Regional heterogeneity of the impact of a national minimum wage policy on inequality

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1. Motivation and groundwork

- Similar to other developed countries, the Portuguese labour market has a single statutory minimum wage that is common across all regions.

- Using regional and occupational heterogeneity in the exposure to minimum wage:

  This paper investigates how minimum wage policies have affected wage inequality in the Portuguese economy during the period of 1998 to 2021.

- Our identification strategy benefits from the fact that between 1998 and 2021, the Portuguese labour market underwent two periods of rapid real minimum wage growth:
  - 2007 – 2011: average real growth rates of 3.6%
  - 2014 – 2021: average real growth rates of 3%.

1. Motivation and groundwork

- Minimum wage policies have emerged as one of the principal instruments in developed countries for reducing inequality and poverty, particularly among women and young individuals.

- The empirical evidence highlights the importance of minimum wage policies to reduce inequality:

  DiNardo et al. (1996), Lee (1999), Teulings (2003), Neumark et al. (2004), Autor et al. (2016), Cengiz et al. (2019) for the United States; and Machin and Van Reenen (2008) for the United Kingdom; Bosch and Manacorda (2010) for Mexico.

- Oliveira (2023) shows that minimum wage increases in Portugal have significantly reshaped wage distribution and reduced inequality.

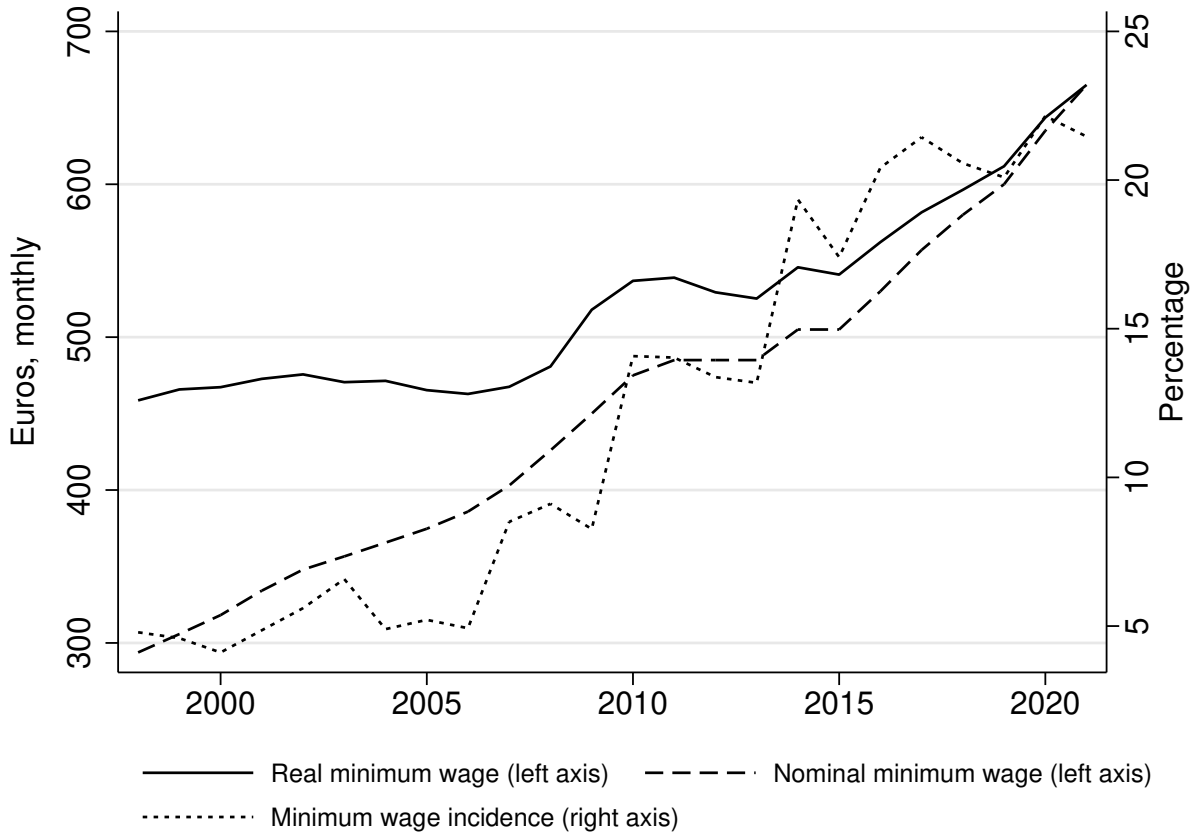


Figure 1: Minimum wage in the Portuguese economy, 1998 – 2021

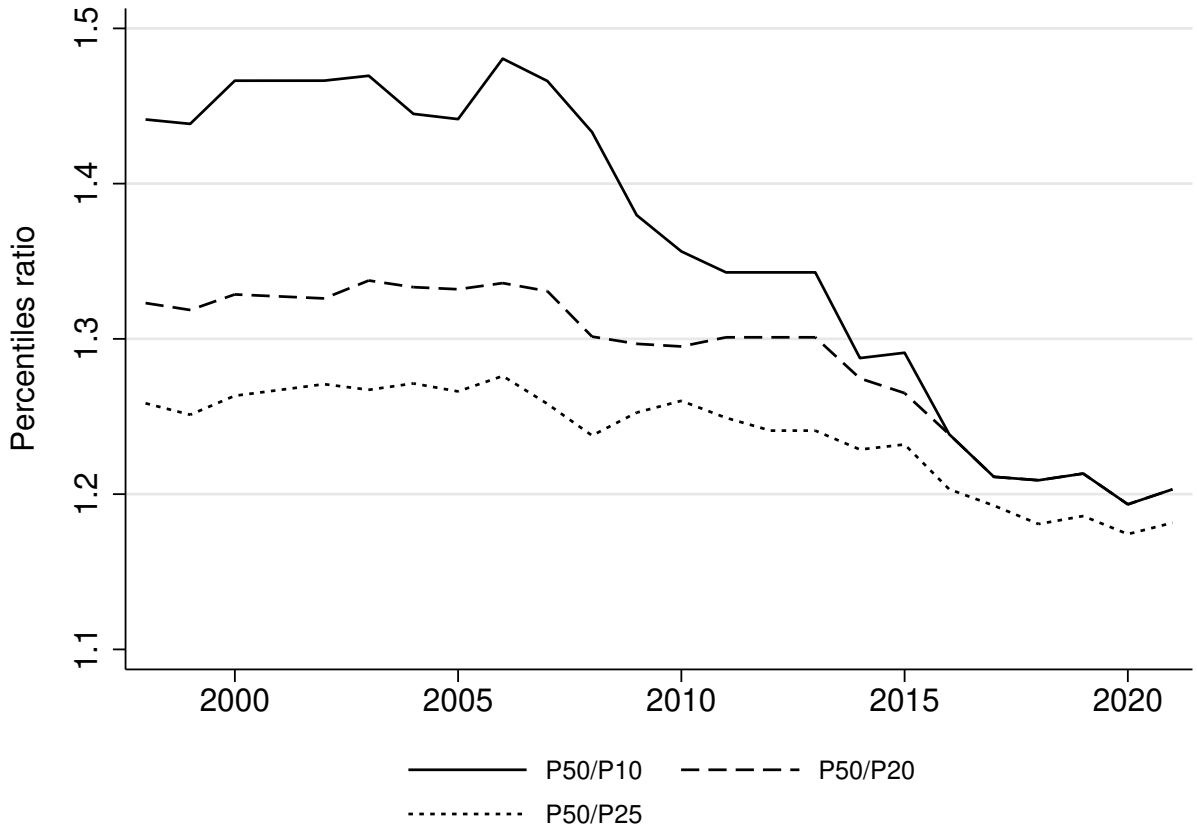
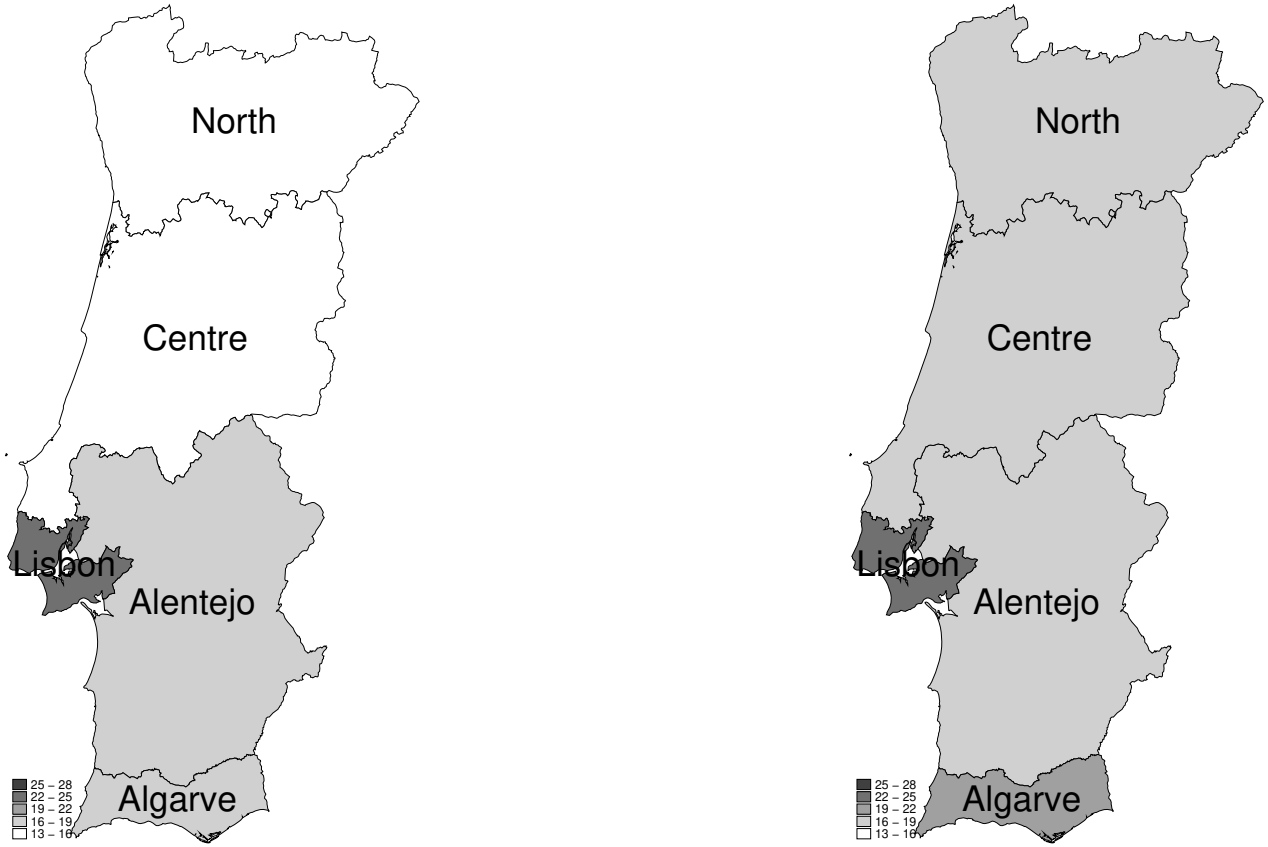


