

Wage behaviour over the cycle under EMU: the role of risk aversion¹

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Abstract

Theory-generated models anticipated wage profligacy under the European Monetary Union because each union would have been too small to have aggregate price effects, and thus less prone to internalise the reaction function of the new common central bank (Iversen and Soskice 1998; Grüner and Hefeker 1999; Cukierman and Lippi 2001). Turning the argument upside down, Grüner (2010) offers a model predicting wage discipline under centralised monetary policy, as risk-averse insider workers would feel responsible for supporting employment in the absence of national stabilization tools. Mikosch and Sturm (2012) put this hypothesis to the test but do not find a specific EMU effect. Risk aversion should but concern certain categories of workers more than others. We posit that only insider workers with firm- or sector-specific skills face large unemployment risks and have an incentive to restrain. Panel data estimations largely confirm our hypothesis.

JEL CLASSIFICATION: J31; J51: E50; F15

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Theory-generated models of trade union behaviour predicted aggressive wage growth under Economic and Monetary Union (EMU), as each national union was likely to be insensitive to the reaction function of the new common central bank because too small to affect euro-area-wide inflation (Grüner and Hefeker 1999; Cukierman and Lippi 2001). Nevertheless, under EMU, wage growth has been generally under control (see for example Posen and Popov Gould 2006), especially in the countries that were expected to lose the most from the centralization of monetary policy (i.e. Germany) (Soskice and Iversen 1998). In response to earlier theories, Grüner (2010) applied the same notion of the "distance" between national wage setters and monetary authorities to predict cautious wage behaviour from part of risk-averse wage setters that feel responsible for supporting employment in reaction to country-specific shocks. Mikosch and Sturm (2012) put Grüner's hypothesis to the test but do not find any significant impact of the monetary union on wage behaviour and subsequently on employment.

Grüner's (2010) theoretical results build on the premise that wage setters are risk-averse; risk aversion - whether infinite or finite - explains why they become disciplined under centralised monetary policy. It is not necessarily true that risk-aversion is common to all national wage setters or that they are all risk-averse in the same way; arguably, some of them face greater unemployment risks than others. This being the case, one should not expect generalised wage restraint under EMU - the hypothesis tested in Mikosch and Sturm (2012) - but restraint in the euro area countries and sectors where there is a relatively high proportion of risk-averse workers. This paper's objective is to test this proposition. We start by operationalizing what constitutes a risk-averse worker and then assess whether this labour-market feature had any impact on wage bargaining.

Risk aversion is related to the probability of remaining unemployed. The higher the unemployment risk, the greater a worker's risk aversion. We posit that the costs of remaining unemployed after a large negative shock are highest for insider workers endowed with firm- or sector-specific skills as opposed to workers with general skills (see Becker 1964). Existing research shows that workers with specific training find it difficult to relocate to a different firm or sector after displacement, going through longer unemployment duration than others (Kriechel and Pfann 2005; Lamo, Messina and

Wasmer 2011). Insiders protected by relatively strict dismissal rules are expected to be particularly risk-averse because they would have a low probability of re-entering the labour market under the same contractual conditions as before the shock. We take employment protection legislation and skill specificity as intrinsically linked. We assume that stringent dismissal rules are an incentive for workers to invest in specific skills - as in Wasmer (2006) - and that extended tenure, a consequence of strict dismissal rules and low turnover, further reinforces a worker's firm-specific skills.

Having defined risk aversion as a function of skill specificity, we assess whether this labour-market feature impacted on wage bargaining under EMU creating an incentive for wage moderation in reaction to shocks that were sufficiently large to pose serious unemployment risks. The empirical strategy is as follows. We first use a difference-in-differences approach to determine whether manufacturing wage growth is slower in euro area countries than in others starting from comparable employment-protection and arguably skill regimes. Secondly, we specifically test our hypothesis on a sample of 11 euro area countries and 15 sectors using a proxy of skill specificity that varies across country, sector, and time. The results largely confirm our hypothesis.

In contrast with the standard labour market literature (e.g. efficiency wage, insider-outsider and contract theories) for which it is the least protected and the low-skilled that are mostly concerned by downward wage adjustments, we find wage moderation from part of insiders with average rather than low-skills. The implications are potentially important. First, the evidence suggests that the centralization of monetary policy has enhanced wage flexibility in the countries that were competitive to start with (i.e. countries enjoying a specifically trained and hence productive labour force), with favourable consequences for their external balance. Second, conservative wage-setting implied that real interest rates have been lower in these countries than in the rest of the monetary union, further contributing to improving their external position.

