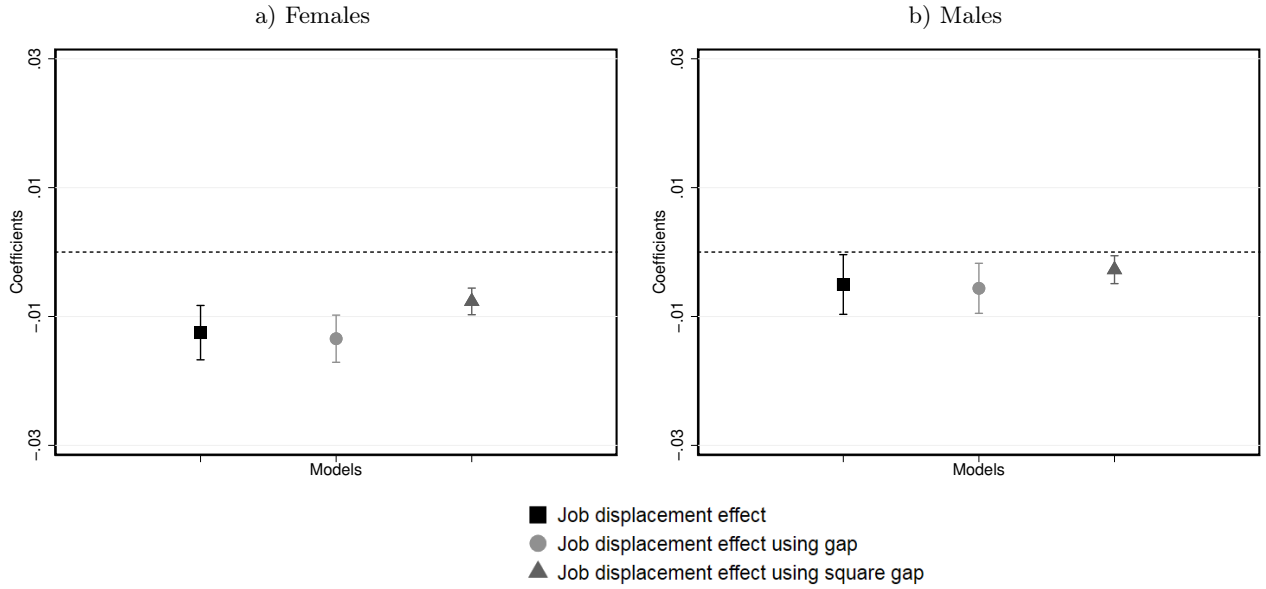
Figure 10: Job displacement effects at the bottom end of the distribution, heterogeneity by period



*Notes.*The sample includes all private jobs with workers between 18 and 60 years old and whose wage is greater than or equal to the current sectoral minimum wage. The treatment group is defined by those jobs whose wages are between the current sectoral minimum wage and the next sectoral minimum wage. The control group is jobs whose salary is at most 10% greater than the following sectoral minimum wage. The estimation includes controls by age, real wage in levels, firm's seniority, sector of activity, number of employees in the firm, rate of unionization, rate of strikes, Herfindahl rate, dummies by month and year, and workerÂ´s fixed effects. The points in each graph reveal point estimates, and the bars represent ninety percent confidence intervals.

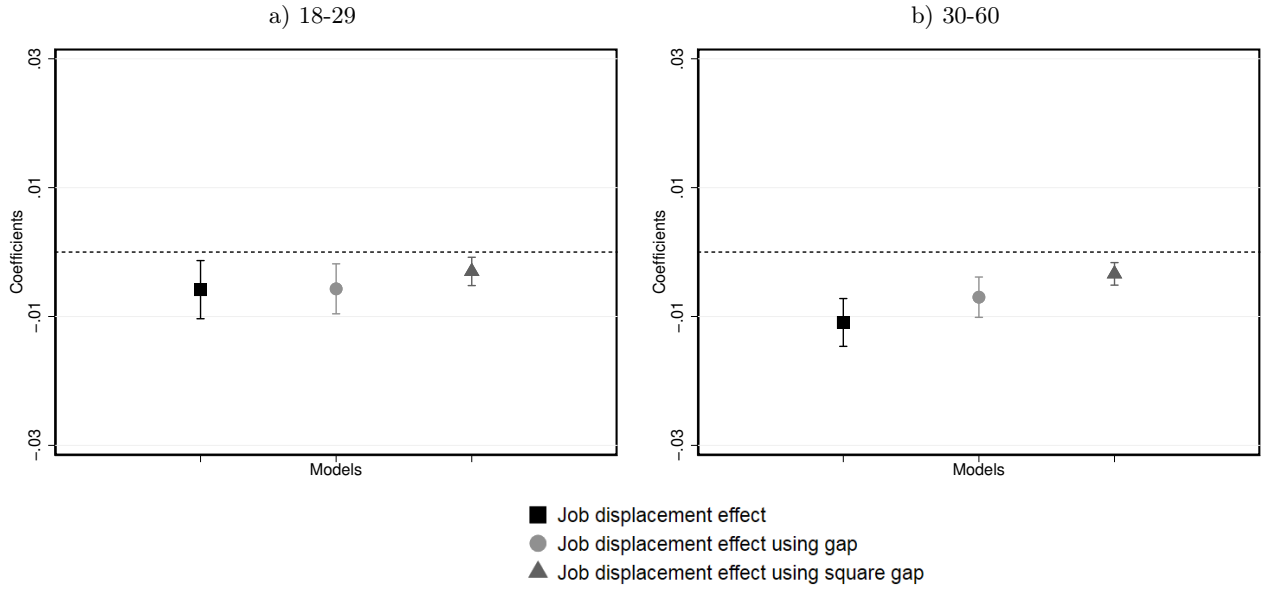
The overall results also hide gender heterogeneity. The main effect is on those jobs that were occupied by women. In Figure 11, we show a negative impact on both genders, but it was greater among women in those jobs that are further from the next minimum wage. Job displacement by age does not present great heterogeneity, with a displacement effect on both groups but greater among the adult workers (Figures 12 and A.4).

Figure 11: Job displacement effects at the bottom end of the distribution, heterogeneity by gender



*Notes.*The sample includes all private jobs with workers between 18 and 60 years old and whose wage is greater than or equal to the current sectoral minimum wage. The treatment group is defined by those jobs whose wages are between the current sectoral minimum wage and the next sectoral minimum wage. The control group is jobs whose salary is at most 10% greater than the following sectoral minimum wage. 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 workerÂ´s fixed effects. The points in each graph reveal punctual estimations, and the bars represent ninety percent confidence intervals.

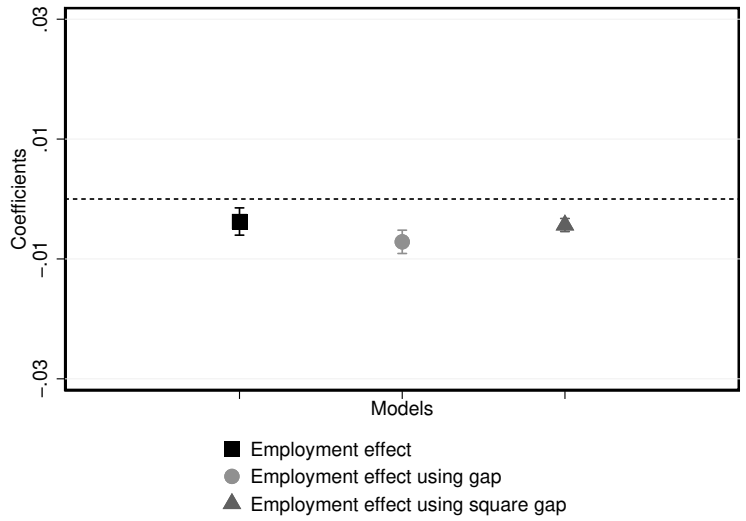
Figure 12: Job displacement effects at the bottom end of the distribution, heterogeneity by age



*Notes.*The sample has all private jobs with workers between 18 and 60 years old and whose wage is greater or equal to the current sectoral minimum wage. The treatment group is defined by those jobs whose wages are between the current sectoral minimum wage and the next sectoral minimum wage. The control group are jobs whose salary is at most 10% greater to the following sectoral minimum wage. 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 workerÂ´s fixed effects. The points in each graph reveal punctual estimations, and the bars represent ninety percent confidence intervals.

