Downward Nominal Wage Rigidity in the OECD

Steinar Holden and Fredrik Wulfsberg

November 25, 2005

Motivation

- Conventional view: Long run Phillips curve is vertical. No long run relationship between inflation and unemployment.
- Challenging view: Nominal wages are rigid downwards (DNWR). At low inflation, DNWR leads to stronger wage pressure, inducing higher unemployment (Tobin).
- Important to study effects from DNWR because of monetary policy aiming at very low inflation and also nominal harmonisation in EMU.
- Wage stickiness in business cycle and monetary policy literature.

Motivation cont.

- Many economists view DNWR as 'money illusion' and 'ad hoc'
- But: solid justifications have emerged

- Fair treatment: employees and employers view nominal wage cuts as unfair (Kahneman; Akerlof, Dickens and Perry; Bewley). Supporting survey evidence

- Contracts: Nominal wage contracts that can only be changed by mutual consent (MacLeod and Malcomson; Holden). DNWR with rational agents

- Supporting micro evidence for many countries

Motivation cont.

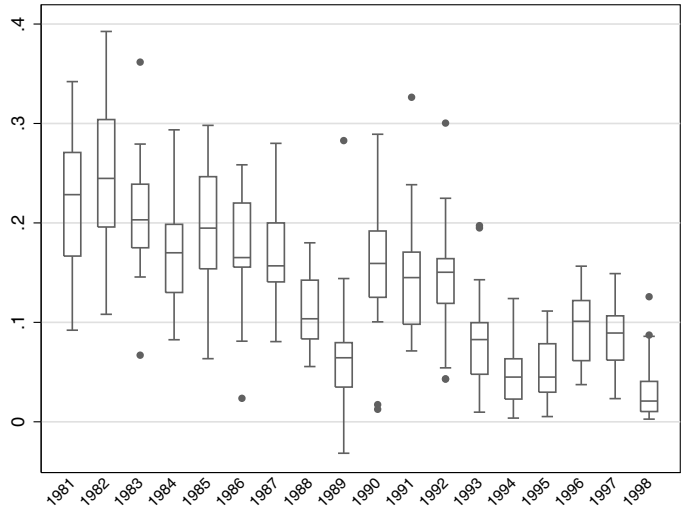
■ A lot of micro evidence documents the existence of DNWR for many different countries, but

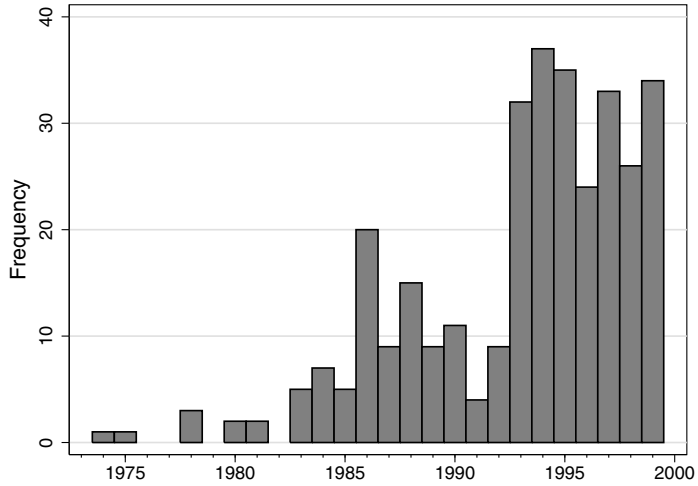
- few studies for continental Europe (exceptions IWFP, Knoppik & Beissinger, Dessy)
- difficult to compare results across countries due to different data and methods
- more countries and longer time dimension makes it possible to explore the effect of institutional variables
- rigidity for job stayers may also reflect selection bias, as those who take wage cuts may quit
- firms can circumvent rigidity at individual level, by turnover, or by shifting jobs to other firms with lower wages

■ Supplement micro data by industry panel data, where the unit of observation is the annual growth in average nominal gross hourly earnings for manual workers in the industry

Data

- Countries: at, be, ca, dew, dk, es, fi, fr, gr, ie, it, lu, nl, no, nz, pt, se, uk, us
- Δw_{jit} where $j =$ industry, $i =$ country, $t =$ year
- 449 country-year samples (it combinations)
- 9509 observations in total of which
- 324 observations of nominal wage reductions