The rest of the paper is structured as follows. Section 1 describes the underlying theoretical model. Section 2 shows results from a difference-in-differences set-up. Section 3 provides some suggestive evidence. Section 4 offers an extended empirical analysis at country- and sector-level focusing specifically on euro area countries. Section 5 concludes.

1. Trade union behaviour and monetary regimes

There is an extensive literature that has looked at the interaction between bargaining structures and monetary regimes. Some of this literature builds on the Barro-Gordon model (1983) for which unions set nominal wages in anticipation of the central bank's reaction function, with the latter choosing the rate of inflation and in turn the real wage and, via the standard labour demand function, employment. Some other literature relies on models of monopolistic competition such as Blanchard and Kiyotaki (1987), where unions set wages in anticipation of the central bank reaction's to price-setting by firms. This second strand of literature does not only model the supply side but also the demand side by suggesting that price-setting would also impact on the real money balance, with nominal money supply fully exogenous. Here, the underlying theoretical model is taken from Grüner (2010), which explicitly models only the supply side but the central argument would hold also when accounting for the policy channel on the demand side.

Unions act first by fixing the nominal wage. Their utility (U) is linear in the real wage and quadratic in unemployment, where the latter is a measure of income risk:

$$U = w - \pi - u^2 \quad (1)$$

The level of unemployment is a function of the real wage that will emerge once the central bank (CB) has chosen the inflation rate π and as a function of an economy-wide shock s that occurs after wage setting and before the choice of π . The shock has mean zero and supports $[-s', s'']$ with $s', s'' > 0$:

$$u = w - \pi - s \quad (2)$$

Given (2) total employment in the economy and employment of the constituents of each n sectoral trade union are denoted respectively by:

$$l = 1 + a(\pi - w + s) \quad (3)$$

$$l_i = \frac{1}{n}(1 + a(\pi - w + s)) \quad (4)$$

Where a measures the extent to which the central bank is prepared to minimise unemployment.

The central bank aims to minimise both inflation and unemployment with reaction function:

$$\pi = b(w - s) \quad (5)$$

for which the central bank inflates away a fraction b of the nominal wage increase. If the central bank is more conservative, b is smaller.

Each union is infinitely risk averse and will fix a nominal wage in such a way that employment of all its members l_i^* is guaranteed even for the maximum adverse shock $s = -s'$. The reaction function of each union can be derived by fixing:

$$l_i = l_i^*$$

where $l_i = \frac{1}{n}(1 + a(\pi - w - s'))$ and $\pi = b(w + s')$

and solving for the symmetric equilibrium wage yields:

$$w = -s' + \frac{1}{a(1-b)} u^* \quad (6)$$

According to (6) equilibrium wages are lower if the maximum adverse shock is larger and if more (risk-averse) insiders are employed initially.

One important clarification with respect to the original model developed in Grüner (2010) concerns the role of the wage bargaining process. We have assumed uncompetitive (unionised) labour markets with n unions. Differently from analyses that stress the capacity of monopolistic unions to internalise externalities from their own behaviour (see for example Olson 1982; Calmfors and Driffill 1988), the present model is not affected by the degree of centralization in wage bargaining. As a matter of fact, by assuming $n = 1$ and rewriting equation (6) as:

$$w = -s' + \frac{1}{a(1-b)}1 - nl^* \quad (7)$$

we obtain that, even in the extreme case of a monopoly union, the negotiation's rationale is the same, so that the equilibrium wage is lower if the maximum adverse shock is larger and the higher the number of (risk-averse) insiders.

2. A difference-in-differences approach

The task of this paper is to demonstrate that the inception of EMU had altered the opportunity set confronting unions, leading to greater wage moderation in countries with a relatively high share of risk-averse workers. We apply a difference-in-differences set-up to study wage growth in the manufacturing sector. The test is performed on a sample of 11 advanced OECD economies over 1980-2007, where the treated group consists of euro area countries and the two time periods are 1980-1994 and 1995-2007.

The countries in the sample have been chosen for having all an indicator of employment protection legislation for collective dismissal - as defined by the OECD - that is more stringent than the OECD average. Having the same institutional set-up, they are expected to face similar frictions when it comes to labour-market adjustment. We firstly estimate a long-run long-run wage equation in a panel cointegration framework, which is understood as an equilibrium relationship across countries with a similar institutional set-up and, arguably, a similar speed in the return to equilibrium. We then estimate an error correction equation against a difference-in-differences set-up to test whether EMU exercised a specific impact on wage behaviour, after having accounted for a common speed of wage adjustment back to equilibrium.