We continue our analysis by changing the outcome variable, considering those who are employed in the private sector six month after the adjustment, regardless of whether it is in the same firm or sector. The policy outcome remains negative but very close to zero (Figures 13, A.5 ,A.6). The displacement effect for the workers at the bottom of the private wage distribution fades out as a relevant political issue if we expand the scope to the whole private sector.

Figure 13: Employment effects at the bottom end of the distribution



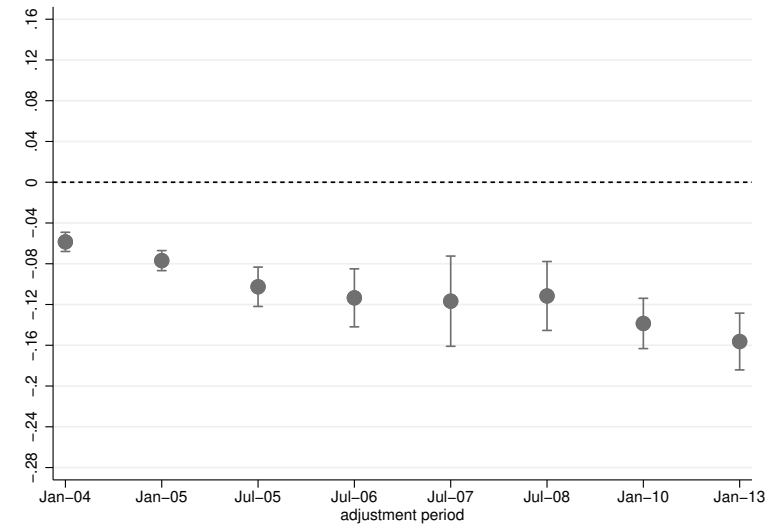
Notes. The sample has all private jobs with workers between 18 and 60 years old and whose wage is greater or equal to the current sectoral minimum wage. The treatment group is defined by those jobs whose wages are between the current sectoral minimum wage and the next sectoral minimum wage. The control group are jobs whose salary is at most 10% greater to the following sectoral minimum wage. 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's fixed effects. The points in each graph reveal punctual estimations, and the bars represent ninety percent confidence intervals.

Next, we include the effect of the NMW on all firms' jobs through the impact of this policy on the sectoral wage distribution. To identify these effects, we compute the gap between the NMW and the sectoral fifth percentile at the end of each round of the collective bargaining scheme as was described in Table 1. We want to explore those workers who are employed in a job in sectors with more binding wages.[16]

In Figure 14, 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 six months before each adjustment. We find a negative effect in each adjustment; on average, a gap of 1 percentage point generates an effect of between 0.05 and 0.16 percentage points between January 2004 and January 2013 (see Table A.2). Note the first two points are before the collective bargaining was part of the wage policy, and the NMW was not binding, but those adjustments are quantitatively lower than the ones that follow.

[16]In Figure A.12 we present the main result on each adjustment moment.

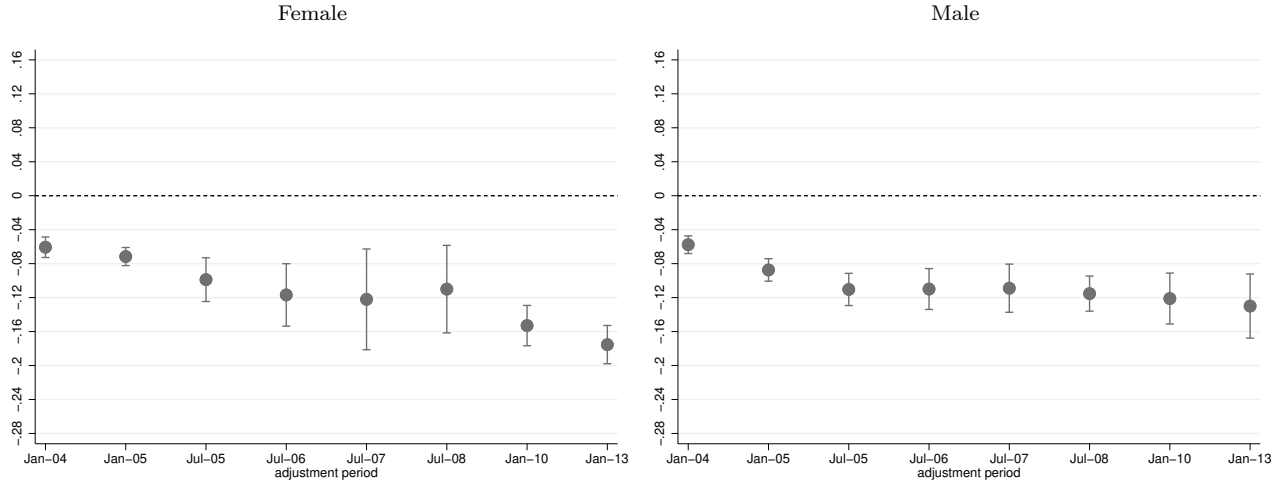
Figure 14: Job displacement effects



Notes. We estimate a Difference-in-Difference model, between before and after the national minimum wage adjustment, and the gap between the national minimum 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. 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.

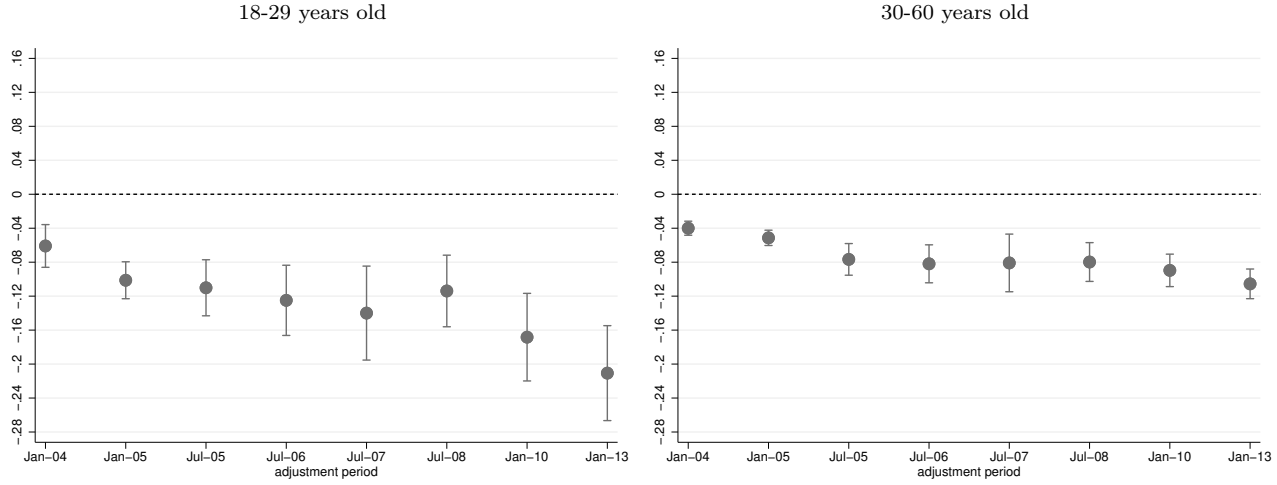
In Figure 15, we observe the estimated effects for females and males separately. We find similar (or even larger among males) negative effects before collective bargaining; after the establishment of collective bargaining, female displacement is greater. Finally, Figure 16 shows negative effects in both subgroups: young and adult workers, with bigger effect among young workers. In this case again, we want to consider also those jobs created in the sectors from new entrants after the wage adjustment; we call this employment effect by sector. In Figure 17 we do not find an employment effect.

