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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

Using theoretical models about the interaction between monetary policy-making and wage bargaining institutions, some researchers had been predicting an acceleration in wage growth under EMU (Iversen and Soskice 1998; Iversen et al 2000; Cukierman and Lippi 2001). However, the empirical evidence shows that, after the formation of the monetary union, wage growth has remained under control or even decelerated. Of the numerous explanations advanced to account for this trend, the most promising seems the one proposed by Posen and Gould (2006), who argue that behind the generalised shift towards wage restraint is enhanced monetary credibility in EMU. Whilst building on a similar argument, this paper adds to it in important respects. First, I show that the effects of a monetary union depend on labour market institutions. Second, and most originally, I argue that a strategic interaction between the ECB and non-atomistic labour unions is possible only in the case of large countries, whose price behaviour can potentially affect EU-13 inflation. This leads to the main finding behind this paper, namely that the relationship between wage growth and economy size is hump-shaped, with wage restraint more present in large and small countries, and less so in countries of intermediate size. Differently from a large country like Germany, small economies are free riders with respect to the monetary regime, but they care nonetheless for cost competitiveness, even if to different degrees. On the other hand, intermediate countries are trapped “in-between” because neither do they believe capable of affecting euro-zone inflation, nor do they look at cost competitiveness as key to their economic survival.

Keywords: wage restraint; collective wage bargaining; EMU; openness; international trade

JEL classification: J31; J51; E50; F15; F41

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INTRODUCTION

It is undeniable that wage growth has remained under control after the formation of EMU (European Commission, Quarterly Report on the Euro Area 2002-2007; Pichelmann in Buti and Sapir 2003; Posen and Gould 2006). This is in contrast to the predictions made by some researchers. Building on sophisticated models that study the strategic interaction between wage bargaining systems and monetary authorities, Iversen and Soskice (1998), Iversen et al (2000) and Cukierman and Lippi (2001) had in fact argued in favour of a decline in wage restraint in EMU. Their analyses were based on a standard political economy argument, according to which monopoly unions refrain from excessive wage settlements when they believe that their central bank will punish them with a monetary restriction that is due to raise unemployment levels. The creation of the monetary union was expected to soften or even eliminate this incentive considering that each labour union, even if monopolistic, would have been nonetheless too small to affect average price conditions in the euro-area and to stimulate thereby a reaction by the European Central Bank (ECB). In particular, Iversen and Soskice (1998) have been supporting this type of argument taking Germany as the key example indeed because here a strategic interaction between labour unions and the Bundesbank had been in place since the mid-1970s. Nevertheless, Germany is the country that registered the most dramatic deceleration in wage growth since the inception of EMU. What explains generalised wage restraint in EMU and the especially steep deceleration in Germany?

Apart from the early theoretical formulations of the kind mentioned above, numerous arguments are out there that could account for the general shift towards wage moderation after 1999. Even so, existing approaches fail on at least three grounds.

First, many of them are theoretically oversimplified. By way of example, the explanation for which wage restraint is induced by enhanced product market competition in a monetary union is largely unsophisticated. External competition does not always force consumers into shifting demand away from national producers in favour of external ones. The relative impact of product market competition on wage growth should in fact depend both on initial cost conditions and on the relative substitutability of domestic and internationally produced goods.

Second, some of the available explanations lack empirical support. A typical example concerns the issue of the impact of enhanced product market competition on labour institutions. The core contention is that globalisation and the threat of relocation conspire to reduce the bargaining power of labour unions and, with it, their possibility to demand relatively high wages. However, 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 wage-setting behaviour (see Hirsch 1993). A related strand of literature revolves around the question of the impact of different levels of collective bargaining on wage inflation. It builds on Calmfors' and Driffil's argument about a non-monotonic relationship between the degree of coordination in wage bargaining and wage developments (Calmfors and Driffil 1988). In this case, the supporting evidence is mixed and, to some extent, problematic. On the one hand, there has been a trend towards de-centralization in wage bargaining since the 1980s not least because of the privatization of public enterprises and because of the

emergence of the service economy, at the same time as some European countries were actually opting for stronger centralization and coordination (e.g. Italy, Spain and Portugal). On the other hand, and more generally, testing these arguments is an exercise complicated by the fact that labour market institutions tend to be sticky and that, informally, changes may occur that are not captured by the formal indexes (e.g. OECD data) most commonly used to categorise countries according to the prevailing level of wage bargaining (see Driffil 2006).

Third, and most disappointingly, most the available explanations for restraint remain sectoral with very little integration between labour economics, trade theory and monetary regime accounts.

In order to address at least some of these shortcomings, this paper focuses on the question of the impact of the monetary regime on wage behaviour using econometric tools to isolate the most prominent explanations for restraint but also integrates monetary-economics arguments with specifications that borrow from traditional trade theories and from studies concerning the effects of labour market institutions on wage growth.

The importance of the monetary-policy context for wage behaviour is undeniable. The ECB regards wage formation as one of the most important determinants of inflation (ECB Introductory Statements 1999-2007). National unions themselves are not immune to monetary policy-making. In one specific case, that of Germany, national wage bargainers go as far as assuming that their wage-setting behaviour may condition the central bank's reaction function (Marzinotto 2007). Against this framework, it is no coincidence if IG Metall, the German metalworking union, is the only labour union in the euro-zone that entertains informal direct talks with the ECB. Given the abundant factual and anecdotal evidence on the relationship between European monetary policy-making and national wage formation processes, it is somehow puzzling that this strand of literature has received comparatively lesser attention than studies about the impact on wages of product market competition (Bertola et al 2001; OECD 2005), of labour market institutions (Soskice 1990; Visser and Hemerijck 1997; Rhodes in Pierson 2001; Hancké and Rhodes 2004; Driffil 2005; Bowdler and Nunziata 2007), and of the interaction between these two (Danthine and Hunt 1994). A notable exception is the paper by Posen and Gould (2006), who argue that wage restraint in EMU is the result of a rise in the credibility of the new single monetary policy. Whilst building on the argument developed by Posen and Gould, this paper integrates it with two specifications.