The long-run wage equation is specified as:

$$\ln w_{it} = \alpha_i + \beta_1 \ln \alpha_{it} + \beta_2 u_{it} + \beta_3 \ln cpi_{it} + \varepsilon_{it} \quad (11)$$

where i and t index country and time respectively, w denotes the level of nominal compensation per employee in the manufacturing sector; wp is the level of nominal compensation per general government employee; pr is real value added per person employed in the manufacturing sector; u is the unemployment rate; cpi is the consumer

price index, and ε is the error term. ⁽²⁾ All variables are in logs except for the unemployment rate. Compensations in the manufacturing sector are expected to be positively related to prices and labour productivity and negatively related to unemployment.

Given equation (11), the short-run (error-correction) wage equation is specified as follows:

$$\Delta \ln w_{it} = \delta_i + c * P_t * G_i + \theta_1 \Delta \ln a_{it} + \theta_2 \Delta u_{it} + \theta_3 \Delta \ln cpi_{it} + \gamma \hat{\varepsilon}_{it-1} + \varepsilon_{it} \quad (12)$$

where $\hat{\varepsilon}$ is the lagged error correction term and $c * P_t * G_i$ consists of the difference-in-differences estimator.

Table 1 shows the results. All variables in the long-run equation exhibit the expected sign and they are all significant at conventional levels except for the unemployment rate. The error correction term is also significant suggesting that deviations of manufacturing wages from their long-term determinants are corrected over time. The inception of EMU made a difference in fact wage growth has been generally more moderate in these countries than in the others, having controlling for inflation, changes in productivity and in cyclical conditions.

Whilst pointing towards the expected results, the exercise remains limited for a number of reasons. First, the group of countries with relatively stringent dismissal rules that did not join the euro area is small. Second, high versus low employment protection legislation is only an approximation of skill specificity. Third, the relation between nominal wage growth, actual inflation and actual productivity increases is a poor proxy of the bargained wage if, for example, wage setters recognise productivity increases only with a lag. We try to address these issues in the section that follows focusing specifically on wage bargaining under EMU.

⁽²⁾ Nominal compensations per employee in the manufacturing sector are calculated as the ratio of total compensations to manufacturing employment; productivity is gross value added at 2005 prices per person employed; the consumer price index is the national consumer price index for all times (2005=100). The data source is the DG ECFIN AMECO Database.

3. Country- and sector-level proxy of risk aversion and suggestive evidence

We provide here for a more detailed operationalization of what constitutes a risk-averse wage-setter than in the previous section. A risk-averse worker is defined as an insider worker endowed with firm- or sector-specific skills, for whom the probability of inter-sector reallocation, would she remain unemployed, is low or lower than average (Kriechel and Pfann 2005; Lamo, Messina and Wasmer 2011). Risk aversion is thus a function of skill specificity, where the latter is said to depend both on the individual level of education and on tenure. Workers with either primary or tertiary education would tend to have general skills - whether low or high - and be generally more mobile than workers with secondary education. This seems a realistic assumption considering that a large part of vocational training in Europe, which typically provides specific skills (see for example Estevez-Abe et al 2001), is concentrated at the level of secondary education (OECD 2013). Tenure should matter too. With time, workers accumulate firm-specific skills that make them more productive than workers with shorter tenure. Tenure is also useful to capture the extent to which a worker is an insider, whether tenure results from country-level employment protection legislation (EPL) or reflects the fact that specific skills raise the opportunity costs of hiring and training new workers, as in the turnover model of Stiglitz (1974).

Skill specificity is thus captured the share of workers with secondary education that have been in the same job for more than 2 years. We have been able to construct this variable for 11 euro area countries and 15 sectors from 1995 to 2007 based on Eurostat data. Graph 1 shows our skill-specificity variable by country for the total economy and for the manufacturing sector. There is greater variation across countries than there is across sectors, which suggests that the country-level institutional environment and the incentives it creates for human capital investment is likely to play an important role. Also, skill specificity is quite stable over time, which shall reflect the fact that it is mostly determined by past education and would only change at the rate of demographic turnover. Skill specificity is highest in Austria and Germany and lowest in Portugal and Spain. Up to the crisis, these have also been the countries with the largest current account surplus and current account deficit, respectively. Graph 2 shows skill specificity

by sector. The sectors where there is the largest share of risk-averse insiders are financial intermediation,

Compensations per employee (or per hour) are only poor proxies of the bargained wage not least because of the strong evidence of a wage drift in Europe (i.e. the difference between the negotiated and effectively paid wages). The European Central Bank (ECB) provides an indicator for *negotiated wages* at the euro area level on a quarterly basis, but data for individual countries are not made available. Recently, a dataset on collectively agreed pay was put together under the name "Collectively Agreed Wages in Europe" (CAWIE). The coverage is limited to the period 1995-2011 and to a small set of euro area countries (i.e. Austria, Belgium, Finland, France, Germany, Italy, Netherlands, Spain, and Portugal), whilst issues of cross-country comparability are not completely solved. Still, these data can be used at this stage for illustrative purposes.