Figure 2: Wage percentile ratios, 1998 – 2021



(a) Year: 2000 (b) Year: 2021

Figure 3: GDP *per capita* (thousands, 2016 prices)

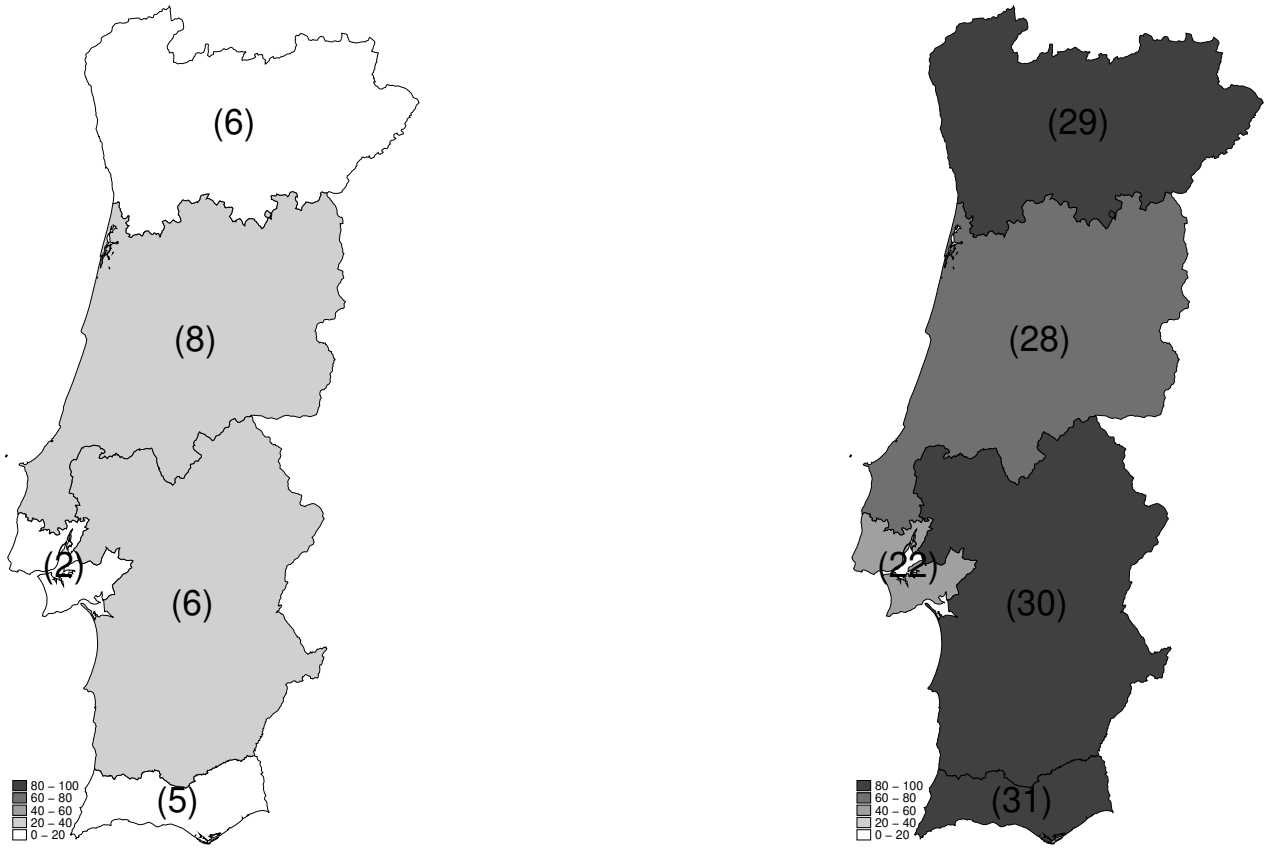
2. Wage and regional inequality, 1998 – 2021

- We measure the reach that the minimum wage has in each region by pairs of region/occupation that are minimum wage binded.