Figure 15: Job displacement, heterogeneity by gender



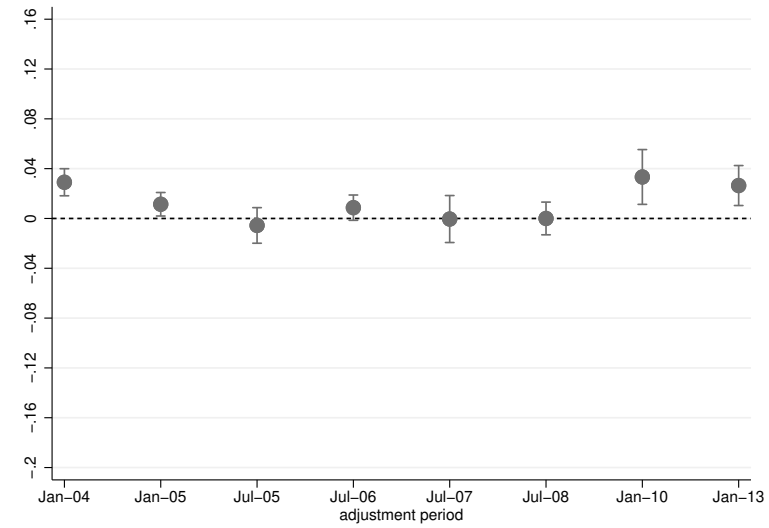
Notes. We estimate a Difference-in-Difference model, between before and after the national minimum wage adjustment, and the gap between the national minimum each and the wage in the first ventile of the sectoral wage distribution. In order to assign for a sector before, we consider those who stay at least three months in the same sector. 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 16: 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 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. 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 17: 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 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 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 exist 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.

Overall, a young person's job seems to have a dynamic independent from the wage policy. They do not suffer significant changes in distribution nor displacement at the bottom of the wage distribution. However, they present significant entrances to and exits from the formal labor market and represent a considerable share of unstable jobs.

In Table 6, we repeat our preferred distributive estimation, but we control for the rate of workers that quit the sector and separate those who are stable workers in the firm from the others. We find, first, similar coefficients when considering the quit rate, with a larger and significant contraction on the left side of the distribution. Among the stable workers, we find a smaller effect at the bottom of the distribution and a quantitatively significant contractive impact at the 85th percentile. We document a distributively relevant impact of the wage policy that was not driven by displacement or deployment. However, movements in jobs and employment and differences in coefficients provide insight into job reallocation along the distribution.

Our findings are in line with the previous literature. The evidence for Latin America is relatively scant, but some countries find the decrease in inequality experienced in the region in the recent decades

Table 6: SECTOR MINIMUM WAGE ON WAGE INEQUALITY. FULL SAMPLE AND ONLY STABLE WORKERSS

	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 for strikes as the rate of the number of worker-days of strikes over the number of workers- working days, and a concentration rate (Herfindahl) measured as the percentage of workers in the sectorâ€™s leading firm. The first model is the same as column 1 of 5. The second model adds as a control *lquit* (lag of percentage of quits in the sector in the last 6 months) as a control, 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.

followed a stress in wage policies. For Argentina, at the beginning of 2000, there is a redistributive effect on income, but no impact on job demand or job insecurity (Groisman, 2016; Arcidiácono, 2015). There is 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 are minor and negative, although not always significant (Engbom and Moser, 2021; Broecke et al., 2017; Saboia and Neto, 2017; Lemos, 2009, 2004). However, there is a negative effect on formality, mainly among more exposed groups ((Saltiel and Urzúa, 2020)). Chile's evidence suggests there are 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 (2010) find inequality expansion 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 finds a distributive contraction but with weak robustness. Finally, Brum and Perazzo (2020) find that wage policy in 2005-2015 was successful in pushing lower wages up and compressing the general wage distribution (formal and informal).

6.3 Robustness checks

In order to give robustness to our main findings, we performed alternative estimations for the three principal results.

First, we show that the distributive results are robust for other benchmarks. We find that there is a sharp contraction of the wage distribution in relation to higher percentiles (60th, 70th and 80th) and in the left tail up to the 40th percentile (Figure A.7). We find few effects on the right tail with the percentile 60 and 70 as benchmark.

Our second result is the job displacement effect for those at the bottom of the distribution. As our database allows us, we change the definition of the treated job to those whose wage is exactly the current minimum wage and the control group to those between the next minimum wage and 10% above it.[17] We do not find any displacement effect for the whole period in Figure A.8. As in the main set of results, in the first lustrum 2005-2009 we find a positive effect and in the second one, a negative effect. These results are similar to those we observe for the squared gap specification, but in this case we do not find any difference by gender and age, as seen in Figures A.9 and A.10.

[17] In Table 4 we show the number of jobs affected by the new definitions.

In the third robustness check (Figures A.11 and A.12), we estimate the sectoral job displacement on the gap between the NMW and the first sectoral wage decile ($NMW_{t+1} - w_{st}(5)$) and split each bargaining round in each adjustment. In both cases, we find similar results to our primary findings.

7 Conclusions

In this paper, we use social security administrative records between 2004 and 2014 to estimate the distributive, displacement, and employment effects of a particular wage policy in Uruguay. The wage policy is composed of a collective wage bargaining scheme that set SMWs and an NMW. Exploiting the adjustment timing of about 80 of the two hundred SMWs, we estimate the distributive effects on the whole distribution, the displacement of jobs and employment in the lower tail of the distribution, and the total job displacement and employment effects.

In our wage policy setting, we differentiate between two periods. First 2005-2009, when collective bargaining started to be used and the NMW became binding, and 2010-2014, when government coordination rise and economic growth rate moderated. In the first period, we observe a significant wage contraction at the left tail of the distribution that did not align with displacement or employment effects. In this sense, in the period 2005-2009, there is a big wage policy effect on the distribution and no effects on jobs. Specifically, at the bottom end of the distribution, we find a bigger contraction effect and neither a displacement nor an employment effect. In those years, formal employment and jobs increased, and 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 the displacement. These small but significant effects decrease when we expand the analysis to employment. According to workers' characteristics, we find female workers' wage distribution contracted more than that of males, and suffered more displacement. At the same time, younger employees showed a bigger job displacement than older ones.

The analysis of displacement and employment by sector wage bindingness shows that on average, whether wage distribution is most left, there is significant displacement even when the national minimum wage was not effective. The employment effect, including those jobs created after the wage adjustment, shows a different pattern. An increase in the gap between the NMW and the fifth sectorial percentile does not affect the employed probability.

Wage policy contributes broadly to the fall in wage inequality that Uruguay experimented with during the last 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., 2018a). In this sense, the minimum wage policy shows spillovers up to the 40th percentile, which means that workers whose initial wages were above the minimum are benefiting from the policy. While the evidence suggests that minimum wages reduce concentration, we are unable to distinguish the effects generated by the collective bargaining scheme. In short, we document that the minimum wage scheme was certainly a contributing factor in reducing lower tail inequality, particularly between 2005-2010, without displacement and negative employment effects.