Graph 3 is a scatterplot correlating collectively agreed pay rises in the manufacturing sector with our measure of relative risk aversion over 1995-2007. A weak but non-negligible negative relationship is found indicating that the greater risk aversion (or skill specificity), the more moderate the collectively agreed pay rise.

4. Empirical results

Existing data on collectively bargained wages in Europe are limited in either time or country coverage and unsuitable for use in extended empirical analysis. We defined the bargained wage as follows:

$$w - Ep = r + E\alpha - \beta u$$

where the expected log real wage depends on expected log productivity, the unemployment rate, given a reservation wage r , which is typically approximated by the real wage in the previous year insofar as it represents the strength of unions (Blanchard and Katz 1999). Whilst $(w - p = \alpha)$ is the warranted wage or the wage that would prevail if either good markets were perfectly competitive or mark-ups constant from one period to the other, the bargained wage accounts for the role of institutions (i.e. the

reservation wage), possible real rigidities (i.e. adaptive expectations about productivity increases) and labour-market tightness.

Graph 4 displays the distribution in each country of the increase in the real bargained wage, which is given by the change in the log hourly real wage minus the change in log productivity in the previous year to account for adaptive expectations about productivity. The time period considered is 1995-2007. The curve is sharply peaked towards the centre – indicating approximation to the warranted wage – mostly in Austria, Germany, and Netherlands. Graph 5 shows the same variable but looks at the distribution within each sector. The curve is sharply peaked towards the centre in the manufacturing sector, arguably the most exposed to competitive pressures.

The hypothesis we want to test here is that wage moderation rises under EMU in the share of risk avert workers, where the latter have been identified as being workers with vocational training education that have been in the same job for other 2 years. More precisely, we posit that risk avert wage setters adjust wages downwards in response to shocks that are large enough to pose significant unemployment risks. The detailed cross-country sample includes 11 euro area countries (Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, and Portugal plus Greece) and 15 sectors.³ Time coverage is limited to 1995-2007. Whilst unable to capture specifically the EMU effect, this nonetheless offers a good starting point for getting an impressionistic view on the possible impact of risk aversion on wage setting behaviour. The baseline specification is as follows:

$$\Delta \ln wbr_{ist} = \beta_0 + \beta_1 \ln wbr_{ist-1} + \beta_2 ra_{ist} + \beta_3 ra_{ist} * S_{it} + D_{is} + D_t + \varepsilon_{ist} \quad (10)$$

where wbr is the difference between the log real hourly wage in year t and log labour productivity in $t-1$; we also include the lagged dependent variable in level form, which

³ The sectors included are: Agriculture, Hunting, Forestry and Fishing; Mining and Quarrying; Construction; Manufacturing; Education; Electricity, Gas and Water Supply; Extra-Territorial Organizations and Bodies; Financial Intermediation; Health and Social Work; Hotels and Restaurants; Other Community, Social and Personal Services; Private Households with Employed Persons; Public Administration, Defence and Compulsory Social Security; Real Estate, Renting and Business Activities; Total Industries; Total Manufacturing; Transport, Storage and Communication; Wholesale and Retail.

we use as a proxy of the reservation wages as in Blanchard and Katz (1999); ra captures risk aversion (or skill specificity); S is a dummy variable for large negative country-specific shock that takes value 1 if the negative output gap is bigger than the 25 % (left tail) threshold; $ra*S$ aims to capture the effect of risk aversion (or skill specificity) when a country faces an especially negative shock; D_{is} and D_t are country-by-time and time fixed effects, respectively.

