

The role of wage bargaining institutions in the Phillips curve flattening

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Plan

1. Research question

2. Methodology

3. Results

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Research question — Main intuition

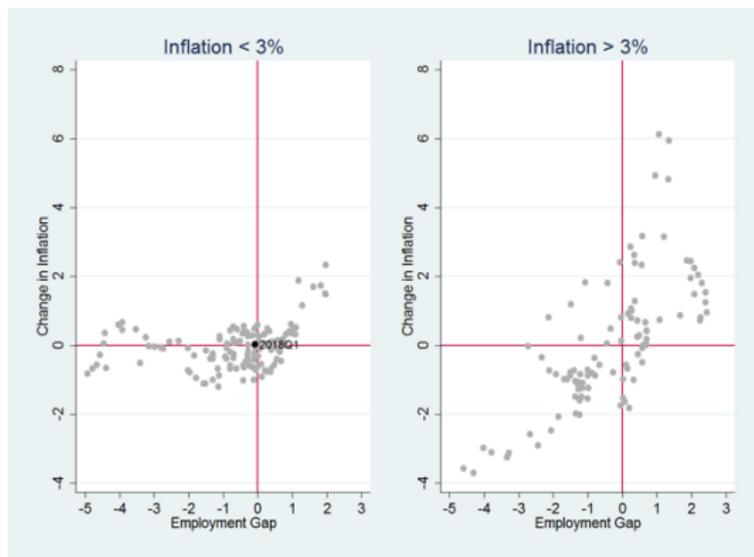
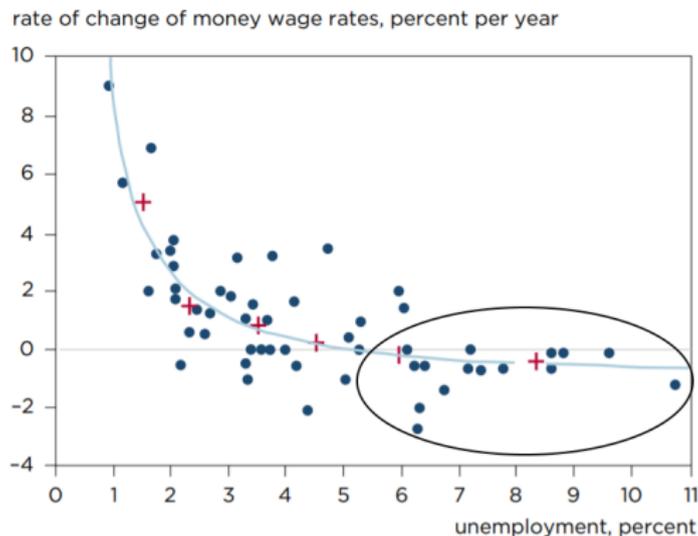


Figure 1. Inflation and Employment: threshold effects?

Source: Collins and Gagnon (2018). Note: the employment gap is defined as $U^* > U$. When inflation is already very low, even large negative employment gaps have little effect, but there is some evidence that positive gaps push inflation up. If the asymmetry is driven by downward wage and price rigidity, there is no reason to doubt that a significant positive employment gap will eventually push inflation up.

Research question — Main intuition



Source: Phillips (1958), retrieved from Wiley Online Library.

Figure 2. Wage Inflation and Unemployment: back to the basics

Note: if the curve is just hibernating, we revert to the original nonlinear Phillips curve where downward nominal rigidities play a crucial role in a low inflation environment.

Research question — Main motivation

Motivation

1. Understanding the determinants of the curve's flattening
2. Exploring the impact of downward nominal rigidities (centralization of wage bargaining)
3. Theoretical model with a two sectors covered and non-covered by collective bargaining
4. Allowing for nonlinear effects and threshold effects
5. For the European economy at the regional level

Literature

1. Several flattening factors: anchored inflation expectations, structural changes (demography, globalization, etc.)
 - ▶ Bernanke (2010); Blanchard (2016); Ball and Mazumder (2019), Daly et al. (2016); Forbes et al. (2020)
2. Complementary explanation: downward nominal wage rigidities (DWR)
 - ▶ Wage and price rigidities bend the Phillips Curve when economic slowdown and low inflation (Gagnon et Collins, 2019)
 - ▶ ↘ Wages are more likely in decentralized bargaining systems and no automatic extension of collective agreements (Villanueva, 2015; Gnocchi et al., 2015)
 - ▶ Flexible wage schemes during the Great Recession in some countries (e.g. Italy) made the wage Phillips curve steeper (Bulligan and Viviano, 2017)

