Models of Unionism, Unemployment and the Wage Bargaining Process[†]

DANIELE CHECCHI (University of Milan and IZA)
LUCA NUNZIATA (University of Padua and IZA

present version: July 2009

Abstract

We investigate the problem of simultaneous determination of labour market institutions and outcomes in single equation multi-country estimations by presenting an empirical analysis of unemployment, union density and wages in 20 OECD countries. When explicitly modelling endogeneity, our results suggest that unions play a more relevant role in explaining unemployment than what previously thought. In addition, the impact of wages and unemployment in explaining union density is larger than what predicted by single equation estimates, and wages are shown to react more to changes in unemployment. Our analysis shows that country heterogeneity is relevant in such estimations. We partition OECD economies into three groups according to the feedbacks between unemployment and union density.

JEL codes: E24, J51, J31.
Keywords: unemployment, unions, wages, labour market institutions, system estimation, endogeneity.

[†] We wish to thank Christian Haefke and other participants to the IZA Workshop on Labour Market Institutions, to the EALE 2006 conference in Prague, to the EAEPE 2006 conference in Istanbul and to the conference held at the University of Milano-Bicocca (2008). Financial support from the Italian Ministry of Education and Research (COFIN project) is gratefully acknowledged. The usual disclaimer applies.

1. Introduction

In recent years we have witnessed a growing literature on the impact of labour market institutions on labour market performance. This has resulted in a number of multi-country models aiming at estimating an empirical relationship between institutions and a labour market performance variable that has generally taken the form of the standardized unemployment rate. The labour market institutions most widely used in this setting are unemployment benefit provision, employment protection regulations, the tax wedge and trade union bargaining power[1], each measured by a number of aggregate variables and indicators mostly produced by the OECD and other researchers. A recent literature review by Bassanini and Duval (2009) suggests that unemployment benefits and the tax wedge are the most significant institutions affecting unemployment, this result applying across alternative population groups. In some cases the empirical literature has been unable to pin down clear directions of impact. For example, it is still not very clear which is the direction of the effect of EPL on average employment, although much more is known about the implications in terms of employment adjustment speed and employment rates of new entrants in the labour market. For what concerns trade unions, the literature does not seem to suggest an unemployment-enhancing role. The theoretical literature usually regards unions as raising unemployment and reducing labour input, through wage rise above competitive levels (Nickell et al. 2005, Besancenot and Vranceanu 1999). These effects are, however, offset if unions and employers coordinate their wage bargaining activities (Nickell et al 2005). Other papers are less clear-cut (Bertola, Blau and Kahn 2001, Baker et al. 2005).

One possible limitation of previous studies in this literature is that multi-country models estimating unemployment as a function of labour market institutions implicitly assume labour market institutions as super-exogenous[2]. This is to say that institutions do not depend on the state of the labour market and estimated parameters are independent of changes in policy. However this simplifying assumption is often contradicted by our knowledge of how institutions are determined. If institutions are coordinating devices that are introduced and modified as optimal answers to market failures, they cannot be taken as fully exogenous to market outcomes. In addition institutions come in clusters, and therefore different institutional aspects can be characterised by either substitutability or complementarity (Amable 2003).

In general, changes in institutions respond to changes in political equilibria, to macroeconomic shocks, or a combination of the two. Botero et al (2004) suggest that the institutional framework of a country (including labour regulations such as employment protection, collective bargaining and social security) depends on the stage of development, as well as on the legal tradition of the country, while the political orientation of the government seems to play no role. Other authors have focused on the potential endogeneity of single institutions. Saint Paul (1996) explores the role of the median voter in determining the degree of employment protection while Di Tella and MacCulloch (2002) analyze the determinants of unemployment benefits. Checchi

[1] See Nickell, Nunziata and Ochel (2005) for a description of each empirical indicator.
[2] See Engle et al (1983).

and Lucifora (2002) treat union density as endogenous and analyse how other institutions play a role of union-complement or union-substitute across European countries. Bertola and Koeninger (2004) find that a more reduced dispersion and volatility of labour income (through employment protection, unemployment benefits and wage compression) is more prevalent in countries where inefficient legal systems restrict borrowing opportunities. In each of these frameworks, unemployment (or more precisely unemployment risk) is considered as one of the determinants of institutions.