- We define a region/occupation pair as 'minimum wage binded' when its 10^{th} percentile wage matches the national minimum wage.

- For example, in 2017, the 10^{th} percentile for "Business and administration associate professionals" in the Lisbon region, the wealthiest region of Portugal, was €3.64 hourly, which was 8.3% above the minimum wage. In the Centre region, this same percentile corresponded exactly to the minimum wage.

- Therefore, we define the "Centre region/Business and administration associate professionals" pair as binded.



(a) Year: 1998 (b) Year: 2021

Figure 4: Employment in binded occupations (%)

(Number of 'Binded' occupations in a given region.)

Table 1: Descriptive statistics of region/occupation pairs

	N occupations		log(P50) - log(MW)		
	Binded	non-Binded	Binded	non-Binded	All
Panel A: 1998					
North	6	32	0.12	0.34	0.31
Centre	8	30	0.14	0.40	0.34
Lisbon	2	36	0.25	0.66	0.62
Alentejo	6	32	0.13	0.40	0.32
Algarve	5	33	0.15	0.37	0.35
Panel B: 2021					
North	29	10	0.07	0.73	0.12
Centre	28	11	0.08	0.47	0.12
Lisbon	22	17	0.10	0.71	0.30
Alentejo	30	9	0.08	0.38	0.11
Algarve	31	8	0.11	0.57	0.13

Notes: The computations are based on real hourly wages. 'Binded' refers to pairs of region/occupation that are bound by the minimum wage. 'P50' stands for the 50^{th} wage percentile. 'MW' represents the minimum wage. 'N occupations' denotes the number of Binded/non-Binded occupations in a given region.

