Why so much wage restraint in EMU? The role of country size
Integrating trade theory with monetary policy regime accounts

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Abstract: Wage growth has remained under control after the formation of the European Monetary Union (EMU). The literature has advanced numerous explanations to account for this phenomenon. But, arguments about the need to preserve competitiveness in an enlarged market remain too generic. At the same time, analyses that focus on the alleged deterioration of labour market institutions (e.g. de-unionization, decentralization, etc.) find little empirical support. More promising are the results obtained by Posen and Gould (2006) indicating that behind the generalised shift towards wage restraint is enhanced monetary credibility in EMU. This paper builds on the school in comparative political economy that models the interaction between wage bargaining systems and the monetary policy regime but integrates it with more traditional trade theories. The argument developed here is that the degree in wage restraint varies according to country size. The relationship between wage growth and economy size is hump-shaped. Wage compression is especially present in large countries (e.g. Germany) that entertain intense trade relations with the rest of the eurozone. This is because wage-setters in large countries fear that they might affect average price conditions in the euroarea forcing a reaction by the ECB, which is highly undesirable as it would dampen not only domestic demand but also demand conditions in the rest of EMU with employment costs spread across the board from more protected to export-oriented sectors. Downwards pressures on wages are less pronounced in small countries. In spite of the fact that small open economies perceive cost competitiveness as a key driver of their economic growth, wage-setters in small countries can nonetheless act as free-riders in the new EMU monetary regime. Finally, countries of intermediate size display slightly faster wage growth than in the rest of EMU because neither do they believe capable of affecting eurozone inflation, nor do they look at the improvement in cost competitiveness as the one and only chance for their economic survival.

1.   Wage moderation and country size

Wage growth has remained relatively under control after the formation of European Monetary Union (EMU) in spite of the fact that researchers had been predicting the opposite to happen. Iversen and Soskice (1998, 2000) and Iversen et al (2000) have argued in favour of a decline in wage restraint in EMU building on sophisticated models that study the interaction between labour market institutions and monetary policy. The initial idea is that monopoly unions refrain from excessive wage settlements against the credible threat that their national central bank will punish them with a monetary restriction, and thus with some unemployment. Following from this argument, once in the monetary union, each national monopoly union will loose the incentive to deliver wage restraint because it is relatively too small to affect average price conditions in the eurozone and to stimulate, thereby, a reaction by the European Central Bank (ECB). Nevertheless, this has not occurred. In contrast, according to some authors, EMU has even come with a minor rise in wage moderation (Pichelmann in Buti and Sapir 2003; Posen and Gould 2006).

Numerous arguments are out there that could explain the general shift towards wage restraint. Yet, none of them seems fully convincing. Existing approaches fail especially on three grounds. First, many of them are theoretically oversimplified. Second, some lack empirical support. Third, and most disappointingly, they remain sectoral, with very little integration between labour economics, trade theory and monetary regime accounts.

By way of example, the explanation according to which wage moderation derives from the fact that market integration induces countries to keep wage growth under control to remain competitive is largely unsophisticated. Enhanced product market competition does not always force consumers into shifting demand away from national producers in favour of external ones. A country's starting wage position and initial competitive advantage should importantly qualify the nature of the "external threat" and in turn determine the type of the domestic reaction to it. To follow, arguments that address the issue of the impact of market integration and globalisation on national labour markets need some more theoretical sophistication.

A second exploited category of explanations for wage restraint focuses on labour market institutions. One version of it is concerned with the impact of enhanced product market competition on labour market institutions. Here, the core contention is that globalisation and the threat of relocation reduce unions' bargaining power and, with it, their possibility to demand relatively high wages. Whilst theoretically persuasive, this explanation finds little empirical support. Besides some sporadic anecdotal evidence, there is not sufficient proof to formulate a conclusive view about the impact of larger external labour supply on national collective bargaining systems. Another version of institutionalist accounts of this kind looks at the move towards de-unionisation and de-centralization in collective bargaining induced by factors other than economic internationalisation (e.g. the emergence of the service economy and the privatization of public enterprises) and argues that the growth of local wage bargaining has altered unions' incentive structure causing a fall in wages. Still, whilst a trend of this type has surely emerged in the 1980s, it has come to an end during the

1990s, which in fact witnessed a generalised increase in wage bargaining coordination[1].

A third less developed strand of literature explores more specifically the effect of EMU on wage developments. Posen and Gould argue that wage restraint in EMU is the result of a rise in the credibility of the single monetary policy that has twisted the arms of monopoly unions into moderation (Posen and Gould 2006).

Whilst adopting the general argument behind the monetary credibility theory of wage restraint, this paper adds to it in important respects.

Firstly, a crucial presumption is that such an effect should be visible only in countries that have a highly centralised collective bargaining system and/or extensive coverage. Only large encompassing unions would in fact internalise the externalities from monetary policy (see Calmfors and Driffil 1988). The article by Posen and Gould contains references to labour market institutions, but their results are ambiguous. Measures of coordination and centralization do not show up as significant, but trade union density is when interacted with economy size, therewith indicating that in large countries a decline in labour union density is conducive to wage moderation (Posen and Gould 2006, 12). Nevertheless, the relevant indicator should be coordination in wage bargaining rather than trade union density as only the former conditions the incentive structure of wage-setters and is thus compatible with the monetary credibility theory of wage restraint[2]. At the same time, the statistical insignificance of coordination and centralization might be ascribed to the fact that the OECD indexes used in the regression do not vary significantly from one period to another.

