On Minimum Wage Determination

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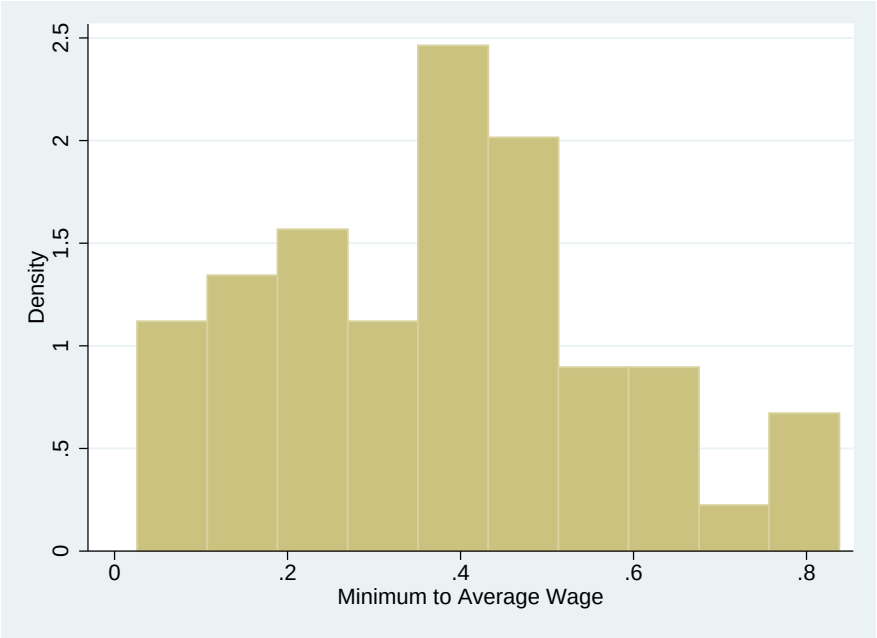
Huge cross-country variation in MW levels

- Imf-fRDB Database: 68 countries with a statutory MW
- Cross-country stdev = 1/2 of the mean
- Large literature on the effects of MW on employment suggesting that the level of MW is very important (non-monotonic effects), but
- much less work on cross-country differences in levels

The cross-country distribution in 2005



OECD Countries

	Ratio minimum wage to median wage (%)			Monthly MW in euros (2010)	Taxonomy of the MW Setting	Percentage MW (2005)
	1990	2010	Diff			
	(1)	(2)	(3)	(4)	(5)	(6)
Australia	63	54	-9	1670	S	–
Belgium	56	52	-4	1388	B	–
Canada	38	44	6	1187	S	–
France	52	60	8	1344	S	16.8
Greece	57	49	-8	863	B	–
Hungary	44	47	3	257	S	8.0
Japan	30	37	7	1069	S	–
Netherlands	56	47	-9	1416	S	2.2
Poland	17	45	28	318	S	2.9
Portugal	53	56	3	554	S	4.7
Spain	47	44	-3	739	S	0.8
United Kingdom	–	46	–	1169	S	1.8
United States	36	39	3	949	S	1.3

Note: Method of setting: S=statute, B=bargaining
Sources: (1), (5): Dolton (2011)
(2) OECD Minimum Wage Database
(4): European countries: Eurostat; Australia, Canada, Japan, Korea, New Zealand, US: OECD Minimum Wage Database

(6): Minimum wages in Europe; Background Paper European Foundation for the Improvement of Living and Working Conditions