The idea

DNWR involves compression of the country-year wage growth distribution

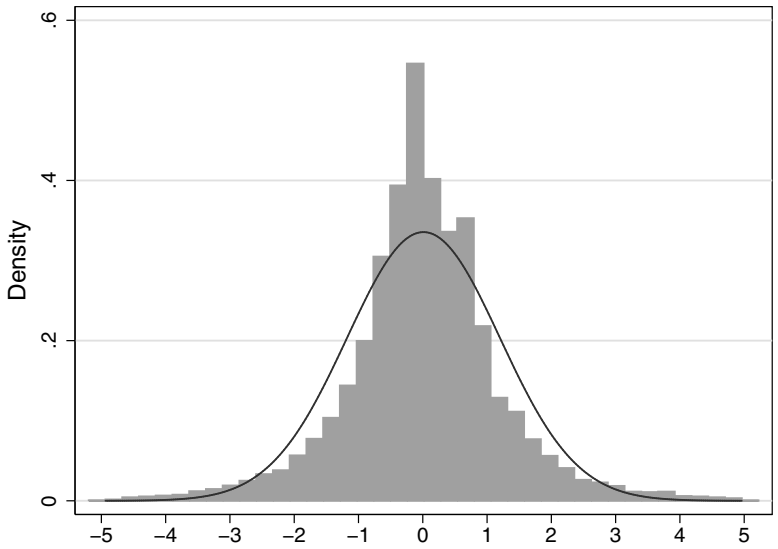
■ To detect DNWR we must compare the observed wage change with the notional wage changes (wage change distribution without DNWR)

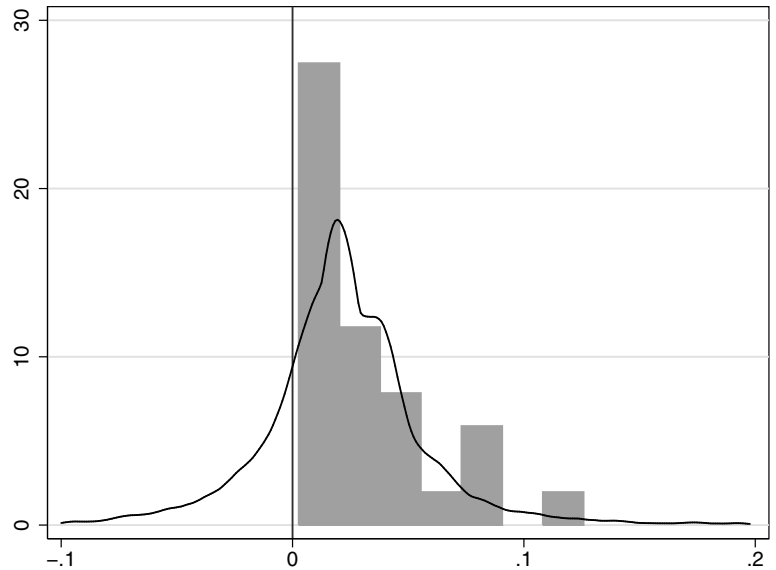
- Assume notional distribution is normal? Or symmetric? The Kahn test requires that the notional distribution is independent of inflation.

- We assume that the shape of the notional country-year specific wage change distribution takes the same form as the empirical wage change distribution in the high inflation years

- We construct notional distribution based on empirical country-year samples in high inflation years, adjusting for country-year specific median wage change and dispersion ($IPR = P75 - P35$).

The underlying distribution (left), empirical and notional distributions for Portugal 1998 (right)





$$\Delta w_s^n = \frac{\Delta w_{jit} - M_{it}}{(P75 - P35)_{it}}$$

$$\Delta \widetilde{w}_s^{it} = \Delta w_s^n (P75 - P35)_{it} + M_{it}$$

Novel method

We find fewer wage cuts in the empirical sample than in the notional, suggesting that DNWR has prevented wage cuts.