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8 Appendix

Table A.1: Descriptives statistics for treatment and control groups

	jul-05			ene-10			ene-12			ene-14		
	T	C	Dif	T	C	Dif	T	C	Dif	T	C	Dif
Sex	0.51	0.53	-0.02	0.42	0.41	0.01	0,44	0.36	0.08**	0.49	0.40	0.08
Age	34.9	34.5	0.40	33.9	34.2	-0.4	34.1	34.2	-0.1	37.6	34.0	3.6**
Tenure	54.4	61.9	-7.5*	44.9	47.1	-2.1	44.6	43.1	1.5	56.6	45.5	11.1
Firm's size	51.8	140.8	-89.0	73.7	68.0	5.7	79.3	96.4	-17.1	68.2	84.1	-15.9
Firm's seniority	18.5	19.7	-1.2	16.9	16.6	0.3	16.5	19.7	-3.2**	19.9	17.6	2.3
Wage	22.1	29.1	-6.9***	35.7	38.2	-2.5***	42.7	46.2	-3.5***	56.4	54.7	1.6

Notes. This table contains jobs whose wages are between current sectoral minimum wage and 10% above the next sectoral minimum wage, with workers' ages between 18 and 60 years old. Also, we restrict the sample to consider those workers with more of than three months of tenure in the firm, and who are dependent workers. All wages are in real terms. Uruguayan pesos of December 2010.

Table A.2: 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

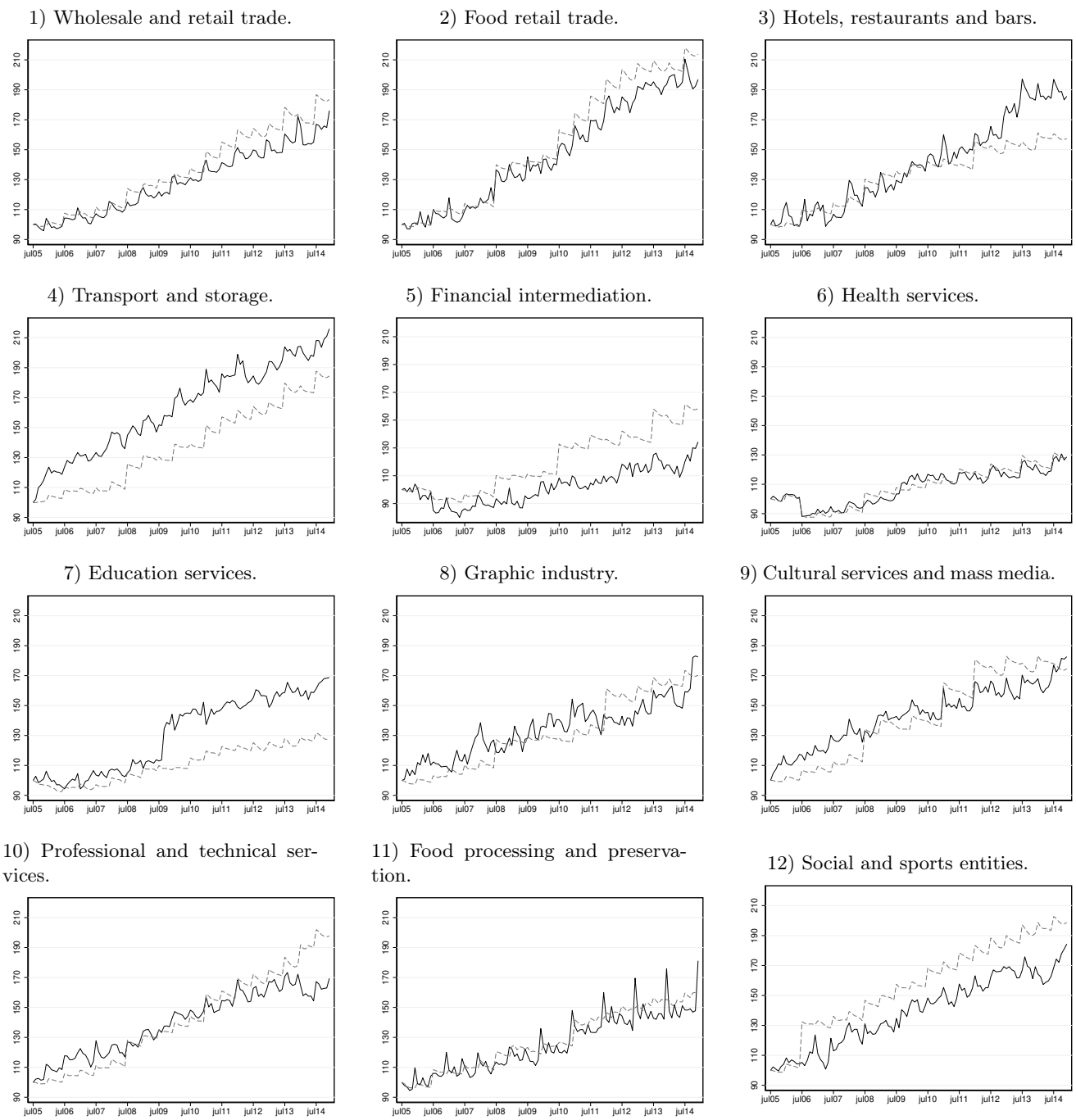
Notes. Difference in Difference estimation with the sector definition: being at least three months in the same sector. The dependent variable indicates if the job i is or not occupied in sector s at time t. Post takes one after the national minimum wage adjustment or zero otherwise. Wage gap (WG) is 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 a rate of the number of union's registered members per number of estimated formal workers in the sector. Strikes are the rate of the number of worker-days of strikes over 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.3: 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 if the job i is or not occupied in sector s at time t. Post takes one after the national minimum wage adjustment or zero 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 after the adjustment. Standard errors clustered at the sectoral level are in parentheses. Unionization is a rate of the number of union's registered members per number of estimated formal workers in the sector. Strikes are the rate of the number of worker-days of strikes over 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

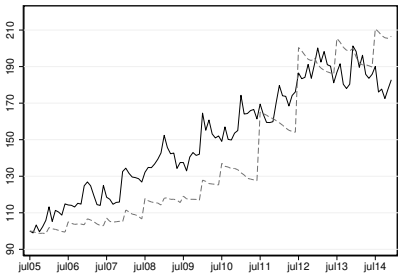
Figure A.1: Evolution of the Real Minimum Wage and Average Wage in each sector. Index =100 in July 2005



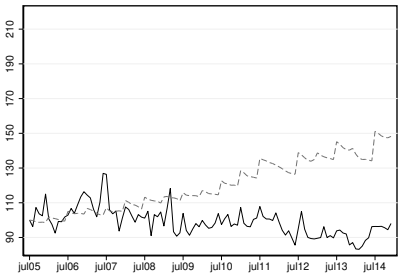
Notes. This Figure shows the evolution of the real minimum wage and the average wage in each sector (Index =100 in July 2005). The sample considers private workers between 18 and 60 years old whose wages are above the current minimum wage. Source: BPS.

Figure A.1: Evolution of the Real Minimum Wage and Average Wage in each sector. Index =100 in July 2005*(cont.)*

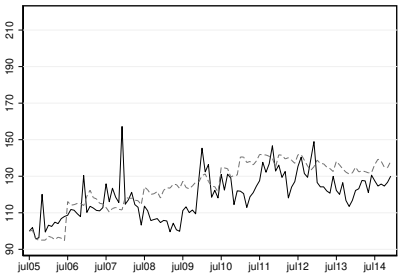
13) Meal processing industry.



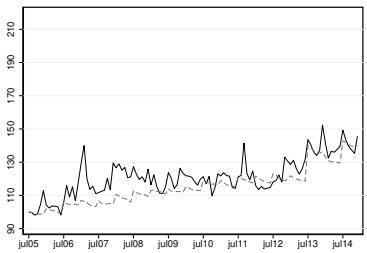
14) Fishing.



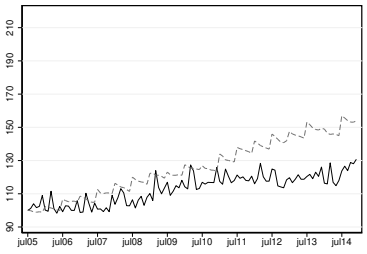
15) Leather industry.



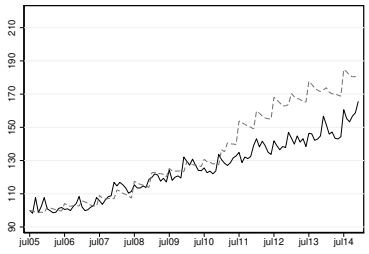
16) Wood, cellulose and paper industry.