Second, even where coordination is high –which is a guarantee of the fact that unions bargain over a national wage- it is not necessarily true that wage inflation in one country will affect eurozone inflation, thereby stimulating a reaction by the ECB. It is reasonable to imagine that only unions in large countries have an incentive to internalise the ECB's reaction function.

This paper takes all of these issues into account. Our core contention is that, whilst wage restraint is a fairly generalised phenomenon in EMU, as already noted elsewhere, the incentives behind wage moderation vary from country to country depending on economy size. More precisely, in the monetary union from 2000 to 2005, the relationship between wage restraint and country size is hump-shaped with wage discipline relatively more evident in large and small countries than in countries of intermediate size.

Our explanation units two theoretical traditions: (a) models about the interaction between wage bargaining systems and monetary policy regimes; and (b) more basic trade theories. The argument is as follows. Labour unions in larger countries are aware that their wage behaviour has the potential to affect average price conditions in the euroarea and, with it, the monetary policy of the ECB. The implication is that they are more likely than not to opt for wage moderation so as to prevent a restrictive response by the ECB. This explanation is clearly indebted to the earlier analyses that have been concerned with the relationship between labour market institutions and monetary policy. There is but room for integrating it with more traditional trade accounts. And in fact, an interest rate hike by the ECB would

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[1] For a discussion of these issues and a reappraisal of the relationship between bargaining structures and real wages (unemployment), see Driffil 2006.

[2] In this respect, it would have been interesting to see whether the gain in monetary credibility interacted with the coordination indicator showed up as significant since one would expect enhanced monetary credibility to lead to wage moderation in rising coordination levels.

constrain demand not only at home, but also in the other euroarea countries, thereby jeopardising the export performance of the large country, from which the financial instability has originated[3].

Small countries have an incentive to deliver wage moderation as well, yet, this will be less pronounced than in the case of larger EMU countries. With respect to the monetary policy regime, small countries are free riders. Nevertheless, they will control wage inflation and, with it, the real exchange rate so as to preserve their international competitiveness considering that all small countries are also extremely open economies. This latter motive is but less compelling that the one dominating in larger countries. As a matter of fact, the deterioration in cost competitiveness has only an *uncertain* impact on a country's export performance, if not because countries hardly produce perfect substitutes, but the dampening effect of a monetary restriction on demand abroad is *certain*.

Finally, economies of intermediate size are trapped in between as none of the two mechanisms described above –the demand mechanism and the competitiveness channel- works in full. This results into faster-than-average wage growth.

If the argument is correct as it is, then the relationship between wage growth and country size should be non-linear in EMU and in EMU countries only.

The remaining of this paper is structured as follows. Section I clarifies the meaning and measurement of wage moderation. Section II presents the contending theories put forward to account for this trend. Section IV describes the econometric model employed. Section V discusses the results obtained.

2. Details on the measurement of wage moderation

The first difficulty in an analysis of this kind revolves around the definition of wage moderation. The theoretical traditions evoked in the opening of this paper refer interchangeably to slower nominal or real wage growth, whether incorporating productivity gains or not.

Similarly to Posen and Gould (2006), our dependent variable is the yearly difference between the rate of wage growth and of productivity growth for a given country. Wage discipline rises in decreasing values of the dependent variable. We look at wage growth for the total economy. From the rise in total compensations of employees (billions Euro) expressed in purchasing power parity, we subtract productivity growth. Differently from Posen and Gould who focused on real wages (2006), we use nominal wage growth because this is the variable that shows up as significant in all regression models, confirming the Keynesian view that unions bargain over nominal wages. To control for the impact of unemployment on wage growth, we have also depurated the latter from the effect of employment growth. Finally, to account for the fact that wage-setters recognise shifts in productivity growth only with a lag (Blanchard and Philippon 2003), from wage growth we subtract productivity in the previous year. Productivity is total factor productivity for the total economy for a given country in t-1. All the figures are the author's calculations and are based on the EU Commission's AMECO database.

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[3] A rise in the EU interest rate is also expected to lead to an appreciation of the Euro with a dampening effect on the country's exports towards trade partners that are not members of the eurozone.

The reason why, similarly to Posen and Gould (2006), we use total compensations as opposed to compensations per employee is that when it comes to arguments about the conquered credibility of the ECB, aggregate prices are surely more relevant than unit prices as they are the only ones capable of affecting the inflation level in the eurozone and, therewith, shape the reaction function of the ECB. There is in fact extensive qualitative evidence confirming that the ECB is extremely sensitive to yearly or even to monthly total wage growth. Furthermore, total compensations allow us to ignore initial positions and to neglect welfare institutions, which each individual union would surely incorporate into their bargaining over individual wages (Mares 2006).

As mentioned above, looking at percentage changes should control for the initial size of national labour forces, unless one establishes a strong positive correlation between the size of the labour market in the early 1990s and its successive expansion, if it were true, for example, that large labour markets become larger and larger because of their force of attraction. Graph 1 correlates the size of employment in 1999 in 10 EMU countries with the percentage increase of employment over the 1999-2005 period. The correlation yields a 0.05 significance coefficient confirming that there is no significant correlation between the initial size of a national labour market and its growth rate. This should be sufficient to exclude that employment creation is determined endogenously by the size of the country.