Time-series variation

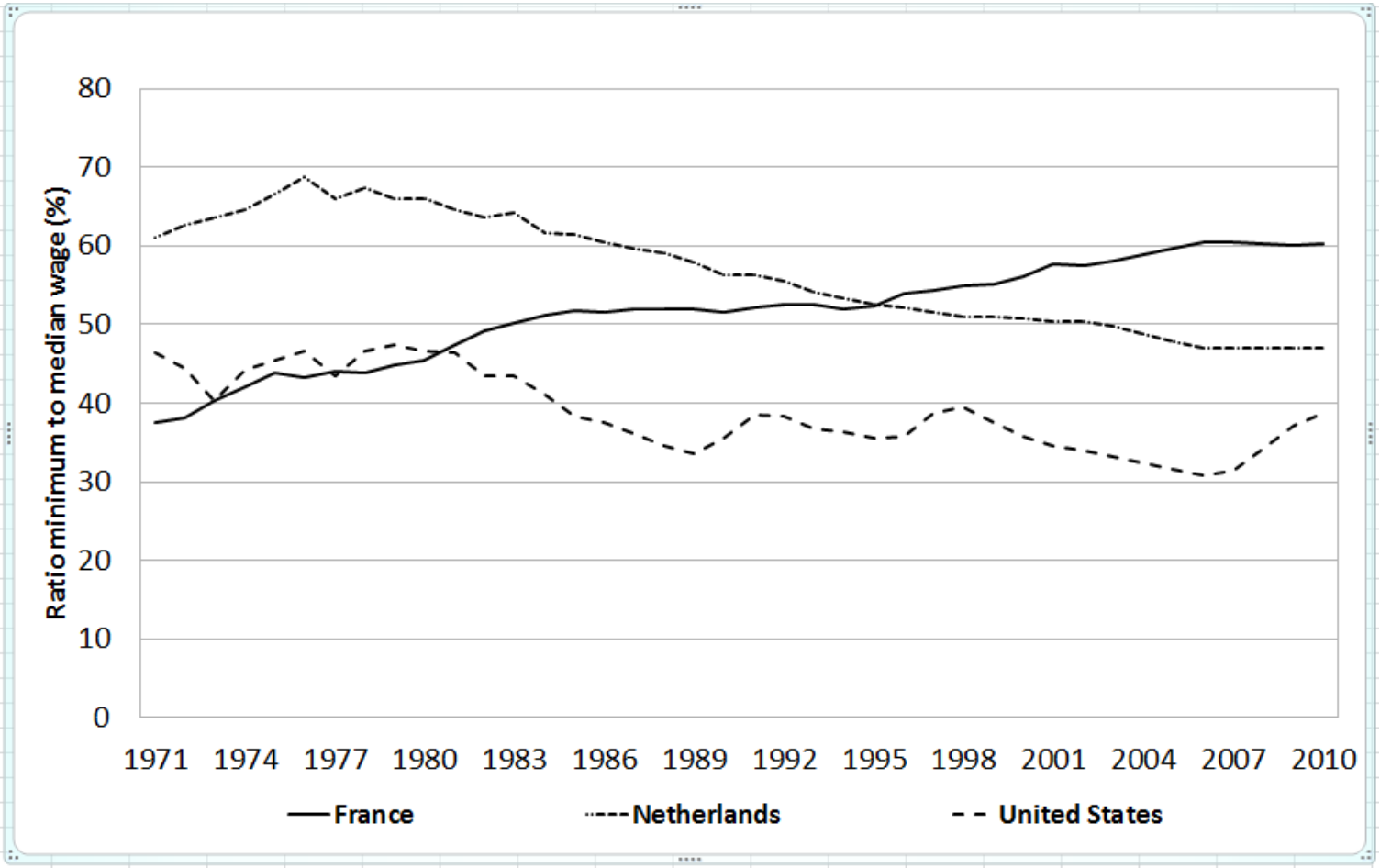


Figure: Ratio of Minimum to Median Wage; 1971-2010

Source: OECD Minimum Wage Database.

Diary Notes of President Low Pay Commission, UK

"... on the central issue of the level of the minimum wage, the Commission negotiated increases sensitive to the shifting power relations in the product and labour markets... The consensus did not emerge simply from discussion or sweet reasons... The stated goal was initially to "help as many as possible low-paid workers without adverse effects on the economy". Two years later the last part had been replaced "without adverse effects on employment."
Brown, The Process of Fixing the British National Minimum Wage, 1997-2007

Minimum Wage Determination

Surprisingly no literature on how the minimum wage is determined.
Partial exception is Algan-Cahuc (2007), but they focus on cultural determinants of Government involvement in wage setting, not on the determination of the minimum wage.
Large heterogeneity in MW setting regimes:

- In some countries MW is set unilaterally by the Government
- in others, it is the outcome of collective bargaining between employers' and workers' organizations
- intermediate cases of Governments fixing MW in consultation with unions and employers

Issues Addressed by this Paper

- Can alternative MW setting regimes contribute to explain the cross-country heterogeneity in the levels of the MW?
- Can we interpret such correlations as causal effects of the setting regime on the level of the MW?
- How do MW react to changes in the elasticity of labor demand (globalisation)?
- And to changes in the generosity of UB systems?

Issues relevant in the fine-tuning of the MW.

Outline

A Monopsonistic Labour Market

Focus on an imperfect labour market, where firms have monopsony power
(not only *equity*, but also *efficiency* arguments in favour of MW)

- Pure Monopsonist *M* maximising profits π by choosing employment level. Marginal value of a job decreasing function (constant-elasticity) of employment rate *L*
- Labour Demand: $L = \left(\frac{A}{w}\right)^{\frac{1}{\eta}}$
  - where A indexes labour productivity and $0 < \eta < 1$ (inverse) labour demand elasticity
- Labour Supply: $G(w) = w^{\frac{1}{\varepsilon}}$
  - where $G(.)$ is the cumulative distribution of reservation wages and (inverse) elasticity of labour supply is indexed by $0 < \varepsilon < +\infty$

A Monopsonistic Labour Market

After integrating labour demand over L, the profit maximisation problem of the pure monopsonist can be written as:

$$\max \pi^M = \frac{AL^{1-\eta}}{1-\eta} - wL$$

Deriving the f.o.c. and solving for wages:

$$w^M = \left[\frac{A}{1+\varepsilon}\right]^{\frac{\varepsilon}{\varepsilon+\eta}}$$

Introducing the Minimum Wage

A properly set MW could remove the deadweight loss associated with monopsony power

- *Joint* Surplus maximisation:

