National Wage Equalization and Regional Misallocation: Evidence from Italian and German Provinces

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Distributional effects of centralized bargaining

Flanagan (1999) JEL survey of collective bargaining. Atkinson Brandolini (2006) survey of determinants of income distributions: centralized wage setting reduces earning and income inequalities.

- Country studies: Maloney and Savage (1996): New Zealand;Gottschalk and Smeeding (1997): Sweden; Kahn (1998): Norway
- Multi-country studies: Wallerstein (1999); Rueda and Pontusson (2000); Mahler (2004);Scheve and Stasavage (2009): not clear effects
- Goldin and Katz (2008): unions and pay differentials in the US

Extensions of national-sectoral agreements to all firms considered to level the playing field across firms: OECD (2017); Hayter and Visser (2017)

Is it true when account is made of "inflation across space"? And what about efficiency-allocation? Drawing on the German and Italian experience: similar regional productivity differences and initial bargaining structures

The paper in a nutshell: North and South in Italy

Labor productivity in the North is higher than in the South.

But nominal wages cannot adjust because of national union contracts.

We show that in this situation:

- Less productive South has high non-employment
- North has high housing prices
- South has higher real wages than the North (because of lower housing prices) for those who find employment
- There is a negative relationship between real wages and value added

The paper in a nutshell: West and East in Germany

Labor productivity in the West is higher than in the East.

But since the mid 90s, nominal wages become more dispersed because

- A practice of regional collective bargaining
- Coverage of union contracts has decreased
- So-called "opening clauses" allow firms to deviate from union contracts

We show that in this situation:

- Nominal wages are higher in the West
- Housing prices are relatively more uniform in the two regions
- Non-employment differences across the two regions are relatively smaller
- Some positive relationship of real wages and value added

Only about Germany and Italy?

- In 12 out of 18 western European countries more than 70% of workers covered by collective bargaining agreements
- In addition, in western Europe bargaining takes place mostly on national or sectoral level
- When two-tier **in meius** clauses generate wage drift wrt to national contracts
- In this paper we want to document the effects of this equalization of wages on the example of Italy and Germany.
- We argue that nominal wage equality across regions generates important distortions related to housing prices, unemployment, and real wages.
- This is particularly true in countries with high regional differences in productivity.

Outline

- A simple model of spatial equilibrium (housing market) with collective bargaining
- Data
- Institutional differences in bargaining systems
- Key empirical results
  1. nominal and real wage compression
  2. housing prices
  3. non-employment rates
- Robustness
- Counterfactuals
- Conclusions

A spatial equilibrium model

Consider two regions $r = \{n, s\}$

- Production in each region is given by:

$$Y_r = A_r K_r^{(1-\alpha)} E_r^{\alpha}$$

- The total population of the country is $\bar{L} = L_n + L_s$
- The utility of a representative worker of region r is given by:

$$\Omega_r = \frac{w_r}{p_r^{\sigma}}(1 - u_r)$$

where w_r is the wage level and u_r is the non-employment rate in region r.

- $p_r = \gamma L_r$ is the price level in region r, which increases in population.
- For simplicity we assume that the consumption weight of housing $\sigma = 1$

A Model of production and employment in two regions

- All workers are renters
- Labour supply is fixed at $\bar{L}$
- We assume zero mobility costs and no heterogeneous tastes
- The wage does not necessarily clear the two labor markets and thus
  - L_n and E_n
  - L_s, and E_s

  may diverge and are endogenous.
- TFP, denoted by A_r, may differ across regions.

Free market case - flexible wages

- Capital is supplied at price i
- Labour demand is determined by the marginal product of labour

$$A_r K_r^{(1-\alpha)} \alpha E_r^{(\alpha-1)}$$

- In equilibrium prices adjust so that unemployment is zero and utility across regions is equalized:

$$E_r = L_r \quad \Leftrightarrow \quad u_r = 0$$
$$\Omega_n = \Omega_s \quad \Leftrightarrow \quad \frac{w_n}{\gamma E_n} = \frac{w_s}{\gamma E_s}$$

Free market case - flexible wages

Six equilibrium conditions for six unknowns $w_n, w_s, E_n, E_s, k_n, k_s$:

1. $w_n^* = A_n K_n^{*(1-\alpha)} \alpha E_n^{*(\alpha-1)}$
2. $w_s^* = A_s K_s^{*(1-\alpha)} \alpha E_s^{*(\alpha-1)}$
3. $i = A_n K_n^{*(-\alpha)} E_n^{*\alpha} (1-\alpha)$
4. $i = A_s K_s^{*(-\alpha)} E_s^{*\alpha} (1-\alpha)$
5. $\Omega_n = \frac{w_n}{\gamma E_n} = \frac{w_s}{\gamma E_s} = \Omega_s$
6. $E_n + E_s = \bar{L}$

Free market case - flexible wages

In the free market equilibrium:

- Wages and employment and capital indexed to TFP: higher in the region with higher A_r.
- Full employment in both regions but $E_n \geq E_s$
- Workers indifferent between the two regions, but $p_n \geq p_s$, real wages equalized
- Capital is indifferent between the two regions (return at i)

Introducing collective bargaining

Wages are set by a contract so that:

$$\bar{w}_n \geq w_n^*$$

$$\bar{w}_s \geq w_s^*$$

In this case w_s & w_n are set first, then E_n and E_s, L_n and L_s adjust.

In equilibrium:

$$\Omega_n = \Omega_s \quad \Leftrightarrow \quad \frac{\bar{w}_n}{\gamma L_n}\frac{E_n}{L_n} = \frac{\bar{w}_s}{\gamma L_s}\frac{E_s}{L_s}$$

$$\frac{L_n^2}{(\bar{L}-L_n)^2} = \frac{\bar{w}_n E_n}{\bar{w}_s E_s} \quad \Leftrightarrow \quad L_n^* = \frac{\sqrt{\frac{\bar{w}_n E_n}{\bar{w}_s E_s}}}{1+\sqrt{\frac{\bar{w}_n E_n}{\bar{w}_s E_s}}}\bar{L}$$

Unequal productivity and equal wages

Suppose that, as in the Italian case:

$$A_n > A_s$$

$$\bar{w}_n = \bar{w}_s$$

- From the labour demand equation it must be that $E_n > E_s$
- and therefore

$$L_n = \frac{\sqrt{\frac{E_n}{E_s}}}{1+\sqrt{\frac{E_n}{E_s}}}\bar{L} > \frac{1}{2}\bar{L}$$

  and therefore $L_n > L_s$
- Also capital and output are higher in region n.

Inefficiency and inequality of this equilibrium

- Housing prices are lower in the south

$$\gamma L_s = p_s < p_n = \gamma L_n$$

- By the equilibrium condition, the expected utilities are equal in both regions

$$\frac{w_n(1-u_n)}{\gamma L_n} = \frac{w_s(1-u_s)}{\gamma L_s}$$

- and thus Unemployment is higher in region s

$$u_s > u_n$$

- Because expected utility is equal but unemployment higher in s, real wages for employed workers are higher in s

$$\frac{w_s}{\gamma L_s} = \frac{w_s}{p_s} > \frac{w_n}{p_n} = \frac{w_n}{\gamma L_n}$$

Data and methodology - wages

Local areas are:

- 103 provinces for Italy; average pop.: 500K (90K – 3700K)
- 96 Raumordnungsregion for Germany; average pop.: 800K (200K– 3500K)

Source for wages:

- ISTAT Quarterly labor force statistics for Italy
- Institute for Employment Research (IAB) for Germany

Coverage:

- All private and public employees for Italy
- All private and public employees, subject to social security contribution for Germany

Data and methodology - wages

Wages are:

- hourly net of taxes for Italy
- daily gross of taxes for Germany
- controlling for workers' characteristics (education, age, gender)
- controlling for industry effects

Robustness checks on the difference between wages net or gross of taxes in the two countries

Data and methodology - housing price

We obtained the raw per square meter housing prices :

- Italy:
  - Osservatorio Mobiliare Italiano
  - Transaction data from residential real estate sales
  - net of object characteristics
- Germany:
  - Bundesinstitut für Bau-, Stadt- und Raumforschung (BBSR)
  - Registered rental offer prices for "ordinary" flats and houses

Let HP^m_{pt} denote this variable in the following.

Data and methodology - CPI

We construct a regional CPI using the methodology of Moretti (2013)

- a CPI that varies across regions and that
- takes into account that prices for other goods are influenced by housing prices

To compute the Moretti CPI^m_{pt} for area p and year t we:

1. Obtain the weight w of housing in household consumption from
   - the central statistical office (Germany)
   - Consumption survey by Ministry of Labor (Italy)
2. Obtain the CPI^s_{pt} and the housing price HP^s_{pt} from official sources:
   - s = Regional Statistical Authority in Germany
   - s = Istat in Italy

   Note that these indices are not comparable across regions.

Data and methodology - CPI

3 Regress CPI^s_{pt} on HP^s_{pt} (in first difference) and retrieve the slope β.

4 The link between the price of non-housing goods to the price of housing is

$$\pi = \frac{\beta - w}{1 - w}$$

where w is the weight of housing in household consumption.