Graph 1. Correlation between Initial Size of Employment (in millions of people) and Percentage Rise in Employment from 1999 to 2005 in 10 EMU Countries.
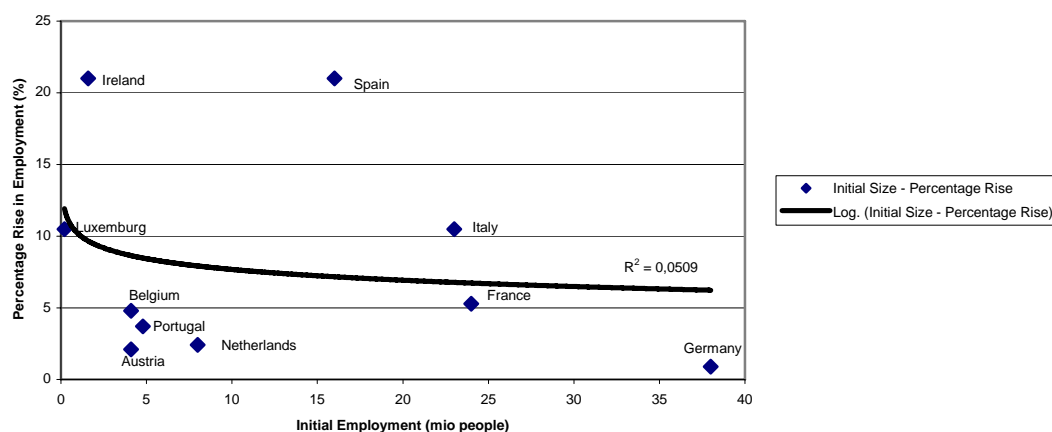
Source: own elaboration on data from AMECO Database

Since we are looking at wage growth minus productivity increases, another potential noise could come from the fact that countries that are more open to labour migration from outside will register a higher rise in total compensations not always coupled with an equivalent rise in labour productivity with the result that wage

moderation in these countries is under-estimated. For now, we bracket the role of labour migration considering that, after EU Eastern enlargement in 2004, the flow of migrants into the original EU has been fairly modest in size with possibly the only exception of Ireland, Austria and Germany where work permits conceded to nationals of the new member states were respectively 1.9, 1,2 and 0.9 percent of the destination country's working population (European Commission 2006). Still, all three countries display significant wage moderation in the period from 2000 to 2005 so that the appreciation of labour migration would lead to the result that wage restraint is more marked than it appears at first sight. This, however, should not alter the ranking of EU countries relative to the respective degree of wage restraint, leaving Germany as one of the more "disciplined" EMU members.

Another obvious shortcoming with looking at year-to-year restraint is that wages are agreed within collective bargaining rounds every 2 or 4 years. However, yearly figures are still warranted because, first, productivity changes yearly and with it the (real) wage gap and, second, even if sectoral wage agreements take place every 2 or 4 years, we may well expect that, overall, there is at least one wage contract renewal every year.

3.   The hump-shaped relationship between wage restraint and country size

The core argument of the present paper is that there exists a non-linear relationship between wage restraint in EMU and country size, where the latter is measured in terms of total employment. The total number of employees seems more appropriate than GDP considering that the focus of the present analysis is the interaction between national labour markets and monetary policy regimes. The sample comprises 9 eurozone members (Belgium, Germany, Spain, France, Italy, the Netherlands, Austria, Portugal, Finland) and 3 countries outside the euroarea (Denmark, Sweden, United Kingdom). Greece has been left out because it entered the monetary union only in 2002, and provides thus only a limited number of observations. We also excluded Luxembourg and Ireland from the sample, the former because too small and differently structured than the other members, and the latter both because it witnessed an extraordinary transformation on labour markets during the 1990s -as a catching-up country- and because of the lack of data on the country's labour market institutions.

Table 1 presents data for our definition of wage growth ($W_{nt} - \alpha_{nt-1} -$ employment growth). The first important information contained in the dataset is that there has been some increase in nominal wages after EMU. In eurozone countries, wages grew on average by 0.78% from the previous period with the greatest pick-ups in small open economies (Belgium, the Netherlands, and Finland). In the largest countries, Germany, France, and Italy, the average rate of growth has been a negative 0,03%. In reality, the period before the introduction of the Euro was characterised by extraordinary wage moderation as European countries were in fact under the pressure to meet the Maastricht convergence criteria and qualify for EMU membership. This coincided with the success of social pacts revolving around wage restraint, which had been struck in numerous EU countries. Even if the figures do not confirm that EMU has come with a rise in wage restraint, as instead suggested by Posen and Gould (2006), they are nonetheless consistent with the general working hypothesis put forward here, i.e. that EMU has not eliminated the incentives for unions to deliver

wage moderation. As a matter of fact, they prove that eurozone countries have been much more disciplined than countries outside EMU. Denmark, Sweden and the United Kingdom registered in fact an average wage rise of 1,36% relatively to the previous period (Table 1).