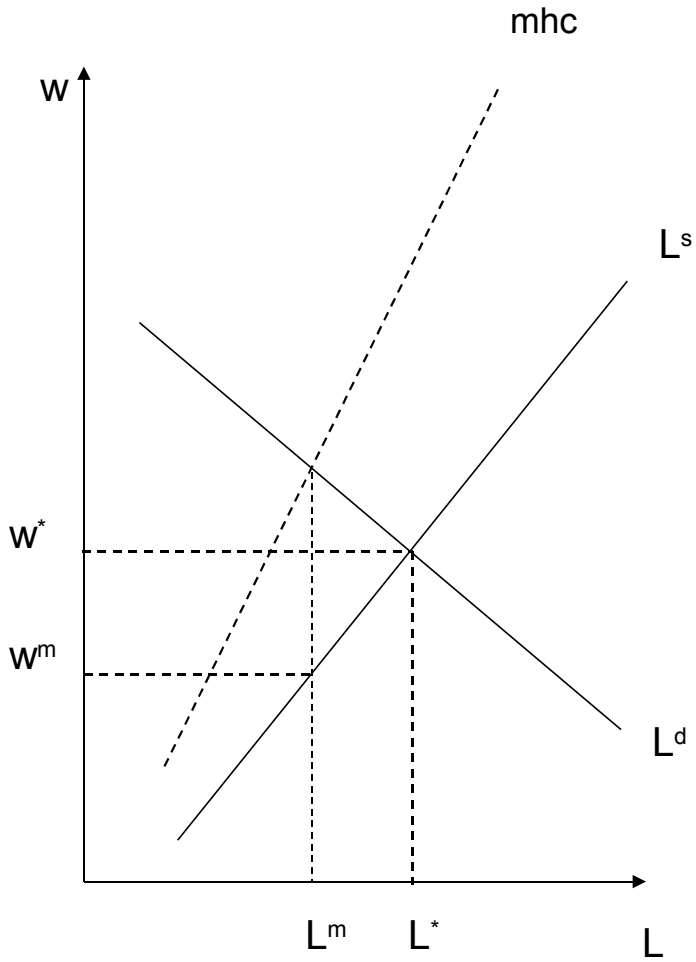
$$\max\left(\left[\frac{AL^{1-\eta}}{1-\eta}-\underline{w}L\right]+\left[\underline{w}L-\frac{1}{\varepsilon+1}L^{\varepsilon+1}\right]\right)=\max\left(\frac{AL^{1-\eta}}{1-\eta}-\frac{1}{\varepsilon+1}L^{\varepsilon+1}\right)$$

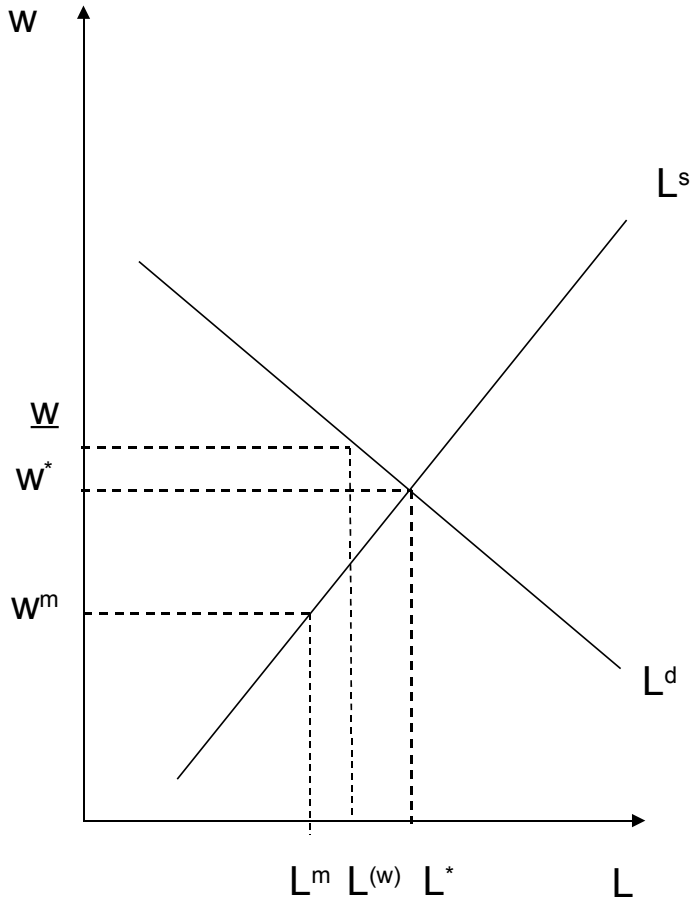
- Total Surplus maximising wage:

$$\underline{w}^{*}=A^{\frac{\varepsilon}{\varepsilon+\eta}}$$

- which is greater than w^M for $\varepsilon > 0$
- For $w^M < \underline{w} < \underline{w}^*$ employment level is greater than under Monopsony

Pure monopsonist





Collective Bargaining

Consider a Right-to-Manage environment with Nash-bargaining:

$$\underline{w}^C \text{ is } \arg\max \left(\left[\frac{AL^{1-\eta}}{1-\eta} - \underline{w}L \right]^{\beta} \left[\underline{w}L - \frac{L^{\varepsilon+1}}{\varepsilon+1} \right]^{1-\beta} \right)$$

- Employment is on the labour demand schedule.