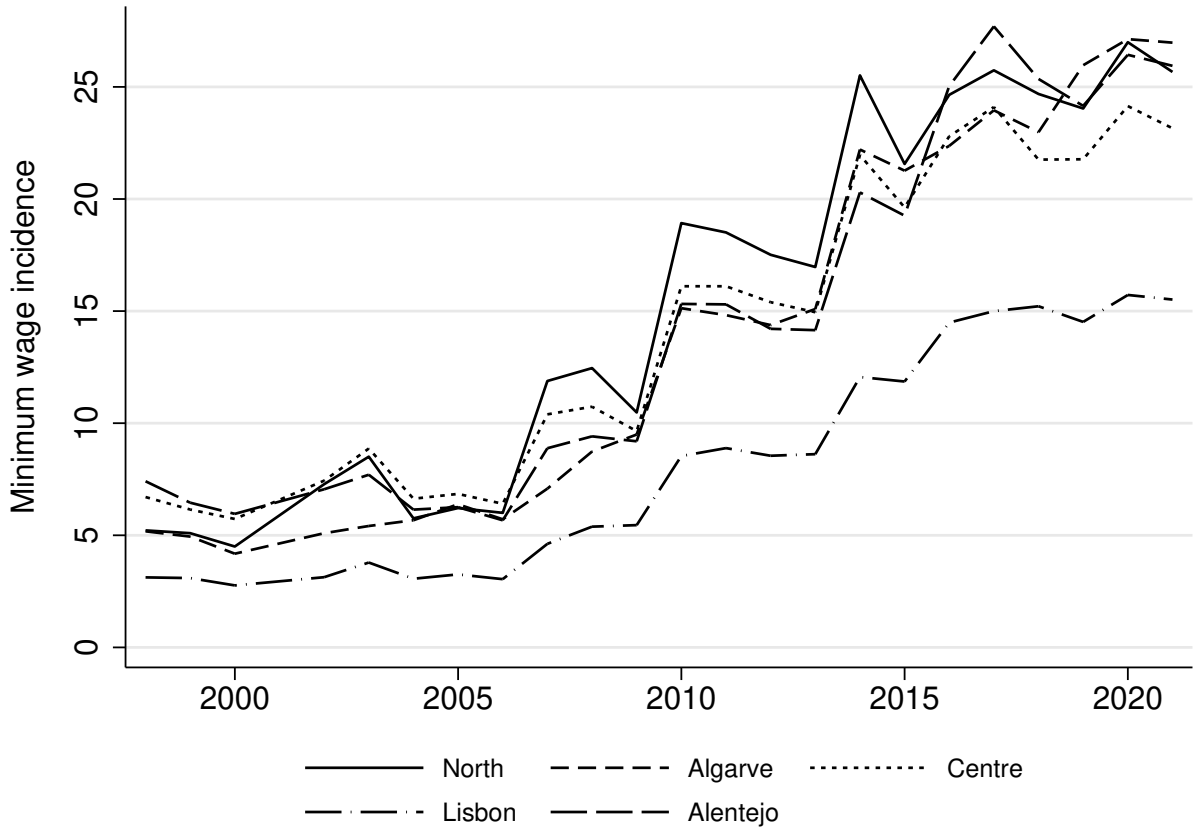
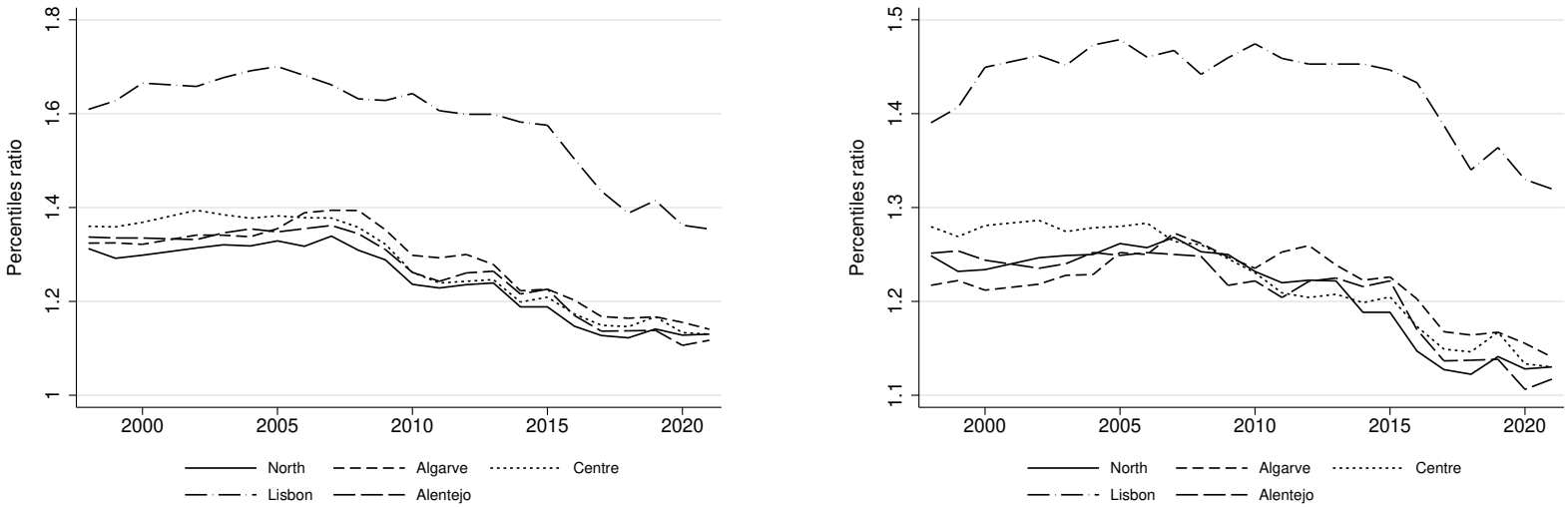


Figure 5: Minimum wage incidence by region, 1998 – 2021

2. Wage and regional inequality, 1998 – 2021



(a) P50/P10

(b) P50/P20

Figure 6: Wage percentile ratios by region, 1998 - 2021

- Linked employer-employee dataset (LEED): 'Quadros de Pessoal' (QP).

- QP provides comprehensive data at the worker level for all employees in firms that have at least one wage earner, and it also includes information at the firm level.

- In 2021, QP reported information on about 283 thousand firms and 3.1 million workers. We restrict our analysis to dependent workers, those with a full pay scheme, full-time workers, workers in mainland Portugal, and workers aged between 18 and 65 years old. As a result, our sample for 2021 includes 221k firms and 2.1M workers.

- We use information on workers' wages, hours worked, age, and occupation for the five NUTS II regions in mainland Portugal for the period 1998 – 2021.

- Our empirical strategy closely follows the specifications used by Lee (1999) and Autor et al. (2016).

- These papers regress the differential between the 10th and 50th wage percentiles on the differential between the minimum wage (state or federal) and the median wage in the USA.

- Our worker-level data enable us to go a step further by implementing an identification approach that explores differences in occupational wage levels across regions, influenced by significant regional income inequality.

Econometric specification:

$$W^{10}_{i,k,c,t} - W^{50}_{i,k,c,t} = \beta_1 Binded_{i,k,t} + \beta_2(MW_t - W^{50}_{i,k,c,t}) \quad (1)$$
$$+ \beta_3(MW_t - W^{50}_{i,k,c,t})^2 + \beta_4(MW_t - W^{50}_{i,k,c,t}) \times Binded_{i,k,t}$$
$$+ \beta_5(MW_t - W^{50}_{i,k,c,t})^2 \times Binded_{i,k,t}$$
$$+ \eta_i + \lambda_k + \psi_c + \gamma_t + \varepsilon_{i,k,c,t}$$

$\rightarrow W^{10}_{i,k,c,t} - W^{50}_{i,k,c,t}$

Difference between the logs of the 10^{th} and 50^{th} percentile hourly wages for NUTS II region i, occupation k, cohort c, in year t.