Table 1. Wage growth averages before and after EMU

	Pre-EMU average 1993-1999	Post-EMU average 2000-2005	Difference (2000-2005) – (1993-1999)
Belgium	0,985	2,56	1,575
Denmark	2,4	2,2	-0,20
Germany	1,05	1,2	0,15
Spain	1,7	1,9	0,20
France	2,17	2,15	-0,02
Italy	2,24	2,03	-0,21
Netherlands	0,10	2,745	2,645
Austria	1,45	1,87	0,42
Portugal	2,31	1,96	-0,35
Finland	-0,5	2,11	2,61
Sweden	1,6	2,7	1,1
United Kingdom	-0,7	2,5	3,2
Average for euro countries			**0,78**
Average for non-euro countries			**1,36**

Source: own elaboration on data from AMECO Database

More precisely, our working hypothesis is that, in EMU, there exists a non-linear relationship between wage restraint and country size, with wage moderation being stronger in small and large countries than in countries of intermediate size. The same relationship should not be visible before the introduction of the Euro, where every member state had its own national monetary policy. The curve estimation for the dependent variable identified above confirms that the relationship between wage growth and country size is not significant in the 1993-1999 period, neither the linear nor the quadratic one (Table 2). On the contrary, when looking at the time span from 2000 to 2005, the relationship becomes statistically significant, and it is more so in the case of the quadratic relationship hypothesised with the square of size explaining about 50% of the variation in wage restraint (Table 3)[4].

Table 2. Dependent Variable: Wnt – αt-1 – employment growth (1993-1999)

Equation	Model Summary					Parameter Estimates		
	R Square	F	df1	df2	Sig.	Constant	b1	b2
Linear	,005	,054	1	10	,821	1,314	-6,71E-006	
Quadratic	,028	,128	2	9	,881	1,087	4,38E-005	-1,43E-009

The independent variable is size

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[4] The same exercise repeated just for EMU countries has showed this non-linearity much better. The coefficient for the quadratic curve estimation yielded a significance of .053 against .066 of the linear correlation with an adjusted R square of .062 against 0.40 of the linear estimation.

Table 3. Dependent Variable: Wnt – αt-1 – employment growth (2000-2005)

Equation	Model Summary					Parameter Estimates		
	R Square	F	df1	df2	Sig.	Constant	b1	b2
Linear	,271	3,717	1	10	,083	2,421	-1,83E-005	
Quadratic	,509	4,664	2	9	,041	2,126	5,03E-005	-1,95E-009

The independent variable is size

The graphical representation of nominal wage restraint is clear in confirming the hump-shaped hypothesis regarding the relationship between wage developments and country size. In particular, wage restraint is greater in larger countries, moderate but less so in smaller countries, and above the average in countries of intermediate size.

Graph 1. The hump-shaped relationship between wage growth and country size (2000-2005)
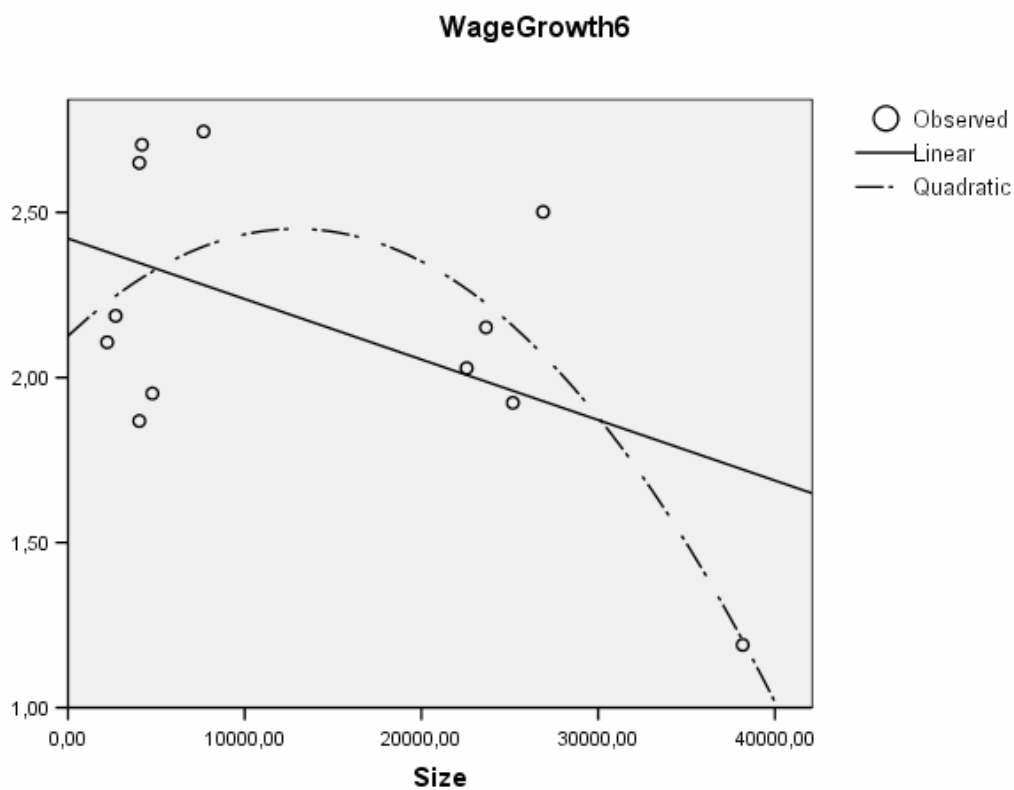
4.   Contending theories of wage moderation in EMU

European economic integration and the introduction of the Euro have been accompanied by significant wage restraint, whether the latter is defined as modest or

negative nominal or real wage growth. There is but little agreement over the reasons behind it[5].

The impact of product market competition on wages

Traditional trade theories acknowledge that economic integration and the ensuing rise in competition have a profound impact on labour markets. Accounts of the automatic effect of market integration and thus of greater product market competition on wages are organised around two opposing views.