  Maximizing wrt $\underline{w}$ subject to $L = \left(\underline{w}/A \right)^{-\frac{1}{\eta}}$ obtains:

$$\underline{w}^C = (\mu)^{\frac{\varepsilon}{\varepsilon+\eta}} (A)^{\frac{\varepsilon}{\varepsilon+\eta}}$$

- where $\mu \equiv \left(1 - \beta \frac{\eta+\varepsilon}{1+\varepsilon} \right) \frac{1}{1-\eta}$ is the optimal mark-up factor of wages over the opportunity cost of working

Collective Bargaining

MW is increasing in the bargaining power of unions

- with $\beta = 0$ minimum wage reduces to $\underline{w}^C = \left(\frac{1}{1-\eta}\right)^{\frac{\varepsilon}{\epsilon+\eta}} (A)^{\frac{\varepsilon}{\varepsilon+\eta}}$, greater than $\underline{w}^*$ for $\eta > 0$
- When all the bargaining power is on employers $\underline{w}^C \leq \underline{w}^*$ and when also $\varepsilon = 0$, $\underline{w}^C = \underline{w}^M$
- Collectively bargained MW can be either above or below the Pareto Optimal level, but:
  - For $\underline{w}^C < \underline{w}^*$ there will be **no unemployment**
  - For $\underline{w}^C > \underline{w}^*$ there will be excess supply of labour.

A Government setting the MW

- As in the right-to-manage model, but with different representation of the two parties.

$$\underset{-}{w}^G \text{ is } \arg\max \left(\left[\frac{AL^{1-\eta}}{1-\eta} - \underset{-}{w}^G L \right]^{\gamma} \left[\underset{-}{w}^G L - \frac{1}{\varepsilon+1} L^{\varepsilon+1} \right]^{1-\gamma} \right)$$

- Two interpretations of γ:
  - Probabilistic voting model: γ measuring electoral power of employers
  - Social planner caring for redistribution (Bernoulli-Nash SWF): γ as the distributional weight of employers

Policy endogeneity

Suppose that a union has a choice of whether or not to delegate the authority over the setting of the minimum wage to the Government. Its decision rule will be

$$\underline{w} = \begin{cases} \underline{w}^G \text{ if } \gamma < \beta \\ \underline{w}^C \text{ if } \gamma \geq \beta \end{cases}$$

MW and the elasticity of Labor Demand

The solution of the bargaining problem coincides with the Pareto optimum when

$$\gamma = \frac{\eta}{\varepsilon + \eta}(1 + \varepsilon), 1 - \gamma = \frac{\varepsilon}{\varepsilon + \eta}(1 - \eta) \tag{1}$$

as in this case the solution is

$$\underline{w}^G = A^{\frac{\epsilon}{\epsilon+\eta}} = w^* \tag{2}$$

Simple rearrangement of the above yields

$$\frac{\gamma}{1-\gamma} = \frac{\eta}{1-\eta}\frac{1+\varepsilon}{\varepsilon}. \tag{3}$$

Thus both $\underline{w}^G$ and $\underline{w}^C$ will be *lower* in presence of a higher elasticity of labour demand

MW and UB

Labour supply in presence of an unemployment benefit

$$G(w) = (w - b)^{\frac{1}{\epsilon}} \tag{4}$$

that is, the wage must strictly exceed b to induce participation in the labour market. This obtains the (gross) minimum wage:

$$\underline{w}^C = b + \left(\mu^C\right)^{\frac{\varepsilon}{\epsilon+\eta}} (A)^{\frac{\epsilon}{\epsilon+\eta}}$$

that is, the minimum wage is shifted out by the non-employment benefit

Empirical Implications

- Under a broad set of circumstances, theory predicts that Government legislated minimum wage should be lower than Collectively Bargained wage floor.

- Both $\underline{w}^C$ and $\underline{w}^G$ should be declining in the elasticity of labour demand.
- and increasing in benefits provided to non-employed people.

Main Data Sources

- New Imf-fRDB Database on minimum wages: levels of minimum on July 1st every year and average wages for 91 countries, period 1980-2005 (unbalanced).
- Standardized to monthly wages
- Information on minimum wage setting procedures in 66 countries (mainly from ILO Minimum Wage Database)
- Databases from Boeri and Macis (2009) and Labartino (2008) with information on unemployment benefit systems, labour market indicators, political and cultural variables and progressiveness of tax systems.

Data Description

66 countries grouped in three cathegories:

- "Bargaining process": MW set by social partners (and then transposed into legislation), or determined by a tripartite body (a commission or independent agency) where government acts as in-between unions and employers' organisations.
- "Consultation process": MW set after formal consultations between Government and "social Partners".
- "Government legislated": MW set by Government without any formal consultation.
- Note: countries with no *national* Minimum Wage (such as Germany or Italy which have industry-level bargained wage floors) are not included in the database.