More generally, under a political economy approach all institutions should be considered endogenous. Potentially, this may then result in biased and inconsistent estimates when endogeneity is not correctly modelled. Even if we were to give to the endogeneity problem an omitted variable interpretation, the inclusion of country fixed effects may account only for the omission of time invariant unobservable factors while some relevant omitted factor may actually vary over time. A practicable remedy would be to instrument institutions in the (un)employment equation and apply 2SLS[3]. However this would still be an inefficient procedure because we would concentrate on a single equation when the true model is one where institutions and unemployment were simultaneously determined.

The approach of this paper is to investigate the problem of potential endogeneity of one institution, trade union membership, through a multi-equation model of the labour market. Since in principle, all labour market institutions [in addition to union density (UD), we may consider the degree of coordination in wage bargaining (CO), employment protection regulations (EP), unemployment benefit replacement rates and duration (BRR, BD), the tax wedge (TW)] are potentially endogenous to changes in unemployment, a system of equations modelling the labour market should then incorporate an equation for each potentially endogenous institution. This would result in a system of unmanageable dimensions that would not be of much help in resolving the problem of biased and inconsistent estimates. In addition, it would be hard, if not impossible, to device appropriate identifying restrictions for each equation describing an institution. In order to build a meaningful model, we need therefore to reduce the system to a manageable dimension, and one way of doing this is to select a (possibly not so large) subset of institutions that we reckon being more likely to be endogenous in an unemployment model. In order to do that we have to think more carefully about how institutions are determined, and possibly introduce some meaningful assumptions. We can roughly select two groups of institutions:

i) institutions that are products of a political deliberation process,

ii) institutions that are the result of decentralized decision making.

We can reasonably assume that the latter group responds more rapidly to changes in the labour market. Employment protection regulations, taxation, minimum wage and unemployment benefit policies are all determined inside national or regional parliaments and therefore are affected by political factors such as the

[3] See Nunziata (2005) for a similar approach in analysing OECD wages. The instruments used in the paper are political variables such as government composition and percentage of left and right seats in parliament.

timing of elections and political deliberations, voters' preference structure, the policy makers' agenda, the existence of stable political equilibria. They evolve at a slower pace than macroeconomic variables, being the product of political processes that do not necessarily (or directly) depend on the status of the economy only. On the contrary, union membership rates (i.e. the ratio of union member to dependent employment) in each country are indeed the product of the decision-making of each single worker, a process happening in real time and therefore more likely to be empirically correlated with the status of the economy or with the perception that each worker or cohorts of workers have of the benefits of joining a union in alternative economic environments. Concentrating on union density as the institutional variable most affected by endogeneity seems therefore a reasonable starting point to tackle the issue of endogeneity of institutions in multi-country models.

There are several theoretical reasons accounting for positive as well as negative association between union density and unemployment. If we consider union density as predetermined, in an imperfect competition framework an increase in union membership raises union bargaining power and, as a consequence, their wage claims. A rise in the bargained wage yields an overall increase in unemployment, thus creating a positive correlation among the two variables (Nickell and Layard 1999). In addition, changes in union density may affect the quality of the relationship between employers and employees, therefore influencing unemployment through different channels than the wage (Blanchard and Philippon 2004); but membership can also be determined by the degree of mutual trust, which in turn may be generated by public regulation (Aghion et al. 2008). Nickell et al (2005) show that labour market institutions explain a relevant portion of changes in OECD unemployment since the 1960s. However, considering the contribution of institutions and macroeconomic shocks, in a single equation model with an AR(1) error component, the role of union density is found marginal with respect to other dimensions such as taxation and unemployment benefits. In addition, higher coordination in wage bargaining seems to reduce the positive correlation between union density and unemployment. Similarly, Bassanini and Duval (2009) do not find any direct effect of unions' bargaining power (as proxied by union density) onto unemployment, whereas they find support for a significant role of various measures of corporativism and/or centralisation of the wage bargaining. When interacted with labour demand shocks, union density seems to exhibit a positive correlation with unemployment, despite the finding is not robust to alternative model specifications.[4]

On the other hand, Checchi and Lucifora (2002) treat unemployment as predetermined and explain the demand for union protection in terms of macroeconomic cyclical indicators (proxied by inflation and unemployment rates), compositional effects (gender, age and sector composition of the labour force) and other competing labour market institutions, discussing their potential complementarity/substitutability impact.