Firstly, a crucial presumption is that labour unions will be capable of delivering wage restraint in the face of a credible non-accommodating monetary policy solely in countries that are characterised by a highly centralised collective bargaining system and/or by extensive coverage. The argument developed in the literature is that only large encompassing unions can internalise the externalities from monetary policy (Franzese 1994; Hall 1994; Iversen 1994; Iversen and Soskice 1998; Franzese and Hall 1998, 2000). Secondly, 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 inflation in the euro-zone, thereby stimulating a reaction by the ECB. This should happen solely in the case of large countries. Only

encompassing unions in large countries have an incentive to internalise the ECB's reaction function.

Following from the above specifications, the core contention behind this paper is that the incentives behind wage moderation vary from country to country depending on economy size. A hint at the relevance of country size in EMU is already present in European Commission (1998) and Cukierman and Lippi (2001). This paper is more specific in that it suggests that the relationship between wage growth and country size is non-monotonic with wage discipline relatively more evident in large and small countries than in countries of intermediate size. The hump-shaped relationship is evident from 2000 to 2005 and weakens where the sample includes EU countries that are not EMU members, but it does disappear in the euro-zone itself before the inception of EMU from 1994 to 1999.

The reasons behind this awkward relationship between euro-area wage developments and country size are as follows. Labour unions in a large country like Germany are aware that their wage behaviour has the potential to affect average price conditions in the euro-area and, with it, the reaction function of the ECB. Marzinotto (2007) provides some anecdotal evidence that would confirm this reading. Hence, they opt for wage restraint as an interest rate hike by the ECB would constrain demand not only at home, but also in the other euro-area countries, thereby jeopardising the export performance of the large country from which the financial instability has originated². The greater a large country's level of intra-EMU trade, the stronger the incentive for restraint. This is the point in which monetary policy regime accounts merge with more traditional trade theories. Small countries, in contrast, are free riders with respect to the logic of the credibility argument as they are practically unable to affect EU-13 inflation³. Still, there should be a tendency towards wage moderation given that cost competitiveness is key to the survival of small open economies, even if I expect some variation in wage behaviour across small countries because sensitivities to cost competitiveness should vary from one country to another depending on traditional trade ties (i.e. whether they are former core ERM countries or not) and on the prevailing type of industry (i.e. whether they are specialised in high-tech industry or not). 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.

The remaining of this paper is structured as follows. Section I presents theories for wage moderation. Section II clarifies the meaning and measurement of wage moderation and offers preliminary evidence on the non-linear relationship between wage restraint and country size that motivates our analysis. Section III describes the baseline model. Section IV presents the econometric model employed and discusses some first results. Section IV uses panel data analysis to check the robustness of the results obtained from the previous exercise.

² 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.

³ There is ample anecdotal evidence confirming small countries' frustration with the impossibility to shape the ECB's reaction function due to their size. Ireland is the most prominent example (The Telegraph 25/04/2007).

1. CONTENDING THEORIES OF WAGE MODERATION IN EMU

European economic integration and the introduction of the Euro have been accompanied by protracted wage restraint, whether the latter is defined as just modest or rather negative nominal or real wage growth, and whether incorporating productivity developments or not. There is but little agreement over the reasons behind persistent wage moderation in EMU⁴.

The impact of product market competition on wages

Traditional trade theories acknowledge that economic integration and the ensuing rise in product market competition (PMC) have a profound impact on labour markets. Accounts of the “automatic” effect of market integration on real wages are organised around two opposing views (Bertola et al 2001).

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 consumer goods compress mark-ups, reduce labour demand, thereby leading to a fall in the real wage. The crucial point in this dynamics is that, after market integration, domestic consumers have the option to shift demand away from national producers and toward external ones. The degree to which this is likely to happen depends upon: (i) the relative substitutability of domestic and internationally produced goods, as real wages should suffer from stronger downward pressures where the imported consumer goods are perfect or close-to-perfect substitutes to national ones; and (ii) the share of consumer goods over total imported goods. This framework of analysis focuses exclusively on the behaviour of private consumption in an integrated market⁵.

Instead, the second view describes an opposite mechanism that revolves around national investment and net exports rather than private consumption. This approach is indebted to the so-called new trade theories, for which market integration is economically desirable mainly because it allows for the exploitation of economies of scale (Krugman 1979). In other words, in the face of a larger market, national producers have the opportunity to increase production volumes with the result that economic growth will be stimulated, labour demand will increase and, with it, the (equilibrium) real wage (Hirsch 1993). This process is in sharp contrast to the one described above, not least because this second mechanism concerns investment and net exports but it ignores private consumption.

All in all, it seems reasonable to argue that the net effect of economic competition on wage developments will depend upon the relative importance of the two mechanisms described above. One possible way of assessing the comparative significance of the two channels through which economic competition affects wages is by determining the contribution of private consumption to GDP growth relative to that of investment and net exports. Where the former prevails, one may well expect that product market competition exercises a dampening effect on wages. It is worth mentioning that most

⁴ For a snapshot of the main theories, assumptions and results, see appendix A.

⁵ 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.

empirical analyses tend to support the more optimistic view on the impact of freer trade on labour markets. This is not only because lately investment and net exports have been stronger drivers of growth than private consumption, but also because import-competing firms across OECD countries have been employing only 4% of the total labour force (OECD 2005, 23-72), which is an indication of the fact that internationally produced goods are hardly perfect substitutes to domestic ones. And, yet, modest wage growth in EMU remains puzzling.

The impact of external competition on labour market institutions

PMC affects wages also indirectly by impacting on labour market institutions (LMI) and, through those, on the nominal and real bargained wage. As concerns the effect of greater openness on LMI, the most common view is that unions tend to refrain from excessive (nominal and real) wage settlements either to preserve competitiveness – where the latter is perceived as an insurance device against possible job losses- or against the threat of relocation. 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. Differently from the theories evoked above, which address the “automatic” impact of economic integration on wages, this strand of literature studies how and to what extent PMC alters labour unions’ opportunity sets and, to follow, their bargaining strategies and outcomes. The extensive literature on the social pacts signed in the 1990s with the aim of preserving or enhancing competitiveness is predicated on these assumptions (Visser and Hemerijck 1997; Rhodes in Pierson 2001; Hancké and Rhodes 2004)⁶.