Countries with Bargaining Process

Country	*Number of country-year observations*	*UB system*	*Minimum to Average Wage Ratio*		*Minimum to Median Wage Ratio*	
			(mean)	*(St. Dev.)*	*(mean)*	*(St. Dev.)*
Argentina	26	Yes	32.6%	0.22		
Bangladesh	3	No	53.6%	0.05		
Belgium	26	Yes	57.0%	0.06	58.6%	0.04
Colombia	24	No	48.9%	0.15		
Costa Rica	26	No	67.0%	0.07		
Dominican Rep.	16	No	55.3%	0.14		
Ecuador	25	No	70.1%	0.14		
El Salvador	24	No	78.9%	0.13		
Estonia	14	Yes	25.5%	0.09		
Ghana	24	No	27.7%	0.09		
Greece	21	Yes	49.4%	0.04	41.6%	0.02
South Korea	18	Yes	25.4%	0.01	28.6%	0.02
Lithuania	16	Yes	36.3%	0.10		
Mexico	26	No	26.8%	0.06	30.9%	0.11
Nicaragua	24	No	46.4%	0.21		
Paraguay	20	No	85.0%	0.13		
Peru	26	No	36.9%	0.11		
Philippines	24	No	55.0%	0.14		
Poland	5	Yes	36.4%	0.08	38.9%	0.05
Thailand	17	Yes	52.7%	0.04		
Turkey	26	Yes	26.6%	0.05		
Ukraine	15	Yes	27.2%	0.17		
Venezuela	7	Yes	30.7%	0.06		
Total	*454*		*45.7%*	*0.018*		

Note: cross country mean and standard deviation in italics. Minimum to median wage ratios were not available for the majority of the country-year observations.

Countries with Consultation Process

Country	*Number of country-year observations*	*UB system*	*Min. to Av. Wage R.*		*Min. to Med. Wage R.*	
			(mean)	*(St. Dev.)*	*(mean)*	*(St. Dev.)*
Albania	17	Yes	56.3%	0.14		
Algeria	9	Yes	32.9%	0.08		
Australia	26	Yes	57.7%	0.06	58.5%	0.05
Bulgaria	26	Yes	41.7%	0.10		
Burkina Faso	4	No	57.2%	0.04		
Canada	26	Yes	35.8%	0.01	40.6%	0.02
China	13	Yes	64.1%	0.17		
Czech Rep.	15	Yes	34.3%	0.08	33.7%	0.08
France	26	Yes	60.3%	0.11	57.9%	0.03
Guatemala	23	No	35.4%	0.08		
Hungary	26	Yes	36.7%	0.06	41.5%	0.05
India	9	Yes	73.6%	0.15		
Indonesia	7	No	53.8%	0.02		
Ireland	6	Yes	50.9%	0.02	50.7%	0.02
Jamaica	17	No	29.3%	0.10		
Japan	26	Yes	34.9%	0.04	31.0%	0.01
Jordan	4	No	52.9%	0.09		
Kenya	14	No	26.6%	0.06		
Latvia	14	Yes	33.5%	0.03		
Morocco	15	No	60.4%	0.03		
Nepal	3	No	94.8%	0.04		
Poland	11	Yes	39.9%	0.03	42.6%	0.04
Portugal	25	Yes	56.0%	0.04	42.5%	0.03
Romania	26	Yes	49.5%	0.08		
Spain	26	Yes	31.2%	0.07	38.1%	0.01
Sri Lanka	26	No	50.2%	0.05		
United Kingdom	7	Yes	36.9%	0.01	42.6%	0.01
Vietnam	10	No	19.4%	0.02		
Total	*457*		*46.7%*	*0.16*		