[4] This finding is sensitive to the different measures adopted for the other institutional variables (see Blanchard and Wolfers, 2000). When taking into account wage dispersion, the correlation is always statistically insignificant (see Bertola, Blau and Kahn, 2001). Blanchard (2006) provides a comprehensive survey of the recent literature on the relationship between institutional measures and unemployment.

They argue that whenever unions are perceived as providing workers' insurance against unemployment risk (Burda, 1990), higher unemployment has a positive impact on union density. This applies only in countries where unions provide effective insurance (as in the so called "Ghent countries" - Iceland, Finland, Belgium, Sweden and Denmark - where unions are involved in managing the unemployment benefit schemes - see Holmlund and Lundborg, 1999), whereas for all other institutional contexts, the correlation between the two variables is negative, because greater unemployment weakens the bargaining power of unions, thus reducing the incentives to join them. Colonna (2008) stresses the discretionary protection offered by unions legally disputing supposedly wrongful dismissal, and he suggests a negative correlation between arrival rate of job offers (equivalent to a positive correlation with unemployment) and union membership. In the sociological literature Western (1997), Lange and Scrugg (1999) and Oskarsson (2001) find similar results, confirming a negative correlation between unemployment and union density. Finland is an interesting case, since the erosion of the Ghent system accounts for the decline in union membership rates, changing the sign of the correlation between unemployment and density into positive (see Böckerman and Uusitalo, 2006). More generally, unions have been proved able to adapt to different institutional environments, preserving their action in reducing competition among workers and rent extraction vis a vis the employers (Boeri et al, 2001).

In order to infer a meaningful causal interpretation from these studies we have to rely on the assumption of exogeneity of institutions on the one hand, and of unemployment on the other. However, if we are ready to believe that these empirical models are informative about the actual processes generating unemployment and union density, then we should also be ready to admit that estimating each of these models separately may result in a set of biased and inefficient estimates..

2. Empirical analysis

We conduct our analysis for the 20 major OECD countries (Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, United States) observed over the period 1964 – 2000.[5] Data sources and descriptive statistics are reported in table 1.

We study the simultaneous determination of unemployment, union density and wages. We restrict to these three variables because they provide a complete description of the labour market (dis)equilibrium (unemployment and wage) as well as of the potentially endogenous determination of decentralised labour market institution (union density), while considering all remaining institutional variables (unemployment subsidy, employment protection, tax wedge) as purely exogenous. In addition, we aim at testing the presence of potential heterogeneous patterns in the relationship between union density and unemployment across these

[5] Our sample is unbalanced, with an average of 34 observations per country and a maximum of 38. Data on Portugal is only available since 1992 for some key variables, like the proportion of males in manual manufacturing jobs over total employment.

countries. Most countries have experienced a significant decline in union density in the last decades, often accompanied by an increase in unemployment. Notable exceptions are the Nordic countries, experiencing an upward trend in density rates, and the Anglo-Saxon countries, with no trend in unemployment (at least starting from the 1980s).

In order to retain comparability with previous literature, we start from single equation estimation for union density in table 2. This table shows that the relationship with unemployment is mediated by unobservable institutional factors, since the correlation changes sign when including country fixed effects. Observable institutional factors that are related with density are employment protection legislation, working as substitute for union presence (Colonna 2008), and unemployment benefit schemes, which seem complementary to unions.[6] However there is clear evidence that union membership is also associated to political participation, as captured by various political variables (among which electoral turn-out and women in politics emerge as the most significant ones). Another variable that is associated to political actions is strike involvement, which exhibit positive and significant correlation with union density (see column 4). However this variable is potentially endogenous, and its interpretation is questionable because it reflects both the attitude of union leaders (whether they pursue an aggressive stance or an acquiescent one) and individual incentives to strike participation. For this reason we provide both versions of the estimates, including and excluding strike involvement. This initial result points to institutional differences in the relationship between unemployment and membership. We could claim that once welfare provision is adequately accounted for, an additional increase of the unemployment risk raises the demand for union protection. Compositional effects, proxied by the share of male industrial employment, take an expected positive sign. The average educational attainment in the population, proxied by the number of years of schooling, could in principle report positive or negative correlations, since on one side better educated labour force is more inclined to defend themselves through individual bargaining, but on the other side most of educated workers are employed in the public sector (education, health), where there is limited managerial opposition. In the present estimates, (average) education of the population show positive correlation with union density.

