EUROPEAN CENTRAL BANK
EUROSYSTEM

Wage and labour cost dynamics in the European Union:
Findings from the Wage Dynamics Network

Frank Smets
European Central Bank

University of Minho
Conference on "10 years of the euro: Adjustment in capital and labour markets"
Braga, 7 May 2009

Overview

- The WDN
  - Objectives and research questions
  - Participation and organisation
  - Data issues
- What have we learnt so far
  - 11 main findings
- Follow up

WDN: Objectives and time line

- The Wage Dynamics Network was approved in February 2006 by the Governing Council of the ECB
- The WDN has the specific objectives of
  - identifying the sources and features of wage and labour cost dynamics that are most relevant for monetary policy
  - clarifying the relationship between wages, labour costs and prices, both at the firm and macro-economic level
- Has been in operation since July 2006

WDN: Research questions

Regarding the first objective:

1. **How do wages, labour costs and their various components adjust over the business cycle and in response to various shocks? Are there sectoral and regional differences?**
2. **How often do wages change? Are wage rigidities nominal or real, symmetric or asymmetric?**
3. **What are the sources of wage and labour cost rigidity?**

WDN: Research questions

Regarding the second objective:

4. **How do changes in wages and other labour cost components at the worker's level translate into marginal costs and output and pricing decisions at the firm level?**
5. **How do wage and labour cost rigidities translate into price stickiness and inflation persistence?**
6. **What factors, such as labour market institutions, the degree of product market competition and globalisation, influence the extent and the speed with which labour costs pass through into output and prices?**

Why important for ECB?

- **Better understanding of the monetary transmission mechanism:**
  - **E.g. slope of the Phillips curve**
- **Helps improve the theoretical specification and the empirical performance of macro-models:**
  - **E.g. micro findings useful for calibration/priors**
- **Useful in monitoring the adjustment mechanism within monetary union:**
  - **E.g. identifying frictions may point to useful areas for structural reform.**

Participants

- **Chairperson: Frank Smets (ECB-DGR)**
- **Secretary: Ana Lamo (ECB-DGR)**
- **ESCB coverage: 24 NCBs + ECB**
- **Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, the Netherlands, Lithuania, Poland, Portugal, Slovenia, Spain, Sweden, UK, ECB (DG-R, DG-E and DG-S) + Slovakia (2008)**
- **Consultants:**

  Giuseppe Bertola (Università di Torino)
  Julian Messina (University of Girona)

Organisation

- **Four research groups:**
  - **Macro: Explores the characteristics of aggregate, country and sectoral wage and labour cost dynamics and their interaction with prices**
  - **Micro: Involves the use of micro data on wages and prices**
  - **Survey: has launched an ad-hoc survey on wages, labour costs and price setting behaviour at the firm level**
  - **Meta: Overlooks the WDN process and focuses on drawing policy implications from the WDN results**

Research output so far

- About 50 working papers:
  - Of which about half are published or forthcoming as WPs, with a couple already forthcoming in journals.
- 20 papers were presented at the WDN conference in June 2008, with top academics as discussants.
- Presentations at several workshops and conferences including sessions at 2009 AEA and 2009 EEA

Cross-country micro data sets: SES

The Structure of Earning Survey (SES)

- **The only single micro database comparable across countries that could be used by the WDN**
  - **Matched employer-employee data (no info on prices)**
  - **Detailed information on workers (base wage, other components of earnings, hours of work, age, gender, education , skill), jobs (tenure, type of contract, sector etc,), and firms (size, nature of wage bargaining, etc)**
  - **There are currently two cross-sections available: for 1995 and 2002 (with some exceptions)**

Cross-country micro data sets: SES

The Structure of Earning Survey (SES)

- **Limited access for research**
- **The WDN has access now to data for 10 countries: AT, BE, CZ, DE, GR, HU,IE, IT, NL and ES**
- **This access has been granted by different channels**
  - **ECB access at the safe center in Eurostat (with help of ECB/DGS)**
  - **ECB remote access**
  - **NCBs direct or remote access**

Cross-country data sets: ad-hoc survey

- The firm survey on wage and price setting behaviour was carried out by 17 NCBs between the end of 2007 and the first half of 2008 on the basis of a harmonised questionnaire.
- Total sample size: 17,000 firms.
- Fully harmonised data is available for 15 countries: Austria, Belgium, Czech Republic, Estonia, France, Greece, Hungary, Italy, Ireland, Lithuania, Netherlands, Poland, Portugal, Slovenia and Spain.
- Sector coverage: manufacturing, trade, markets services, non-markets services, financial services and construction.
- Unique evidence on frequency and timing of price and wage setting, incidence and factors of wage rigidities, adjustment to shocks, etc.

This presentation

- **Focus mostly on the main micro findings**
- **The macro group has done a lot of modelling work, but the link between micro findings and the macro implications is not yet fully developed.**
- **This linkage is prerequisite for deriving the monetary policy implications.**

Finding 1

There is substantial heterogeneity in wage setting institutions across countries in Europe.

In many countries these institutions have not changed much over the last decade.

Three groups of countries in EU

1. Most of the euro area and Scandinavian countries are characterised by a system of collective wage bargaining:
   - Union density varies (e.g. France versus Denmark);
   - But extension procedures imply high level of collective agreement coverage
   - Sectoral level agreements are dominant

   Includes AT, DK, FR, DE, GR, IE, IT, NL, PT and SE
2. A second group features, in addition, indexation schemes and a high level of government involvement:

   Includes BE, CY, ES, FI, LU, and SI
3. A third group is characterised by a more deregulated wage bargaining system:
   - Low coverage rates and dominance of firm level agreements.

   Includes CZ, EE, HU, LT, PO, UK

Wage setting institutions

- Trade union density has generally declined, but collective bargaining coverage has remained high in most euro area countries.
  - One exception is Germany, where coverage has fallen quite a bit.
- Coverage is low in new MS (less than 20 percent):
  - Exception is Czech Republic, where coverage has increased (WDN survey: 50%).
- Sectoral bargaining is dominant in the euro area:
  - Implications for synchronisation of wage changes, wage leadership and wage structure.
- Firm-level bargaining is dominant in most new MS.

Finding 2

The frequency of wage adjustment is lower than that of price adjustment.

Frequency of wage and price adjustment

- The typical frequency of wage changes is once per year
  - Around 60 percent of firms surveyed report that, on average, they change wages once a year.
  - One quarter of the firms reply that base wages are changed less frequently than once a year.
- For prices, the corresponding percentages are lower at 40 and 7.4 percent (consistent with IPN evidence)
- Translates in an average duration of wages of 15 months and of prices of 9.5 months
  - Can be used to calibrate standard DSGE models with sticky prices and wages.