5 This because, assuming that $NHP = \pi HP + \nu$,

$$CPI = wHP + (1 - w)NHP \approx (w + (1 - w)\pi)HP = \beta HP.$$

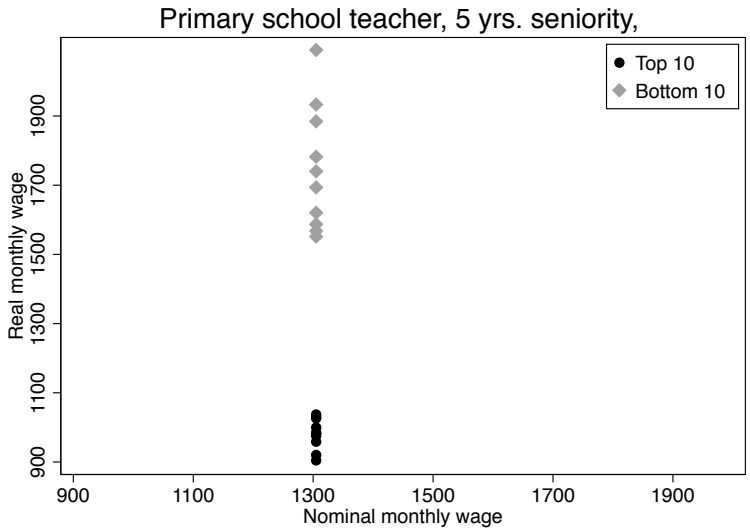
6 Finally, compute CPI^m_{pt} (reflecting also geographical price differences) as

$$CPI^m_{pt} = wHP^m_{pt} + (1 - w)\left[\pi HP^m_{pt} + (1 - \pi)NHP^s_{nt}\right]$$

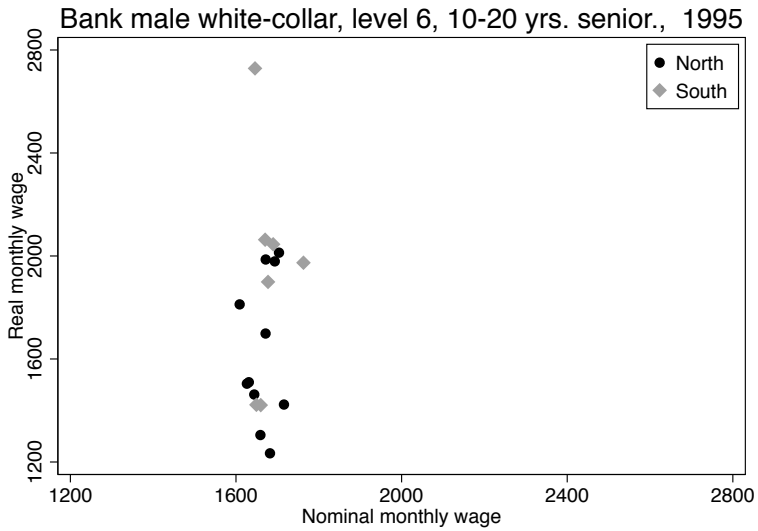
Wage setting: Italy s. Germany

- Italy: 346 national agreements covering 97.7 % employees and 99.3 % firms
- two-tier system: second level can only increase wages wrt first level
- Germany: Lander based system
- After unification opening clauses and reduction of coverage

Nominal and real wages for a specific worker in Italy



Teacher
Top/bottom 10 provinces
for housing price

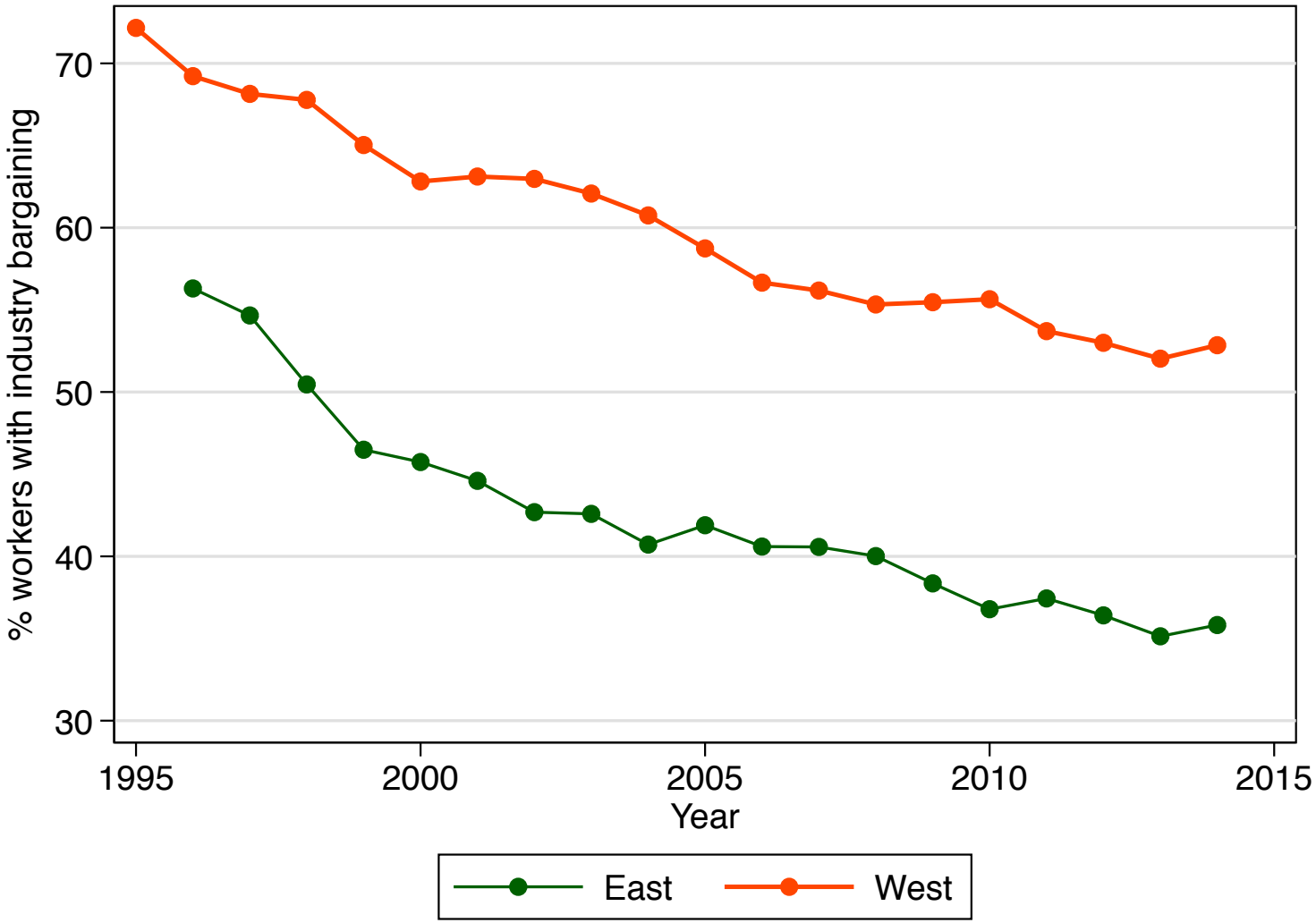


Bank teller
in the 20
regional capitals

Table: Example of a collective bargaining contract in Italy: Construction sector, 2016

Cost component	Mean	Min	Max	SD
Minimum/Floor	4.86	4.86	4.86	0.00
Indexation to inflation	2.96	2.96	2.96	0.00
Cost of living allowance	0.06	0.06	0.06	0.00
Variable component of pay	0.15	0.04	0.50	0.09
Sectoral allowance	1.11	0.91	1.26	0.07
Total : Hourly components of pay	9.02	8.79	9.37	0.09
Remuneration for national holidays	0.61	0.60	0.62	0.00
Compensation for yearly vacation	0.47	0.46	0.48	0.01
Contribution to mutual sectoral fund	1.77	1.73	1.80	0.01
Transport allowance	0.29	0.05	1.40	0.20
Compensation for training	0.18	0.18	0.18	0.00
Contribution to mutual fund for injury	0.21	0.20	0.21	0.00
Total : Additional costs	3.46	3.19	4.64	0.21
Contribution to social security	4.38	4.23	4.78	0.09
Contribution to accident insurance	1.62	1.57	1.77	0.03
Contribution to special contruction worker fund	0.78	0.39	1.16	0.15

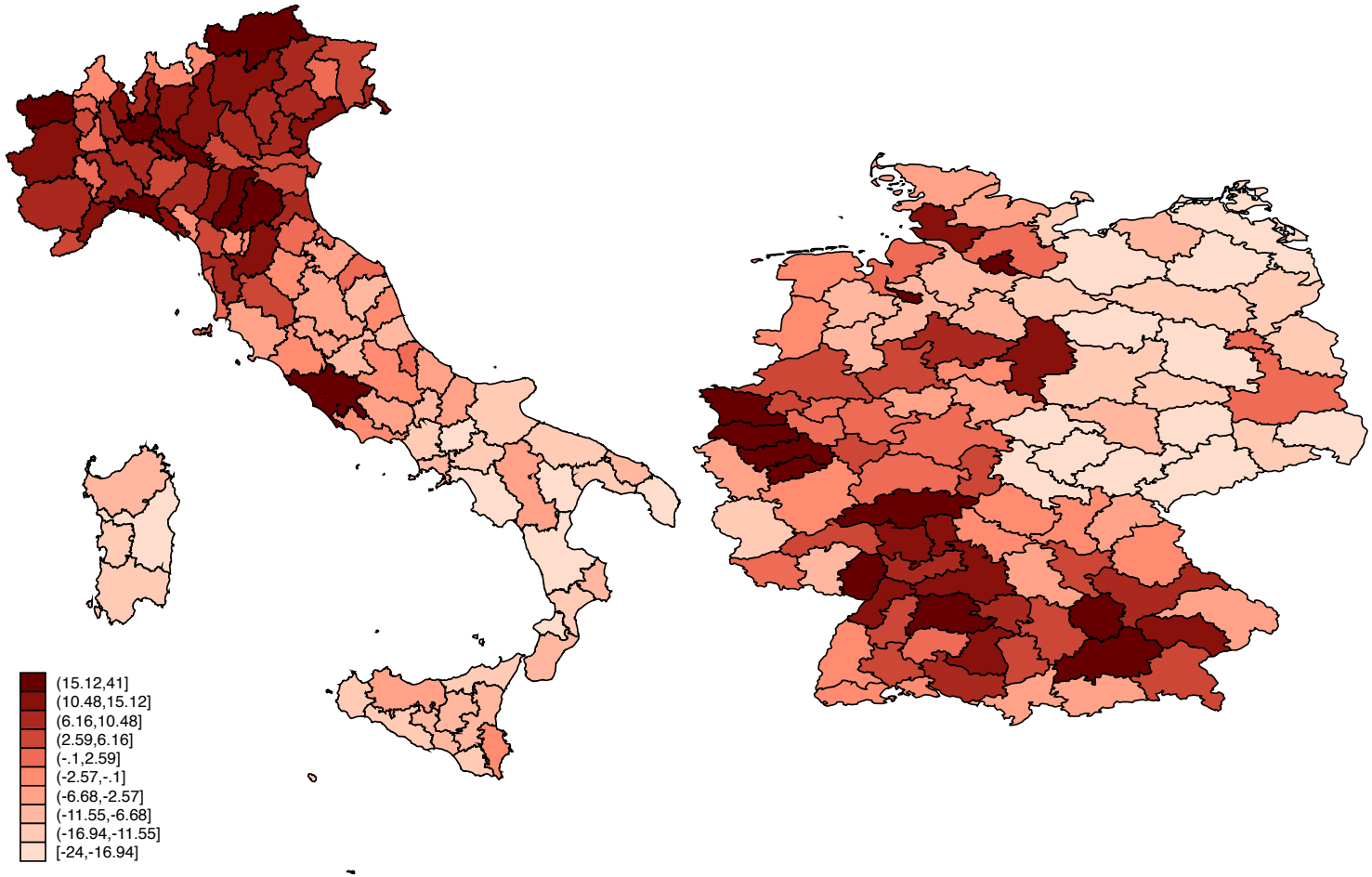
Coverage of collective bargaining - Germany