In table 3 we proceed with single equation estimation for unemployment. Our results are consistent with previous findings in the literature. Looking at the third column and leaving aside macroeconomic determinants (monetary and real shocks), we find a positive contribution of unemployment insurance schemes (as a result of either average duration or replacement rate, or of their interaction), while tax wedge is positive but weakly statistically significant (at 13%). The effect of EPL is positive when one considers the cross sectional variation in the data, however it becomes negative when introducing country fixed effects. Not surprisingly, density and unemployment exhibit positive correlation only when institutional specificities are

[6] When we control for country heterogeneity using the index of hostility of state versus unions in XIX century proposed by Crouch 1993, the correlation turns out negative, but the index is collinear with women representation in parliament, and therefore we dropped this variable.

controlled for using country fixed effects (column 3). However the positive contribution of union membership is attenuated by coordination in wage bargaining (Nickell 1998).

Finally, the labour cost equation reported in table 4 suggests that productivity is the key determinant of wages, as found in previous studies (Nunziata 2005). Controlling for productivity, the tax wedge has a significant positive effect, suggesting (partial) wage resistance. The unemployment rate coefficient has the expected negative sign, suggesting a lower reservation wage when unemployment is higher. The implication of this finding is that a rise in unemployment triggers an adjustment in wages that brings unemployment back to the equilibrium level. Combined with the unemployment equation, these results are fully consistent with a non-competitive model of wage/employment determination (Nickell and Layard, 1999). Also in line with a non competitive wage determination, union membership positively affects the wage bargaining process, with an effect which is even stronger in magnitude.

We now move to the joint estimates of the unemployment, union density and wage equations using 3SLS, with country and time fixed effects. The 3SLS estimator is a GMM estimator with a particular weighting matrix and better finite sample properties that allows for an explicit modelling of endogeneity. Most of the single equations results still hold when the equations are jointly estimated. However we find evidence of some bias of single equation estimation: the 3SLS estimates suggest a more relevant role of unemployment in explaining union membership (the estimated coefficient changes from 0.75 or 0.78, respectively reported in column 3 or 4 of table 2, to 0.59 or 0.90, respectively reported in column 1 and 4 of table 5).[7] Similarly the union density coefficient in the unemployment equation more than double, going from an estimate of 0.05 reported in column 3 of table 3 to 0.11-0.12 obtained in the system equation of table 5. This results seem to suggest that single equations estimations assuming exogeneity of the key variables tend to be downward biased. In other words, unions play a more relevant role in explaining unemployment, but unemployment may or may not be a relevant factor explaining unions' membership rates. As regards the wage equation, both union density and unemployment rate are significantly different from zero, suggesting that the labour market adjustment mechanism works as predicted by the theory (Nickell 1998). As far as the other institutional variables that are assumed as fully exogenous, we observe that tax wedge exhibit a positive correlation with real wage, suggesting net wage resistance, and a weak positive correlation with the unemployment rate. Unemployment benefit schemes (in terms of either replacement or duration) seem to shift out the equilibrium combination of our endogenous variables, being associated to higher union density (complementarity), higher unemployment and higher wage. Eventually employment protection legislation is uncorrelated with unemployment, but reports negative significant correlation with union density (substitutability) and labour costs. Each equation is identified using the regressors we have already shown being statistically significant in OLS single equation estimation. Union density is characterised by variables related to political participation,

[7] This range of estimates is due to the exclusion/inclusion of strike involvement among the explanatory variables in the union density equation.