Frequency of wage and price adjustment

Frequency of wage changes (for any reason)				
	more frequently than once a year	yearly	less frequently than once a year	never/don't know
Total	**12.1**	**59.3**	**25.8**	**2.8**
Euro area	**11.4**	**59.2**	**26.7**	**2.7**
Austria	6.8	84.2	5.9	3.1
Belgium	22.0	64.8	9.8	3.4
France	19.7	74.1	5.2	1.1
Greece	33.9	56.4	9.7	0.0
Ireland	9.2	71.8	12.9	6.1
Italy	4.2	26.9	64.6	4.3
Netherlands	11.1	69.9	16.9	2.1
Portugal	5.9	82.2	8.4	3.5
Slovenia	27.2	65.6	5.9	1.3
Spain	11.9	84.1	2.5	1.5
Non- Euro Area	**14.0**	**59.5**	**23.2**	**3.3**
Czech Republic	11.5	64.1	23.0	1.4
Estonia	19.9	64.4	10.5	5.2
Hungary	2.6	75.0	12.2	10.2
Lithuania	42.1	44.0	7.5	6.4
Poland	13.6	56.3	28.2	1.9

Source: Druant, Fabiani, Kezdi, Lamo, Martins and Sabbatini (2008). Figures weighted by employment weights.

Duration of wage and price changes across sectors

Average duration of price and wage changes

(months)

	Prices	Wages
Total	9.6	15.0
Euro area	9.6	14.7
Non-Euro area	9.6	15.1
Sector		
Manufacturing	10.2	15.0
Construction	9.2	13.4
Trade	6.8	15.4
Business services	10.9	15.0
Financial services	7.7	14.5

Source: Druant, Fabiani, Kezdi, Lamo, Martins, Sabbatini.

Frequency of wage and price adjustment

- The cross-sectoral variation in the frequency of wage changes is limited, compared to that of price changes.
- Instead, the cross-country differences in wage change frequencies are relatively larger.
- This is consistent with the findings that
    - Products market characteristics (competition and the labour share) are significant determinants of differences in price change frequencies
    - Institutional factors (indexation and collective bargaining) influence differences in wage change frequencies.

Explaining wage and price change frequencies

Price and wage duration

(SURE estimates)

	Duration of prices	Duration of wages	Link between price and wage changes
Construction	-0.39***	-0.08***	0.12***
Trade	-1.10***	0.01	-0.11***
Market services	-0.07	0.03**	0.06***
Financial intermediation	-1.39***	0.12***	-0.30***
20-49	0.11*	0.01	0
50-199	0.03	-0.02*	-0.02
>200	-0.05	-0.08***	-0.02
labor_cost_share	**0.68*** **	-0.01	0.35***
high_skilled	0.04	0.01**	0.01
white_collars	0.05	0.01	-0.09***
share_permanent	0.28***	0.03	0
coll_agr_out	0.08	**0.05*** **	0.02
coll_agr_firm	-0.03	**0.03** **	0.01
indexation	-0.03	**-0.11*** **	0.02
perceived_competition	**-0.33*** **	-0.02	0
export_share	-0.10	0	-0.14***
Obs.	6306	6306	6306
Significance of country dummies: $X^2(14)$	76.5***	1389***	247.4***

Significant at 10%; ** significant at 5%; *** significant at 1%.Source: Druant, Fabiani, Kezdi, Lamo, Martins, and Sabbatini.

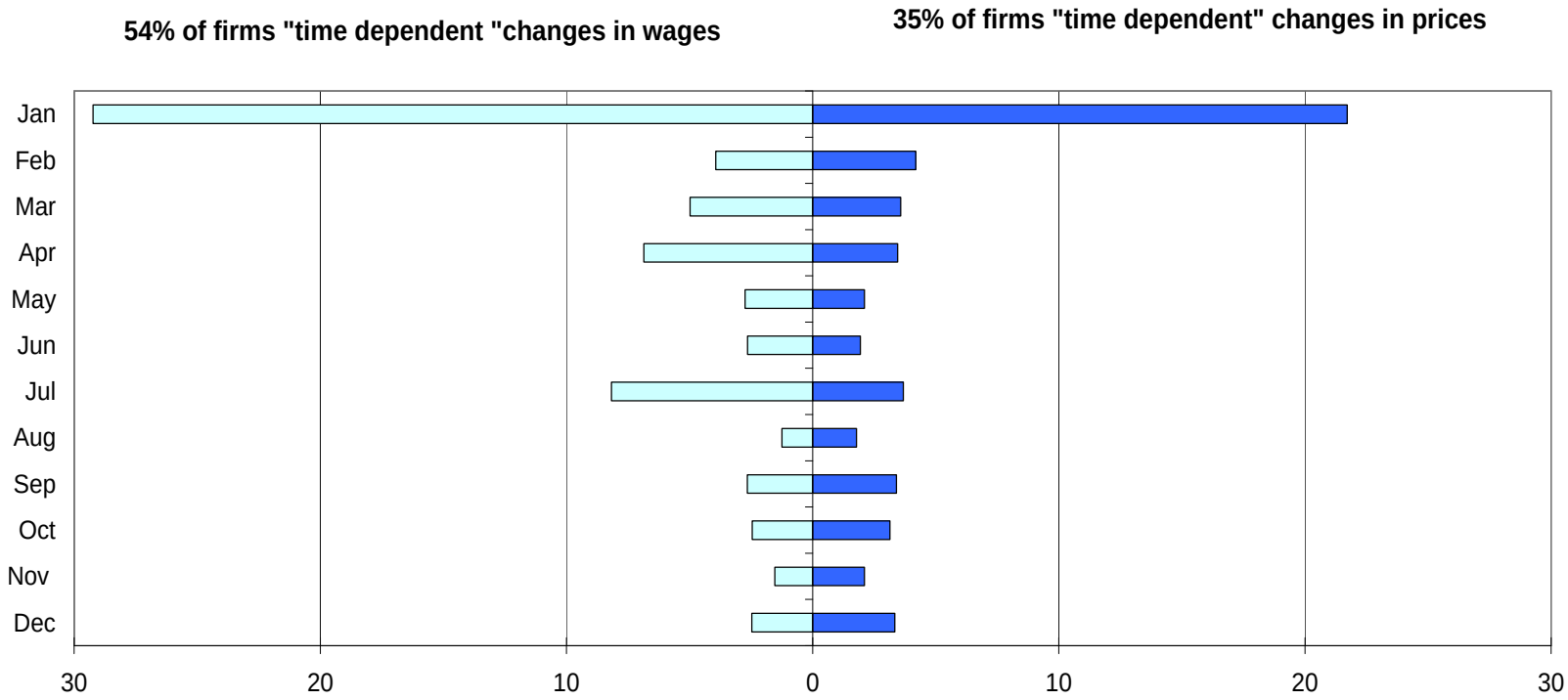
Finding 3

Wage changes are more time dependent and more synchronised than price changes.

Time dependence and synchronisation

Timing of wage and price changes

Percentage of firms that change wages and prices in particular month(s)



Source: Druant, Fabiani, Kezdi, Lamo, Martins and Sabbatini (2008). Figures weighted by employment weights. Germany not included in the calculations

Time dependence and synchronisation

- There is strong evidence of time-dependence in wage-setting:
  - 55 percent of firms concentrate wage changes in a particular month.
- There is a prominent "January effect" in all countries: on average 30 percent of wage changes take place in January.