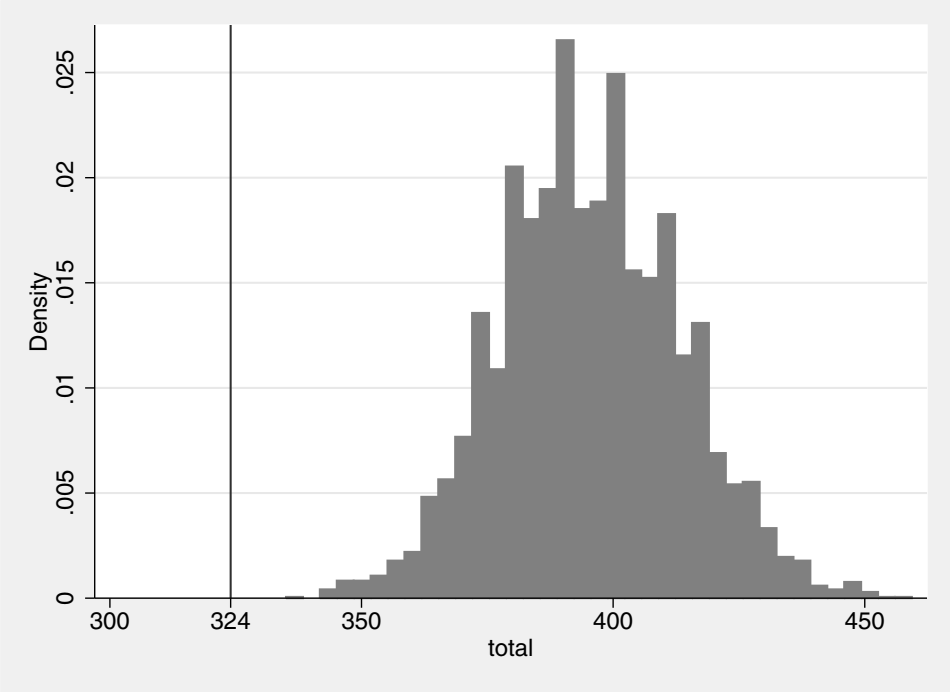
Is this difference significant? Novel statistical method:

1. Count number of observed wage cuts
2. Construct probability of a wage cut from notional sample in each country-year, i.e. 449 notional probabilities.
3. Use notional probabilities to undertake 5000 Monte Carlo simulations over the 449 country-year samples, and count the total number of simulated wage cuts.
4. Evidence of DNWR if 'sufficiently often' more simulated wage cuts than observed.

Results from 5000 simulations

- In 5000 simulations there were more simulated wage cuts than observed. Probability of significance = 0

- On average, we simulate 395 wage cuts, as compared to 324 observed wage cuts. Fraction of wage cuts prevented FWCP = 1 – 324/395 = 0.18



Results on regions

Sample properties:	All regions	Anglo	Core	Nordic	South
No. of observations (S)	9509	2961	3110	1976	1462
No. of country-years	449	129	158	95	67
Observed wage cuts (Y)	324	153	125	18	28
Incidence of wage cuts (Y/S)	0.0341	0.0517	0.0402	0.0091	0.0192
Simulation results:					
Average simulated wage cuts ($\widehat{Y}$)	395.4	173.7	149.3	31.8	40.5
$\#(\widehat{y} > y^B)$	5000	4807	4948	4984	4883
Probability of significance	0	0.039	0.010	0.003	0.023
Fraction of wage cuts prevented ($FWCP$)	0.181	0.119	0.163	0.435	0.309
Fraction of industry-years affected ($FIYA$)	0.008	0.007	0.008	0.007	0.009