The impact of labour market institutions on wages

LMI themselves, whether undergoing changes on the back of globalisation or not, have a bearing on compensations. Wages are in fact taken to reflect unions’ bargaining power. It is often explained that persistent wage moderation since the 1980s is the consequence of declining union membership and union density, i.e. the share of the labour force covered by a national contract. Yet, simple arguments about the diminishing political power of labour unions are not always convincing not least because LMI are more than just union membership and density. They incorporate other dimensions, and in particular: centralization and coordination.

Centralization and coordination refer to the level at which collective bargaining takes place (firm-, sectoral or national level). Insofar as they shape unions’ incentive structure rather than their actual political power, these two dimensions of LMI seem particularly appropriate in an analysis that focuses on the interaction between wage bargaining systems and monetary policy and that is indeed concerned with positive and negative incentives. The theoretical inspiration here comes from Calmfors and Driffil (1988), who have postulated a hump-shaped relationship between the level of collective bargaining and real wages (and hence employment) and suggested that wage restraint is greater in highly coordinated and in fully decentralized bargaining

⁶ A second valuable research avenue has looked at the impact of technological progress on wage behaviour, where the argument is that capital-augmenting technological progress increases job turnover thereby reducing unions’ bargaining power (see Hornstein et al 2002). Yet, because these dynamics concern the long-term, they will not be explicitly addressed in this context. I am grateful to Esther Perez-Ruiz for reminding me of this literature.

systems, but it is discouraged where collective bargaining is “in between”. 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 refrains from excessive wage settlements because it is able to internalise the (undesirable) consequences of wage militancy. As a matter of fact, a wage rise in one sector would lead to a similar rise in all the other sectors with the result that the general price level should increase leading to a fall in the real wage (Calmfors and Driffil 1988; see also Soskice 1990; 2000; Mares 2006). Following from this theoretical tradition, it is often argued that persistent wage moderation since the 1980s is the consequence of the move towards de-centralization and of the rising importance of firm-level wage contracts.

It should be noted however that the empirical tests on the impact of LMI on wage developments have some limitations.

Firstly, there is little empirical evidence to show that wage bargaining has in fact become local across the board. In contrast, there are numerous examples pointing to rising coordination in many European countries (e.g. Ireland, Italy and Spain), mostly attained in the framework of social pacts in the run-up to EMU and thereafter (Rhodes 1997; Regini 1999; Campos Lima and Naumann 2000; Royo 2002; Hanckè and Soskice 2003).

Secondly, even if there were a move towards de-centralization, it is not necessarily true that this should lead to wage restraint independently of the initial level of collective bargaining. Following from Calmfors’ and Driffil’s hump-shaped curve (1988), highly centralised systems that move slowly towards de-centralization will first go through a stage in which coordination is intermediate and thus the real bargained wage will go up. Instead, one should witness downward wage pressures on the back of de-centralization only in the case of countries that move from intermediate to firm-level wage bargaining. Yet, the evidence on this latter case is weak. The only countries that in the early 1990s show intermediate levels of wage bargaining register either no change in their collective bargaining systems as of 2000 (i.e. France and Sweden) or a move towards greater centralization (i.e. Italy and Portugal)⁷.

Thirdly, LMI tend to be sticky. The indexes normally used to measure centralization and coordination show little variation from one year to the other (OECD 2004), in spite of the fact that informally wage bargaining systems in Europe have undergone important transformations (Driffil 2005).

Fourthly, different labour market indicators capture different aspects of the bargaining system. By way of example, coordination and coverage tend to be positively and significantly correlated with each other, but the former affects unions’ incentive structures, whereas the latter directly addresses the issue of enforceability. It is up to the researcher to pick the LMI indicators that best fit her research agenda. At other times, different dimensions of LMI (trade union membership, coverage, coordination, centralization, etc.) are used interchangeably or even as expressions of the same phenomenon despite the fact that they might indeed have opposite wage effects. The

⁷ This is based on the OECD’s centralization and coordination indexes (OECD 2004), see table 3.

effect of a combination of high union density and high coordination, for example, is ambiguous. High union density tends to raise wage militancy just because, by representing a large proportion of employees, labour unions have greater bargaining power. At the same time, however, they also cover more sectors of the economy (*read* a rise in coordination), which should lead to a decline in wage demands either because inflationary wage settlements will spread across the economy reducing all employees' purchasing power or simply because encompassing unions tend to opt for an egalitarian wage policy (Kittel 2000).

Some researchers have studied how the effect of LMI on wages varies along with changes in the macroeconomic context, and more specifically in the degree of product market competition. A notable example is the study by Danthine and Hunt (1994). The authors argue that greater international competition produces a shift in unions' incentive structures in the sense that workers have no alternative but to accept relatively moderate wage settlements, whether collective bargaining is centralised, fully decentralised or intermediate. In other words, market integration flattens out Calmfors' and Driffil's hump-shaped curve (Danthine and Hunt 1994), a result that speaks to the literature on the impact of globalisation on LMI evoked earlier.

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 the so-called monetary credibility arguments. A burgeoning strand of literature has brought together the literature on the impact of LMI on wage growth and the studies on central bank independence and then built dynamic models that indeed explore the interaction between bargaining structures and changes in monetary policy (Cukierman and Lippi 1999; Coricelli et al.). Along similar lines, Iversen and Soskice (1998, 2000) had anticipated that the devolution of monetary sovereignty to the ECB was deemed to reduce the incentive for restraint as every single national union would have been too small in EMU to affect average price conditions with the result that the incentive to internalise the externalities from excessive wage settlements was to fade away. To be fair, these analyses were but only theoretical and anticipated possible dynamics in EMU.

Empirical analyses on the impact of monetary credibility on wage developments normally revolve around inflation expectations. Wage growth in EMU is modest because economic agents –persuaded of the fact that the ECB's commitment to price stability is a credible one- have lowered their inflation expectations and in turn their nominal wage demands. The EU Commission itself has often used this argument (EU Commission 2006, 2007). However, applied studies that build on strong theoretical foundations remain scarce. A notable exception is the paper by Posen and Gould (2006). The authors find that increases in monetary credibility with the coming into operation of the ECB –measured by the fall in the long government bond rate- have produced wage restraint in almost all OECD countries, whether they are member of the euro-zone or not, and in particular in those countries -Italy is a case in point- that did not have a history of a non-accommodating monetary policy at home before joining EMU.