Time dependence and synchronisation

- **Some evidence of synchronisation between the timing of wage and price changes at the firm level:**
  - **For example, 50 percent of firms which change prices in January also change wages in that month.**
- **But the overall degree of synchronisation between wage and price changes is not particularly strong:**
  - **When asked directly, almost 60 percent of the firms state that there is no link between the timing of wage and price changes.**
- **Time dependence and synchronisation is much less important in non-euro-area countries, probably due to the much lower incidence of collective bargaining.**

Finding 4

While formal indexation schemes are limited to a number of countries, there is evidence that about one third of the firms in a wide range of countries have a policy which adapts base wages to inflation;

Indexation

- The WDN survey directly asked firms whether or not they have a policy that adapts changes in base wages to inflation:
  - There is a high degree of formal indexation in Belgium and Spain, consistent with the institutional setting.
  - In most other countries, about one third of the firms reply they have some kind of adaptation of wage changes to inflation;
  - This is quite important in Central and Eastern European countries.

Indexation

Policy of adjusting base wages to inflation: country overview

(percentages)

	Firm-level indexation policy (1)					Country-level indexation (2)
	Automatic link to inflation		No formal rule		Total	
	Past	Expected	Past	Expected		
AT	9	1	9	3	24	Very low
BE	98	0	0	0	98	High
CZ	7	5	28	24	60	None
DE	*na*	*na*	*na*	*na*	*27*	None
EE	3	2	35	21	54	None
ES	38	16	11	5	70	High
FR	9	2	21	8	33	Very low
GR	15	5	12	10	47	None
HU	7	4	14	6	33	None
IE	6	3	19	10	30	None
IT	1	0	3	1	6	Very low
LT	7	4	24	13	48	
NL	0	0	0	0	0	None
PL	5	2	17	6	31	Very low
PT	3	6	13	29	52	None
SI	20	3	32	5	60	Low
Total	**12.3**	**3.6**	**11.7**	**6.4**	**33.0**	
EA countries	**14.6**	**3.7**	**8.7**	**5.0**	**31.1**	

(1)Source: Druant, Fabiani, Kezdi, Lamo, Martins and Sabbatini (2008).Weighted by employment weights. Euro area and total do not include Germany. (2) Source: Du Caju et al., (2008).

Finding 5

Real wages are marginally pro-cyclical in the euro area.

W age cyclicality

- Evidence on the cyclicality of private sector real wages in the euro area is mixed:
  - For the euro area as a whole real wages are procyclical with a lag;
  - But differences across countries (E.g. Germany procyclical, Spain countercyclical);
  - Some evidence that cross-country differences may be related to union bargaining power;
- Public wages are procyclical with a one to two year lag.

Long-run Phillips curve

- **Wages appear to be less sensitive to unemployment in the euro area than in the United States:**

US

$$w = p + h - \underset{(0.065)}{0.327u}$$

$$p = \underset{(0.042)}{0.872w} - \underset{(0.073)}{0.480h} + \underset{(0.042)}{0.128z}$$

EA

$$w = p - \underset{(0.023)}{0.157u}$$

$$p = \underset{(0.045)}{0.626(w - h)} + \underset{(0.045)}{0.374z}$$

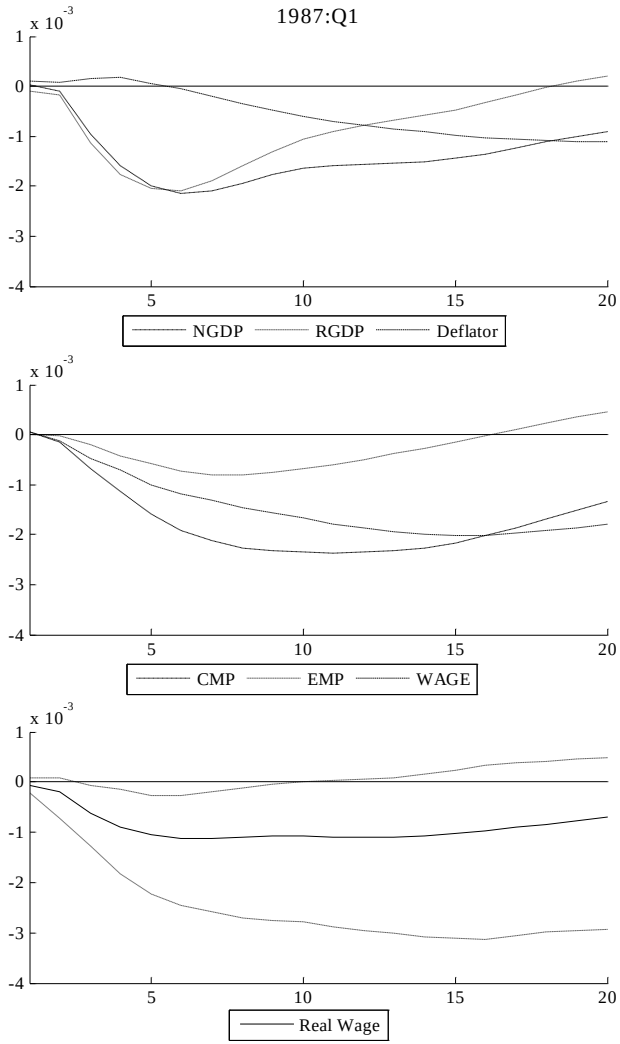
(source: Duarte & Marques, 2008)

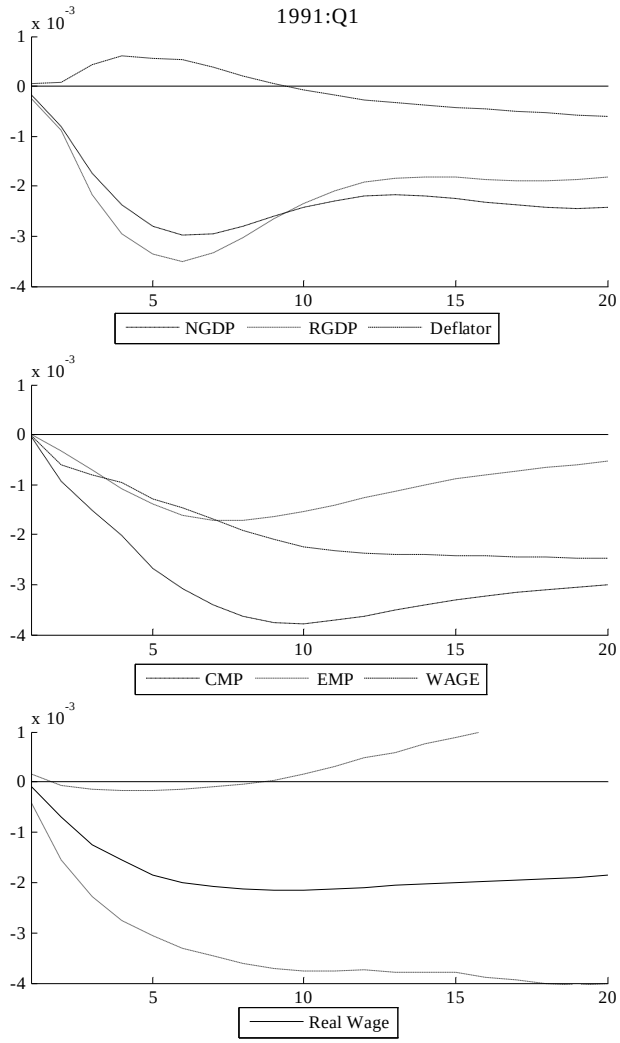
But real wages have responded quite strongly to the fall in unemployment in the euro area.