One is set against a traditional wage-setting equation and posits that competitive pressures from abroad that take the form of a rise in the supply of substitute goods compress mark-ups reducing labour demand, with the result that real wages will fall. This dynamics revolves exclusively around private consumption, as the significant change in the new post-integration setting is that domestic consumers shift demand away from national producers in favour of external ones[6]. The degree to which this is likely to happen depends upon the relative substitutability of domestic and internationally produced goods. More precisely, the downward pressure on real wages is deemed to be stronger where imported consumer goods are perfect or close-to-perfect substitutes to national ones.

The second view describes an opposite mechanism and focuses on a country's investment and export performance rather than on private consumption. This interpretation is indebted to so-called new trade theories, which have insisted on the fact that market integration allows for the exploitation of economies of scale (Krugman 1979). This implies that, in the post-integration setting, national producers are left with the opportunity of increasing production volumes in the face of a larger market. The growth effect therewith involved should improve labour market conditions rather than deteriorate them, thereby producing a rise in real wages. This is a benign interpretation of the implications of freer trade for labour markets[7] that is in sharp contrast with the dynamics previously described.

To allow for a thorough analysis of the relative importance of these two opposite mechanisms, we should add into the equation, first, the degree of substitutability of domestic consumer goods with internationally produced ones. As anticipated above, real wages are subject to downwards pressures following a rise in product market competition only under the condition that external and national consumption goods are perfect or close-to-perfect substitutes. Secondly, because the two alternative views focus on different macroeconomic variables -the former on private consumption and the latter on investment and net exports- we should consider the significance of private consumption relative to the sum of investment and net exports in the construction of national GDP growth.

This paper follows this second strategy. We assume that the relative strength of the two mechanisms described above depends on the relative importance of private consumption in the formation of national economic growth versus investment and net exports. Instead, the issue of the substitutability between national and internationally produced goods is left in the background for a number of reasons. For a start, it is extremely troublesome to extrapolate measures of sectoral substitutability that indeed distinguish between consumption, intermediate and capital goods. In addition, the

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[5] See Appendix a.

[6] Please note that reference is to private consumption only. We leave public consumption out of the picture. The choice is warranted considering that the important variable here is consumption of tradable goods, whereas public administrations typically acquire non-tradable goods.

[7] For an overview, see OECD Employment Outlook 2005, pp.23-72.

volume of imported consumption goods may be smaller than desired because of the presence of non-tariff barriers and/or of informational asymmetries that constraint consumers' appetite for international goods. Partially confirming this view is the fact that, across Europe, the value of imported consumer goods (as a share of national GDP) is significantly more modest than the total value of intermediate and capital goods. In Germany, Italy and France, the average value of imported consumer goods amounted to 1.4% of GDP in 2006 against a 4.5% of GDP for intermediate and capital goods totted up together[8]. Finally, even imagining that internationally produced consumer goods are perfect or close-to-perfect substitutes to domestic goods and that import capacity is not constrained in any shape or form, it is still hazardous to postulate that the expected impact on mark-ups is that they would decline. As a matter of fact, EMU and the planned completion of the single European market have exercised a differentiated impact on countries' profits (corrected for taxes and interests) with, for example, a sensible improvement in profitability since 2000 in the case of Germany, but a marked deterioration in Italy starting with 1998[9]. In light of these considerations, it seems more appropriate to determine the importance of downwards pressures relative to upwards pressures on wages by looking at the yearly contribution of private consumption, on the one hand, and of investment and net exports, on the other hand, to the formation of year-to-year GDP growth.

The impact of product market competition on labour market institutions

Product market competition can affect wages also indirectly through labour market institutions. The most common view regarding the impact of greater openness on labour markets is that unions tend to refrain from excessive (nominal and real) wage settlements against the threat of relocation or simply in order to preserve competitiveness, where the latter is perceived as an insurance against possible job losses. In one way or the other, the crucial point is that, with market integration and globalisation more generally, the employment costs of excessive wage rises have gone up. Whilst the theories evoked above consider the automatic impact of economic integration on real wages, these latter accounts posit that greater product market competition changes unions' opportunity sets and, with them, unions' bargaining strategies and outcomes. The extensive literature on the new social pacts that were signed in the 1990s to preserve or enhance competitiveness is predicated on this assumption (Hemerijck and Visser 1999; Rhodes in Pierson 2001; Rhodes and Hancke 2005). In a fairly similar vein, Danthine and Hunt have argued that greater international competition produces a shift in incentive structures with the result that, in a more open market, workers have no alternative but to accept relatively moderate wage settlements, whether collective bargaining is centralised, fully decentralised or "in between" (Danthine and Hunt 1994). Their reference to the fact that international competition flattens out the hump-shaped relationship between the degree in wage bargaining centralization and actual wages takes us to the vast strand of literature that has looked at the impact of labour market institutions on wage determination.

The impact of labour market institutions on wages

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[8] The figures have been extrapolated from DATASTREAM.
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Calmfors and Driffil have postulated a hump-shaped relationship between the level of collective bargaining and real wages (and hence employment), suggesting that wage restraint is greater in highly coordinated and in fully decentralized bargaining systems, and that is instead discouraged where collective bargaining is "in between" (Calmfors and Driffil 1988). The explanation for it is as follows. In countries where collective bargaining is decentralised, excessive wage settlements have immediate employment costs because of the high elasticity of product demand. In contrast, in coordinated wage bargaining systems, the monopoly union will internalise the employment costs of an excessive wage settlement as a wage rise in one sector leads to a similar rise in all the other sectors with an increase in the general price level associated with a fall in real wages and newly created unemployment.