Research question — Testable assumptions

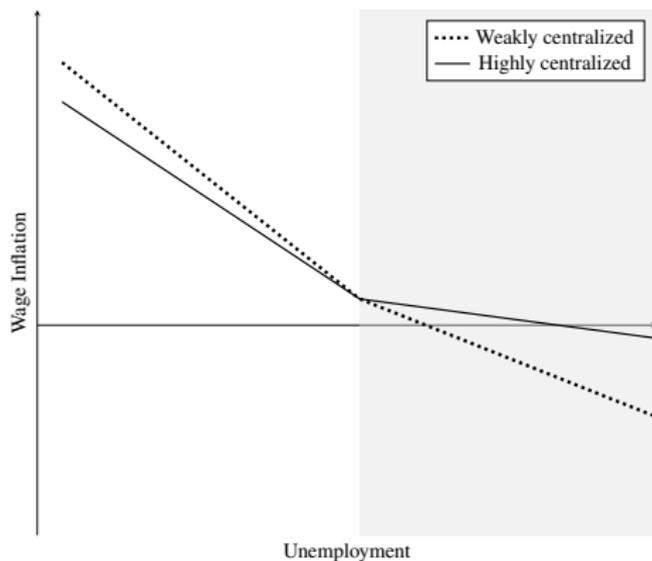


Figure 3. A simple scheme of testable assumptions

Note : three assumptions: (i) the wage PC is steeper in economies with weakly centralized wage bargaining (dotted line); (ii) the wage PC is flat in economies with industry or cross-industry levels of wage bargaining (plain line); and (iii) the influence of wage bargaining institutions on the link between unemployment and wage growth is mainly observed in periods of high unemployment, because of DWR (shaded area).

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Methodology — Theoretical model

A labor market model with frictions *à la Mortensen-Pissarides*

- ▶ Formalizing the link between wage dynamics and bargaining centralization
- ▶ To study wages' variation following a negative economic shock according to the level of wage bargaining
- ▶ Extension of Mortensen and Pissarides' benchmark model (1999) with wage negotiations at the sectoral level leading to collective agreements

Important Proposition

A recession ($dx < 0$) leads to a smaller decline in wages in firms covered by a collective wage agreement than in uncovered firms

$$\left| \frac{dw_c}{dx} \right| < \left| \frac{dw_{nc}}{dx} \right|$$

▶ Interpretation:

- ▶ w_c depends on the coverage of the agreements l_c , which increases due to our assumption of positive labor externalities (see Proposition 1)
- ▶ The ability of collective agreements to mitigate the decrease in wages during a bad economic situation relative to individual agreements makes employment in firms covered by a collective agreement more attractive

Economic variables

1. European regional data (NUTS-2 level), from 1995 to 2019, $N = 280$
2. Data on the usual determinants of the Wage Phillips curve

Variables definition

<i>WAGE</i>	Hourly wage (compensation divided by the number of hours worked)
<i>UGAP</i>	Unemployment Gap (Unemployment rate - Mean of unemployment rate)
<i>GVA</i>	Gross value added (all economic activities included, NACE Rev. 2)
<i>SHARE_{AGR-GVA}</i>	Share of Agriculture GVA in Total GVA
<i>SHARE_{CON-GVA}</i>	Share of Construction GVA in Total GVA
<i>SHARE_{IND-GVA}</i>	Share of Industry GVA in Total GVA
<i>SHARE_{LOW-EDUC}</i>	Share of 25-64 year olds which achieved a low-level of education
<i>SHARE_{MEDIUM-EDUC}</i>	Share of 25-64 year olds which achieved a medium-level of education

Institutional variables

1. National data on collective bargaining features, from 1995 to 2019
2. Centralization of wage bargaining, taking into account:
 - ▶ the predominant level of bargaining
 - ▶ the incidence of and control over additional bargaining at enterprise level
 - ▶ the space that central or sectoral agreements allow for enterprise bargaining
 - ▶ degree to which agreements can be perforated through opening clauses

Variables definition

<i>LEVEL</i>	Measure on 0-4 scale of the predominant level of bargaining (firm, firm-sector, sector, cross-sectoral)
<i>BARGCENT</i>	Centralization of wage bargaining and flexibility of firm-level bargaining, if any (0.8-4.7)

Baseline specification

$$\begin{aligned} \Delta \log(WAGE)_{i,c,t} = & \alpha \Delta \log(WAGE)_{i,c,t-1} + \beta UGAP_{i,c,t} + \theta BARGCENT_{c,t} \\ & + \lambda [UGAP_{i,c,t} \times BARGCENT_{c,t}] + \gamma X'_{i,c,t} + \mu_i + \nu_t + \epsilon_{i,c,t} \quad (1) \end{aligned}$$