Response of real wages to monetary policy

- **Real wages fall significantly in response to a monetary policy tightening**
  - **Nominal wages respond more than prices;**
  - **The largest nominal wage responses are in construction and manufacturing;**
  - **Some convergence across countries in the most recent period.**

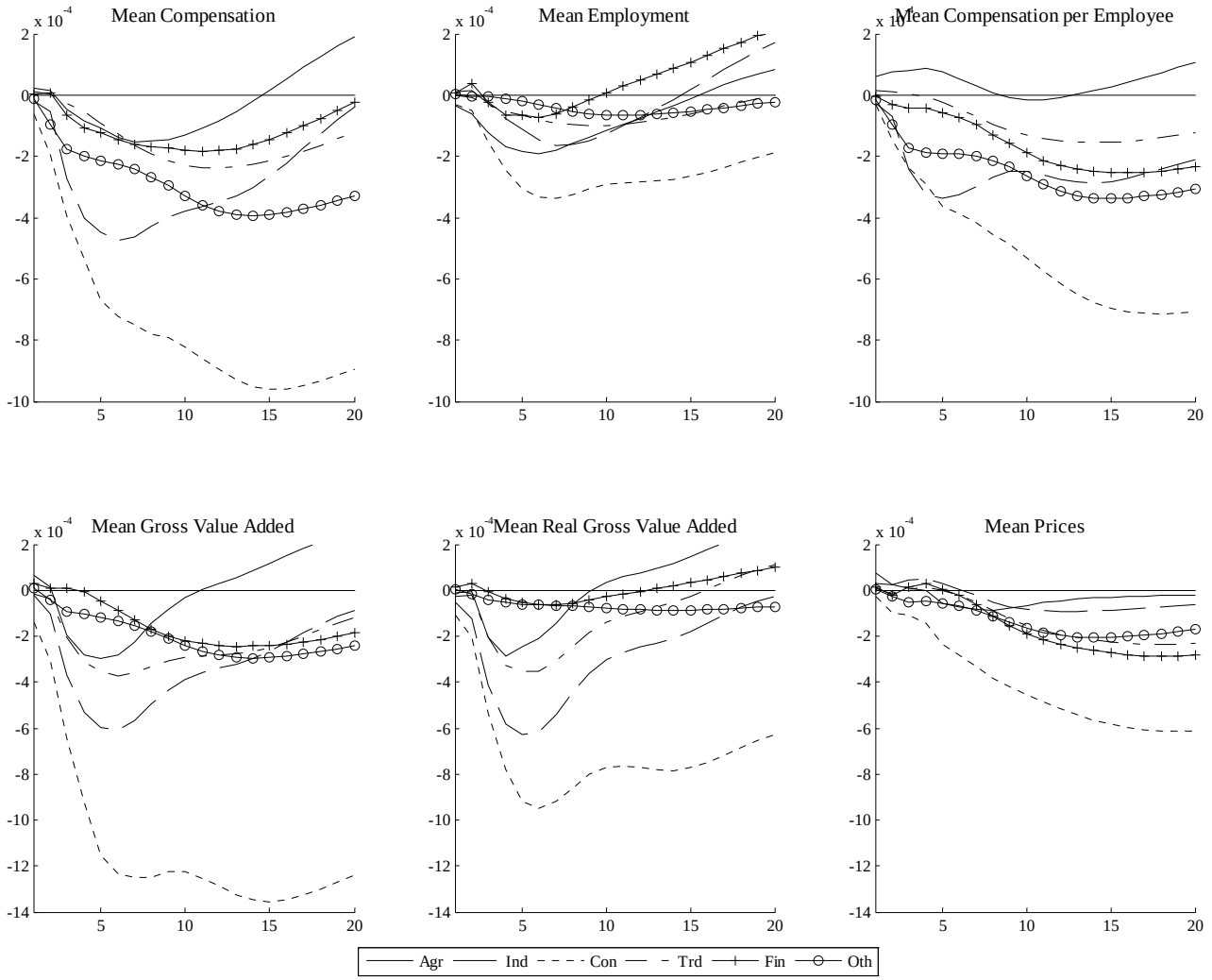
Response of wages to monetary policy





Source: McCallum & Smets

Sectoral differences



Finding 6

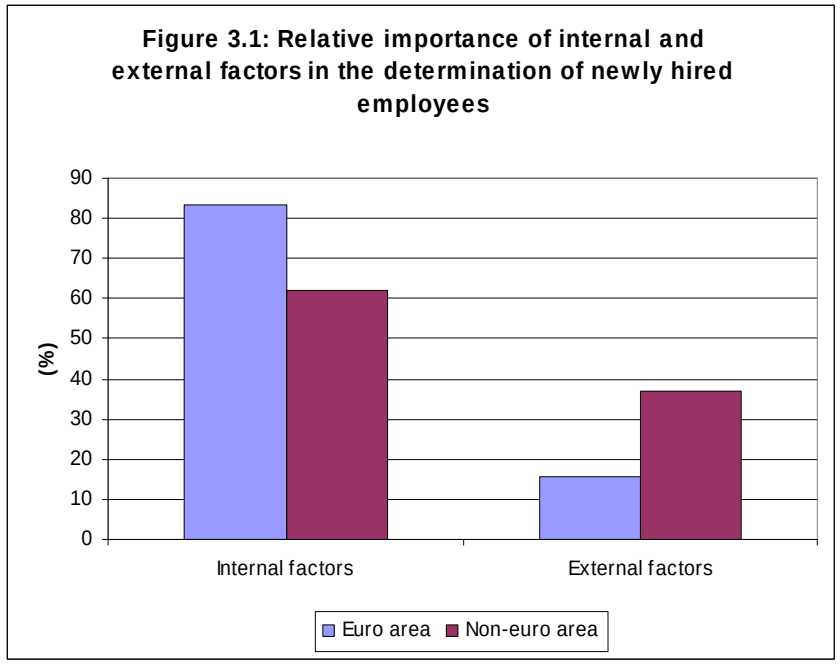
Wages of new hires depend a lot on the internal wage scale.

Wages of new hires

- Micro-evidence for the United States and various European countries suggests that wages of new hires are more pro-cyclical than wages of incumbents:
  - E.g. survey by Pissarides (2007) suggests an elasticity of about 3.
- However, the direct survey evidence suggests that internal factors are more important determinants of the wages of new hires than external labour market conditions.
- Distinction is important both for explaining volatility of employment and for link between wage and price stickiness in modern labour-market matching models.