Following this theoretical tradition, the recent emergence of flexible and firm-level wage contracts should be associated with stronger wage moderation. Nevertheless, the rising importance of firm-level wage contracts that complement or, at times, even contradict national contracts concerns in particular post-unification Germany, which had benefited from a long tradition of coordination in wage bargaining. In this respect, the shift from national to firm-level wage contracts should have no effect on real bargained wages. The empirical evidence on coordination in wage bargaining is overall ambiguous. And in fact, whilst some countries may have gone through a softening in the degree of coordination (e.g. Germany), some others have witnessed a transformation in their labour market institutions towards greater coordination and centralization over the 1990s (e.g. Italy, Ireland, Finland).

More general institutionalist accounts of wage moderation posit that restraint has been enhanced over the last two decades against unions' progressive loss in political and bargaining power following a decline in union membership and in union density (i.e. the share of the labour force covered by a national contract). Yet, whilst a long-term trend towards de-unionisation is certainly there and noticeable, there is no empirical evidence to show that it has been enhanced with or by European monetary unification, so that we should not see more wage restraint in EMU than in, say, the preceding decade.

The impact of monetary credibility on wages

Better linked to the characteristics of the new EMU regime that has come into being as of 1999 are so-called credibility arguments. Posen and Gould find that the credibility of the ECB has produced wage restraint in almost all OECD countries, whether they are member of the eurozone or not, but in particular in those countries, and Italy is a case in point, that did not have a history of a non-accommodating monetary policy at home before joining EMU (Posen and Gould 2006).

This result is intriguing as it is in contrast with the predictions made by authors such as Iversen and Soskice (Iversen and Soskice 1998; 2000). Building on Calmfors and Driffil's hump-shaped hypothesis about the relationship between centralization and wage restraint (employment) and on dynamic models that take account of the relationship between bargaining structure and changes in monetary policy (Cukierman and Lippi 1999; Coricelli et al.), these authors had anticipated that the devolution of monetary sovereignty to the ECB would reduce the incentive for restraint in countries such as Germany that had benefited from an efficient coordination between a highly coordinated wage bargaining system and a conservative national central bank. Yet, the opposite has proved right. If anything, Germany is the country that has registered the most intense wage moderation in EMU.

The explanation offered by Posen and Gould is that "German wage bargainers continue to keep their eye on the ECB response to their negotiations much as they did on the Bundesbank's response" (Posen and Gould 2006, 16)[10].

We find these results more persuasive than generic references to the rise in competitive pressures, which are theoretically weak and not sufficiently sophisticated, but also more persuasive than arguments concerning the changing face of industrial relations in EMU, which, on their part, lack convincing empirical evidence.

Nevertheless, the argument presented by Posen and Gould needs to be better defined. The authors argue that the rise in monetary credibility proxied by the decrease in the long government bond rate has led to greater wage restraint more or less across the board, with possibly a slightly stronger effect on countries that did not have a strictly non-accommodating monetary policy before joining EMU. Yet, Posen and Gould underestimate the fact that, in a monetary union, the crucial variable is not much the individual gain in monetary credibility from the previous period, but rather the relative size of an economy as in fact the incentive to restrain wage demands in anticipation of the monetary reaction by the ECB should be manifest only in countries that are large enough to affect average wage inflation in the eurozone, thereby precipitating a reaction by the ECB. Posen and Gould make some sparse reference to the role of country size but this remains only at the margins. In addition, economy size measures by GDP level is not interacted with monetary credibility, which would be required to test the hypothesis laid down above, but only with trade union density to assess the impact of declining union density on wages whilst controlling for the fact that large countries may have some independence of labour supply (Posen and Gould 2006, 12).

We address this issue by incorporating size into our cross-sectional analysis of wage restraint before and after EMU testing in particular whether the relationship between country size and wage growth is hump-shaped rather than monotonic. The general hypothesis we test here is that large, intermediate and small countries have different motivations for wage restraint. In large countries, excessive wage settlements are particularly detrimental to employment because of the characteristics of the new monetary regime. Since wage and price developments in large countries can potentially affect average inflation in the euroarea, lack of moderation may well produce a restrictive monetary response by the ECB. The interest rate hike would not only dampen aggregate demand at home, but also in the rest of the eurozone with negative consequences for the large country's exports towards other monetary union members. The implication is that wage restraint should be visible the most in large countries that entertain intense trade relations with other eurozone members[11]. We should see some wage moderation in small countries as well. However, here, small

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[10] This is also confirmed by more qualitative evidence, see Marzinotto 2006. Hancke and Soskice propose an alternative explanation for Germany's extraordinary wage restraint in EMU. The authors argue that there is some sporadic evidence in support of a sort of informal coordination in collective bargaining in the eurozone with Germany acting as a wage leader and all the other members following suit. This is believed to have produced a race to the bottom in wages indeed in Germany because of a cumulative processes that forces the country to act last in the game leaving it no option but to restrain wage demands even further (Hancke and Soskice 2003). The evidence in favour of coordination in wage bargaining across Europe remains but fairly weak and, as pointed out by Hancke and Soskice themselves, the agreements that pointed in this direction (e.g. the so-called Door agreement and a decision taken by the European Metalworkers Federation) were stronger in paper than in practice.