I find that these results are more promising than generic references to the rise in competitive pressures, which are in most cases theoretically unsophisticated, as well

as more persuasive than arguments concerning the changing face of industrial relations in EMU, which on their part lack convincing empirical evidence. Yet, the argument, as presented by Posen and Gould (2006), needs to be better defined.

I posit, first, that this should be visible only in countries that have a centralised collective bargaining system or extensive coverage, as only large encompassing unions are capable of internalising the externalities from their behaviour (Olson 1982). Along similar lines, Hall and Franzese (1998) confirm an interactive pattern with inflation falling in central banking conservatism and in bargaining coordination. The article by Posen and Gould contains references to labour market institutions. Yet, their results are ambiguous. Measures of coordination and centralization do not show up as significant, a condition that could be ascribed to the fact that the OECD indexes used in the regression do not vary significantly from one period to another. Trade union density becomes significant only 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 restraint⁸.

Secondly, 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 wages in anticipation of a monetary reaction by the ECB should be manifest only in countries that are large enough to affect average wage inflation in the euro-zone, and thereby to precipitate a reaction by the ECB. Posen and Gould refer to country size but the issue remains more or less on the margins. The authors interact country size (measured by GDP levels) with trade union density to assess the impact of changes in LMI on wage growth whilst controlling for the fact that large countries may have some independence of labour supply (2006, 12). Yet, to support the monetary credibility argument and in line with the observations made above, it would have probably been necessary to interact country size with the change in the long government bond rate. I address this issue by incorporating size into my cross-sectional analysis of wage restraint, before and after EMU, together with other independent variables.

2. THE HUMP-SHAPED RELATIONSHIP BETWEEN WAGE RESTRAINT AND COUNTRY SIZE

The first step in an analysis of this kind is to find an appropriate definition for 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.

Most of the existing analyses look at nominal and real compensations per employee and/or unit labour costs. These indicators allow in fact for cross-country comparisons.

⁸ 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.

Nevertheless, in the present research context, and similarly to Posen and Gould (2006), I have decided to look at total wage growth in an economy, as this is the only aggregate the ECB shows sensitive to. There is in fact extensive qualitative evidence confirming that the ECB is extremely responsive to yearly or even monthly total wage growth (ECB 2007a, 2007b, 2007c).

To start, I consider both nominal and real compensations of employees in each EU country. The former are expressed in billions Euro (purchasing power parity). The latter are derived by deparating nominal compensations using an index for the price deflator of final demand. The decision to focus on the price deflator as opposed to the most commonly used GDP deflator derives from the fact that the latter can be misleading as it overstates price changes that result from improved terms of trade (Kohli 2004). Furthermore, to account for the fact that total wages in one country may increase just because the number of people in employment has gone up, I subtract employment creation from the rate of wage growth⁹. Because wage settlements have an inflationary potential when they grow above productivity, I also deduct productivity growth. This is total factor productivity for the whole economy in each country as opposed to mere labour productivity given the typical mechanism of rent-sharing between employers and employees. Moreover, this variable is measured in the previous year to account for the fact that wage-setters tend to recognise gains in productivity only with a lag (Blanchard and Philippon 2003). All the figures are the author's calculations and are based on the EU Commission's AMECO database. To sum up, the dependent variable is as follows:

$$\Delta TW_{t\text{NorR}} - \Delta E_t - \Delta \alpha_{t-1}$$

where $\Delta TW_{t\text{NorR}}$ is the change in total (nominal or real) wages in time t ; ΔE_t is the change in employment in time t ; $\Delta \alpha_{t-1}$ is lagged total factor productivity growth. All in all, this measure of wage growth differs from the so-called real wage gap indicator, i.e. real compensation per employee expressed in labour efficiency units (Blanchard 1997) insofar as it looks at nominal total compensations. But it is also different from unit labour costs to the extent that productivity is here lagged.

Table 1 presents figures on the nominal and the real version of the dependent variable. Wage discipline rises in decreasing values of the dependent variable. Average nominal wages have gone up, albeit only slightly, after the introduction of the single currency. In the euro-zone, they grew by 0.79% from the average in the previous period (1994-1999). In real terms, wage growth remained de facto unchanged. These figures are consistent with the view that EMU has not weakened the incentive behind wage moderation. In fact, the period before the introduction of the Euro was characterised by extraordinary wage restraint agreed in the framework of social pacts, as EU countries were under the pressure to meet the Maastricht convergence criteria and qualify for EMU membership. Most interestingly, the figures are in line with the

⁹ There is the risk that employment growth is determined endogenously by the size of the national labour market, if it were true that large labour markets tend to attract more workers than smaller ones. This is but not confirmed by statistical evidence. The correlation between the size of employment in 1999 in 10 EMU countries and the percentage increase of employment over the 1999-2005 period yields the following equation $y = -1.0828\ln(x) + 10.175$ with a R^2 of 0.05, which confirms that there is no significant relationship between the initial size of a national labour market and its growth rate.

general working hypothesis behind this paper, namely that the ECB's monetary policy may be exercising a disciplining effect on national wage-setters. Nominal and real wage growth in non euro-zone countries (Denmark, Sweden, UK) was faster under EMU than in the pre-EMU period, having in fact risen by 1.39% and 1.67% respectively from the previous period (1994-1999). Finally, the available data suggest that wage moderation is indeed a generalised phenomenon, but that there is still significant cross-country variation, as already highlighted elsewhere (European Commission 2007), which I explain as being a function of country size, amongst other things.