W ages of new hires

- 80 percent of firms report that internal factors are the most important factors driving wages of new hires;
- External labour market conditions are relatively more important in non-euro-area countries (36 percent) than in euro area countries (15 percent):
  - Partly reflects differences in bargaining coverage.



Source: Galuscak, Murphy, Nicolitsas, Smets, Strzelecki, and Vodopivec

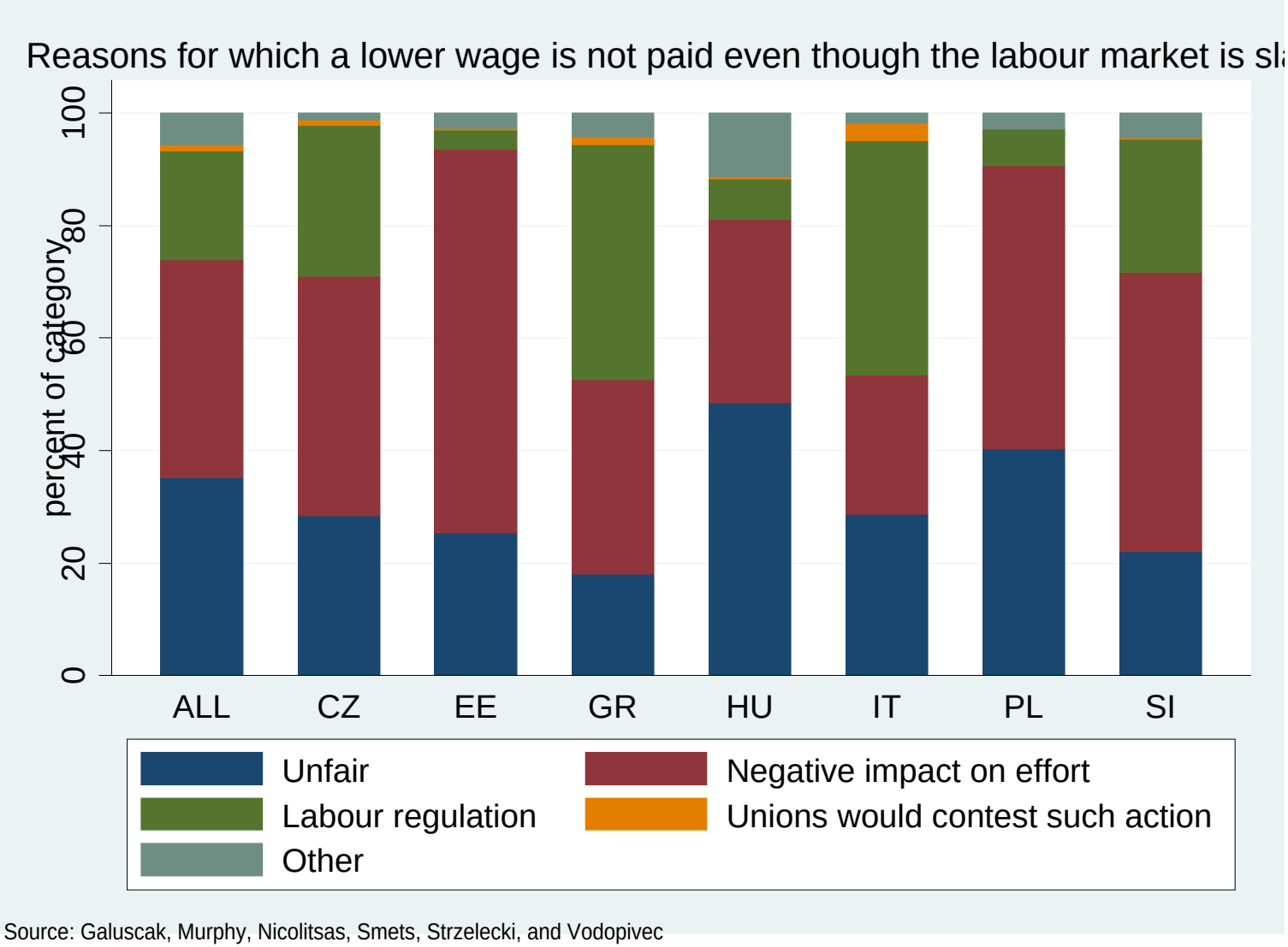
- For smaller firms, firms that face more competition, that employ more high-skilled employees and that face a higher turnover, external labour market conditions matter more.

W ages of new hires

- **Only 4 percent of firms reply they would lower (increase) wages of new hires relative to incumbents if the labour market was tight (loose).**
- **Only available for a subset of countries.**

	Lower wage	Higher wage	Flexible (both)
Czech Republic	10.5	15.9	3.1
Estonia	17.9	17.7	3.8
Greece	15.8	15.0	2.1
Hungary	11.3	17.1	4.8
Italy	12.6	23.5	5.6
Lithuania	18.3	12.3	4.7
Poland	15.7	5.8	2.2
Slovenia	4.3	4.8	0.9
Weighted average	13.4	16.0	4.0

Reasons for relative wage stickiness



Source: Galuscak, Murphy, Nicolitsas, Smets, Strzelecki, and Vodopivec

Finding 7

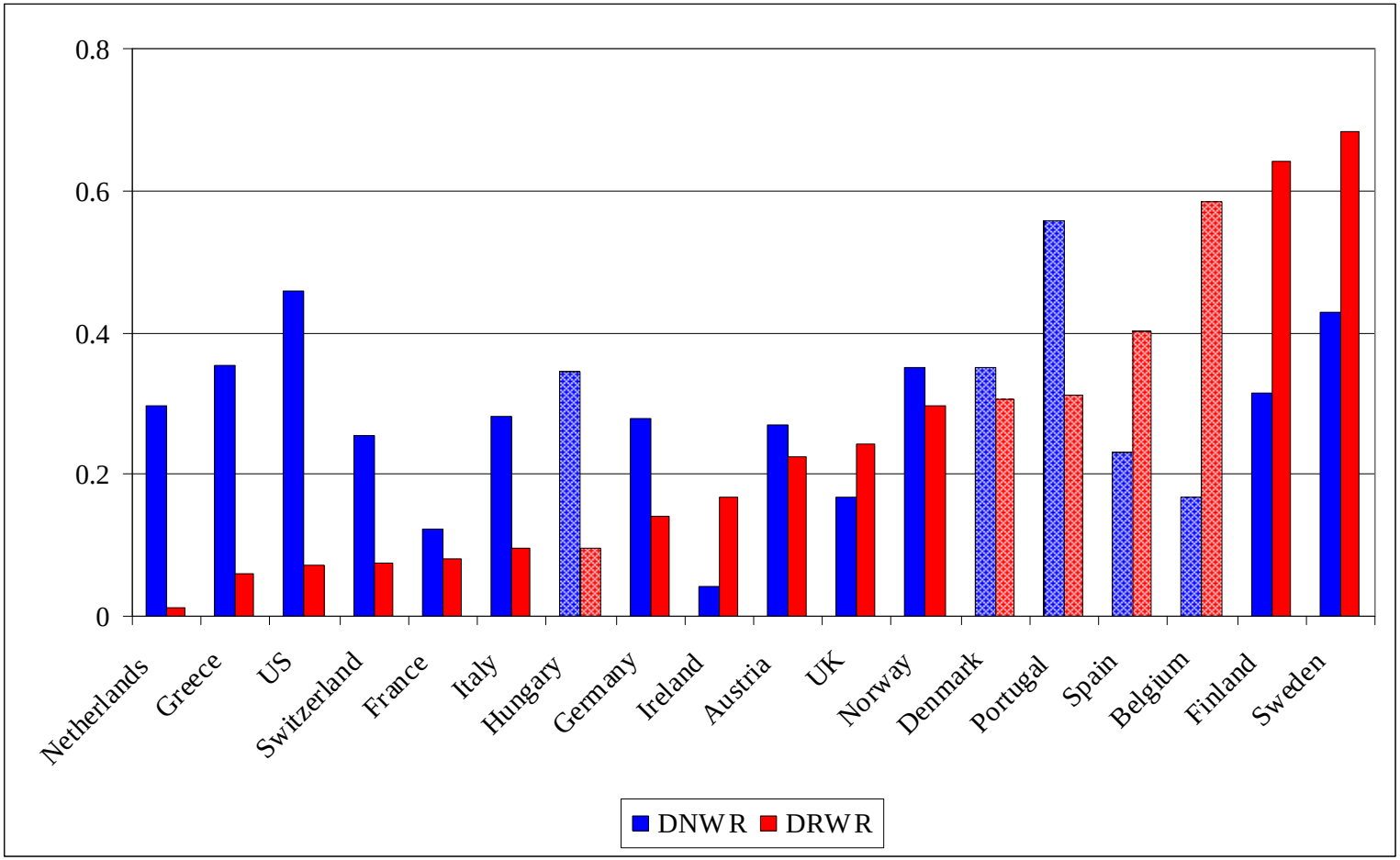
There is evidence of downward wage rigidity, but the type of rigidity (nominal versus real) differs across countries mainly depending on labour market institutions.