Equation (1) contains two explanatory variables of interest.

- On the one hand, we consider the differential between the log of the hourly national minimum wage at time t, MW_t, and the median wage at the NUTS II region i, occupation k, cohort c, and year t, $MW^{50}_{i,k,c,t}$.
- On the other hand, we include a binary indicator that equals 1 for pairs region/occupation that are minimum wage binded, $Binded_{i,k,t}$.

The estimation of equation (1) enables us to address the following questions:

- How does wage inequality vary between region/occupation pairs that are bound by minimum wage (binded) and those that are not (non-binded)?
- What is the impact of a national minimum wage increase on the wage distribution?
- How does the magnitude of this impact vary between binded and non-binded region/occupation pairs?

Table 2: Regression estimates for within-region-occupation inequality

	$W^{10} - W^{50}$		
	(1)	(2)	(3)
Binded	0.0599***		0.0246
	(0.003)		(0.019)
$MW - W^{50}$		0.9592***	0.8880***
		(0.037)	(0.051)
$[MW - W^{50}]^2$		0.2177***	0.1730***
		(0.015)	(0.021)
$[MW - W^{50}] \times Binded$			0.2018**
			(0.045)
$[MW_t - W^{50}]^2 \times Binded$			-0.0667*
			(0.027)

Notes: clustered standard errors at the NUTS II level in parentheses. Significance levels: *, 10%; **, 5%; ***, 1%. Decade of birth, NUTS II and year dummies are included. The number of observations is 24262.

Column (1):

- Inequality is 6% lower in *Binded* region/occupation pairs.

Column (2):

- For a gap of 50%, a 1% reduction in the gap between the minimum wage and median wage results in a 0.74% decrease in occupational wage inequality.
- When considering an average gap of 20%, the elasticity is now 0.87%, implying a variation of 0.13 pp.