[11] Notwithstanding the fact that an interest rate rise may lead to an appreciation of the Euro exchange rate vis-à-vis other similarly credible international currencies with negative consequences also for exports to third countries.

countries are free riders with respect to the logic of the credibility argument considering that they exercise no impact whatsoever on average inflation in the eurozone. Because small countries tend to have very open economies, their only concern revolves around their international cost competitiveness. Here, the incentive behind wage moderation remains nonetheless weaker than in the case of large countries. This is because the impact of relative unit labour costs on export market share is *uncertain*[12] differently from the impact of world demand conditions on export market shares, which is instead *certain* (i.e. unfavourable demand condition abroad will always jeopardise a country's export performance). Finally, in countries of intermediate size, the impact of national wage and price developments on average inflation in the eurozone is ambiguous and competitiveness issues are of some importance but they are not as vital as in the case of small open EU economies.

5.   An econometric exercise

To test the argument hypothesised, we estimate ordinary least squares regressions, for the pre-EMU and post-EMU period, which take the following form:

$$\Delta W = \beta_0 + \beta_1 * Openness + \beta_2 * B + \beta_3 * S + \beta_4 * S^2 + \beta_5 * TEU + \varepsilon$$

where ΔW, the dependent variable, is the average percentage change in nominal wages minus productivity in t-1 minus employment growth, that is $W_{nt} - \alpha_{t-1} -$ employment growth; openness is the average contribution of trade to GDP formation; B is a composite index that sums up together the degree of wage bargaining coordination, centralization and coverage; TEU is the average ratio of exports towards eurozone countries over total exports; S is the average size of each country in terms of total employment; S^2 is the square of size; and ε is an error term.

The first independent variable generally relates to openness. We expect the sign of the correlation between wage growth and openness to be negative because greater openness should produce more wage restraint. We treat it separately from the previous variable because the correlation between [C- (I + NX)] and openness is not statistically significant, even if, in more open economies, the contribution of private consumption to GDP growth should be more modest than that of investment and net exports totted up together.

The independent variable B considers the role of labour market institutions in wage formation processes. We use indexes from the OECD (2004), Driffil (2005) and Visser (2006). The use of indicators that qualitatively describe the situation of national labour market institutions poses a few methodological problems.

Firstly, they are delicate variables to deal with since changes in bargaining can occur without altering the fundamental structure of bargaining so that, even if anecdotal evidence points to important transformation in collective bargaining modes during the 1990s, the coordination and centralization indexes used by the OECD, for example, have remained fairly unchanged. Undoubtedly, limited variation is a constraint on the use of these indexes in cross-sectional and panel data regressions.

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[12] This is confirmed by an econometric exercise run by Carlin et all showing that the responsiveness of purchasers to relative prices and costs has in fact decreased with globalisation rather than increased and, more precisely, that it is lower in high-tech industries and in core ERM countries (Carlin et al 2001).

Secondly, centralization, coordination, trade union density and coverage are often used interchangeably or even as expressions of the same phenomenon despite the fact that they might indeed have opposite wage effects or simply capture different aspects labour market institutions. Concerning the first possibility, the effect of a combination of high union density and high coordination, for example, is ambiguous. High union density tends to raise wage-pushfulness just because, by representing a large proportion of employees, labour unions have greater bargaining power. At the same time, however, they cover also more sectors of the economy (*read* a rise in coordination), which should lead to a decline in wage-pushfulness either because inflationary wage settlements will spread across the economy reducing all employees' purchasing power or because encompassing unions opt for an egalitarian wage policy. Kittel suggests that whether one or the other effect will prevail depends upon external conditions, and mainly: the monetary regime, the unemployment rate, real GDP growth and openness (2000). The implication is that the effect of labour market institutions is endogenous to a country's macroeconomic context, at least to some extent. There are two complementary ways of tackling this problem. First, labour market indicators should be always interacted with other variables, as it will be done with the present econometric exercise. Second, it is necessary to pick the qualitative labour market indicator that best fit the research context and aims. By way of example, whilst it is true that coordination and coverage tend to positively and significantly correlated, they capture different dimensions of the bargaining structure. The former affects unions' incentive structures insofar as it measures the relative incentive to internalise the external impact of excessive wage settlements, whereas the latter directly addresses the issue of enforceability. In this sense, it is up to the researcher to use the measure that best fits the aim of the research. To address these issues, B is here constructed adding the indexes that measure coordination, centralization and coverage with values from 1 to 15 increasing in half-point increments to indicate greater centralization, coordination and coverage[13]. If institutionalist accounts of wage determination were right, then we would expect a negative sign as greater coordination, centralization and coverage should be associated with slower wage growth.

The third variable S relates to the size of the country measured in terms of average total employment. As we do not expect a monotonic relationship between size and wage growth, we add a fifth variable, S^2, which is the square of size.

The last variable TEU captures the importance of intra-EU trade. The expected sign of the correlation is negative, as wage growth should be slower in countries that entertain intense trade relations with other monetary union members. Nevertheless, the impact of intra-EMU trade should be significant especially when interacted with country size. We will interact size with openness to test whether it is not true that wage restraint is very visible in smaller countries just because they have more open economies. Finally, we will check whether the competition variable correlates with level of intra-EU trade to show whether we are talking of competition from EMU partners or from emerging economies in Asia.