Downward wage rigidity

- WDN distinguishes between downward nominal rigidity (DNWR: the inability of firms to cut nominal wages) and downward real rigidity (DRWR: the inability of firms to increase wages at a rate less than the prevailing inflation rate)
- Estimates of the incidence of DWR are derived both from the distribution of wage changes across workers (using the International Wage Flexibility Project methodology) and from the WDN survey.

Downward wage rigidity: IWFP methodology

Downward nominal and real wage rigidity across countries. IWFP Methodology.



Source: the figures for Belgium, Denmark, Portugal and Spain are from Messina, Du Caju, Duarte, Izquierdo and Lynggård Hansen (2008), figures for Hungary are from Katay (2008b) the rest are IWFP figures from Dickens *et al(* 2007).

Downward wage rigidity

- DNWR is found to be the dominant rigidity in the Netherlands, Greece, Germany, Austria and Portugal (as in the case of the US)
- DRWR is found to be particularly prevalent in Spain, Belgium, Finland and Sweden.
- The patterns of cross-country differences found in the data point to the importance of wage setting institutions in determining the incidence of wage rigidities across countries.

Downward wage rigidity: Survey evidence

- Nominal cuts in base wages are extremely rare:
  - Excluding Germany, only 3.9 percent of firms report that base wages were cut during the previous five years.
  - 10 percent report they have frozen base wages.
- Wage freezes have been twice as common in non-euro area countries than in euro area countries.
- Labour market institutions matter:
  - E.g. the strictness of employment protection legislation affects DNWR.
- Fairness and efficiency wage arguments are the most important explanations.

Finding 8

Many firms use other margins than changes in base wages for adjusting their wage bill.

Alternative margins of adjustment

Labor cost adjustment strategies - Country-level statistics

Country	All margins	Reduce bonuses	Reduce benefits	Change shifts	Slow promotions	Cheaper hires	Early retirement
Belgium	0.460	0.184	0.079	0.072	0.150	0.264	0.189
Czech Repub	0.679	0.322	0.075	0.111	0.019	0.087	0.089
Estonia	0.936	0.402	0.205	0.211	0.062	0.162	0.026
France	0.586	0.147	0.061	-	0.154	0.390	0.303
Greece	0.835	0.204	0.124	-	-	-	-
Hungary	0.672	0.227	0.119	0.383	0.351	0.265	0.102
Ireland	0.883	0.133	0.049	0.098	0.047	0.276	0.040
Italy	0.712	0.256	0.218	0.260	0.340	0.456	0.202
Lithuania	1.000	0.410	0.250	0.199	0.106	0.179	0.027
Poland	0.505	0.236	0.163	0.124	0.128	0.237	0.109
Portugal	0.395	0.137	0.084	0.107	0.140	0.162	0.000
Slovenia	0.575	0.135	0.128	0.091	0.189	0.158	0.089
Total	0.624	0.228	0.148	0.192	0.209	0.322	0.167
Euro area countries	0.635	0.206	0.148	0.214	0.252	0.388	0.207
Non-euro area countries	0.604	0.267	0.149	0.163	0.134	0.207	0.097

Source: Babecký, Du Caju, Kosma, Lawless, Messina and Rõõm (2008). Notes: proportion of firms that use given strategy, weighted by employment.

Alternative margins of adjustment

- About 60 percent of the firms surveyed have used one of the alternative strategies to reduce costs.
- Notable differences across countries and sectors in the relative importance of the different adjustment margins.
  - Reduction of bonus payments is the most popular method in non-euro-area countries, while euro area firms rely to a greater extent on the replacement of departing workers by cheaper hires.

Alternative margins of adjustment

Factors:

- **The presence of downward nominal rigidity is an important determinant of whether firms use one or other of these alternative adjustment mechanisms**
- **Firms in a competitive environment are more likely to use these strategies.**
- **Firms with collective agreements are also more likely to use these measures, especially when the agreements are at the firm level**

Finding 9

Wages partially feed into prices depending on the degree of competition and the share of labour costs in total costs.

How wages feed into prices

- **Over 60 percent of firms surveyed declare that they would use a strategy of increasing prices when faced with a permanent unexpected increase in wages.**

Reaction after a permanent wage shock

Adjustment strategy	
Reduce (other) costs	64.2
Adjust prices	64.1
Reduce margins	54.9
Reduce output	26.1

Source: Bertola, Dabusinskas, Hoeberichts, Izquierdo, Kwapil, Montornès Radowski (2008). Note: percentages weighted by employment.

How wages feed into prices

- The pass-through of wages into prices is particularly strong in firms with a high labour share:
  - The frequency of price adjustment is lower in firms with a high labour cost share, confirming evidence from the IPN.
  - Firms with a high labour cost share report more frequently that there is a tight link between price and wage changes.
- But the pass-through of wages into prices is mitigated if the degree of competition or the export share is high.