Table 1 shows the results. We provide results taken from a pooled OLS estimation including country, industry and time effects (Model 1), from fixed (Models 2 and 4) and random effects (Model 3). We perform a Hausman test and find that the fixed-effects model has superior explanatory power over random-effects; we also run a joint test to see if the dummies for all years are equal to 0; we find that they are not and thus include time effects (Model 4). The results indicate that there is a correction mechanism in place with the real bargained wage growing less, the higher the wage level in the previous year; the bargained wage also decreases the higher unemployment in the previous year. There is some evidence of wage moderation in the countries and sectors where there is a high share of risk avert workers – i.e. for higher values of the skill-specificity parameter; this is especially true when we include separate industry dummies, which would indicate that our results are not driven by the fact that workers with secondary education and long tenure tend to be concentrated more in some sectors than in others. Confirming our hypothesis, the interaction between relative risk aversion and the presence of a large negative shock is rightly signed and significant in the preferred specification (Model 4).⁴

5. Conclusions

In the late 1990s, game-theoretic models of the interaction between wage setters and monetary authorities predicted that centralization of monetary policy under EMU would be associated with excessive wage growth because each trade union, even if monopolistic at home, would have been too small to internalise the reaction function of the new central bank. In reaction to lack of evidence of wage profligacy Grüner (2010)

⁴ The same results largely hold when using the nominal bargained wage.

advanced the argument that risk-averse insider workers that aim to minimise employment risks would reduce wage demands specifically because they believe that the new central bank is unlikely to react to regional shocks.

The reality in the euro area until the crisis has been of rather divergent wage developments from one country to the other. At the same time, it is reasonable to assume that not all workers are risk-averse or risk averse in the same way. We have assumed that risk aversion rises in skill specificity which is in turn a function of the content of education (i.e. worker's investment in vocational training) and the length of tenure. We have tested this hypothesis empirically and found indeed that EMU seems to have exercised a disciplining effect especially on the countries and sectors where there is a relative high share of workers endowed with specific skills. Wage moderation is especially evident in response to large negative shocks.

The theoretical implications are important. Whilst skill specificity has been typically identified as one of the barriers to labour market adjustment in the presence of sectoral reallocation shocks, we find some evidence in favour of the hypothesis that the centralization of monetary policy may have indeed softened this form of rigidity supporting wage adjustment.