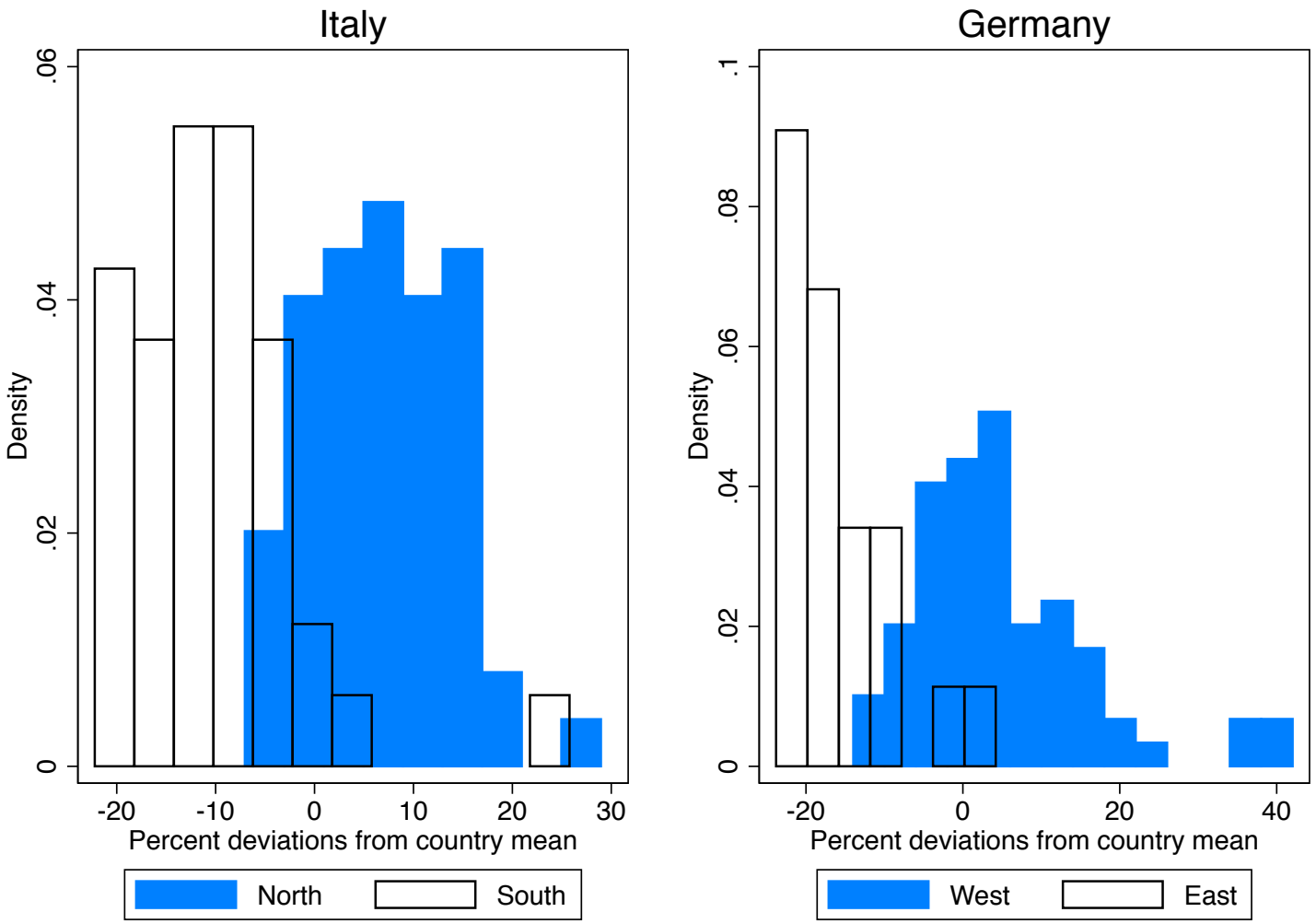
Collective bargaining and opening clauses - Germany

	% workers under industry contract		% workers subject to opening clauses	
	West	East	West	East
1996	69.22	56.30	.	.
1998	67.77	50.46	.	.
2001	63.11	44.60	.	.
2003	62.08	42.58	.	.
2005	58.74	41.89	33.36	23.69
2007	56.18	40.57	38.30	28.19
2009	55.46	38.35	.	.
2011	53.70	37.44	47.27	40.01
2013	52.03	35.13	.	.