TABLE 1. AVERAGE WAGE GROWTH BEFORE (1994-99) AND AFTER EMU (2000-05)

	1994-99		2000-05		Difference (2000-05) – (1994-99)	
	Nominal	Real	Nominal	Real	Nominal	Real
Belgium	0.99	-0.03	2.65	0.12	1.66	0.15
Denmark	2.38	0.92	2.19	0.25	-0.19	-0.67
Germany	1.05	1.08	1.19	0.55	0.14	-0.53
Spain	1.7	0.92	1.92	-1.79	0.22	-2.71
France	2.17	0.18	2.15	0.55	-0.02	0.37
Italy	2.24	0.18	2.03	-0.89	-0.21	-1.07
Netherlands	0.10	-1.42	2.745	0.65	2.645	2.07
Austria	1.45	1.3	1.87	0.39	0.42	-0.91
Portugal	2.31	0.28	1.95	-0.58	-0.36	-0.86
Finland	-0.48	-2.97	2.11	0.89	2.59	3.86
Sweden	1.56	0.06	2.71	1.98	1.15	1.92
United Kingdom	-0.71	-4.35	2.5	-0.58	3.21	3.77
Average for euro countries					0.79	0.04
Average for non-euro countries					1.39	1.67

Source: own elaboration on data from AMECO Database

In order to substantiate my argument, I provide for a statistical estimate of the correlation between wage growth and country size. The sample comprises 9 euro-zone members (Belgium, Germany, Spain, France, Italy, the Netherlands, Austria, Portugal, Finland). Greece has been left out because it entered the monetary union only in 2002, and provides thus only a limited number of observations. I also excluded Luxembourg and Ireland, the former because too small and differently structured than the other member economies, 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 qualitative indicators on national labour market institutions. Country size is measured in terms of total employment. This seems a better measure than GDP levels considering that, in a possible signalling game between the ECB and national wage-setters, the size of the labour market is more relevant than a general measure of the country's economic strength. The choice of this measure has important implications for the categorization of countries according to size. In fact, German GDP is about one third greater than that of France, Italy and Spain, but the size of its labour market is double that of the other large euro-area countries. Table 2 is a case summary.

TABLE 2. CASE SUMMARIES

	COUNTRY	Nom W 1994-1999	Nom W 2000-2005	Real W 1994-1999	Real W 2000-2005	Size LM 1994-1999	Size LM 2000-2005	GNI 1994-1999	GNI 2000-2005
1	Belgium	,010	,027	,000	,001	3939,980	4035,446	232,232	264,045
2	Germany	,011	,012	,011	,006	37671,830	38175,789	1895,696	2083,835
3	Spain	,017	,019	,009	-,018	14249,450	15533,323	539,002	674,442
4	France	,022	,022	,002	,006	22958,480	23658,839	1305,677	1511,013
5	Italy	,022	,020	,002	-,009	21698,130	22548,436	1091,544	1208,784
6	NL	,001	,027	-,014	,006	7426,220	7676,168	366,886	435,805
7	Austria	,014	,019	,013	,004	3973,450	4035,877	186,839	213,769
8	Portugal	,023	,020	,003	-,006	4628,680	4775,386	105,389	122,630
9	Finland	-,005	,021	-,030	,009	2127,700	2217,053	109,816	139,988
1	Minimum	-,005	,012	-,030	-,018	2127,700	2217,053	105,389	122,630
	Maximum	,023	,027	,013	,009	37671,830	38175,789	1895,696	2083,835
	Std. Deviation	,009744	,004522	,013612	,008992	12081,4593	12320,94161	637,036052	703,700281

The curve estimation for nominal wage growth and country size is not significant in the period preceding the introduction of the single currency, neither the linear nor the quadratic function (Table 3). This result should be taken to suggest that, from 1994 to 1999, there is no relationship whatsoever between wage growth and country size. Instead, the correlation becomes robust under the EMU regime. Table 2 indicates that over 55% of the variation in wage growth is explained by the square of country size, a result that confirms the hypothesised non-linear relationship between these two variables. Linearity is significant too but it accounts for a more modest 40% of the variation in total wage growth. Reinforcing the view that EMU membership is responsible for this non-monotonic correlation between wage growth and country size is the fact that, once three non euro-zone members are included in the sample (i.e. Denmark, Sweden and United Kingdom), the results are still significant but the adjusted R-square of the quadratic function is a more modest 0.42 against the 0.55 registered for EMU countries only¹⁰.

TABLE 3. NOMINAL WAGE GROWTH AND COUNTRY SIZE: CURVE ESTIMATION

NOM. WAGE GROWTH	1994-1999		2000-2005	
	Linear	Quadratic	Linear	Quadratic
Sig.	,397	,256	,066*	,089*
(Constant)	,937	,198	2,388	2,128
Adjusted R-Square	,104	,365	,403	,553

Key = * significant at the 5% to 10% level; ** significant at the 1% to 4% level.

Interestingly enough, there is no significant statistical relationship between real wage growth and country size, neither linear nor quadratic, and this throughout the period from 1994 to 2005 (Table 4).

TABLE 4. REAL WAGE GROWTH AND COUNTRY SIZE: CURVE ESTIMATION

REAL WAGE GROWTH	1994-1999		2000-2005	
	Linear	Quadratic	Linear	Quadratic
Sig.	,235	,497	,858	,288
(Constant)	-,704	-,938	,056	,818
Adjusted R-Square	,194	,208	,005	,340