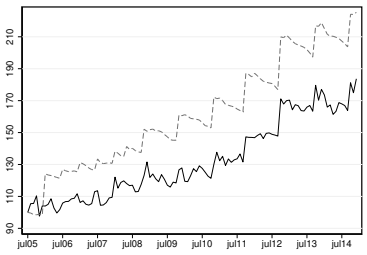
17) Chemical industry.



18) Metal product industry.



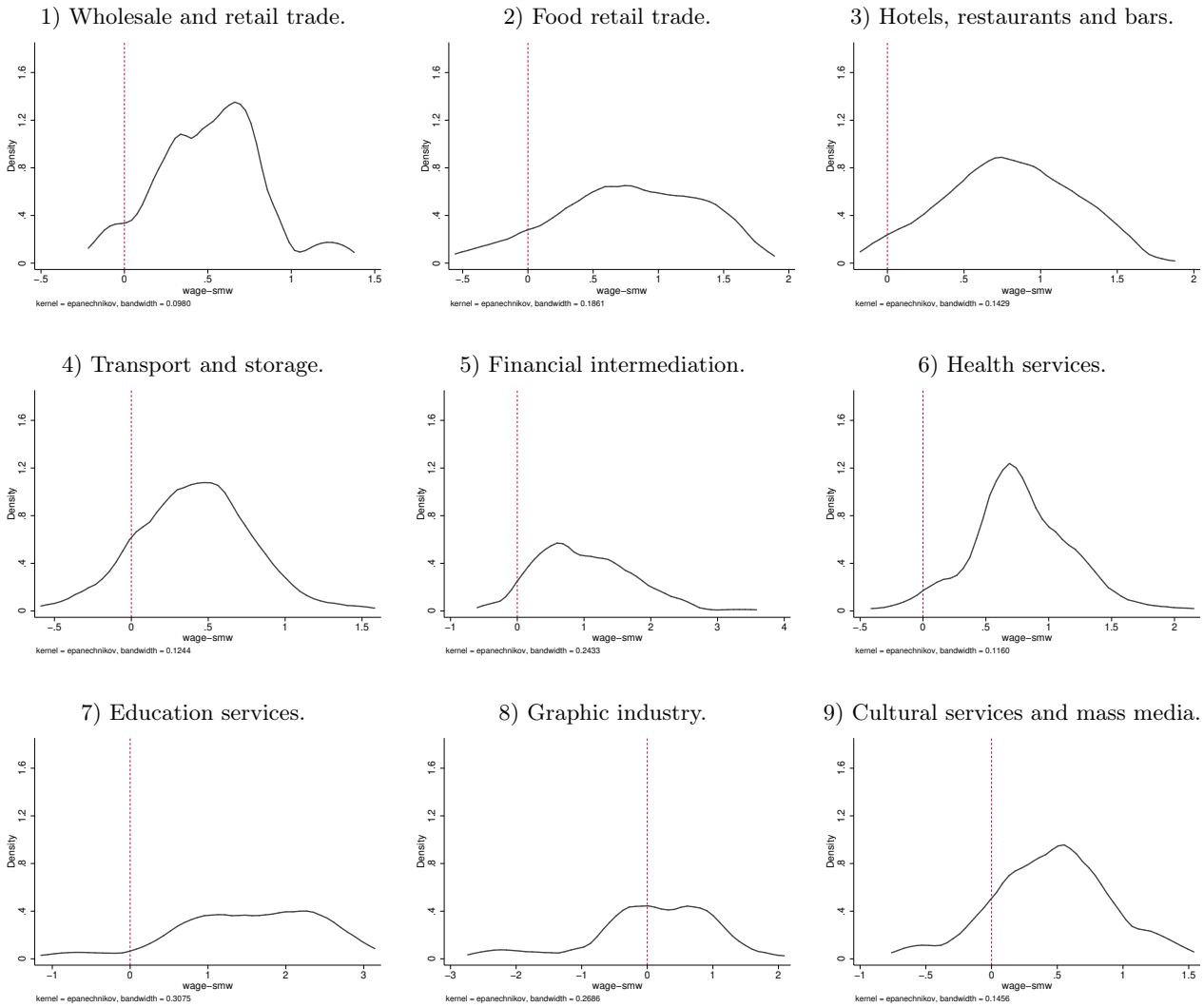
19) Construction industry.



Real mean wage index Real minimum wage index

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 workers between 18 and 60 years old whose wages are above the current minimum wage. Source: BPS.

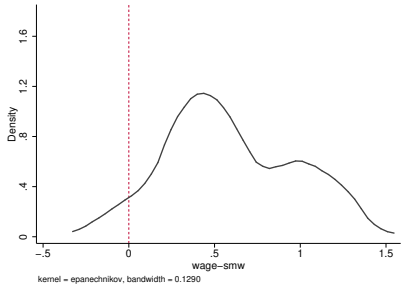
Figure A.2: Wage distribution centered in the next minimum wage by sector



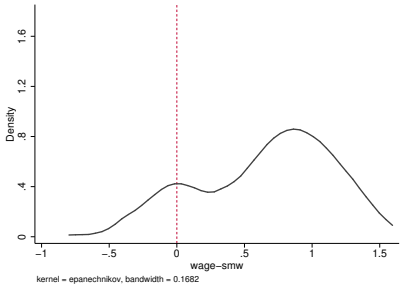
Notes. This Figure shows the estimated Kernel wage distribution by group centered in the next sectoral minimum wage.

Figure A.2: Wage distribution centered in the next minimum wage by sector *(cont.)*

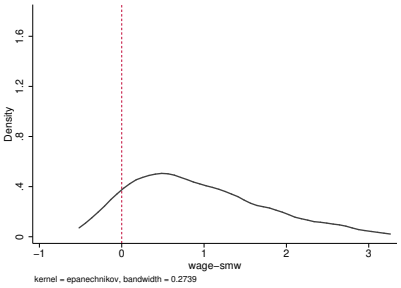
10) Professional and technical services.



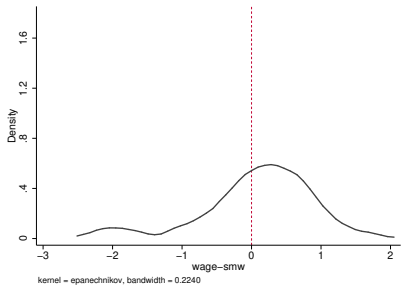
11) Food processing and preservation.



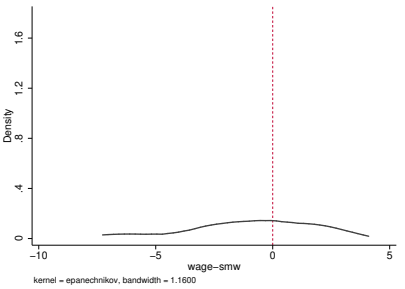
12) Social and sports entities.



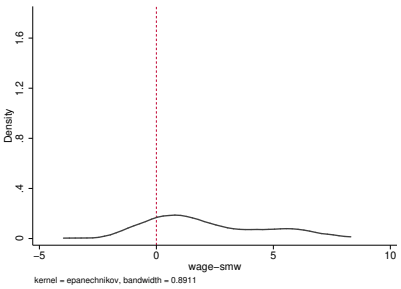
13) Meal processing industry.



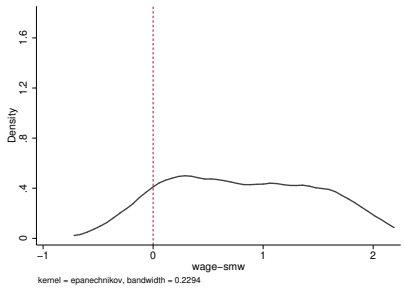
14) Fishing.