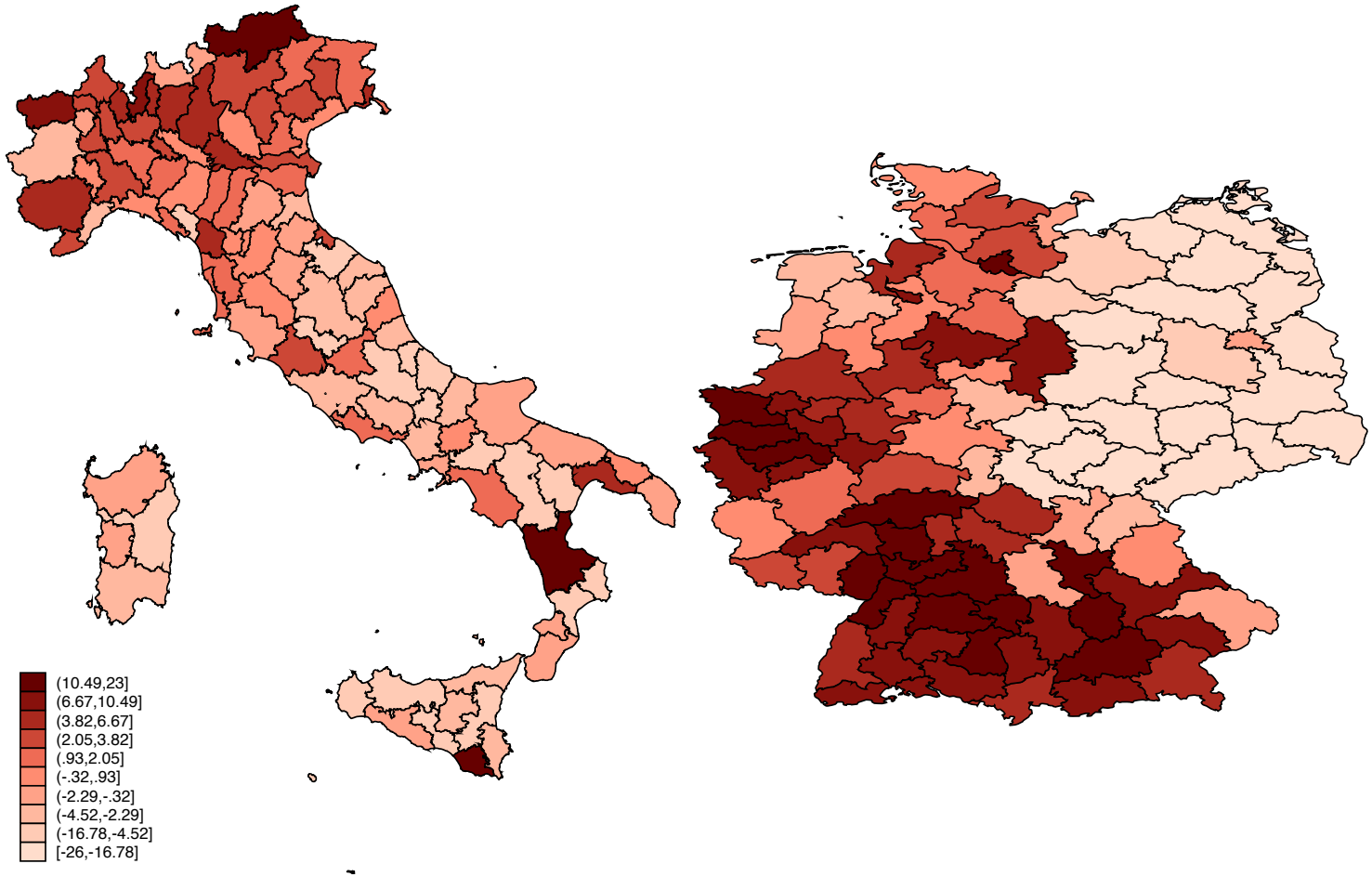
Value added per worker



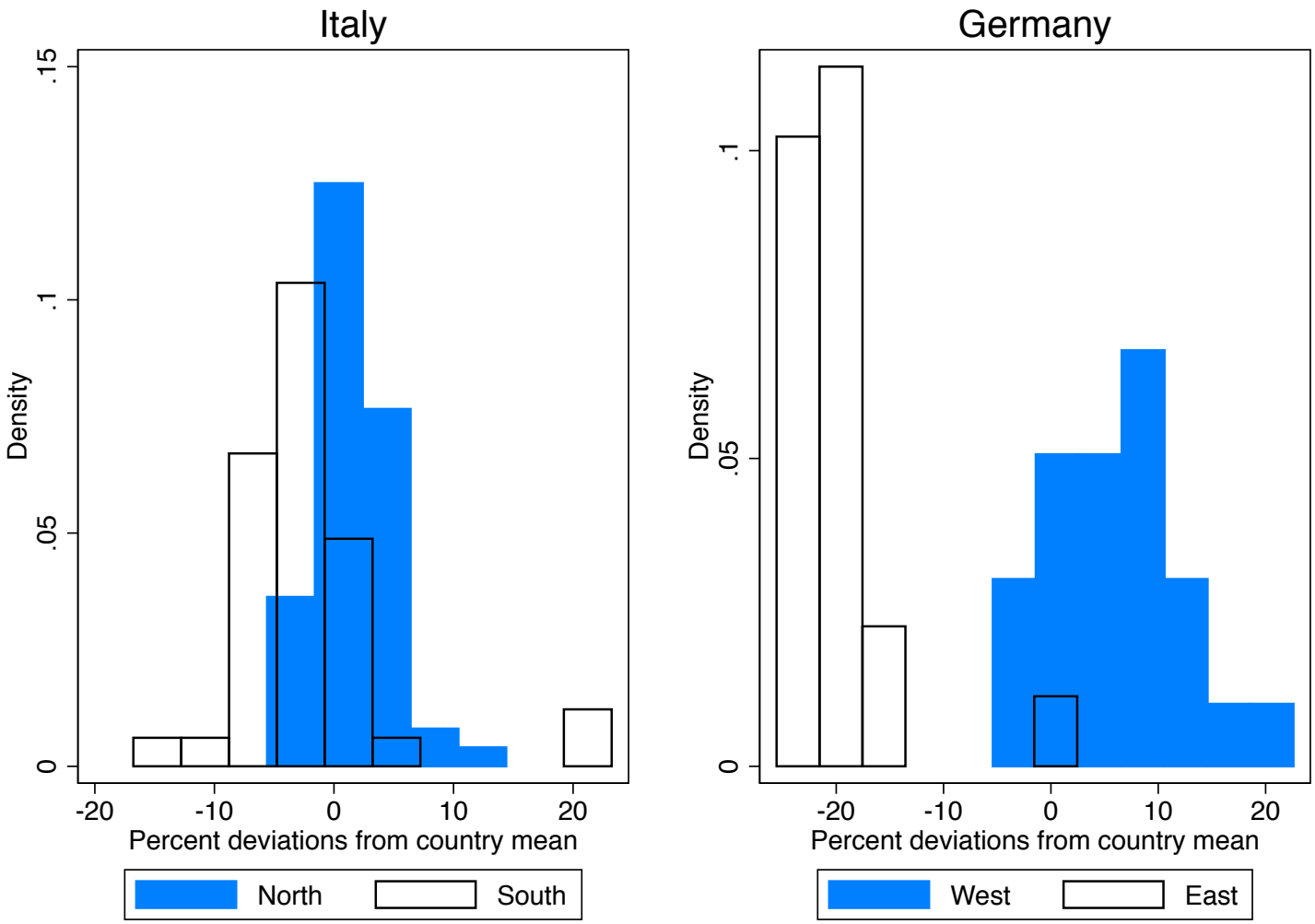
Value added per worker



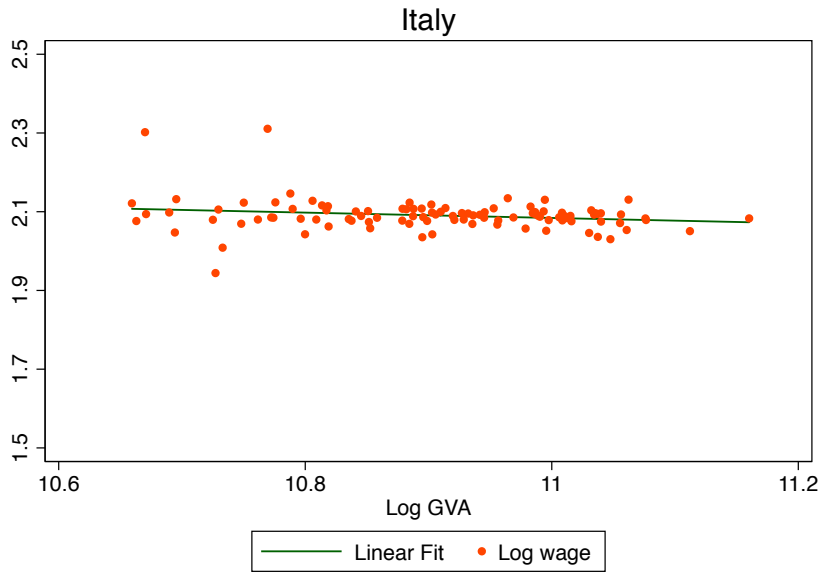
Nominal wages

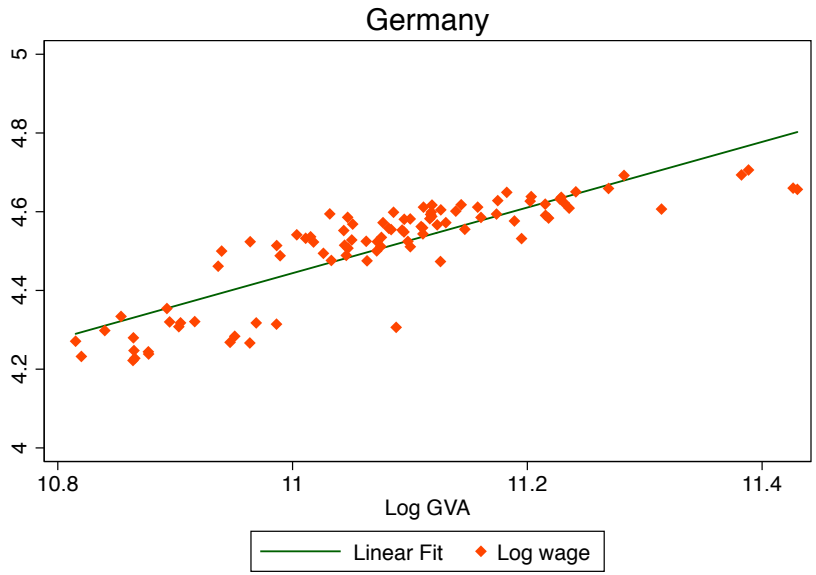


Nominal wages

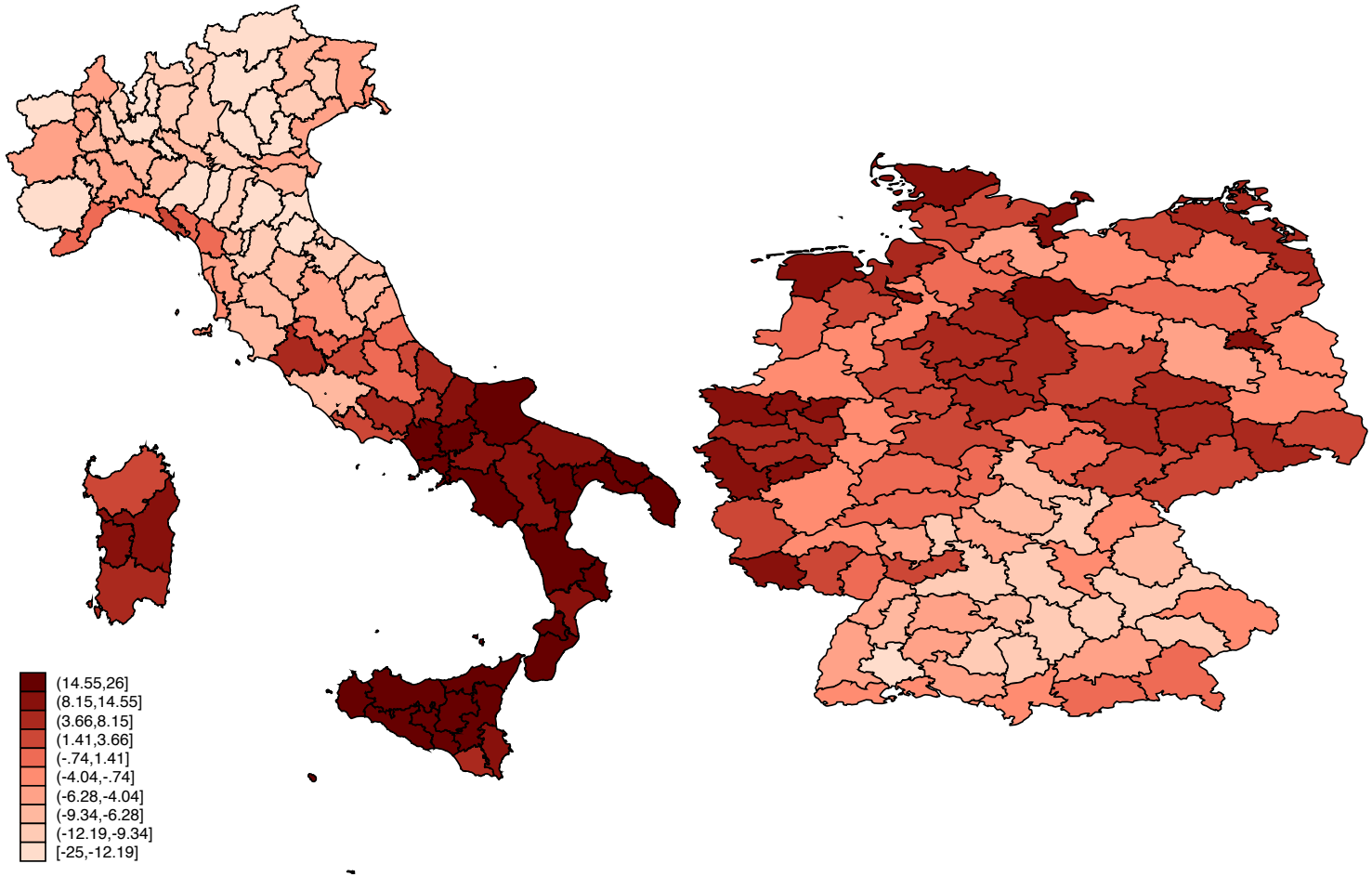


Nominal wage and GVA

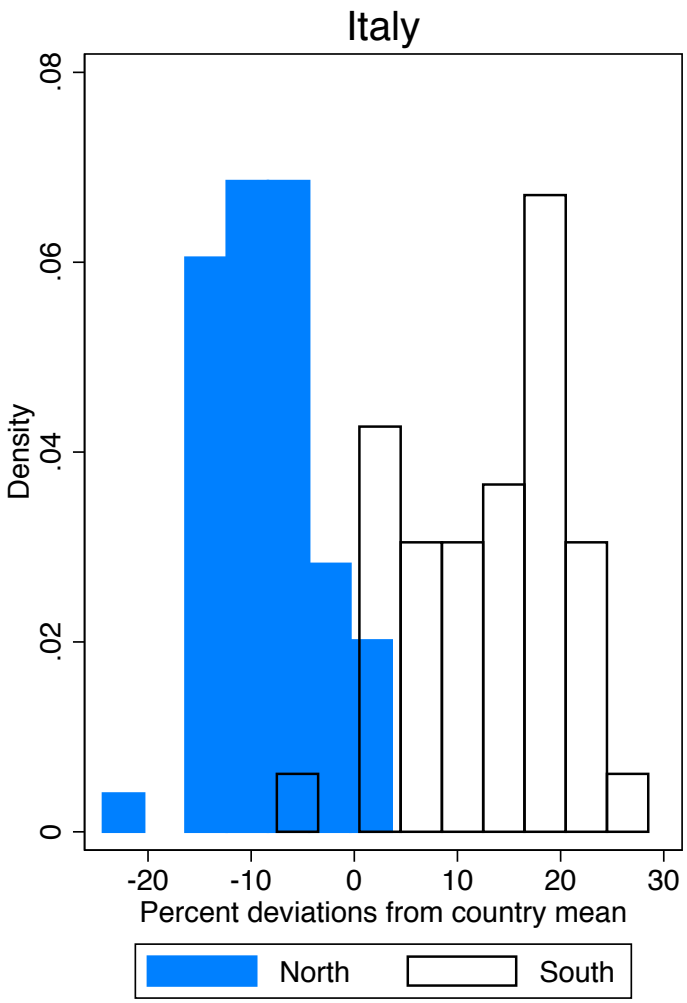


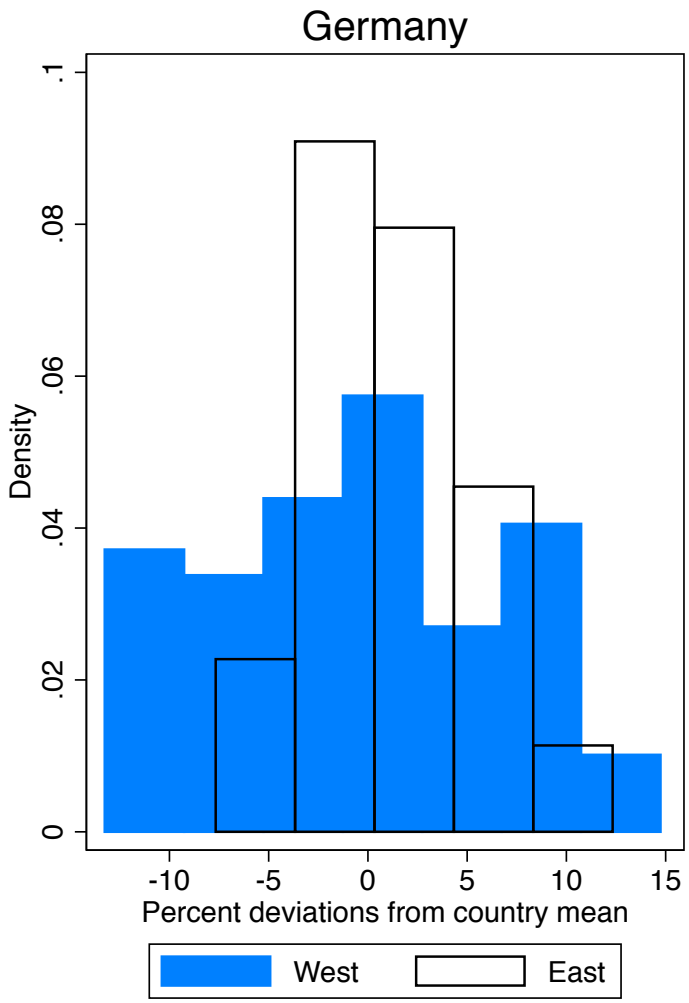


Non-employment rate