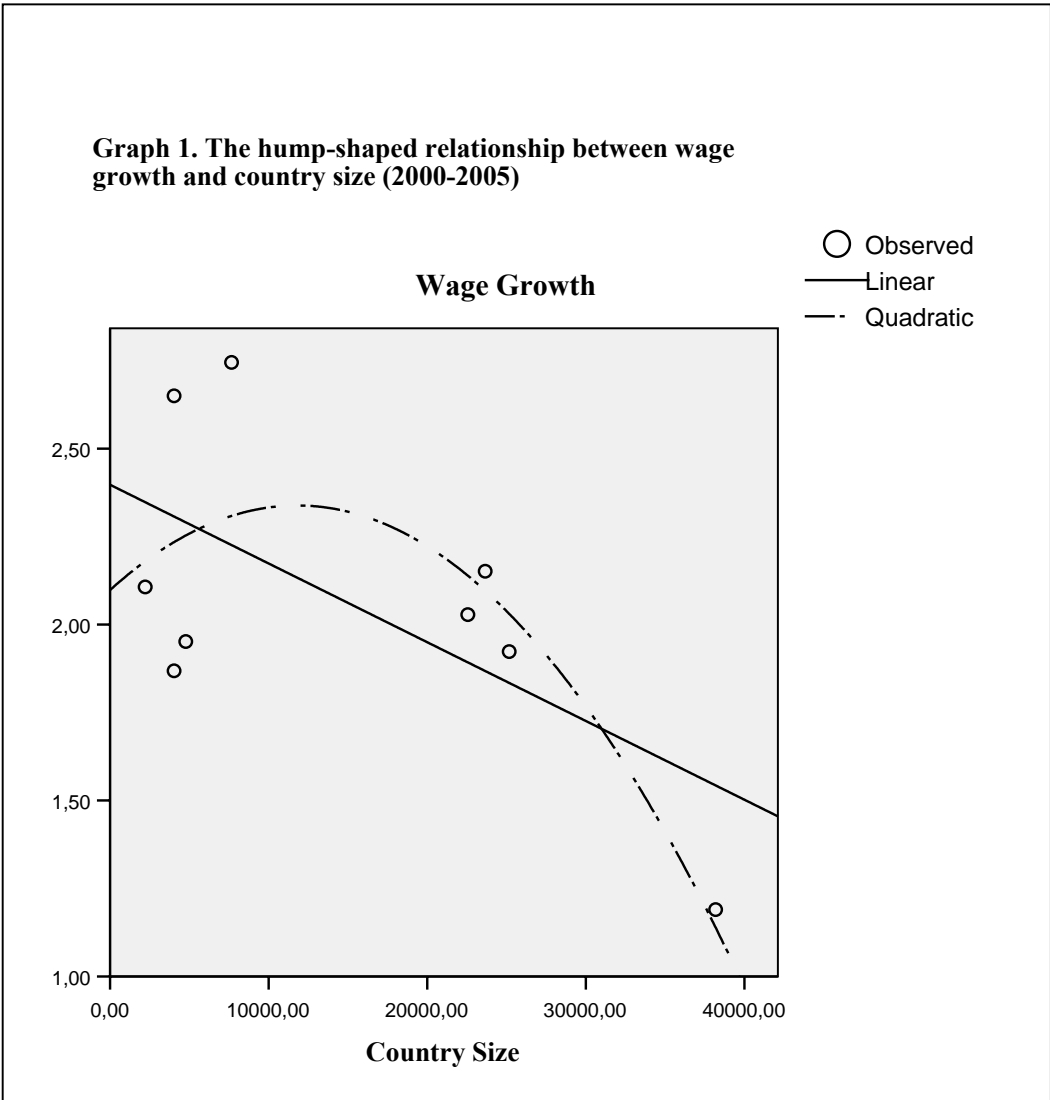
Key = * significant at the 5% to 10% level; ** significant at the 1% to 4% level.

¹⁰ It should be further noted that the relationship is not statistically significant when country size is measured in terms of gross national income at 2000 prices.

That nominal wage growth is significant but real wage growth is not is a theoretically interesting result insofar as it confirms, firstly, the Keynesian view that unions tend to bargain over nominal wages and, secondly, that monetary policy may indeed have an impact on wage growth, an argument that is at the root of this paper. It is interesting to note that this is exactly the aggregate the ECB seems mostly responsive to:

“The extent to which an increase in nominal wage growth leads to upward pressure on inflation depends crucially on trend labour productivity growth. Under normal circumstances, stronger labour productivity growth would justify an increase in nominal wage growth, thus allowing wage earners to participate in economic growth without adding to inflationary pressures. But for the same reason, without sustained improvements in labour productivity higher nominal wages would not lead to improvements in real purchasing power, but fuel inflationary pressures (Trichet 2007)”.

Graph 1 is a representation of the correlation between nominal wage moderation and country size and elucidates well the hump-shaped relation hypothesised.



4. AN ECONOMETRIC EXERCISE BASED ON AVERAGES

To test the argument hypothesised above, I estimate ordinary least squares (OLS) regressions, for the pre-EMU and post-EMU period, of the following form:

$$\Delta W = \beta_1 S + \beta_2 \text{SizeQuad} + \beta_3 \text{Density} + \beta_4 \text{IntraEMU} + \varepsilon$$

where ΔW , the dependent variable, is the average percentage change in nominal wages minus productivity in $t-1$ minus employment growth, which will be calculated for the period before and after the introduction of the single currency; S is the average size of each country measured in terms of total employment; SizeQuad is the square of size; openness is the average contribution of trade to GDP formation; Density is the portion of employees who are union members and is used as a proxy for coordination; Intra-EMU trade is the percentage of exports towards other EMU countries over total exports¹¹.

I do not expect the first variable S it to be significant under EMU as the relationship between wage growth and size should be non-monotonic. Instead, the square of size should be statistically significant and bear a negative sign to confirm the hump-shaped wage-size relationship. The variable about density looks at the role of labour market institutions in wage formation processes.

Table 5 presents the results from the OLS regression for the period from 1994 to 1999 and from 2000 to 2005 for euro-area countries only. Model 1 for both the pre-EMU and the post-EMU period estimates the relationship between nominal growth, country size and the square of size. The results confirm the existence of a link between wage developments and the size of the labour market. In particular, the hump-shaped pattern is well manifest in both periods but more significant under EMU than before the introduction of the single currency with a *p-value* of 0.15 against 0.29 in 1994-1999. Moreover, the hump is more pronounced in 2000-2005 than in the previous period with a negative coefficient of 7.1 against 4.5. Throughout the period from 1994 to 2006, country size explains about 70% of the variation in nominal wage growth, whether in a monotonic or non-monotonic fashion.

Model 2 adds labour market institutions. The variable for density is significant under EMU and not in 1994-1999. Dissimilarly to Posen and Gould (2006), who find that monetary credibility has an impact on wage developments independently of the structure of labour markets, these results confirm my working hypothesis, for which the non-accommodating stance of the ECB should bite and force unions in large countries into delivering wage restraint only in highly centralised bargaining system. The sign of the estimated coefficient

¹¹ I have left cyclical variables out of the picture in light of the fact that the recent literature has been stressing the lack of a strong link between cyclical positions and wage developments. If they do, then the elasticity of wages to unemployment is of about 30% (Arpaia and Pichelmann 2007), which is probably but not sufficient to flatten the hump in the curve.

is but opposite from the one expected. Nevertheless, this outcome may depend upon the limited number of observations and the modest size of the sample is also not allowing a further test on this hypothesis, which would require adding an interaction term to check whether it is true that wage growth and coordination in collective bargaining are negatively correlated in large countries, yet not necessarily so in small economies.