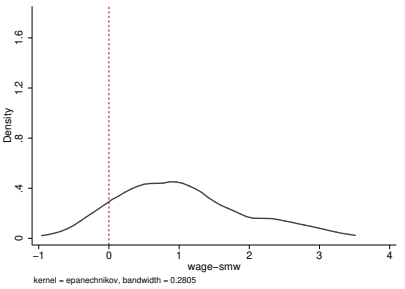
15) Leather industry.



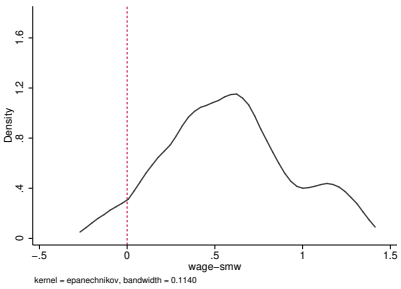
16) Wood, cellulose and paper industry.



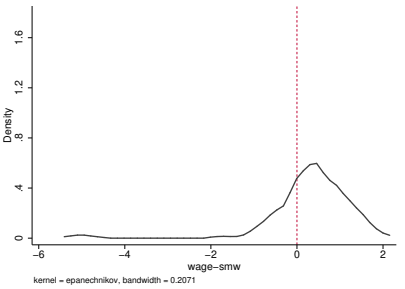
17) Chemical industry.



18) Metal product industry.

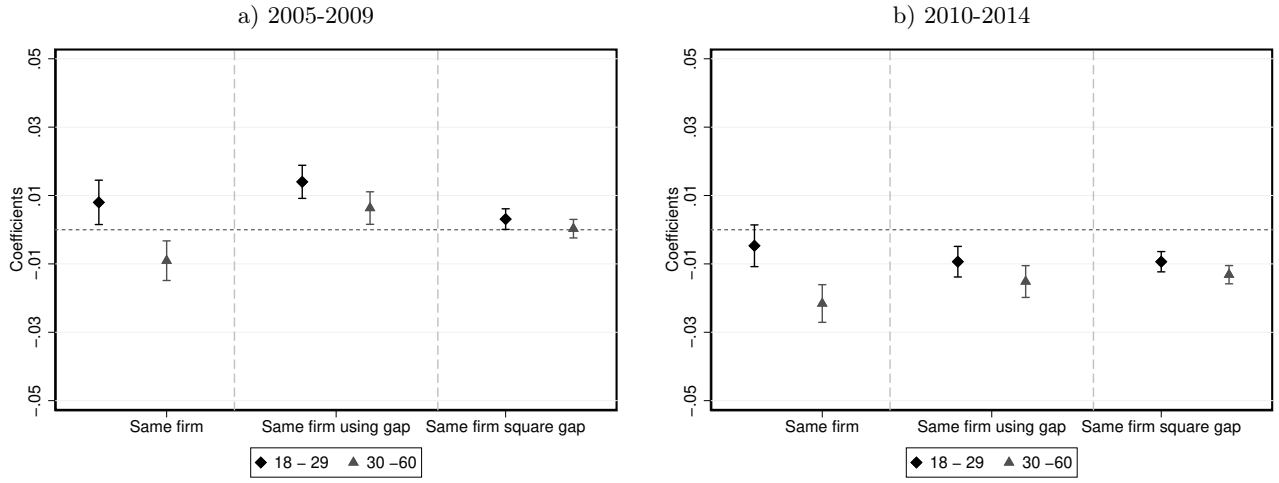


19) Construction industry.



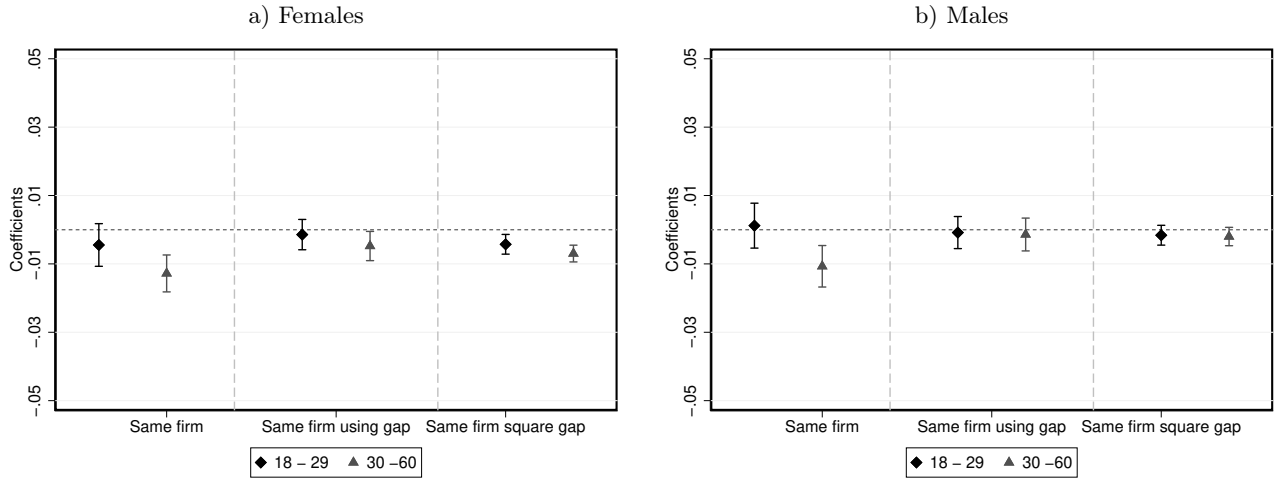
Notes. This Figure shows the estimated Kernel wage distribution by group centered in the next sectoral minimum wage.

Figure A.3: Job displacement effects at the bottom end of the distribution, heterogeneity by period and age group



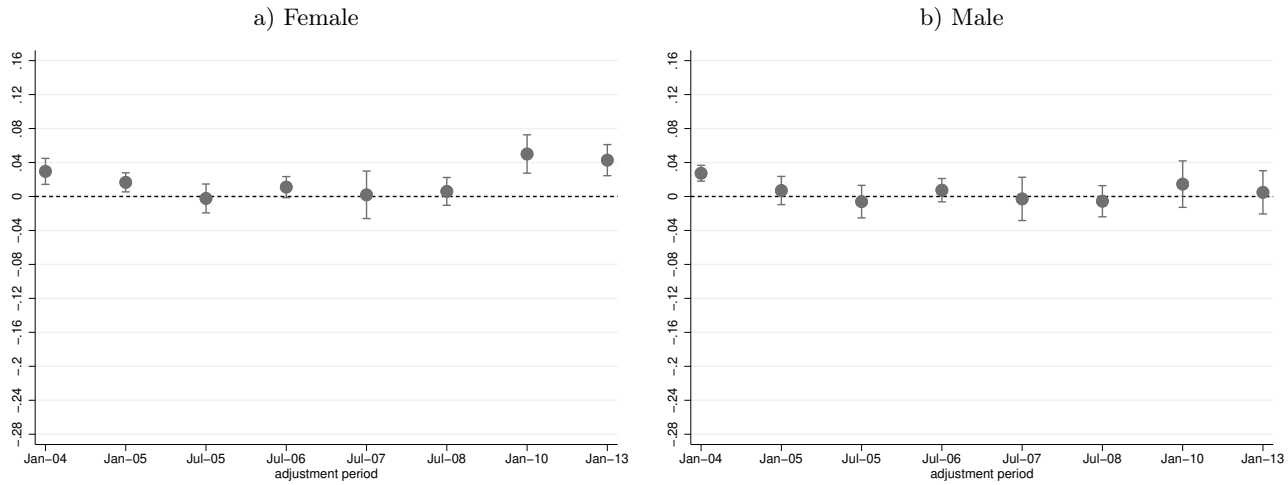
Notes.The sample has all private jobs with workers between 18 and 60 years old and whose wage is greater or equal to the current sectoral minimum wage. The treatment group is defined by those jobs whose wages are between the current sectoral minimum wage and the next sectoral minimum wage. The control group are jobs whose salary is at most 10% greater to the following sectoral minimum wage. 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 workerÂ´s fixed effects. The points in each graph reveal punctual estimations, and the bars represent ninety percent confidence intervals.