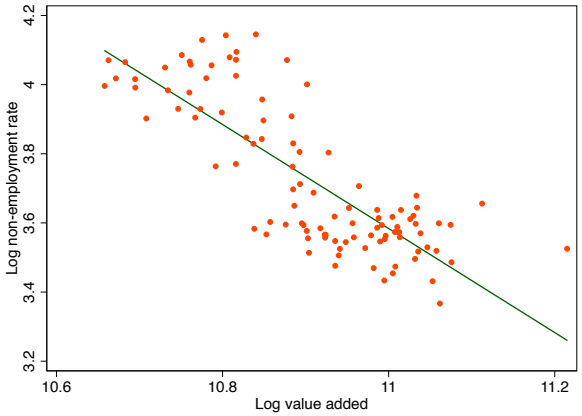
Non-employment rate



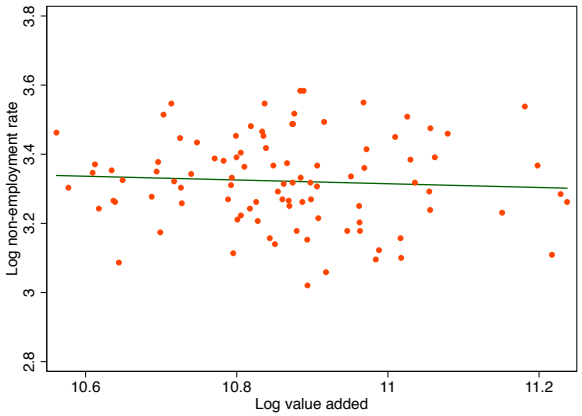


Non-employment and value added

Figure: Non-employment and value added



(a) Italy



Why don't the jobless from the south migrate to the north?

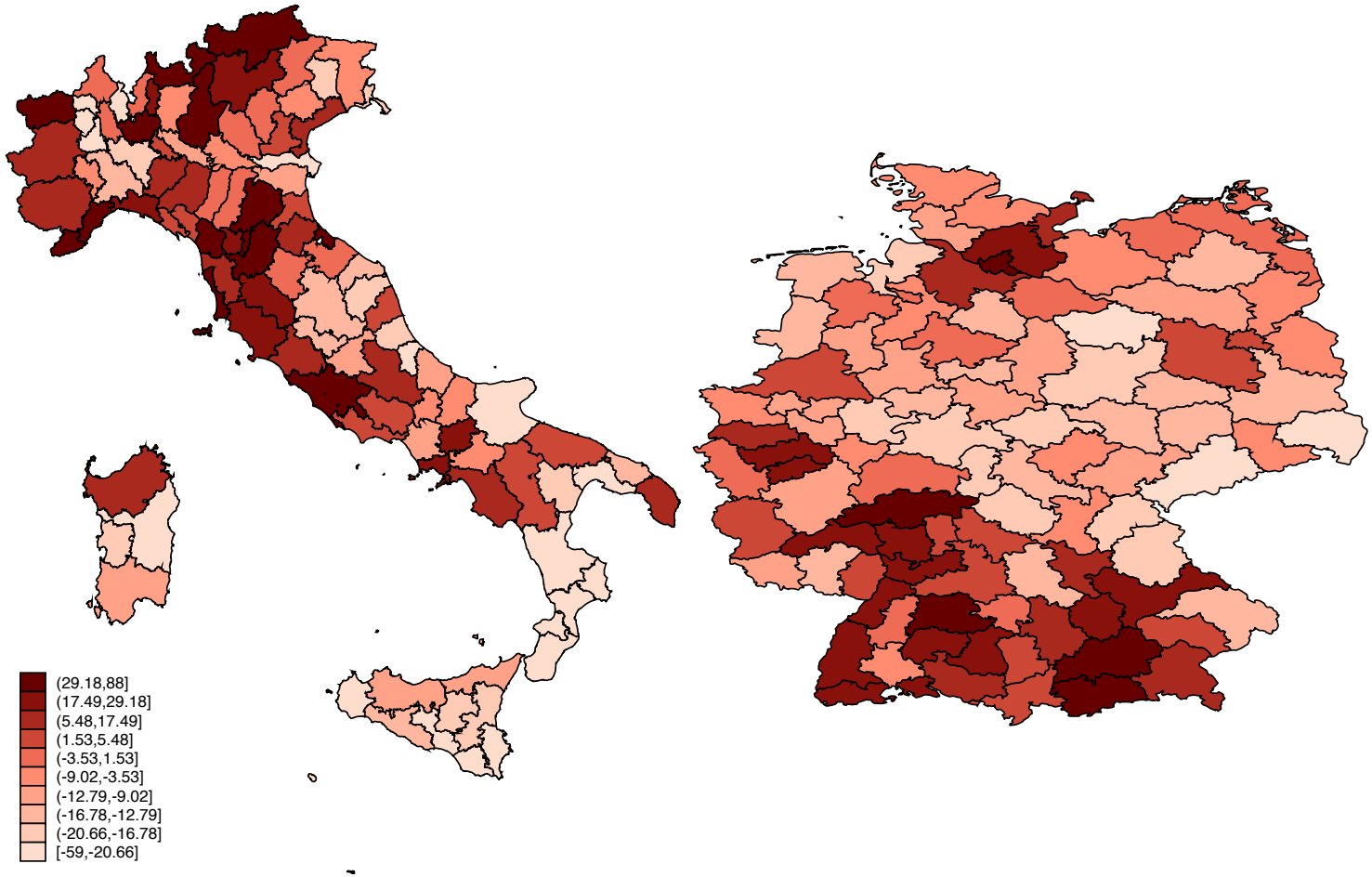
High labour demand causes housing prices in the north to go up but nominal wages are still at a similar level as in the south.