Model 3 includes also the lever of intra-EMU trade. Interestingly enough, the variable is significant only under EMU even if it does not bear the expected sign. Again, this result should be treated with caution as it is likely to depend upon the limited number of observations.

TABLE 5. OLS ESTIMATIONS: BASIC DETERMINANTS OF NOMINAL WAGE GROWTH BEFORE AND AFTER EMU

	1994-1999			2000-2005		
	(1)	(2)	(3)	(1)	(2)	(3)
Size	0.00 (0.00)**	0.00 (0.00)**	0.00 (0.00)	0.00 (0.00)**	0.00 (0.00)**	7.20 (0.00)
Size Quad	-4.5 (0.00)**	-4.6 (0.00)*	-2.4 (0.00)	-7.1 (0.00)**	-4.7 (0.00)**	-2.0 (0.00)* _b
Density		-0.001 (0.09)	-0.012 (0.014)		0.03 (0.07)**	0.015 (0.05)**
Intra-EMU			0.018 (0.017)			0.023 (0.06)**
Adjusted R-Square	0.718	0.672	0.680	0.707	0.916	0.974
Number of observations	9	9	9	9	9	9

Key = * significant at the 5% to 10% level; ** significant at the 1% to 4% level; all other estimates are significant at the 1% level. b = significance of 0.106.

Whatever the model adopted and in spite of the very limited number of observations, the important result that emerges from Table 4 is that the hypothesised non-monotonic relationship between wage growth and country size is robust. Whilst wage moderation is a fairly generalised phenomenon in EMU, large, intermediate and small countries have different motivations for restraint. In large countries, excessive wage settlements are particularly detrimental to employment under the new monetary regime. Since wage and price developments in large countries can potentially affect average inflation in the euro-area, lack of moderation is likely to produce a restrictive monetary response by the ECB. An interest rate hike would not only dampen aggregate demand at home, but also in the rest of the euro-zone and thereby affect large countries' exports towards the other monetary union members. 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 than 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 (Carlin et al 2001), if not because countries hardly produce perfect substitutes, but the dampening effect of a monetary restriction on demand abroad is *certain*. Finally, in countries of intermediate size, the impact of national wage and price developments on average inflation in the euro-zone 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. TESTING ROBUSTNESS WITH PANEL DATA ANALYSIS

So as to check the robustness of my previous results, I use here panel data to estimate the effects of a few key independent variables on nominal wage growth. The analysis relies on a linear regression with panel-corrected standard errors and a panel-specific form of autocorrelation based on Durbin-Watson. The overall econometric model is of the following form:

$$\Delta W = \beta_1 \text{SMALL} + \beta_2 \text{INTERM.} + \beta_3 \text{BIG} + \beta_4 \text{Density} + \beta_5 \text{Openness} + \beta_6 \text{IntraEMU} + \varepsilon$$

where *SMALL*, *INTERM.*, *BIG* are three dummy variables to represent country size; these dummies have been created to account for the fact that the size-variable is completely discrete. *Density* is the portion of employees who are union members; as highlighted above, this is not an ideal measure for LMI in this specific research context, but it is the only labour market indicator for which it is possible to extrapolate yearly values and is used here as a proxy for coordination. *Openness* is the yearly contribution of trade to GDP formation. *Intra-EMU* is the share of total exports directed to other euro-zone countries.

The estimation results for the period from 1994 to 2005 are presented in Table 6. Column 1 displays the results from a base specification that tests the relationship between wage growth and country size, whilst not controlling for any other variable.

The estimated coefficients on the three dummy variables (*SMALL*, *INTERM.* and *BIG*) are all significant at a level between 0% and 1% (*p-values* are 0.003, 0.000, and 0.018 respectively). Most interestingly, these estimates form a hump-shaped pattern as they rise from a value of 1.57 to 2.05 and then decrease down to 1.12 for big countries, reinforcing our assumption that wage growth is slower-than-average in small countries, yet, not as much as in large countries. These results are fairly robust considering that they are insensitive to the model used¹². It should be noted, however, that the German case is unequivocally driving the results. As a matter of fact, when including three other EU countries that are not part of the euro-area (Denmark, Sweden and UK), the dummy for big countries -which includes not only Germany but also the UK- loses its significance. This is in line with the general argument of the paper, for which the hump-shaped relationship

¹² Only in model (3) "SMALL" loses some of its statistical significance.

between wage growth and country size is a prerogative of euro-area members, as well as with its strong empirical approach as in fact Germany is the only EMU country that could possibly condition the reaction function of the ECB, given its size, the structure of its labour market institutions and unions' familiarity with a setting of strategic interaction with monetary authorities (Soskice 1990; Hall 1994).

Model 2 adds density to the three dummy variables. The estimated coefficients on the variables for size are all highly significant with *p-values* of 0.000. Moreover, they confirm the hump-shaped pattern already revealed in model 1. Density is equally significant (*p-value* of 0.000) and the sign of the coefficient confirms the Calmfors' and Driffil's hypothesis, for which higher levels of coordination are associated with greater wage restraint because encompassing unions tend to internalise the negative externalities from excessive wage settlements in the presence of a non-accommodating monetary authority.

Finally, model 3 incorporates two additional independent variables: openness and intra-EMU trade. The estimated coefficients on the three dummy variables SMALL, INTERM. and BIG are by and large significant, even if to different degrees (*p-values* are 0.112, 0.015, and 0.085 respectively) and confirm the non-monotonic relationship between nominal wage growth and country size. Density is also highly significant (*p-value* of 0.012) and confirms its negative sign. Openness is significant and positively correlated with wage growth, thereby suggesting, in contrast with Romer (1993), that wage inflation is greater in more open economies. There are two possible explanations for this awkward result: either is freer trade a driver of labour market conditions and thus of wage growth (see OECD 2005) or labour unions in open economies are less wary of their wage behaviour considering that a large portion of the domestic price level is determined abroad (Daniels et al 2006). Intra-EMU is significant even if to a lesser extent than openness (*p-value* of 0.062 against 0.002 for openness) arguably because the sample includes the entire 1994-2005 period, whilst the working hypothesis behind the present exercise is that trade within the euro-area becomes a crucial variable only under EMU. Nevertheless, the sign is as expected suggesting that wage growth is modest especially in those countries that entertain dense trade relations with other EMU countries not least because a monetary restrictions would dampen demand across the entire euro-area.