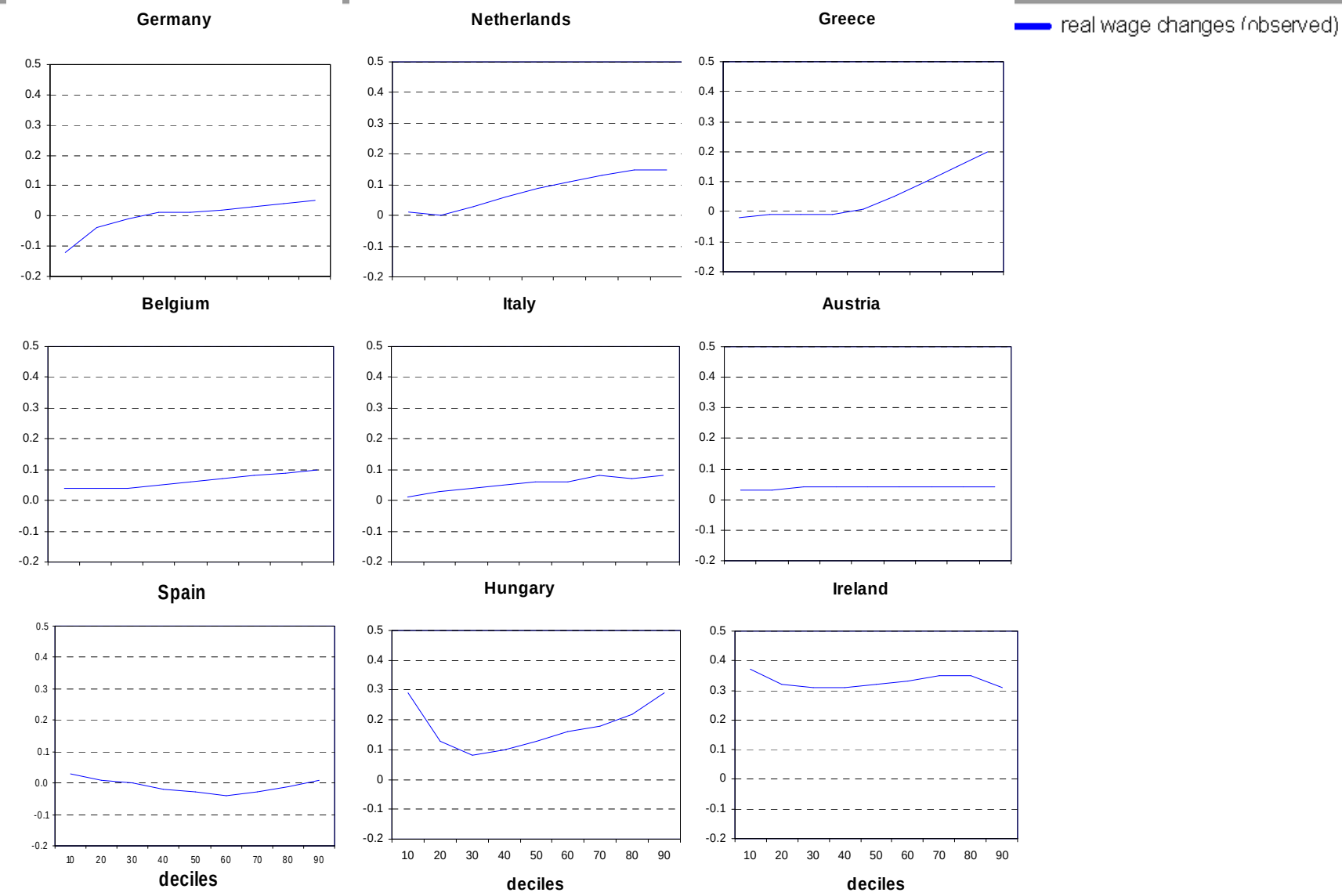
How wages feed into prices

- This evidence of a substantial, but partial, pass-through of wages into prices is more difficult to obtain using micro data.
  - Using a high-quality data set on both wages and prices, an elasticity of 0.3 is found for Sweden.
  - Other estimates for Italy and France are much smaller, but there are substantial measurement issues.
- In contrast, prices of intermediate goods seem to pass-through much stronger.

Finding 10

The evolution of the wage structure differs across countries and has responded to macroeconomic trends and institutional factors

Changes in the wage structure

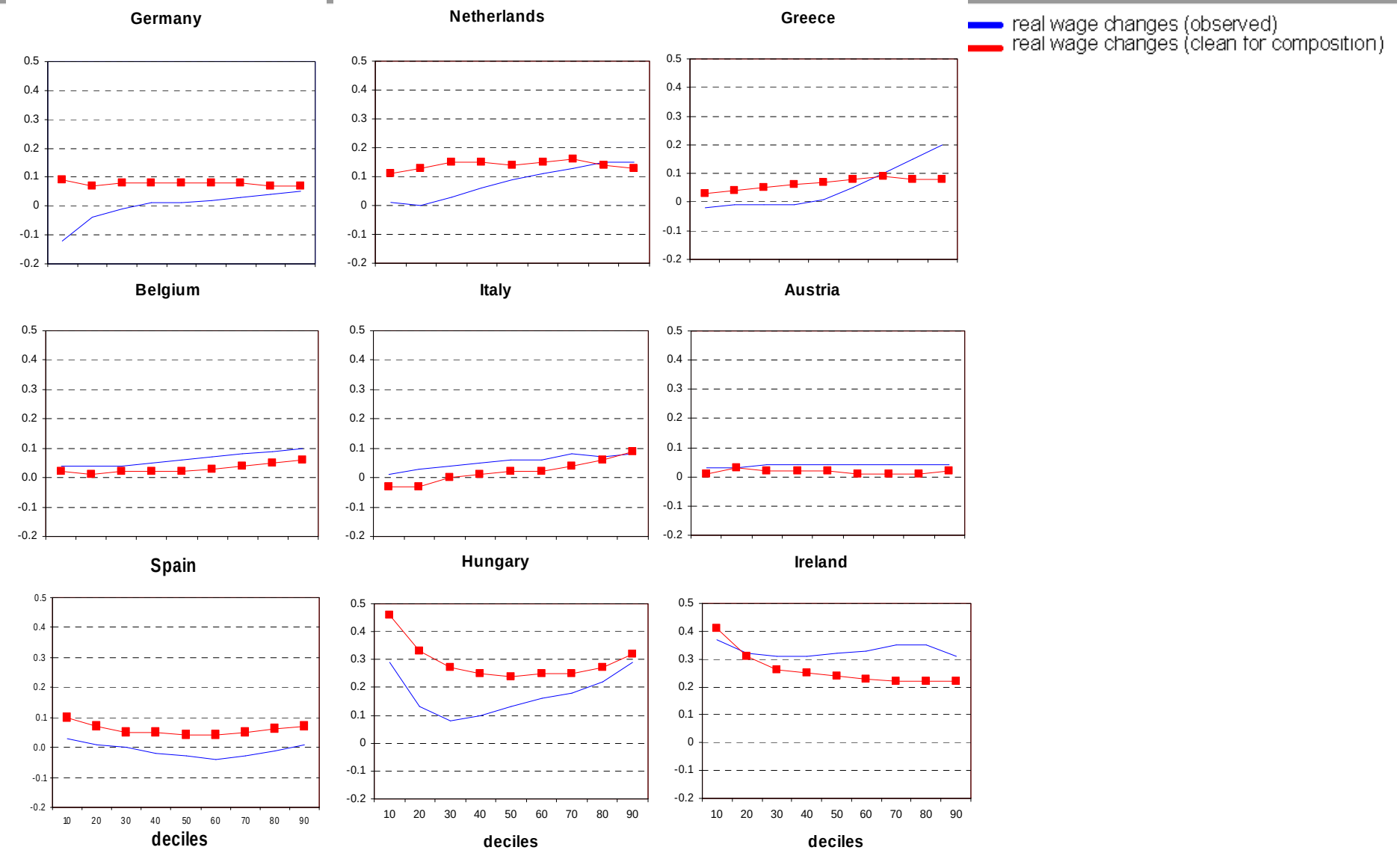


Source: Christopoulou, Jimeno, Lamo (2008)