$\Rightarrow$ Real wages are actually higher in the south

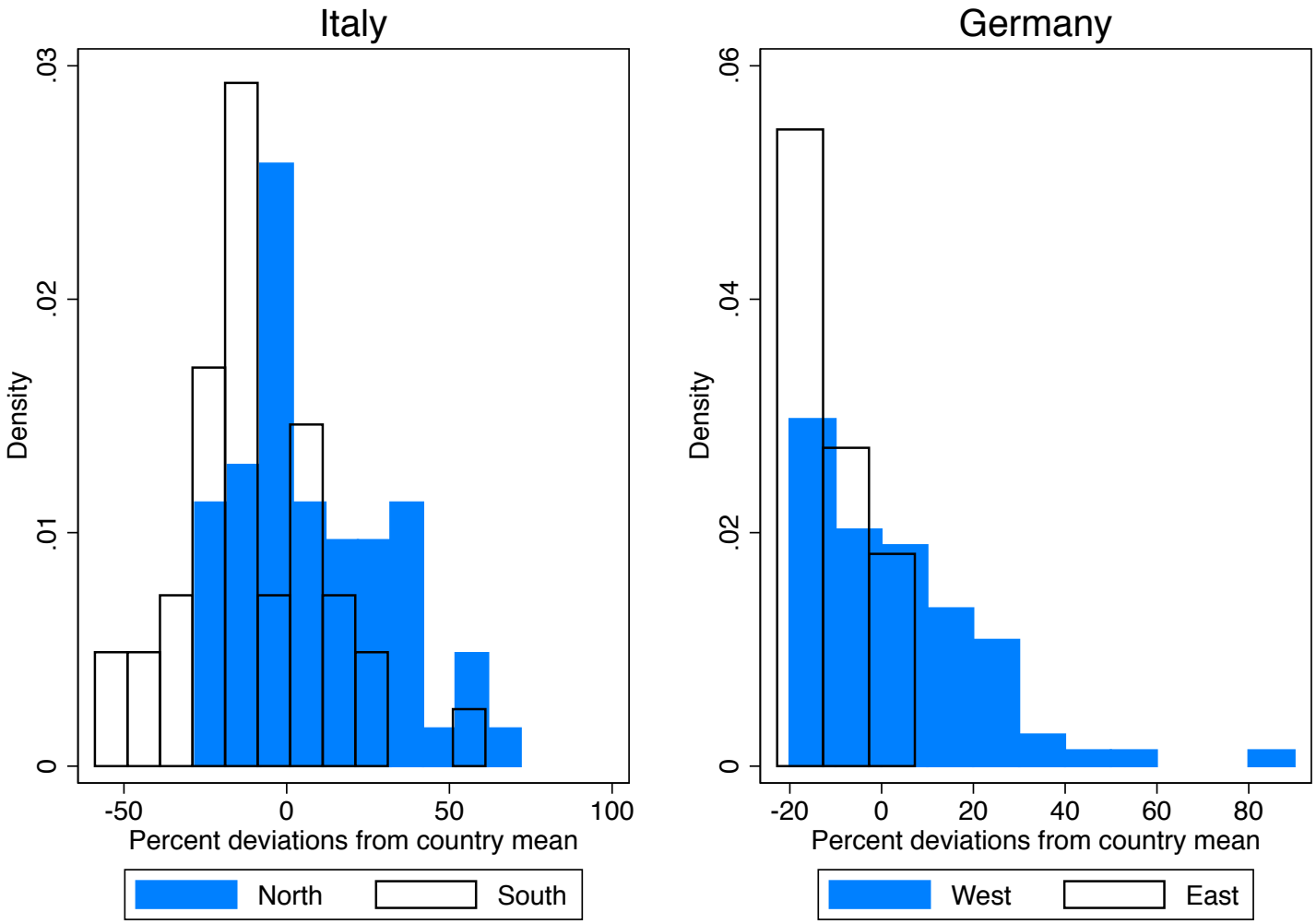
Taking wages, housing costs and employment probabilities into consideration:

$\Rightarrow$ the incentive to move is small

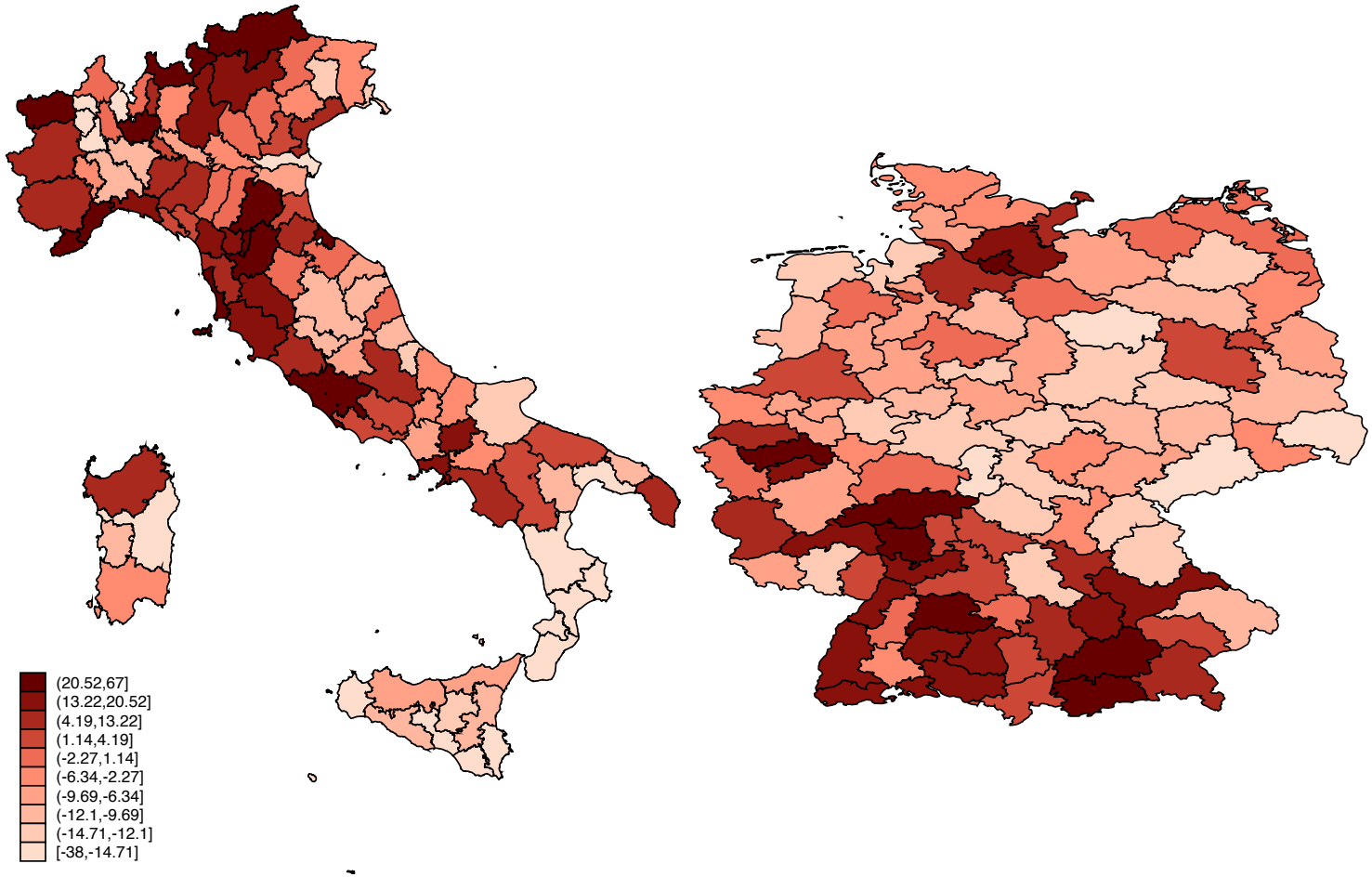
Housing prices



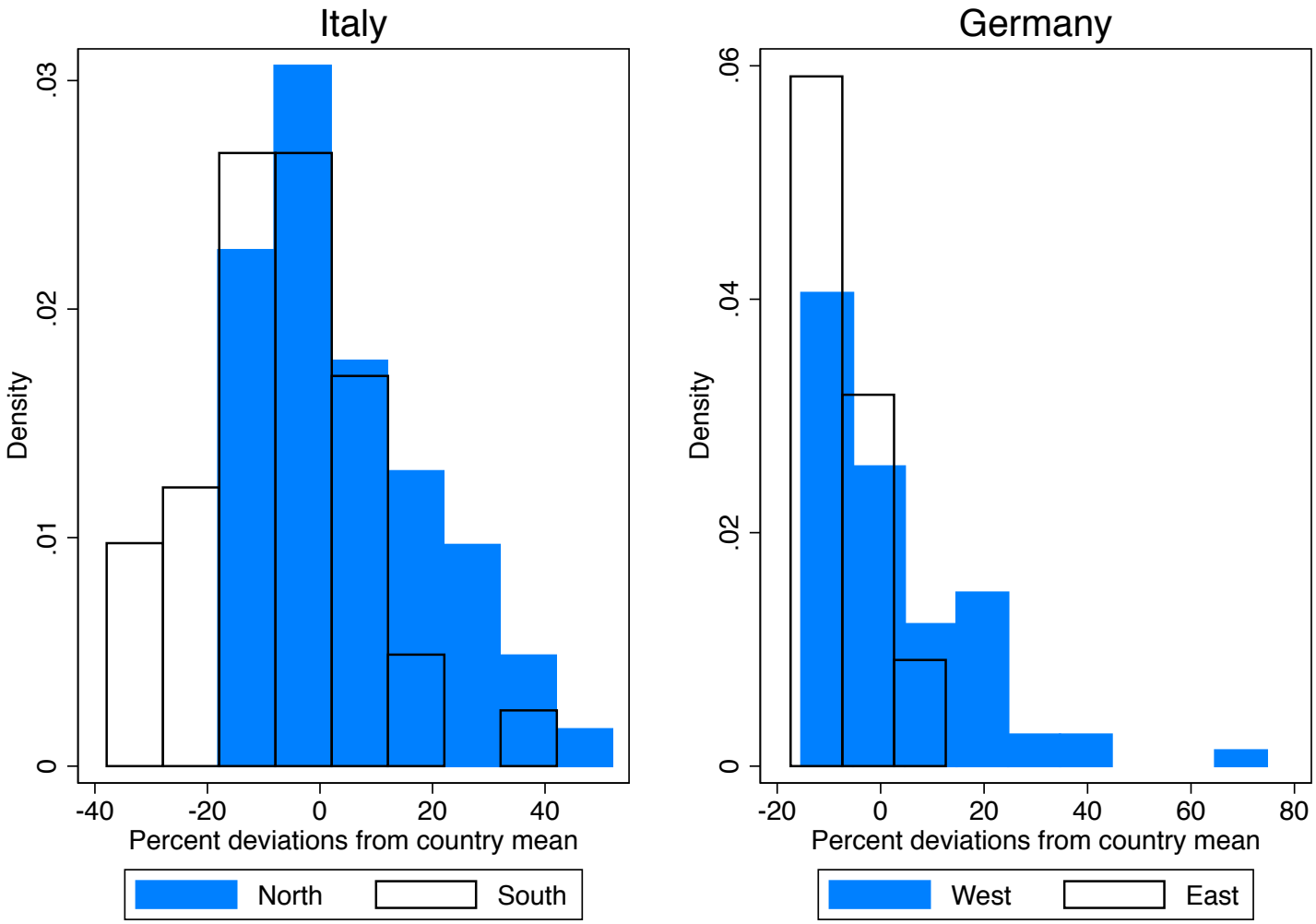
Housing prices



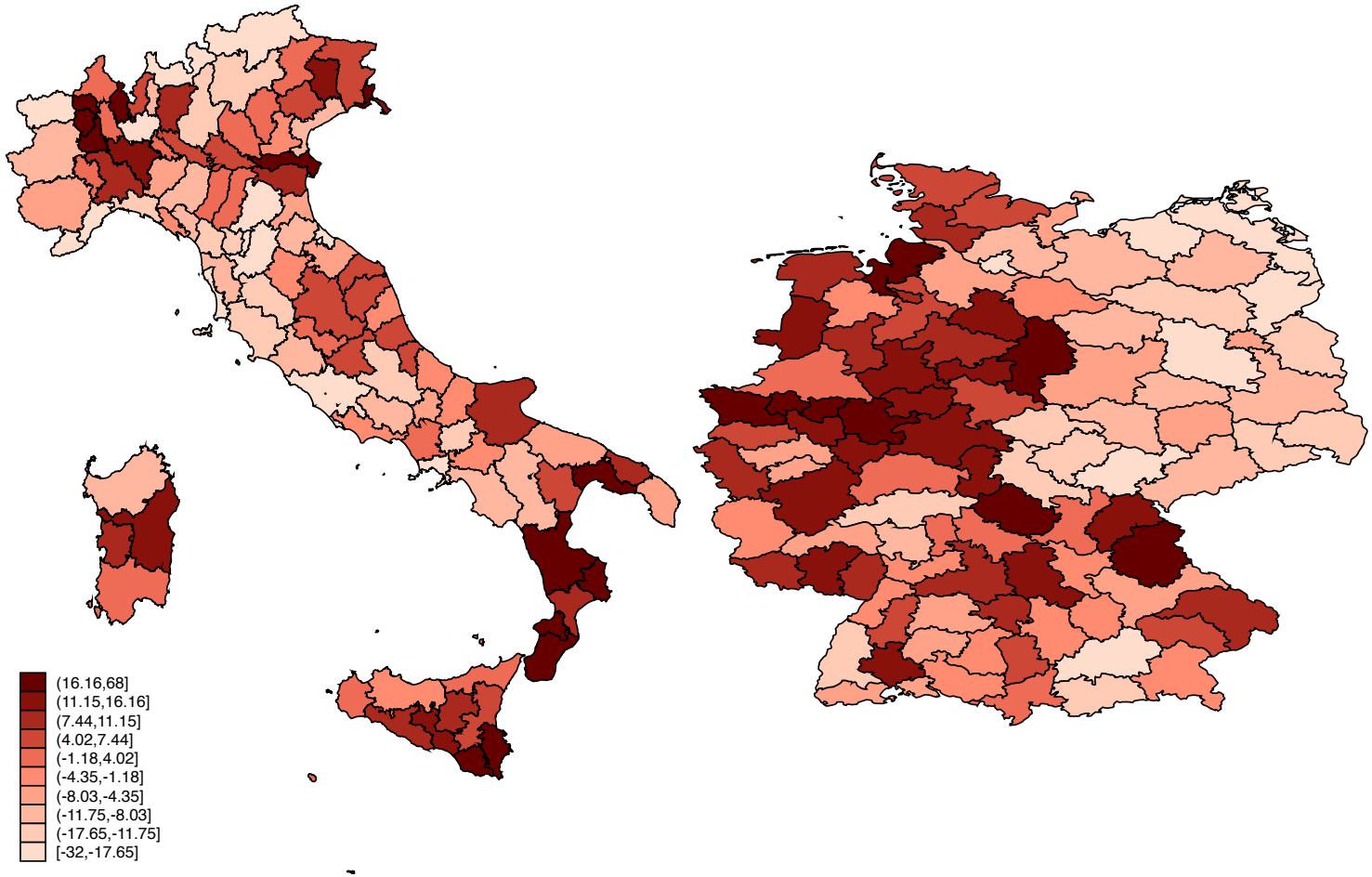
Consumer prices



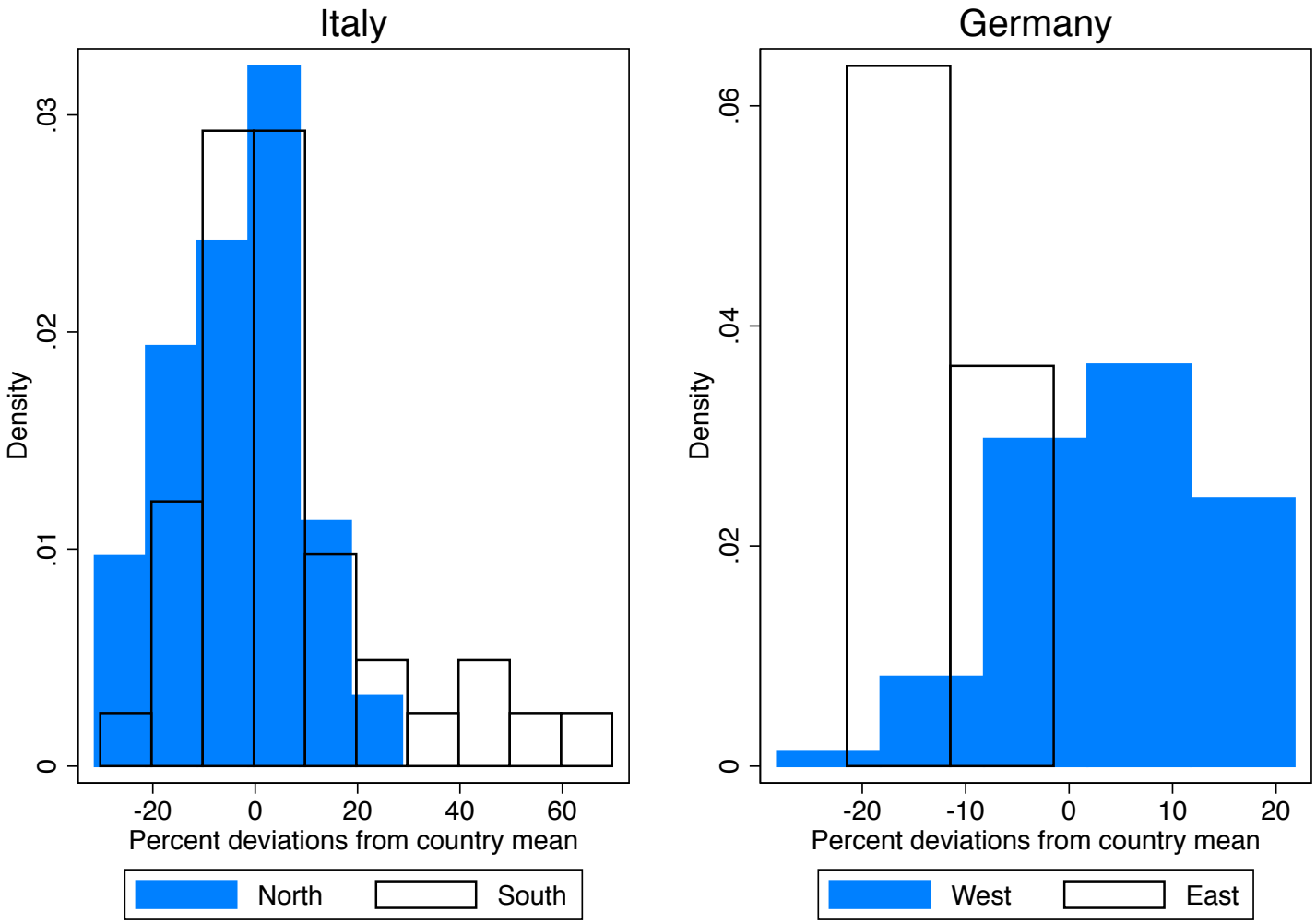
Consumer prices



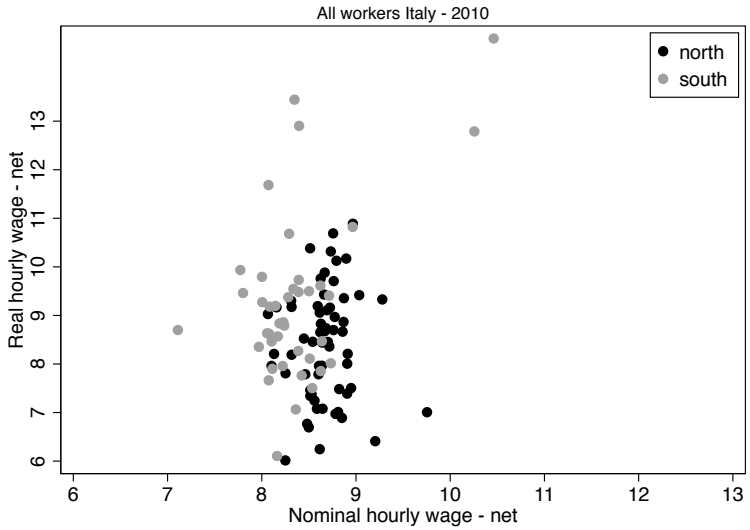
Real wages


(16.16,68]
(11.15,16.16]
(7.44,11.15]
(4.02,7.44]
(-1.18,4.02]
(-4.35,-1.18]
(-8.03,-4.35]
(-11.75,-8.03]
(-17.65,-11.75]
[-32,-17.65]

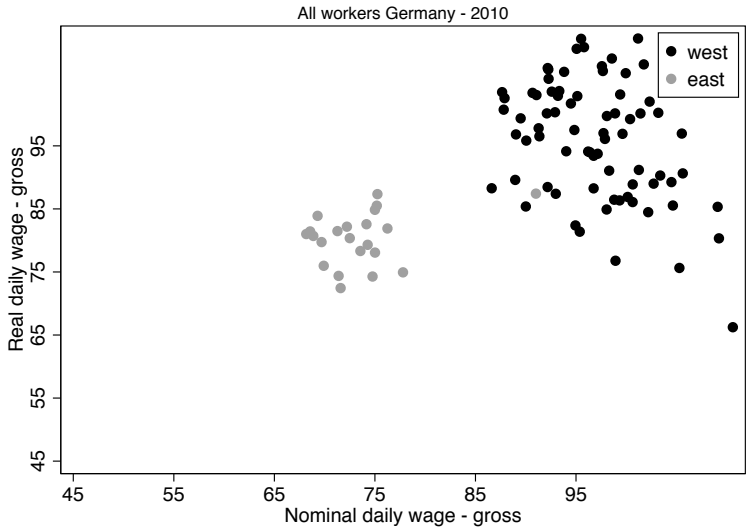
Real wages


Italy
Density
0
.01
.02
.03
-20
0
20
40
60
Percent deviations from country mean
North
South
Germany
Density
0
.02
.04
.06
-20
-10
0
10
20
Percent deviations from country mean
West
East