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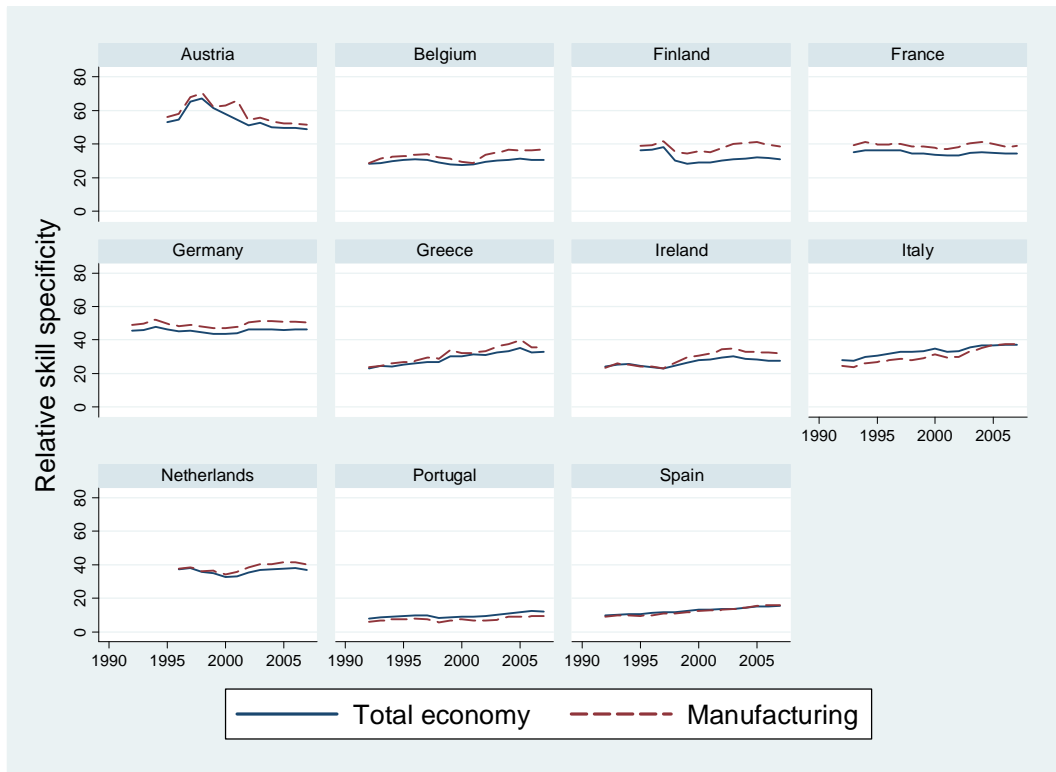
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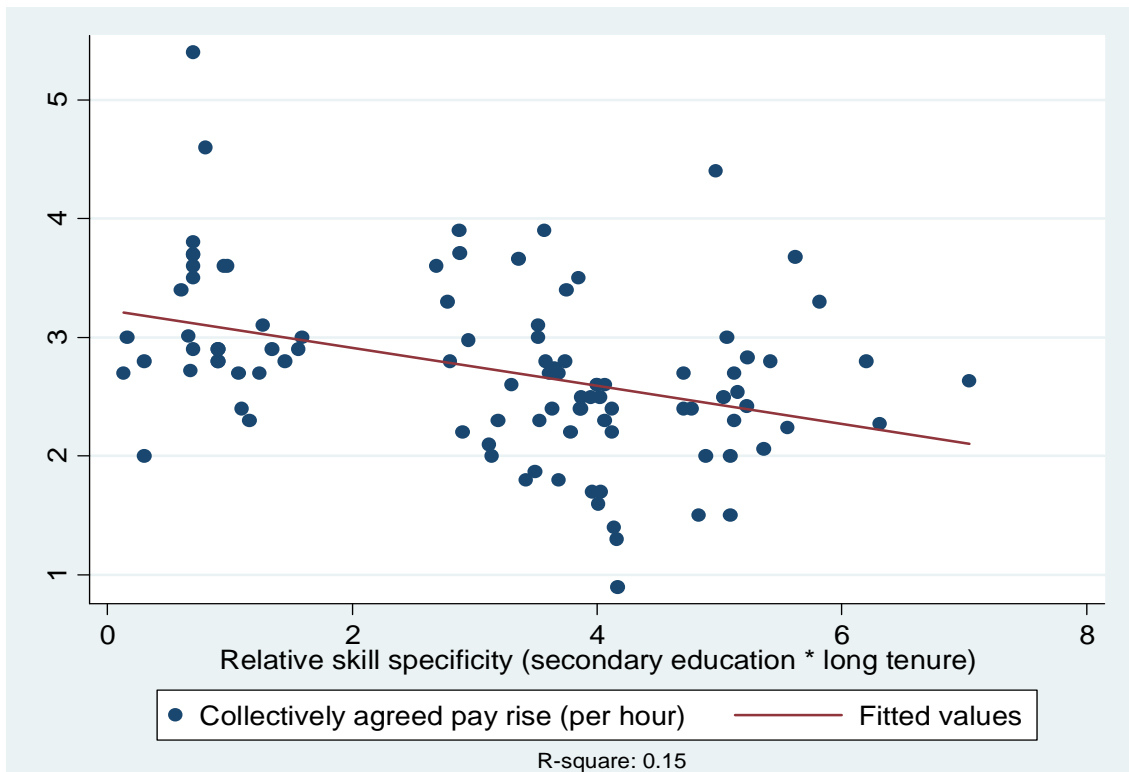
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Graph 1: Relative skill specificity, EA countries 1995-2007



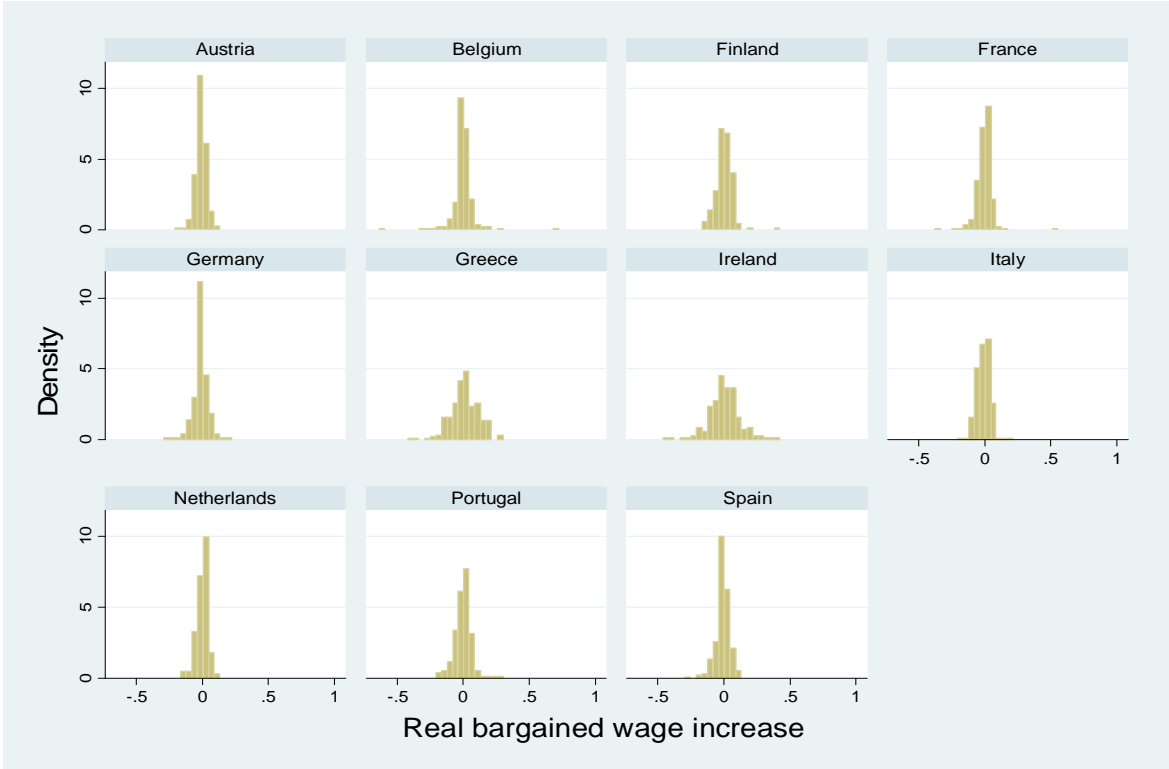
Source: Own calculations based on Eurostat.