Figure A.4: Job displacement effects at the bottom end of the distribution, heterogeneity by gender and age group



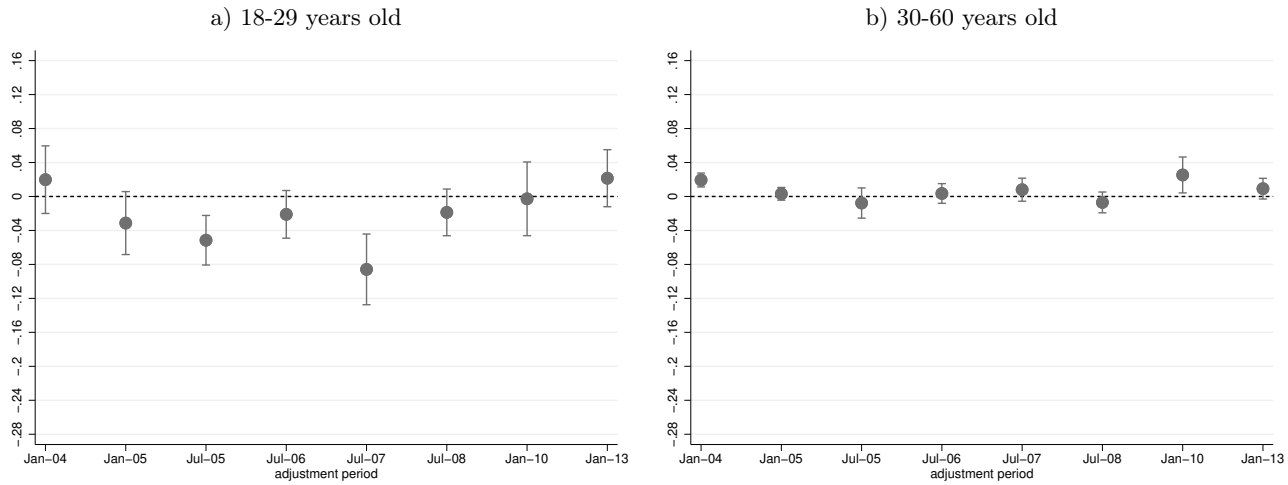
Notes. The sample has all private jobs with workers between 18 and 60 years old and whose wage is greater or equal to the current sectoral minimum wage. The treatment group is defined by those jobs whose wages are between the current sectoral minimum wage and the next sectoral minimum wage. The control group are jobs whose salary is at most 10% greater to the following sectoral minimum wage. 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 workerÂ´s fixed effects. The points in each graph reveal punctual estimations, and the bars represent ninety percent confidence intervals.

Figure A.5: Employment effects, heterogeneity by gender



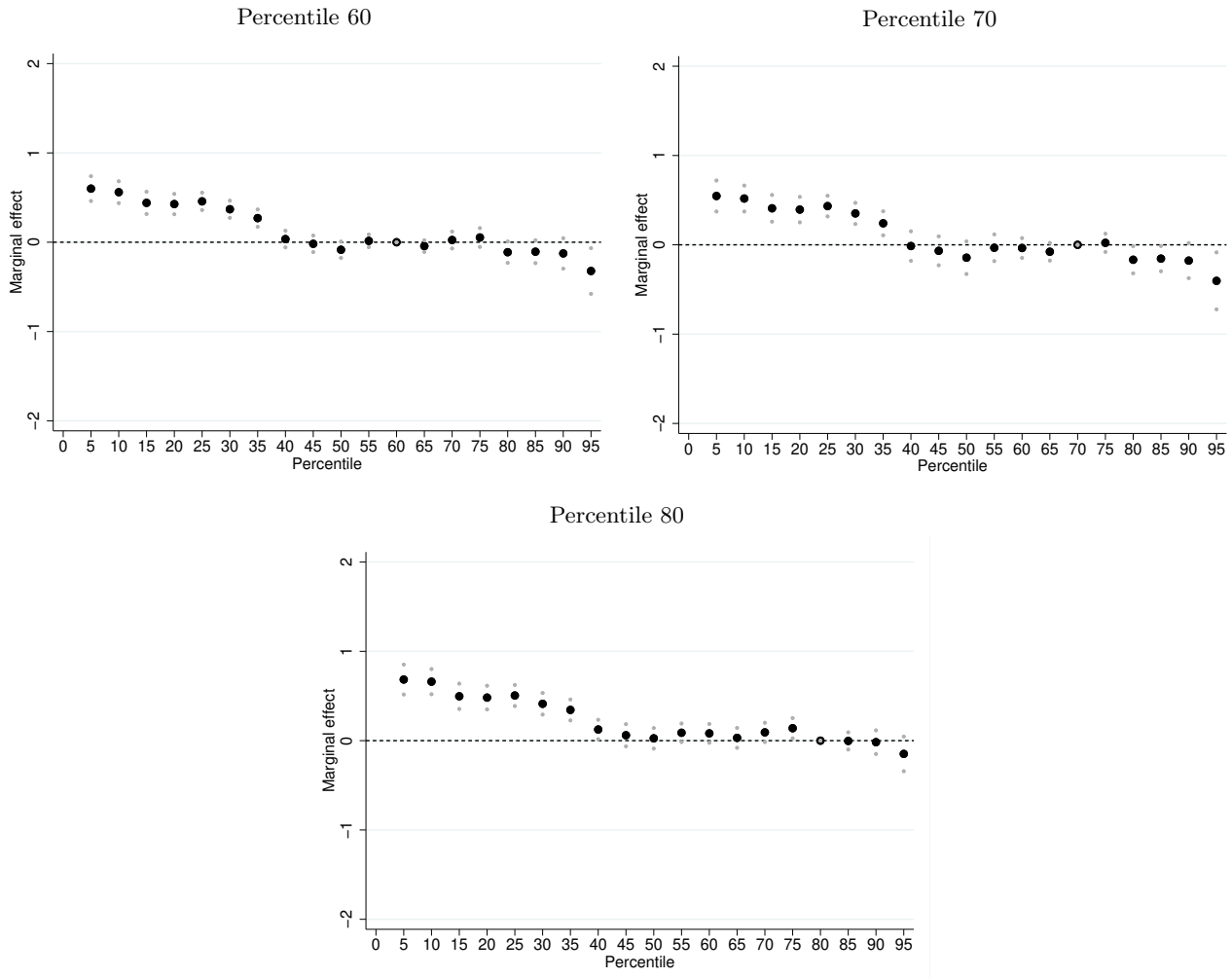
Notes. We estimate a Difference-in-Difference model, between before and after the national minimum wage adjustment, and the gap between the national minimum each and the wage in the first ventile of the sectoral wage distribution. In order to assign for a sector before, we consider the last sector before the adjustment and we add those who are only 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 exist 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.

Figure A.6: Employment effects, heterogeneity by age



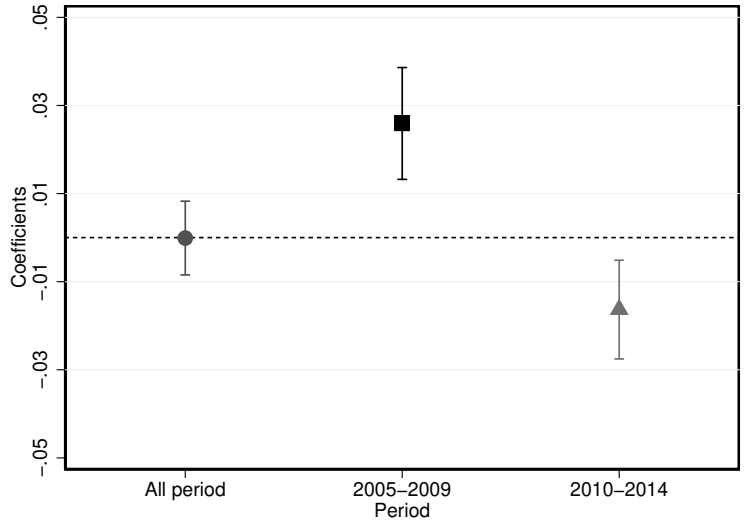
Notes. We estimate a Difference-in-Difference model, between before and after the national minimum wage adjustment, and the gap between the national minimum each and the wage in the first ventile of the sectoral wage distribution. In order to assign for a sector before, we consider the last sector before the adjustment and we add those who are only 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 exist 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.