Countries with Government Legislated MW

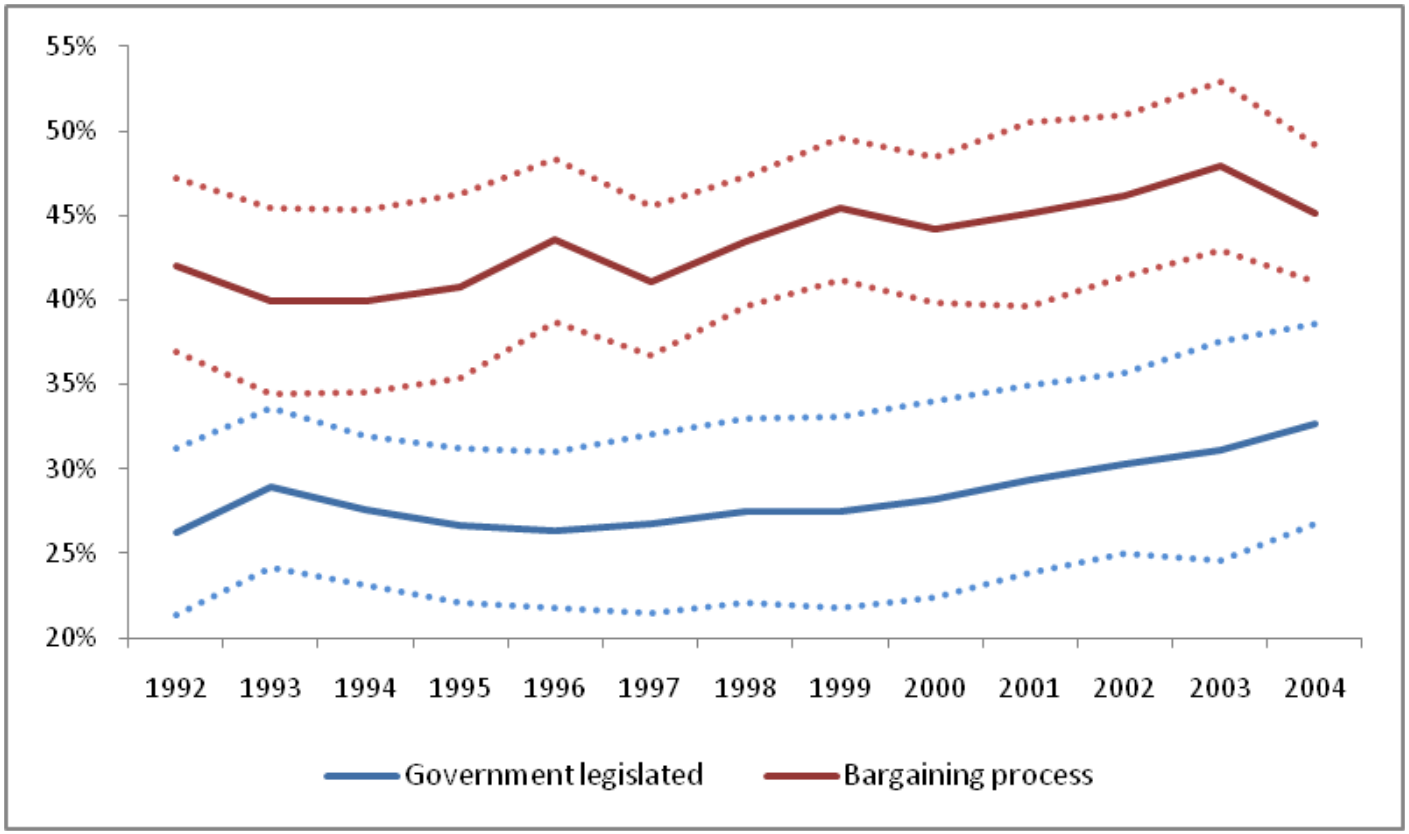
Country	*Number of country-year observations*	*UB system*	*Minimum to Average Wage Ratio*		*Minimum to Median Wage Ratio*	
			(mean)	*(St. Dev.)*	*(mean)*	*(St. Dev.)*
Azerbaijan	15	Yes	8.7%	0.08		
Belarus	14	Yes	11.5%	0.07		
Bolivia	18	No	22.7%	0.07		
Brazil	19	Yes	19.8%	0.04		
Cameroon	2	No	12.2%	0.013		
Chile	26	Yes	33.2%	0.14	75.9%	1.04
Ethiopia	4	No	4.5%	0.01		
Israel	19	Yes	47.5%	0.00		
Kyrgyzstan	13	Yes	12.2%	0.09		
Netherlands	26	Yes	51.0%	0.10	51.7%	0.05
New Zealand	26	Yes	41.3%	0.06	48.8%	0.06
Nigeria	5	No	36.4%	0.19		
Pakistan	12	No	52.0%	0.30		
Poland	10	Yes	26.4%	0.08		
Russia	14	Yes	8.7%	0.02		
United States	26	Yes	35.2%	0.03	37.5%	0.04
Uruguay	17	Yes	54.9%	0.29		
Total	*266*		*28.1%*	*0.17*		

Descriptive Statistics

Table 2: Descriptive Statistics

Variable	*Bargaining process*				
	Obs.	*Mean*	*Std. Dev.*	*Min.*	*Max.*
Unemployment benefit	742	0.148	0.205	0	0.731
Log of GDP per capita	668	8.735	0.943	6.375	10.427
Openness to trade	668	56.929	30.682	9.275	180.350
Yearly inflation	722	0.529	3.842	-0.012	74.817
Variable	*Consultation process*				
	Obs.	*Mean*	*Std. Dev.*	*Min.*	*Max.*
Unemployment benefit	631	0.127	0.183	0	0.675
Log of GDP per capita	513	8.477	0.984	6.530	10.260
Openness to trade	513	60.637	29.660	12.843	187.361
Yearly inflation	639	0.143	0.501	-0.041	10.584
Variable	*Government legislated*				
	Obs.	*Mean*	*Std. Dev.*	*Min.*	*Max.*
Unemployment benefit	351	0.127	0.164	0	0.720
Log of GDP per capita	302	8.477	1.139	5.660	10.490
Openness to trade	302	86.138	35.513	11.129	164.829
Yearly inflation	367	1.253	6.769	-0.098	117.496

Minimum Wage to Average Wage



Empirical Framework

Estimated equation:

$$Y_{it} = SET_i\theta + X_{it}\beta + \tau + \gamma_i + \tau\gamma_i + u_{it}$$

- SET: dummy variables for the different minimum wage setting mechanisms (no country where there has been a change in the regime)
- τ: time trend
- γ_i: geographical country groupings
- X_{it}: time varying observable country-specific characteristics (openness to trade, GDP per capita, inflation, progressiveness of the tax system, share of services and agriculture, presence/level of unemployment benefits)