Graph 2: Relative skill specificity and collectively agreed pay, manufacturing sector, EA 1995-2007



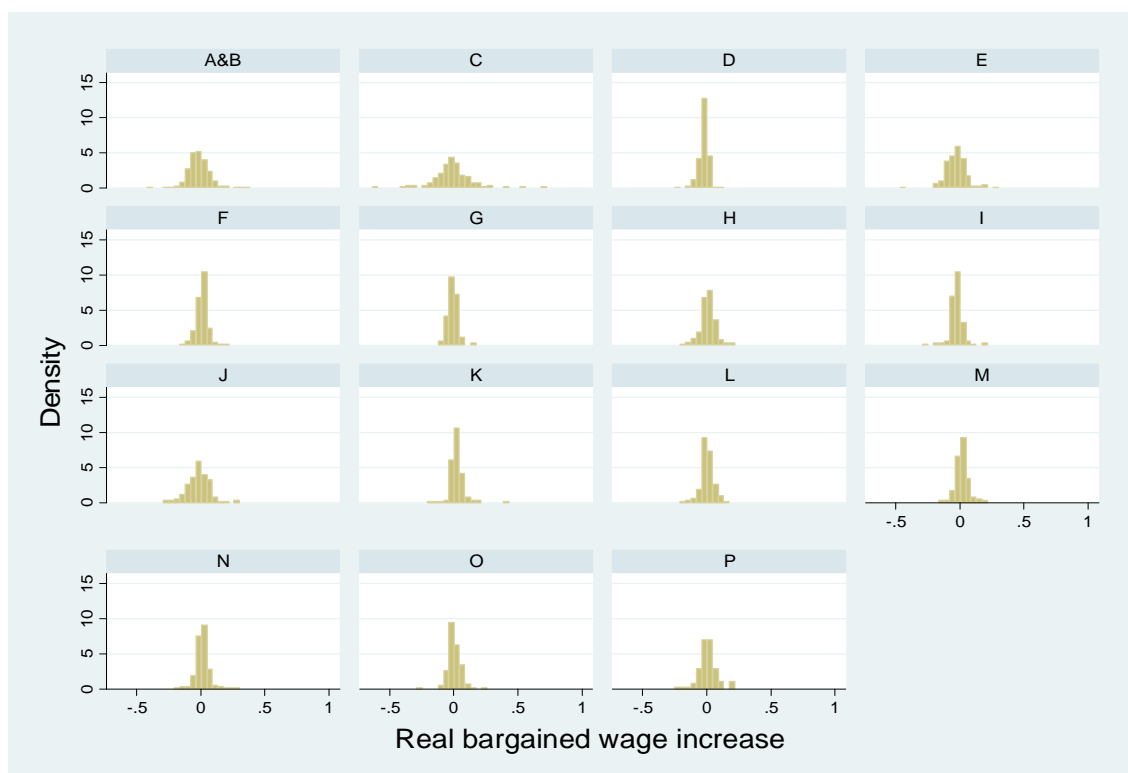
Source: TURI Database on Collectively Agreed Wages in Europe (CAWIE), 2012.