Changes in the wage distribution

- **Real wages have increased along the whole range of wage levels in the nine European countries**
  - **Exceptions: Wages of the lowest paid jobs in Germany and wages in the middle part of the wage distribution in Spain.**
- **Three groups:**
  - **Observed real wages have increased more the higher the initial wage level in the Netherlands, Germany, Greece, Italy and Belgium resulting in a widening of the wage distribution.**
  - **In Hungary, Ireland and Spain the wage distribution has become more compressed, as the larger wage increases have taken place for low paid jobs.**
  - **Very little movement in Austria**

Changes in the wage structure



Source: Christopoulou, Jimeno, Lamo (2008)

Changes in the wage structure

- This picture changes somewhat when compositional effects due to changes in job and worker characteristics are taken out:
  - The apparent widening of the wage distribution in Netherlands, Germany and Greece disappears when controlling for composition effects
  - In Belgium and Italy the observed widening of the distribution is less pronounced and holds after controlling for compositional affects.
  - The compression of the wage distribution in Hungary, Ireland and to certain extent in Spain is even more remarkable after controlling for composition effects.

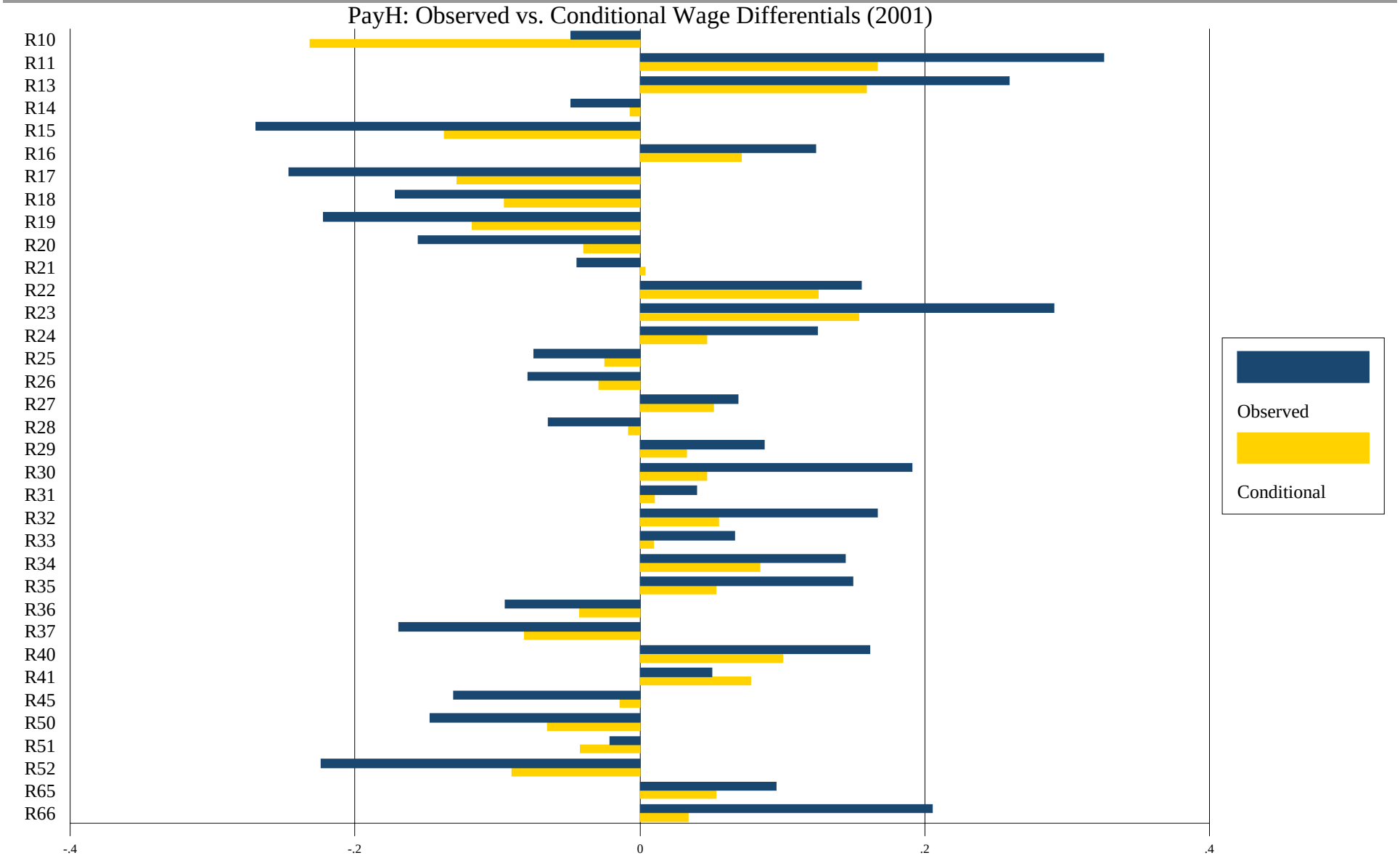
Changes in the wage structure

- **The wage structure in EU countries has responded to macroeconomic and structural trends.**
  - **Observed changes in technology are positively associated with wage increases, the effect of technology seems to be stronger for very high and very low paid jobs.**
  - **Globalisation is associated with wage increases, but less so for the lowest wages.**
  - **Increases in migration are associated with declines in wages.**

Finding 11

There is evidence of wage differentials across sectors that points to non-competitive explanations of wage setting

W age differentials across sectors



St. Dev.: Observed=0.16, Conditional=0.09; PW Cor.: 0.87; Spearman: 0.9

Wage differentials across sectors

- Observed wage differentials cannot be fully explained by a large set of observed workers, job and firm characteristics
- In addition, there is no evidence to support that they could be due to unobservable worker's characteristics.
- This therefore points to non-competitive explanations of wage setting.

W age differentials across sectors

- Cross-country evidence supports rent sharing theories in the eight EU countries of the sample
- There is also evidence of a negative relationship between sectoral wage differentials and proxies for the degree of competition in the products market,
- The role of labour market institutions seems to be relevant to explain differences in dispersion of sectoral wages across countries (still on-going work).

What next?

- We have collected a rich set of stylised facts on wage setting in the euro area and the EU.
- Challenge is to derive the macro and monetary policy implications of the WDN findings.