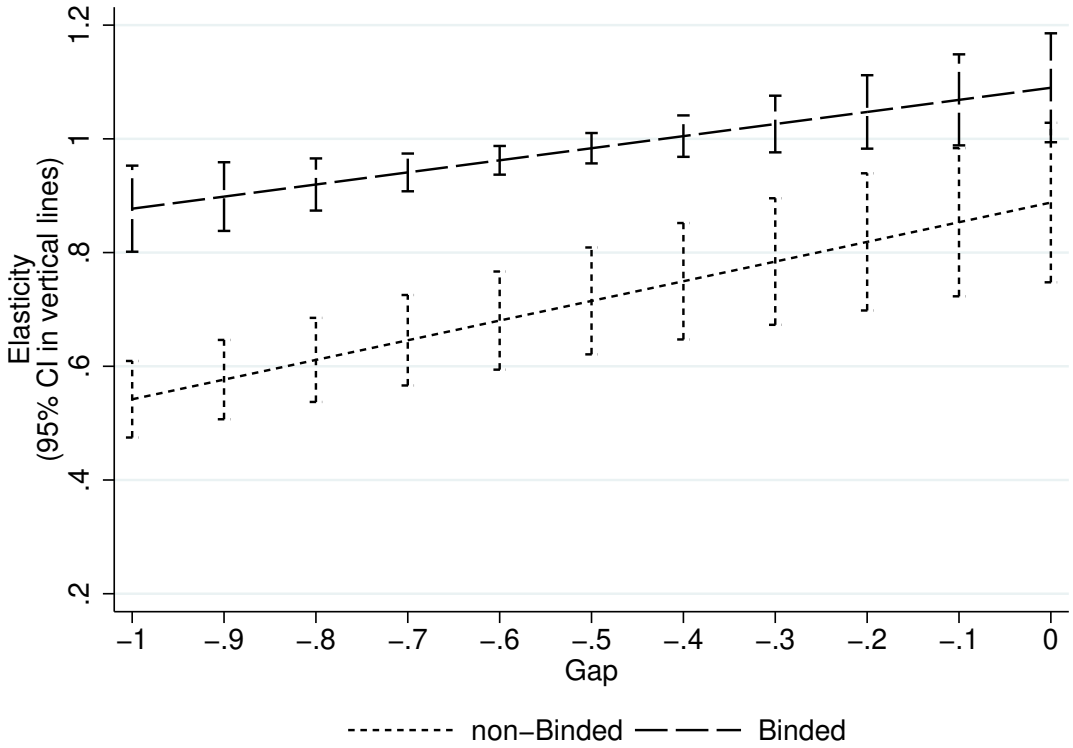


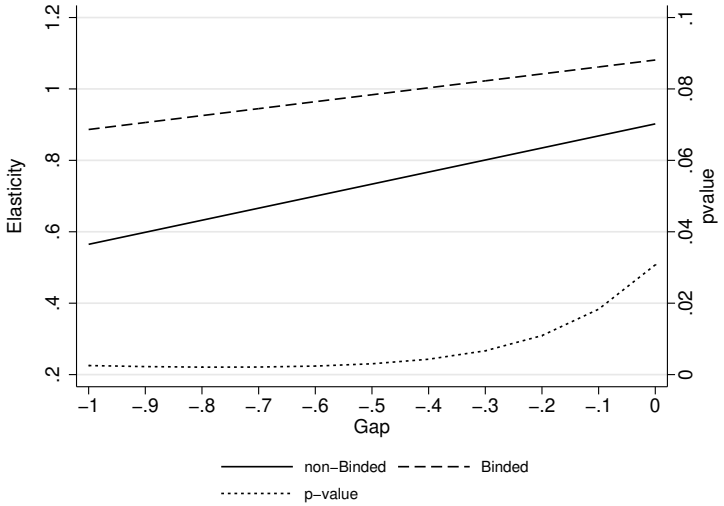
Figure 7: Table 2, Column (3) – Elasticity of inequality with respect to the minimum-to-median wage gap, $MW_t - W^{50}_{i,k,c,t}$

Column (3):

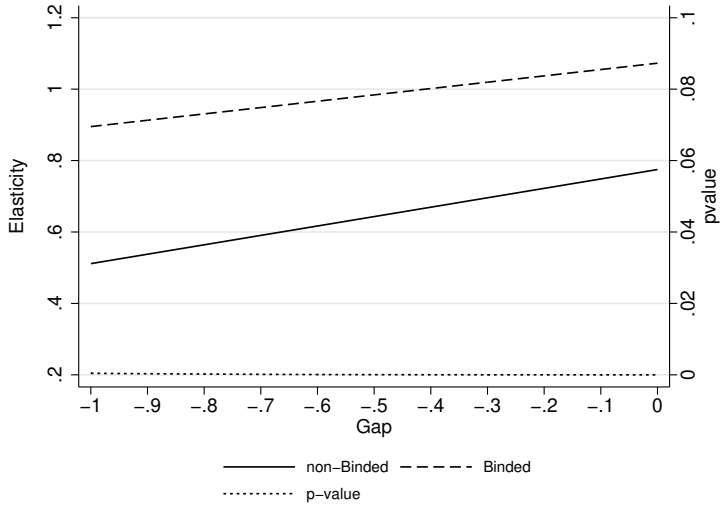
- The effect of minimum wage increases on wage inequality is stronger for *Binded* region/occupation pairs.
- If we consider a minimum to median wage gap of 50%, the elasticity for non-*Binded* pairs is 0.71, whereas for *Binded* pairs this value is 0.98%, a difference of 0.27 pp.
- Given a gap of 25%, the elasticity for the non-*Binded* group stands at 0.8% (an increase of 0.09 pp), while for the *Binded* group, it increases to approximately 1.04%, marking a difference of about 0.14 pp.

- We now test the hypothesis of whether there is a difference in the impact of the minimum wage between the Lisbon region and the remaining regions.

- We adapt equation (1) by introducing interaction terms between the main variables of interest, $MW_t - W^{50}_{i,k,c,t}$ and $Binded_{i,k,t}$, and a dummy variable $Lisbon_i$ that takes the value of 1 if the observation corresponds to the NUTS II Lisbon region, and 0 otherwise.