Nominal and real wages

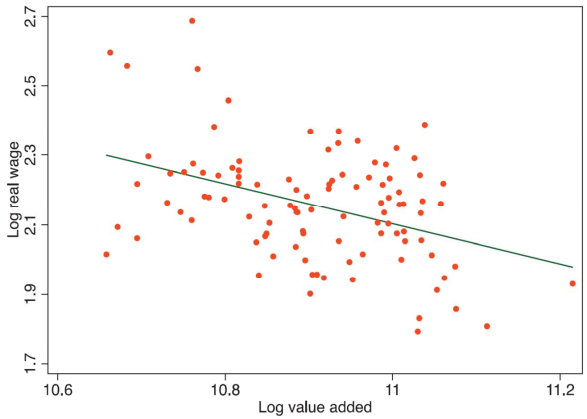


Italy

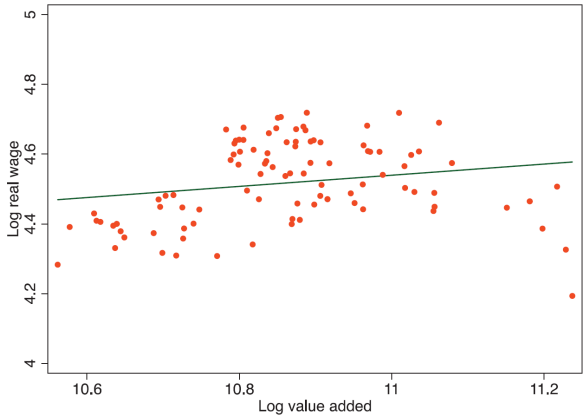


Germany

Real wages and value added



Italy



Germany

Average wage differences between macro areas

	North - South in Italy		West - East in Germany	
	nominal	real	nominal	real
% Difference	0.0425	-0.0921	0.282	0.176
	(0.003)	(0.017)	(0.003)	(0.007)
Year FE:	Yes	Yes	Yes	Yes
Provinces:	103	103	96	96
Years:	2009-2013	2009-2011	2000-2014	2004-2014

Non-employment differences between macro areas

	North - South in Italy	West - East in Germany
% Difference	-0.208	-0.0493
	(0.004)	(0.004)
Year FE:	Yes	Yes
Provinces:	103	96
Years:	2004-2013	2001-2014

Account for irregular work

GVA and non-employment

	Italy				Germany	
	Uncorrected		Corrected			
	(1)	(2)	(3)	(4)	(5)	(6)
Log value added	-1.434	-0.534	-1.259	-0.403	-0.252	-0.110
	(0.030)	(0.031)	(0.042)	(0.050)	(0.024)	(0.031)
Region FE:	No	Yes	No	Yes	No	Yes
Provinces:	103	103	103	103	96	96

Wage dispersion - % change between the 75th-25th percentiles

	Italy		Germany	
	nominal	real	nominal	real
1992	.	.	6.532086	.
1995	.	.	6.951316	.
1998	.	.	7.597002	.
2001	.	.	8.711095	.
2004	.	.	11.01851	22.87099
2006	.	.	12.49297	21.70946
2008	.	.	12.84203	22.14809
2009	4.769041	20.36008	12.52927	22.29334
2010	5.833282	20.61098	13.10308	20.23523
2011	5.628336	19.78682	12.81291	21.26323
2012	5.036365	.	11.76886	22.63316

Summary of empirical results

Italy

- slightly higher nominal wages in the north
- slightly higher real wages in the south
- much lower employment in the south
- much higher housing prices in the north

Germany

- higher nominal wages in the west
- higher real wages in the west
- differences in employment much lower
- differences in housing prices much lower

Robustness checks

Real income - out of equilibrium?

Table: Real wage, non-employment, real income across areas:

	North - South in Italy			West - East in Germany		
	(1) real w	(2) non-empl	(3) real inc	(4) real w	(5) non-empl	(6) real inc
% Difference	-0.0921	-0.208	0.193	0.176	-0.0493	0.213
	(0.017)	(0.004)	(0.017)	(0.007)	(0.004)	(0.007)
Year FE:	Yes	Yes	Yes	Yes	Yes	Yes
Provinces:	103	103	103	96	96	96
Years:	2009-2011	2004-2013	2009-2011	2004-2014	2001-2014	2004-2014

German convergence

Table: Real wage, non-employment, real expected income and migration in Germany

	West - East			
	Real wage	Non-employment	Real exp income	Migr Surplus west
2004	.194	-.094	.289	51675
2005	.197	-.085	.282	48976
2006	.202	-.061	.26	54144
2007	.197	-.059	.248	54805
2008	.193	-.041	.225	51008
2009	.178	-.03	.201	32319
2010	.172	-.019	.185	23579
2011	.165	-.015	.175	21586
2012	.166	-.012	.174	14902
2013	.147	-.014	.156	10497

Correct for informal work in Italy

Table: Average differences of employment and expected income between macro areas: Uncorrected and corrected for informal work – Italy

	North - South			
	Uncorrected		Corrected	
	(1)	(2)	(3)	(4)
	Non-empl	Exp. income	Non-empl - corr	Exp. income -corr
% Difference	-0.208	0.193	-0.159	0.0726
	(0.004)	(0.017)	(0.005)	(0.019)
Year FE:	Yes	Yes	Yes	Yes
Provinces: 103	103	103	103	
Years:	2004-2013	2009-2011	2004-2011	2009-2011

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Net and gross wages

- Wages we have obtained from ISTAT are net of taxes
- Net nominal wages could be more contracted across regions than gross wages
- We use average gross and net wages per province from INPS
- Calculate the net/gross ratio for each province
- Divide our net ISTAT wages by this ratio

Correcting Italy from net to gross: Nominal and real wage differences

	North - South in Italy		West - East in Germany	
	(1)	(2)	(3)	(4)
	nominal- corr	real - corr	nominal	real
% Difference	0.0717	-0.0629	0.282	0.176
	(0.004)	(0.017)	(0.003)	(0.007)
Year FE:	Yes	Yes	Yes	Yes
Provinces:	103	103	96	96
Years:	2009-2013	2009-2011	2000-2014	2004-2014

Correcting Italy from net to gross: Nominal and real wage differences

	North - South			
	Uncorrected		Corrected	
	(1)	(2)	(3)	(4)
	nominal	real	nominal - corr	real - corr
% Difference	0.0425	-0.0921	0.0717	-0.0629
	(0.003)	(0.017)	(0.004)	(0.017)
Year FE:	Yes	Yes	Yes	Yes
Provinces:	103	103	103	103
Years:	2009-2013	2009-2011	2009-2013	2009-2011

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Inequity and inefficiency

What is striking is that applying the same nominal wage agreements to everybody, generates *de facto*

- inequities, rents, losers and winners
- inefficient allocation of human resources, that are kept away from more productive working opportunities
- larger total unemployment and lower total GDP

Table: Counterfactuals exercises for Italy

	South		North		Total		
	Level	Change	Level	Change	Level	Change	Change %
Average hourly wage: *in Euros*							
Status quo	8.36		8.68		8.54		
Scenario 1	7.84	-0.53	8.68	0.00	8.30	-0.24	-2.65
Scenario 2	7.56	-0.80	8.68	0.00	8.18	-0.36	-4.13
Employment rate: *in % corrected for informal work*							
Status quo	57.32		71.00		64.86		
Scenario 1	70.17	12.85	71.00	0.00	70.63	5.77	11.04
Scenario 2	71.24	13.92	71.00	0.00	71.11	6.25	11.95
Aggregate labor income per capita: *in Euros per month*							
Status quo	766.63		986.68		887.89		
Scenario 1	881.00	114.37	986.68	0.00	939.24	51.34	7.45
Scenario 2	861.44	94.81	986.68	0.00	930.46	42.56	6.22

Table: Counterfactual scenarios - Variant 2 – top 5 provinces

	South		North		Total		
	Level	Change	Level	Change	Level	Change	Change %
Average hourly wage: *in Euros*							
Status quo	8.36		8.68		8.54		
Scenario 1	7.38	-0.98	8.39	-0.30	7.94	-0.60	-6.99
Scenario 2	6.92	-1.45	8.23	-0.46	7.64	-0.90	-10.50
Employment rate: *in % corrected for informal work*							
Status quo	57.32		71.00		64.86		
Scenario 1	70.17	12.85	71.80	0.79	71.07	6.21	11.80
Scenario 2	71.95	14.63	72.41	1.41	72.20	7.34	13.74
Aggregate labor income per capita: *in Euros per month*							
Status quo	766.63		986.68		887.89		
Scenario 1	828.53	61.90	963.96	-22.72	903.16	15.27	3.35
Scenario 2	795.03	28.40	953.35	-33.33	882.28	-5.61	0.69

Table: Counterfactual scenarios - Variant 3: top 10 provinces

	South		North		Total		
	Level	Change	Level	Change	Level	Change	Change %
Average hourly wage: *in Euros*							
Status quo	8.36		8.68		8.54		
Scenario 1	7.37	-0.99	8.38	-0.30	7.93	-0.61	-7.09
Scenario 2	6.93	-1.43	8.25	-0.43	7.66	-0.88	-10.28
Employment rate: *in % corrected for informal work*							
Status quo	57.32		71.00		64.86		
Scenario 1	69.66	12.35	71.32	0.32	70.58	5.72	11.01
Scenario 2	71.34	14.03	71.82	0.82	71.61	6.75	12.78
Aggregate labor income per capita: *in Euros per month*							
Status quo	766.63		986.68		887.89		
Scenario 1	821.33	54.70	956.94	-29.73	896.06	8.17	2.50
Scenario 2	790.23	23.60	948.41	-38.27	877.40	-10.50	0.11

Table: Counterfactual scenarios - Variant 4: top 20 provinces

	South		North		Total		
	Level	Change	Level	Change	Level	Change	Change %
Average hourly wage: *in Euros*							
Status quo	8.36		8.68		8.54		
Scenario 1	7.42	-0.94	8.43	-0.26	7.97	-0.57	-6.55
Scenario 2	7.02	-1.34	8.34	-0.35	7.75	-0.79	-9.27
Employment rate: *in % corrected for informal work*							
Status quo	57.32		71.00		64.86		
Scenario 1	69.00	11.69	70.60	-0.40	69.89	5.03	9.89
Scenario 2	70.53	13.21	70.94	-0.06	70.76	5.90	11.41
Aggregate labor income per capita: *in Euros per month*							
Status quo	766.63		986.68		887.89		
Scenario 1	819.10	52.47	952.57	-34.10	892.65	4.76	2.10
Scenario 2	791.41	24.78	946.83	-39.84	877.06	-10.83	0.08

Conclusion

In Italy, nominal wage compression and higher productivity in the North generates

- higher housing prices in the North
- higher unemployment in the South
- higher real wages in the South

Distributional consequences both *across* and *within* regions:

- Inequality of real wages across regions: southern workers gain
- Inequality of income within the south of Italy due to unemployment: southern unemployed lose
- High housing rents in the north: gain for house owners in the North vs. people with only labour income