TABLE 6. PANEL DATA: BASIC DETERMINANTS OF NOMINAL WAGE GROWTH, 1994-2005

	1994-2005		
	(1)	(2)	(3)
SMALL	1.57 (0.53)**	2.16 (0.30)**	3.00 (1.9) ^a
INTERMEDIATE	2.05 (0.26)**	2.29 (0.01)**	4.00 (1.65)**
BIG	1.12 (0.47)**	1.54 (0.28)**	2.77 (1.61)*
Density		-0.15 (0.00)**	-0.03 (0.01)**
Openness			0.03 (0.01)**
Intra-EMU			-0.05 (0.03)*
R-Square	0.37	0.38	0.48
Number of observations	108	96	90

Panel-corrected standard errors in parenthesis; key = * significant at the 5% to 10% level; ** significant at the 1% to 4% level; a = the *p*-value for small is only slightly above the 10% level (0.112)

The results in table 5 refer to the entire period from 1994 to 2005. To better gauge the EMU effect, I have then conducted two separate estimates, one for the period 1994-1999, and one for 2000-2005. Constrained by the modest number of observations, I have left the dummies for size out in order to focus on the interaction terms that should be revealing of the two basic assumptions behind this paper. The new estimation model is as follows:

$$\Delta W = \beta_1 \text{Density} + \beta_2 \text{Openness} + \beta_3 \text{IntraEMU} + \beta_4 \text{Size} * \text{IntraEMU} + \beta_5 \text{Size} * \text{Density} + \varepsilon$$

where Size*Intra-EMU trade is an interaction terms that links size and intra-EMU trade to test whether large countries are more wary of wage developments when they entertain intense trade relations with the rest of the euro-zone; Size*Density is again an interaction term, which aims to assess where country size matters only in rising union density.

The estimation results are presented in table 7. Model 1 focuses on the interaction between country size and size of intra-EMU trade. The results are fairly awkward in this case. Both openness and intra-EMU show to be significant variables throughout the period. The interaction term size * intra-EMU is not significant, but it is nonetheless worth noting the variable has a better significance value under EMU than earlier and that it assumes the expected value in 2000-2005.

In Model 2, I substitute size * intra-EMU with size * density. Here, density and openness confirm significant in the determination of wage developments. In line with my initial hypothesis, the interaction between country size and collective bargaining systems is not significant in 1994-1999 but becomes very significant after the introduction of the single currency. This is there to suggest and confirm that, under the EMU regime, wages decrease in rising size and more so where a larger share of the labour force is unionised, which in this instance can be used as a proxy for coordination.

TABLE 7. PANEL DATA: BASIC DETERMINANTS OF NOMINAL WAGE GROWTH BEFORE AND AFTER EMU

	(1) 1994-1999	(2) 2000-2005	(1) 1994-1999	(2) 2000-2005
Density	-0.07 (0.006)	-0.003 (0.11)	-0.13 (0.005)**	0.10 (0.003)**
Openness	-0.01 (0.006)**	0.01 (0.06)*	0.35 (0.005)**	0.30 (0.12)**
Intra-EMU	0.03 (0.007)**	0.03 (0.015)*	-0.08 (0.005)	-0.00 (0.008)
Size * Intra EMU	2.33 (1.88)	-2.88 (2.24)		
Size * Density			1.49 (2.08)	-7.93 (3.40)**
Adjusted R-Square	0.16	0.69	0.16	0.70
Number of observations	41	41	41	41

Panel-corrected standard errors in parenthesis

Key = * significant at the 5% to 10% level; ** significant at the 1% to 4% level.

CONCLUSIONS

The results herewith achieved have far-reaching implications. First, from a theoretical perspective, it seems relevant that unions tend to bargain over nominal rather than real wages. Models that support the argument that union behaviour is pivotal to the determination of equilibrium unemployment imply that labour unions, whether monopoly or atomistic, bargain over real wages and thus care for inflation only insofar as this determines their real wage. Nevertheless, it is probably realistic to assume that, at relatively low levels of inflation, which is a feature of the EMU regime, unions are less sensitive to inflation per se, whilst but wary of the real impact of monetary policy. They thus refrain from excessive nominal wage settlements as these would precipitate a reaction by the most inflation-averse actor of the economic system, i.e. the ECB. A monetary restriction would in fact produce more unemployment leading to a fall in the bargained real wage. Second, the present research results imply that the EMU regime is far from being an unconditional blessing. A one-size-fits-all monetary policy comes in fact with significant distributional consequences depending on country size. The largest EU labour market, Germany, is

constrained in a straight-jacket. German wage bargainers have been refraining from excessive nominal wage settlements as their behaviour has the potential to affect average price conditions in the euro-zone and to induce the ECB to react with an interest rate hike. As the latter would concern the euro-area as a whole, the costs are diffused across categories, involving simultaneously national consumers, investors, and export-oriented sectors. Certainly, slow economic growth has contributed itself to moderate wage developments in Germany. Yet, whilst the EMU regime and output fluctuations have been pushing wage growth in the same direction, greater risks lie ahead now that German economic growth is moving back towards the upper side of the cycle. In the boom, national wage bargainers will be induced to share rents with employers, but they will nonetheless remain subject to the constraint of the EMU regime and the fear that the ECB punishes them with a monetary restriction.

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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
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_n ; W_r	Negative	It concerns the EU as a whole
Size	W_n ; W_r ; $W_n - \alpha$; $W_r - \alpha$	Non-linear	It concerns EMU only
Intra-EMU trade	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

Nominal wage growth and labour tax
2000-2005

**NOM. WAGE
GROWTH**

	Linear	Quadratic
Sig.	,906	,886
(Constant)	2,086	2,083
Adjusted R-Square	,002	,040

Key = * significant at the 5% to 10% level;
** significant at the 1% to 4% level.