System-GMM (Blundell and Bond, 1998)

1. Dynamic specification of the wage Phillips Curve equation
2. Potential endogenous covariates among RHS variables

Panel threshold model with endogenous regressors

$$\begin{aligned}\Delta \log(WAGE)_{i,c,t} = & \chi \Delta \log(WAGE)_{i,c,t-1} \\ & + \beta_1 UGAP_{i,c,t} I(BARGCENT_{c,t} \leq \gamma) + \beta_2 UGAP_{i,c,t} I(BARGCENT_{c,t} > \gamma) \\ & + \alpha_1 X'_{i,c,t} + \mu_i + \varepsilon_{i,c,t}\end{aligned}\quad (2)$$

Kremer et al. (2013)

1. Extends the panel threshold model of Hansen (1999).
2. Potential endogenous covariates among RHS variables.
3. Threshold effects: the coefficient of the curve changes after a certain level of bargaining centralization ($\beta_1 \neq \beta_2$).

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2. Methodology

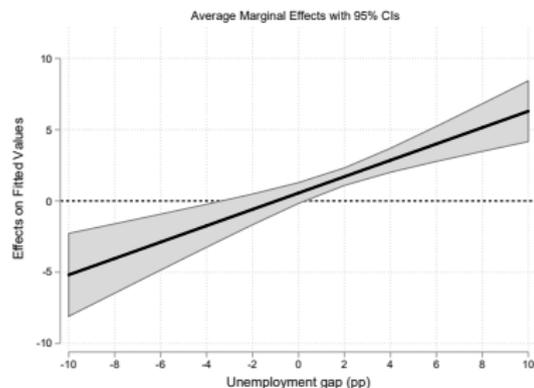
3. Results

Table 1. Effects of bargaining centralization on the PC

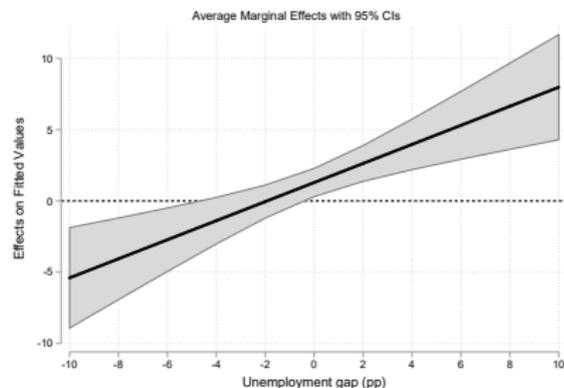
Dep. Variable: $\Delta \log(WAGE)$	Coefficient	SE
UGAP	-0.289***	[0.077]
BARGCENT	0.410***	[0.130]
BARGCENT \times UGAP	0.116***	[0.035]
Other control variables	YES	
Intercept	2.163*	[1.251]
Observations		3585
Rsquared		0.596
Year FE		YES
Region FE		YES
AR(2) (p-value)		0.262
Hansen test (p-value)		0.198

Note: Robust standard errors are in brackets. Statistical significance levels are * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Results — Nonlinear regression



(a) Sectoral (Highly centralized) *versus* Company (Weakly centralized)



(b) Cross-sectoral (Highly centralized) *versus* Company (Weakly centralized)

Notes: If the confidence interval includes 0 on the y-axis, the implication is that no significant difference exists in the slope of the wage PC between the predominant bargaining level considered and the reference level (company level). If the confidence interval is above 0 on the y-axis, the slope of the wage PC is less steep; if it is below, it is steeper.

Results — Nonlinear regression

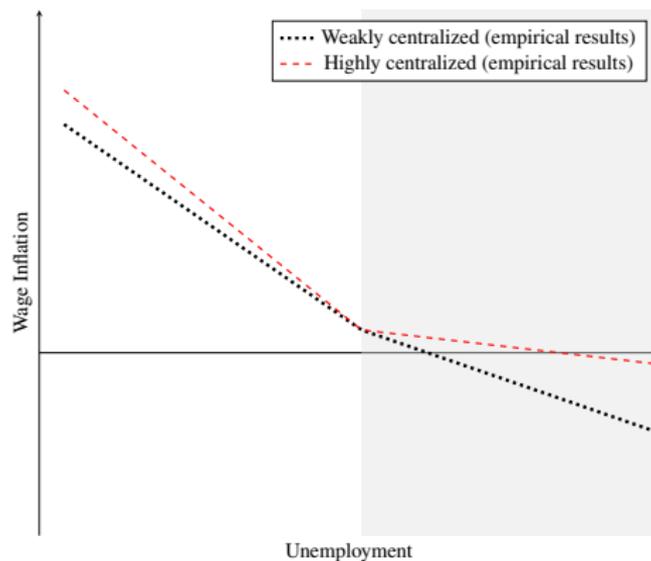


Figure 5. Testable assumptions and empirical results

Note : when the unemployment reduces highly centralized firms obtain larger wage increase, contrary to the initial intuition.