Graph 4: Distribution of real bargained wage increase by country, 1995-2007



Note: The variable is constructed as the growth rate of the log hourly real wage in t minus the growth rate of log productivity in $t-1$. **Source:** Own elaboration based on EU KLEMS data, including 15 sectors in each country.

Graph 5: Distribution of real bargained wage increase by sector, 1995-2007



Note: The variable is constructed as the growth rate of the log hourly real wage in t minus the growth rate of log productivity in $t-1$. **Source:** Own elaboration based on EU KLEMS data, including 11 EA countries per sector data. A&B = Agriculture, Hunting, Forestry and Fishing; C = Mining and Quarrying; F = Construction; D = Manufacturing; E = Electricity, Gas and Water Supply; Extra-Territorial Organizations and Bodies; J = Financial Intermediation; Health and Social Work; H = Hotels and Restaurants; Other Community, Social and Personal Services; P = Private Households with Employed Persons; L = Public Administration, Defence and Compulsory Social Security; K = Real Estate, Renting and Business Activities; Total Industries; Total Manufacturing; I = Transport, Storage and Communication; G = Wholesale and Retail.

Table A: List of variables

Variable	Definition	Source
Wage	Labour compensation per unit labour input - compensations of employees divided by total hours worked by employees of businesses (EU KLEMS) or compensations of employees divided by total employees in manufacturing (Eurostat)	EU KLEMS, Eurostat
Labour productivity	Labour productivity per unit labour input – real output divided by total hours worked by those in employment (EU KLEMS) or by total headcount employment in manufacturing (Eurostat)	EU KLEMS, Eurostat
Shock	Output gap level (dummy takes value 1 if (negative) output gap bigger than the 25 % (left tail) threshold	AMECO Database
EPL	Strictness of employment protection (overall) – synthetic indicators of the strictness of regulation on dismissals	OECD Employment Protection
Job tenure	Average job tenure corresponds to the length of time spent working with the same employer or on the same job as self-employed. It refers to continuing spells of employment rather than to completed spells.	Eurostat
Education attainment	1 = pre-primary, primary and lower secondary education (levels 0-2); 2 = upper secondary, post-secondary non tertiary education (levels 3-4); 3 = tertiary education (levels 5-6)	Eurostat
Unemployment	Harmonised unemployment rate, all persons aged 15-74.	Eurostat

Table 1: Impact of EMU on wage growth across similar institutional settings, advanced OECD countries 1980-2007

VARIABLES	(1) Long-run equation	(2) DID Error Correction Model
Post		0.000172 [0.0325]
Treat		0.00683+ [1.681]
Diff-in-diff		-0.0110+ [-1.865]
Δ log productivity		0.174** [5.351]
Δ log consumer price index		0.898** [18.38]
Δ unemployment		-0.000145 [-0.109]
Lagged error correction term		-0.141** [-4.655]
Log consumer price index	1.137** [29.36]	
Log productivity	0.314** [8.440]	
Unemployment	-0.00108 [-0.319]	
Constant	-2.376** [-19.35]	0.0102** [2.595]
Observations	288	277
R-squared	0.987	0.689
Number of groups	11	11

Robust t-statistics in brackets

** p<0.01, * p<0.05, + p<0.1

Table 2: Relative skill specificity and large negative shocks, EA 1995-2007

	(1) Pooled OLS	(2) Fixed Effects	(3) Random Effects	(4) Time-Fixed Effects
Growth of log real wage in t minus growth of log productivity in t-1				
Log real wage level in t minus log productivity in t-1	-0.0515** [-2.611]	-0.491** [-10.11]	0.00570 [0.541]	-0.488** [-10.08]
Unemployment rate in t-1	-0.00326 [-1.620]	-0.00458* [-2.398]	-0.000708 [-0.894]	-0.00507* [-2.322]
Risk aversion or skill specificity parameter	-0.000694* [-2.377]	0.000444 [0.535]	-0.000510** [-3.387]	0.000279 [0.323]
Risk aversion * Large negative shock	-0.000259+ [-1.772]	-0.000112 [-1.232]	-0.000134 [-1.111]	-0.000211+ [-1.694]
Constant	0.0266 [1.287]	0.0156 [0.505]	0.0208* [2.479]	0.0246 [0.708]
Industry dummies	yes			
Country dummies	yes			
Time dummies	yes	no	no	yes
Observations	1,177	1,177	1,177	1,177
R-squared	0.084	0.263	0.159	0.266
Number of groups	175	175	175	175

Robust t-statistics in brackets

** p<0.01, * p<0.05, + p<0.1

Note: Standard errors are robust with respect to heteroskedasticity and non-independence within country clusters.