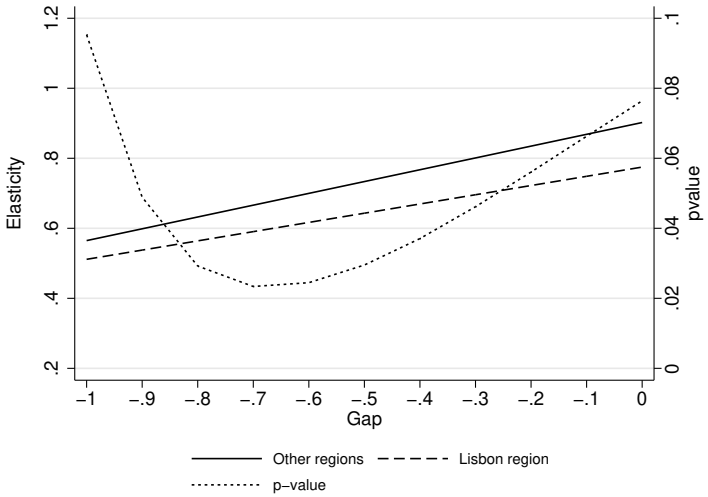


(a) North, Centre, Alentejo & Algarve regions

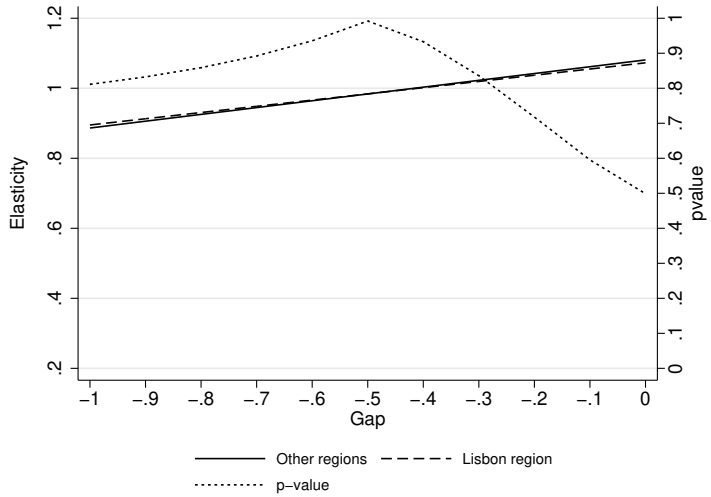


(b) Lisbon region

Figure 8: Elasticity of inequality with respect to the minimum-to-median wage gap, $MW_t - W^{50}_{i,k,c,t}$

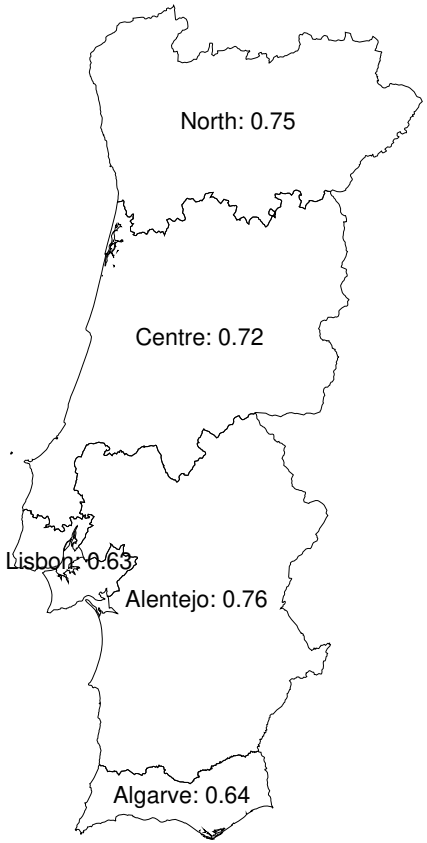


(a) non-Binded

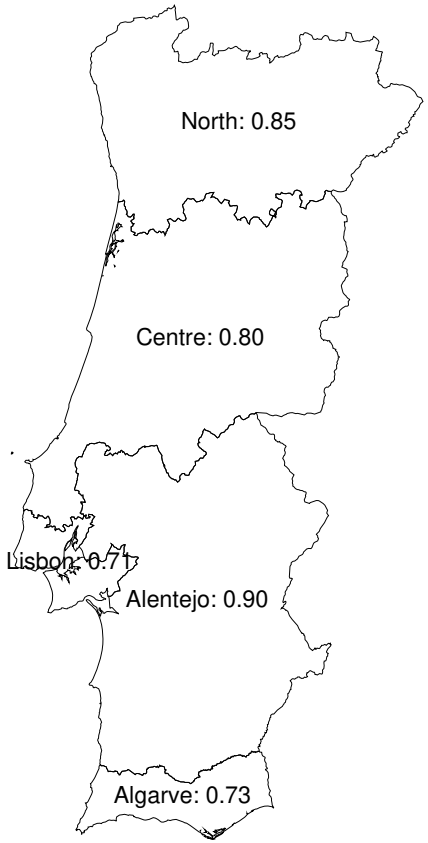


(b) Binded

Figure 9: Elasticity of inequality with respect to the minimum-to-median wage gap, $MW_t - W^{50}_{i,k,c,t}$



(a) Minimum-to-median 50% wage gap



(b) Minimum-to-median 20% wage gap

Figure 10: non-*Binded* pairs – Elasticity of inequality with respect to the minimum-to-median wage gap, $MW_t - W^{50}_{i,k,c,t}$

- The North, Centre and Alentejo regions have very similar elasticities at around 0.75, with a gap between the highest and lowest of only 0.04 pp.
- Lisbon and Algarve are very similar, with a gap between the two of around 0.01pp, at around 0.63%.
- When evaluating at a lower minimum-to-median gap, that is, a minimum wage closer to the median, elasticities increase, with the diversity between regions also increasing.
- For the North, Centre and Alentejo regions, the gap between the highest and lowest is now 0.1 pp, while the gap between Lisbon and Algarve is 0.03 pp.

5. Concluding remarks

- Decreases in the minimum-to-median wage gap correlate with a reduction in wage inequality.
- This reduction is particularly pronounced in region/occupation pairs that are more affected by minimum wage policies.
- In region/occupation pairs with a lower prevalence of minimum wage, the amplification of this effect becomes more evident as the wage gap narrows.
- The effects of minimum wage policies varied across Portuguese regions, with the Lisbon region being the least affected.