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[13] The decision to ignore union density derives from the findings available in Kittel (2000), for which a non-accommodating monetary regime combined with high coordination –an institutional set-up typical to most European countries over the 1999-2005 period- restricts wage growth even at average-to-high levels of union density, which -if taken in isolation- should instead enhance wage-pushfulness.

6.   Discussion of the results

Table 4 presents the results from the OLS regression for the period from 1993 to 1999 for euroarea countries only. The results obtained are not statistically significant. The only variable that shows up as significant is intra-EU trade, with a coefficient of .088. Interestingly enough, the sign of the correlation is opposite from the one expected. As the ratio of intra-EMU trade rises, nominal wages increase. This is there to suggest that, just after the planned completion of the single European market, the prevailing trade effect was the one anticipated by new trade theories, for which market integration was expected to allow for the exploitation of economies of scale. Hence, rising wages can be taken to suggest that stronger exports to other eurozone countries have improved labour market conditions, allowing for a rise in wages (Table 4).

Table 4. Cross –section wage restraint analysis: regression results (1993-1999)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6,115	5	1,223	1,092	,450(a)
	Residual	6,717	6	1,119		
	Total	12,832	11			

a Predictors: (Constant), SizeQuad, TEU, Openness, Coordination, Size
b Dependent Variable: Wnt – αt-1 – employment growth

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,690(a)	,477	,040	1,05806

a Predictors: (Constant), SizeQuad, TEU, Openness, Coordination, Siz

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	-7,360	4,825		-1,525	,178
	TEU	,102	,050	,911	2,035	,088
	Size	8,71E-005	,000	,951	,644	,544
	Coordination	,367	,218	,879	1,679	,144
	Openness	-2,277	1,372	-,657	-1,661	,148
	SizeQuad	-1,36E-009	,000	-,545	-,415	,693

a Dependent Variable: Wnt – αt-1 – employment growth

Table 5 uses the same model to assess the relationship between wage growth and our 5 independent variables for the subsequent period, namely from 2000 to 2005. The analysis shows up as significant and explains almost 85% of the variation in wage growth. The square of the size is a very significant indicator with a coefficient of .0.50. Openness stands out with a coefficient of .0.36 and is positively correlated with wage growth. Similarly to the case of intra-EMU trade in the period from 1993 to

1999, greater openness and thus a stronger export performance is associated with more favourable labour market conditions, and thus higher wages. Finally, and similarly to the results obtained by obtained by Posen and Gould (2006), labour market institutions do not seem to have impacted on wage growth (Table 5).

Table 5. Cross –section wage restraint analysis: regression results (2000-2005)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1,555	5	,311	9,601	,046(a)
	Residual	,097	3	,032		
	Total	1,652	8			

a Predictors: (Constant), SizeQuad, CvsINX, TEU, Openness, Coordination, Size
b Dependent Variable: Wnt – αt-1 – employment growth

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,970(a)	,941	,843	,17998

a Predictors: (Constant), SizeQuad, CvsINX, TEU, Openness, Coordination, Size

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	-,134	2,044		-,065	,952
	TEU	-,004	,010	-,109	-,448	,685
	Size	,000	,000	3,329	2,444	,092
	Coordination	,094	,121	,366	,781	,492
	Openness	,882	,242	,767	3,642	,036
	SizeQuad	-3,19E-009	,000	-3,423	-3,191	,050

a Dependent Variable: Wnt – αt-1 – employment growth

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Appendix a

Hypotheses about the determinants of wage restraint

Independent variable	Depended variable	Expected sign	Comments
Product market competition	W_n; W_r; $W_n - \alpha$; $W_r - \alpha$	Negative	It concerns the EU as a whole
Product market competition	Union bargaining power	Negative	It concerns the EU as a whole
$[C - (I + NX)]$	W_r	Negative	It concerns the EU as a whole, but it should be stronger in EMU
Openness	W_n; W_r; $W_n - \alpha$; $W_r - \alpha$	Negative	It concerns the EU as a whole, but it should be stronger in EMU
Labour market institutions	W_r	Negative	It concerns the EU as a whole
Size and size²	W_n; W_r; $W_n - \alpha$; $W_r - \alpha$	Non-linear	It concerns EMU only
Intra-EMU trade and intra-EMU trade²	W_n; W_r; $W_n - \alpha$; $W_r - \alpha$	Non-linear	It concerns EMU only

Key: W_n = nominal wage; W_r = real wage; $W_n - \alpha$ = nominal wage growth minus productivity; $W_r - \alpha$ = real wage growth minus productivity.

Appendix b

Variable name	Variable label	Data source
WNOMt_αt-1_employment growth	Nominal compensations of employees (billions Euro PPS) in t minus productivity in t-1 minus employment growth (all in percentage changes)	Own calculations based on AMECO Database
SIZE_EMP	Employment in 1000 persons	AMECO Database
C_I+NX	Significance of C relative to (I + NX) measured as the difference between the contributions of C to GDP and the sum of the contributions from I and NX	Own calculations based on AMECO Database
COORD	Coordination index	OECD's Employment Outlook for 2004
CENTRAL	Centralization index	OECD's Employment Outlook for 2004; Driffil 2005
COV	Coverage of collective bargaining	OECD's Employment Outlook for 2004; J. Visser, "Union membership statistics in 24 countries", Monthly Labour Review, Jan 2006
EMU_ trade	Country's trade with EU12	IMF's *Direction of Trade Statistics*
OPENN _ GDP	Country's openness measured as the share of (X + M) as of GDP in 2000 constant prices	Penn World Tables