Anglo: Canada, Ireland, New Zealand, UK and US

Core: Austria, Belgium, Germany, France, Netherlands and Luxembourg

Nordic: Denmark, Finland, Norway and Sweden

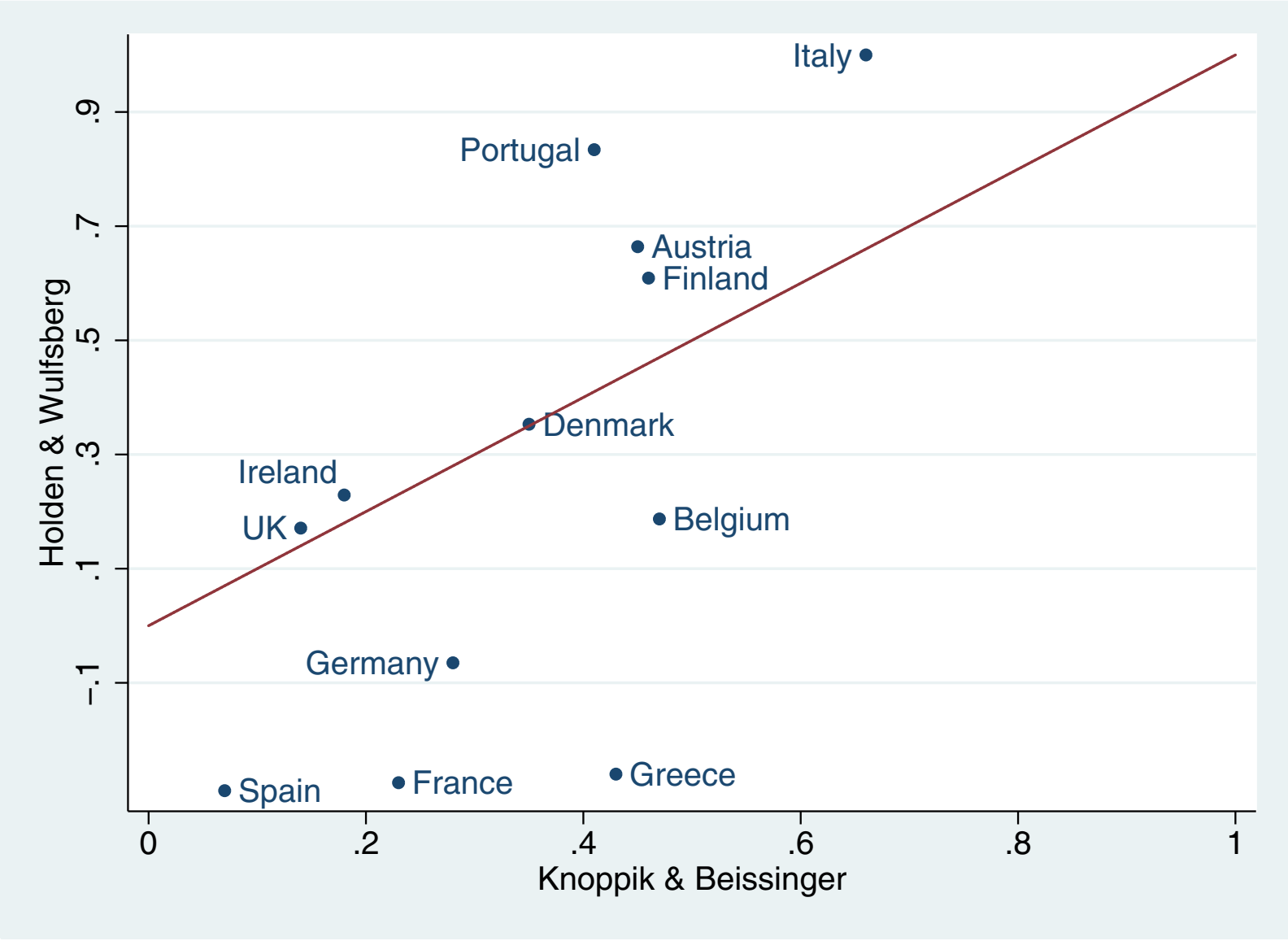
South: Greece, Italy, Portugal, Spain

Results on periods

Sample properties:	1973–1979	1980–1989	1990–1994	1995–1999
No. of observations (S)	2224	3717	1906	1662
No. of country-years	109	175	88	77
Average wage growth	13.78%	8.72%	5.60%	3.99%
Average inflation rate	10.30%	8.13%	4.42%	2.19%
Average unemployment rate	3.71%	6.72%	8.49%	8.07%
Observed wage cuts (Y)	5	74	93	152
Incidence of wage cuts (Y/S)	0.0023	0.0199	0.0488	0.0915
Simulation results:				
Average simulated wage cuts ($\widehat{Y}$)	12.8	107.7	109.4	165.5
$\#(\widehat{y} > y^B)$	4937	4998	4815	4422
Probability of significance (p)	0.013	0.000	0.037	0.116
Fraction of wage cuts prevented ($FWCP$)	0.609	0.313	0.150	0.082
Fraction of industry-years affected ($FIYA$)	0.003	0.009	0.009	0.008

Results on countries

Country	S	T	Y	Y/S	$\widehat{Y}$	$\#(\widehat{y} > y^B)$	p	$FWCP$	$FIYA$
Austria	408	26	2	0.0049	6.0	4714	0.057	0.664	0.010
Belgium	575	26	31	0.0539	38.1	4620	0.076	0.187	0.012
Canada	627	26	57	0.0909	57.3	2419	0.516	0.005	0.000
Denmark	462	24	8	0.0172	12.4	4380	0.124	0.353	0.009
Finland	368	23	2	0.0054	5.1	4437	0.113	0.609	0.008
France	556	26	21	0.0378	16.5	389	0.922	–0.275	–0.008
Germany	665	26	16	0.0241	15.0	1681	0.664	–0.065	–0.001
Greece	469	26	7	0.0149	5.6	992	0.802	–0.260	–0.003
Ireland	463	23	27	0.0583	35.0	4612	0.078	0.229	0.017
Italy	312	13	0	0	3.0	4763	0.047	1	0.010
Luxembourg	423	27	32	0.0757	39.1	4498	0.100	0.183	0.017
Netherlands	483	27	23	0.0476	34.6	4965	0.007	0.335	0.024
New Zealand	750	27	45	0.0600	52.3	4244	0.151	0.139	0.010
Norway	674	27	2	0.0030	3.5	3395	0.321	0.431	0.002
Portugal	411	18	3	0.0073	18.0	5000	0.000	0.834	0.037
Spain	270	10	18	0.0667	14.0	539	0.892	–0.289	–0.015
Sweden	472	21	6	0.0127	10.9	4752	0.050	0.447	0.010
UK	615	26	18	0.0293	21.7	3987	0.203	0.171	0.006
US	506	27	6	0.0119	7.4	3062	0.388	0.190	0.003