Regression Results

Table 3: Regression results

	OLS pooled		Random Effects	
	(1)	(2)	(3)	(4)
	Minimum wage to average wage			
Bargaining process	0.114***	0.114***	0.115***	0.115***
	(0.014)	(0.014)	(0.041)	(0.040)
Consultation process	0.084***	0.090***	0.132***	0.136***
	(0.015)	(0.015)	(0.043)	(0.041)
Unemployment benefit level	0.151***	0.147***	0.053	0.055
	(0.035)	(0.035)	(0.061)	(0.065)
Elasticity of demand	0.000	0.000	-0.001***	-0.001
	(0.000)	(0.000)	(0.000)	(0.000)
Time trend		-0.005*		-0.006**
		(0.003)		(0.002)
Regional dummies	Yes	Yes	Yes	Yes
Income group dummies	Yes	Yes	Yes	Yes
Regional dummies * time trend	No	Yes	No	Yes
Constant	0.053	9.975*	-0.010	11.16**
	(0.035)	(5.486)	(0.110)	(4.791)
Observations	1108	1108	1108	1108
R-squared	0.30	0.31		
Number of countries	66	66	66	66

Robust standard errors in parentheses. Reference cathegory is a Government legislated MW. minimum wage. * significant at 10%; ** significant at 5%; *** significant at 1%.

Low and High Unemployment Countries

Table 4: Regression results - Middle to high unemployment countries

	OLS pooled		RE	
	(1)	(2)	(3)	(4)
	Minimum wage to average wage			
Bargaining process	0.116***	0.116***	0.116***	0.133***
	(0.014)	(0.015	(0.040)	(0.043)
Consultation process	0.103***	0.110***	0.141***	0.153***
	(0.015)	(0.016)	(0.041)	(0.043)
Unemployment benefit level	0.127***	0.080***	0.057	0.040
	(0.036)	(0.035)	(0.065)	(0.060)
Elasticity of demand	0.000	0.001	-0.001	-0.001**
	(0.000)	(0.000)	(0.000)	(0.000)
Time trend	-0.005*		0.002	
	(0.003)		(0.039)	
Bargaining * Low unempl.	-0.068***		-0.056*	
	(0.026)		(0.033)	
Consultation * Low unempl.	-0.123***		-0.006**	
	(0.032)		(0.002)	
Regional dummies	Yes	Yes	Yes	Yes
Income group dummies	Yes	Yes	Yes	Yes
Regional dummies * time trend	Yes	No	Yes	No
Constant	10.05*	-0.01	11.35**	-0.085
	(5.507)	(0.039)	(4.795)	(0.110)
Observations	1108	987	1108	987
R-squared	0.321	0.304		
Number of countries	66	57	66	57

Robust standard errors in parentheses. Reference cathegory is the Government legislated minimum wage; * significant at 10%; ** significant at 5%; *** significant at 1%

OECD countries only

Table 6: OECD countries

	OLS pooled		
	(1)	(2)	(3)
	Median wage to average wage		
Bargaining process	0.046***	0.040***	0.051***
	(0.014)	(0.008)	(0.009)
Unemployment benefit level		0.232***	0.247***
		(0.031)	(0.030)
Elasticity of demand		0.000**	0.000**
		(0.000)	(0.000)
Time trend		-0.002***	-0.002***
		(0.001)	(0.001)
MW enforcement index			-0.054**
			(0.027)
Constant	0.455***	4.216***	4.739***
	(0.006)	(1.405)	(1.402)
Observations	289	279	259
R-squared	0.03	0.27	0.31
Number of countries	13	13	12

It includes Australia, Belgium, Canada, France, Greece, Ireland, Japan, Netherlands, New Zealand, Portugal Spain, UK and US.
The residual category is Government legislated plus consultation process.
Robust standard errors in parentheses;
* significant at 10%; ** significant at 5%; *** significant at 1%.

binary classification

Table 5: Binary classification

	OLS pooled			
	(1)	(2)	(3)	(4)
	Minimum wage to average wage			
Government legislated	-0.102***	-0.104***		
	(0.013)	(0.013)		
Bargaining process			0.073***	0.071***
			(0.012)	(0.018)
R-squared	0.30	0.31	0.28	0.29

Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%. The regressions replicate the specifications of Table 3

Endogeneity Issues (I)

Table 7: Countries with a long history of minimum wages

Minimum wage introduced at least 10 years before		
	(1)	(2)
	Minimum wage to average wage	
Bargaining process	0.065***	0.064***
	(0.013)	(0.013)
R-squared	0.22	0.24
Number of countries	62	62
Minimum wage introduced at least 20 years before		
	(1)	(2)
	Minimum wage to average wage	
Bargaining process	0.075***	0.079***
	(0.014)	(0.014)
R-squared	0.24	0.25
Number of countries	42	42

Columns (1) to (2) replicate the same specifications of Table 3.
The residual category is Government legislated plus consultation process.
Robust standard errors in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%

Endogeneity Issues (II)