Figure A.7: Wage inequality on the sectoral minimum wage by wage percentile. Robustness



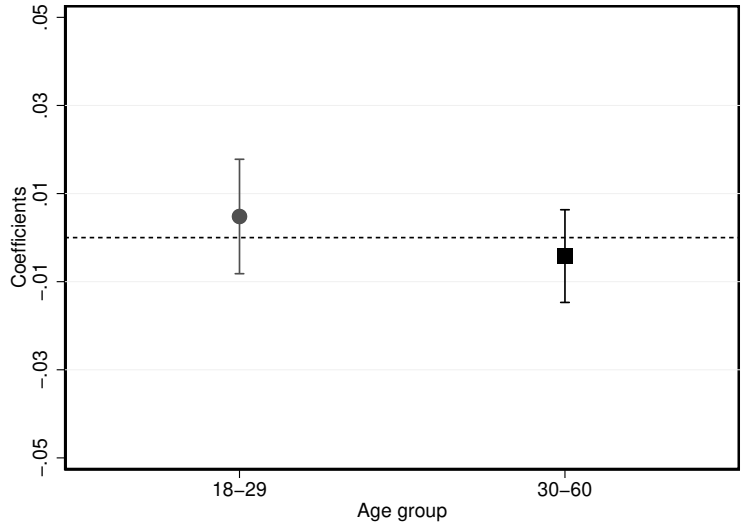
Notes. This figure shows in each plot the results of the marginal effects of our four specification of the effect of the increase on minimum wages on the wage distribution, for the period between 2005 and 2014. Black points corresponds to punctual estimation of the effect of the increase in sectoral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

Figure A.8: Job displacement effects at the bottom end of the distribution by period. Robustness



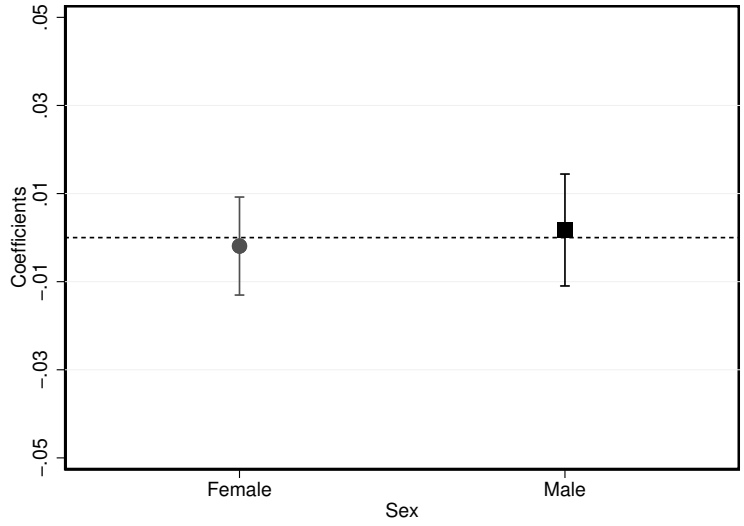
Notes. The sample has all private jobs with workers between 18 and 60 years old whose wage is greater or equal to the current sectoral minimum wage. The treatment group is defined by those jobs whose wages are exactly the current sectoral minimum wage with a margin of +-1%. The control group are jobs whose salary is at most 10% greater to the following sectoral minimum wage. 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's fixed effects. The points in each graph reveal punctual estimations, and the bars represent ninety percent confidence intervals.

Figure A.9: Job displacement effects at the bottom end of the distribution by age. Robustness



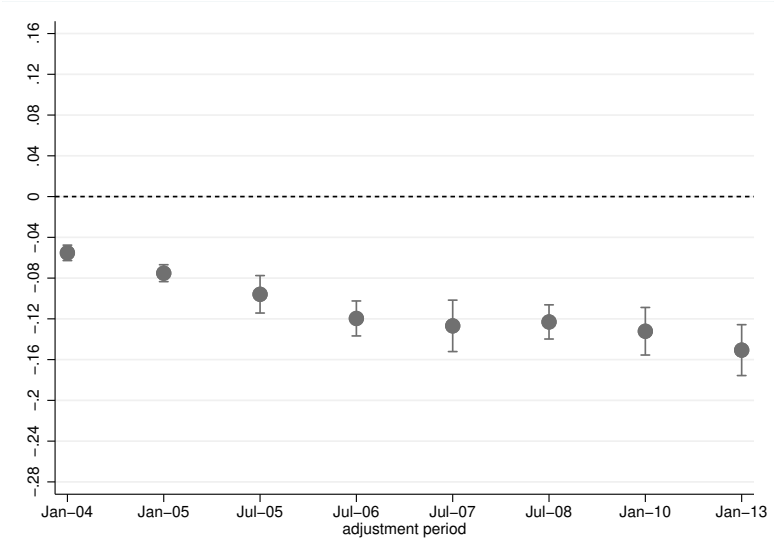
Notes. The sample has all private jobs with workers between 18 and 60 years old whose wage is greater or equal to the current sectoral minimum wage. The treatment group is defined by those jobs whose wages are exactly the current sectoral minimum wage with a margin of +-1%. The control group are jobs whose salary is at most 10% greater to the following sectoral minimum wage. 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's fixed effects. The points in each graph reveal punctual estimations, and the bars represent ninety percent confidence intervals.

Figure A.10: Job displacement effects at the bottom end of the distribution by gender. Robustness



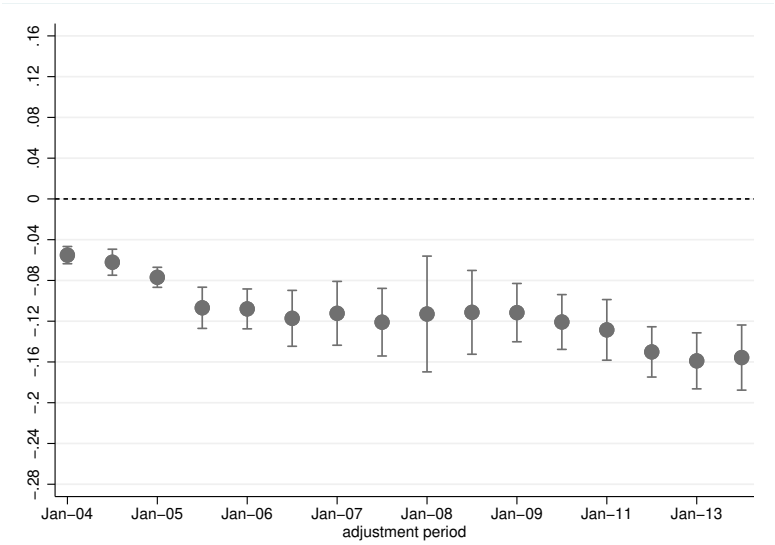
Notes. The sample has all private jobs with workers between 18 and 60 years old whose wage is greater or equal to the current sectoral minimum wage. The treatment group is defined by those jobs whose wages are exactly the current sectoral minimum wage with a margin of +-1%. The control group are jobs whose salary is at most 10% greater to the following sectoral minimum wage. 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's fixed effects. The points in each graph reveal punctual estimations, and the bars represent ninety percent confidence intervals.

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.