Italy
Portugal
Austria
Finland
Denmark
Ireland
UK
Belgium
Germany
Spain
France
Greece
Holden & Wulfsberg
−.1
.1
.3
.5
.7
.9
0
.2
.4
.6
.8
1
Knoppik & Beissinger

Robustness

- Country specific and period specific underlying distributions
- Contaminating the data

- Adding downward nominal wage rigidity:
  Our measure is able to detect 93% of additional DNWR
- Adding downward real wage rigidity:
  Adding 20% DRWR increases FWCP by only 6 percentage points.
- Adding noise (capturing compositional changes) weakens the evidence of DNWR.

Can labour market institutions explain the number of (observed) wage cuts (Y_{it})?

$$Y_{it} \sim \text{Poisson}(\lambda_{it}) \text{ where } \lambda_{it} \sim \Gamma(\gamma_{it}, \delta_i) \tag{1}$$

where

$$\gamma_{it} = \exp\left\{\beta_1 EPL_{it} + \beta_2 UD_{it} + \beta_3 \Delta cpi_{it} + \beta_4 (\Delta cpi_{it})^2 + \beta_5 U_{it}\right\} \tag{2}$$

Allow for industry specific effects and 'overdispersion'.

Log-likelihood estimation of the βs conditional on $\sum_t Y_{it}$

	Incidence of wage cuts		Fraction of wage cuts realised	
	Pooled	Fixed effects	Pooled	Fixed effects
Ln(S_{it})	1 (–)	1 (–)	–	–
Ln(Simulated cuts)	–	–	1 (–)	1 (–)
EPL	-0.310^{*} (0.104)	-0.785^{*} (0.200)	-0.096(0.058)	-0.395 (0.288)
Union density	-0.803 (0.598)	-1.992^{*} (0.980)	-0.941^{*} (0.376)	-1.870 (1.394)
Inflation	-0.484^{*} (0.073)	-0.345^{*} (0.062)	-0.068 (0.047)	-0.025 (0.062)
Inflation squared	0.016^{*} (0.003)	0.011^{*} (0.003)	0.003 (0.002)	0.002 (0.003)
Unemployment	0.116^{*} (0.029)	0.092^{*} (0.036)	0.032^{*} (0.016)	0.007 (0.035)
constant	1.092^{*} (0.463)	1.855^{*} (0.762)	0.208 (0.242)	—
log-likelihood	–364.6	–288.5	–279.3	–231.4
Number of observations	422	409	416	403

- Weakening EPL in Portugal from strict to medium level would raise incidence of nominal wage cuts from 0.7 to 2.3 percent

Conclusions I

■ Statistically significant DNWR in industry level data indicates that firm behaviour and market mechanisms may diminish, but do not seem to remove, rigidity at individual level.

- periods: 1973–79, 1980–89 and 1990–94 at 5% level
- regions: Core, Nordic, South and Anglo at 5% level,
- countries: Italy, Netherlands, Portugal and Sweden at 5% level, Austria, Belgium, Ireland and Luxembourg at 10% level

Conclusions II

- high inflation, strict employment legislation, low unemployment, and high union density have significant

  - negative effect on the incidence of nominal wage cuts
  - positive effect on the fraction of wage cuts prevented

- Supports contract explanations of DNWR

Conclusions III

- The fraction of wage cuts prevented has fallen over time, from 60 percent in the 1970s to 8 percent in the late 1990s . . .

. . . except in Nordic countries, where fraction of wage cuts prevented has increased

- the fraction of industries affected by DNWR has been stable at about 1% in the 80s and 90s, but was smaller in the 70s.

- Method seems capable of detecting most DNWR, and distinguishing DNWR from DRWR.