Table 8 - IV regressions

	OLS (1)	IV (2)	IV (3)
	Mean wage to average wage		
Bargaining process	0.097***	0.247***	0.225***
	(0.017)	(0.052)	(0.047)
Unemployment benefit level	0.139***	0.225***	0.205***
	(0.041)	(0.052)	(0.056)
Elasticity of demand	0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)
Time trend	-0.005*	-0.001	-0.000
	(0.003)	(0.004)	(0.005)
Income group dummies	Yes	Yes	Yes
Regional dummies	Yes	Yes	Yes
Regional dummies* time trend	Yes	Yes	Yes
Constant	11.13***	6.841***	7.747***
	(2.364)	(2.772)	(2.799)
Observations	355	355	305
R-squared	0.57	0.47	0.27
Number of countries	22	22	17
	IV - First Stage		
Right Wing Ideology		0.577***	0.491***
		(0.048)	(0.053)
R-squared		0.47	0.61
Hausman Test		29.15***	23.19***
F		(1, 337)	(1, 290)

Column (3): Algeria, Ethiopia, Belarus, Vietnam and Kyrgyzstan not included as we have no information about changes in the political orientation of Governments after the introduction of MW. The residual category is Government legislated plus consultation process. * significant at 10%; ** at 5%; *** at 1%

Final Remarks

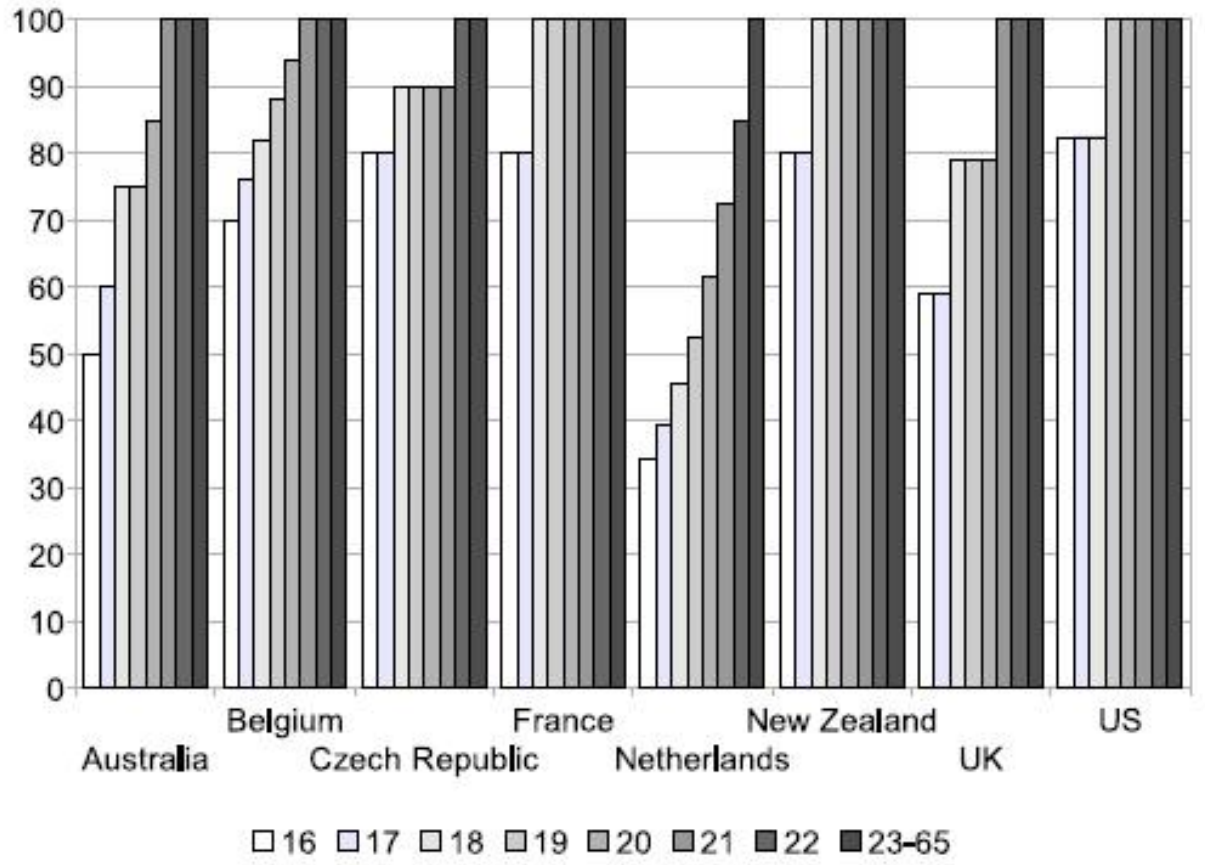
- MW fixing regime matters
- Inertia in regime
- MW set within collective bargaining are higher than MW set by Governments.
- This gap can be interpreted as casual effect on MW fixing regime on the level of the MW

Further Work

- MW subminima (measure of dispersion)
- Effects on the Shadow Economy
- Clustering by regions
- Looking for natural experiments
- Beyond correlations: Survey: would you buy the following identifying assumption? Degree of democracy is in a given country and time is correlated with wage fixing regime but not directly with minimum wage level

Youth sub-minima

Youth Minimum Wage as a percentage of the adult minimum wage by age



Effects on the Shadow Economy