Results — Threshold regression

Table 2. Dynamic threshold panel regression estimation

Dep. Variable: $\Delta \log(WAGE)$	BARGCENT		BARGENT (after 2008)	
Estimated threshold	2.4		2.1	
95% Confidence Interval	[2.2; 2.4]		[1.2; 2.6]	
Impact of UGAP				
Below threshold (β_1)	-0.567***	[0.083]	-0.753***	[0.109]
Above threshold (β_2)	-0.255**	[0.113]	-0.315*	[0.182]
Observations	3 660		2 948	
Observations above threshold	1435		1 184	

Note: Robust standard errors are in brackets. Statistical significance levels are * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Final thoughts

To conclude

- ▶ Provides an complementary explanation about the curve's flattening in the European case (labor market specificity)
- ▶ Theoretical model and an empirical investigation to understand the role of these specific DWR
- ▶ Identifies nonlinearities and the existence of a threshold in the centralization of bargaining
- ▶ After this threshold, the curve becomes flat due to DWR
- ▶ Understanding of the interaction of monetary policy and labor market characteristics under different regimes (tight vs slack)

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Theoretical model

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- ▶ Extension of Mortensen and Pissarides' benchmark model (1999) with wage negotiations at the sectoral level leading to collective agreements

Main features

- ▶ Time is continuous
- ▶ Unemployed coexist with job vacancies, matched with a Cobb-Douglas matching function
- ▶ A continuum of firms l (normalized to 1) in an institutionalized labor market, divided into two parts:
 1. l_c covered firms participating in collective bargaining at the sectoral level
 2. l_{nc} non-covered firms excluded from collective bargaining

Theoretical model

Wage determination

- ▶ **Decentralized bargaining:** worker & firm

- ▶ By solving a Nash maximization problem, the wage agreement is

$$w_{nc} = \gamma x + \gamma \kappa + (1 - \gamma)z$$

- ▶ with $\gamma \in [0, 1]$ denoting the worker's bargaining power, x the job's production level, κ the cost of a vacant job, z the unemployment benefit

- ▶ **Collective wage bargaining:** trade union & employers' federation

- ▶ Trade unions' utility is $l_c w_c$.
- ▶ Employers' federation utility is $l_c [x(1 + l_c) - w_c]$, with $x(1 + l_c)$ corresponding to positive externalities related to the share of firms participating in collective bargaining (network between firms, access to training for workers, etc.)
- ▶ By solving a Nash maximization problem, the collective wage agreement is

$$w_c = \beta x(1 + l_c) + \beta \kappa + (1 - \beta)z$$

- ▶ with $\beta \in [0, 1]$ denoting the trade unions' bargaining power

Theoretical model

Proposition 1

A recession ($dx < 0$, i.e. a decrease in production in each firm) leads to

1. a reduction in the tightness of both parts of the labor market
 2. a decrease in wages in both parts of the labor market
 3. an increase in covered employment and a decrease in uncovered employment
 4. a decrease in the total employment (or increase of unemployment)
- ▶ Interpretation:
- ▶ Facing a decline in labor demand following the recession, both individual worker and trade unions lower their wage claims
 - ▶ In non-covered firms, employment falls since the level of production is lower
 - ▶ In covered firms, employment increases because a higher level of employment avoids the fall in labor productivity due to positive externalities (overcompensates for the decrease in x)

Theoretical model

Proposition 2

A recession ($dx < 0$) leads to a smaller decline in wages in firms covered by a collective wage agreement than in uncovered firms.

$$\left| \frac{dw_c}{dx} \right| < \left| \frac{dw_{nc}}{dx} \right|$$

- ▶ This result holds under the assumption of high productivity, which may refer to industrial firms, rather than firms in the service sector, where productivity gains are generally lower (Sorbe et al., 2018)
- ▶ Interpretation:
 - ▶ w_c depends on the coverage of the agreements l_c , which increases due to our assumption of positive labor externalities (see Proposition 1)
 - ▶ The ability of collective agreements to mitigate the decrease in wages during a bad economic situation relative to individual agreements makes employment in firms covered by a collective agreement more attractive