articulated in terms of election turnout, left voting and political participation. As we have already discussed above, strike involvement could be considered as an additional indentifying variable of the density equation, and for this reason we both exclude it in system equation (columns 1 to 3 of table 5) and include it (columns 4 to 6 of table 5). The main difference between the two versions is the statistical significance of union density in wage determination, which seems related to the push element associated to strike activity. The unemployment equation is mostly identified by demand and cost shocks, whereas the wage equation is identified by long run productivity trends. The logic behind our jointly estimated system can be illustrated as follows:. Unemployment and union density on one side, and wage and union density on the other, both represent two self-sustaining mechanisms. Each of them feeds back positively, thus depicting cumulative processes which induce unstable dynamics. An exogenous positive shock to density may activate a destabilising process, through progressive increases in wages and unemployment, both reinforcing the initial increase in union density. However, the system is stabilized by the negative impact of unemployment onto wages, which may soften (and even invert) the cumulative process of wage increases.

3. Country heterogeneity

These results have been obtained imposing a homogeneous structure on the coefficients, i.e. assuming that the correlations between the variables are the same in every country in the sample. This is an extremely strong assumption, though often introduced in multi-country estimations. However, many authors in the literature have stressed the importance of considering (labour market) institutions as part of a comprehensive social model rather than single dimensions that can be separated from the context. Assuming homogeneous coefficients may then give a misleading perception of a unique modus operandi of market economies, which is heavily disputed by some political economists. For example Hall and Soskice (2001) distinguish between liberal market economies (LME) and coordinated market economies (CME) according to the type of relationships between firms and within each firm. Among the former group they list United States, United Kingdom, Australia, Canada, New Zealand and Ireland, while in the latter they include Germany, Japan, Switzerland, the Netherlands, Belgium, Austria and the Nordic countries (Denmark, Finland, Sweden and Norway). Amable (2003) combines factor and cluster analysis in order to characterize alternative models of capitalism. When concentrating on a set of dimensions including product markets, labour markets, finance, welfare and education, five groups of countries are identified: market-based economies (akin to LMEs of Hall and Soskice: Australia, Canada, United Kingdom and United States), the social-democratic model (the Nordic countries except Norway), the continental European model (Switzerland, Netherlands, Ireland, Belgium, Norway, Germany, France and Austria), the Mediterranean capitalism (Greece, Italy, Portugal and Spain) and the Asian capitalism (Japan and Korea). The OECD Economic Outlook (2004b) provides a classification of countries in terms of degree of coordination/ centralisation of wage bargaining. According to this perspective, a

vast group of countries exhibits high levels in coordination/centralisation (CC). This group includes Denmark, Finland, Norway, Portugal, Spain, Sweden, Australia, Austria and Ireland. Another group is characterized by an intermediate degree of CC (Belgium, Germany, New Zealand, Switzerland, Netherlands, United Kingdom, and Japan). A final small group is decentralised (France, Italy, Canada, Korea and United States).

Instead of superimposing one of these pre-existing classifications to the analysis of the relationship between union density, unemployment and wage determination, we prefer to let the data speak by allowing for general heterogeneous effects among the variables. In other words, without imposing any restriction on the degree of heterogeneity in the model we let the impact of union density and unemployment rate vary across countries, therefore allowing the data suggest alternative social frameworks across countries. We retain the assumption of homogeneous coefficients in the wage equation in order to keep the problem to a manageable dimension. We then estimate our system using 3SLS through a recursive procedure, where both density (UD) and unemployment (UR) are endogenous but imposing a set of perturbations in the coefficients that allow some degree of heterogeneity across countries. We end up having 20 coefficients for UD and 20 coefficients for UR, estimated under the assumption of endogeneity.[8] We plot these perturbed estimated coefficients in order to check detectable patterns across countries in the mutual influence of union density and unemployment (see figure 1). In terms of the interplay between unemployment and union density we can identify at least two groups of countries in figure 1. In the south-east quadrant we have what could be described as the "union decline" scenario: unions producing high unemployment, and by doing so eroding their base of support. This union type is what Burda (1990) termed the "Cheshire cat" union. The United States are a typical example of this occurrence. On the contrary, in the north-west region of the graph, we have the "union rise" scenario. In this case an increase in unemployment has a positive impact on union density, either through appropriate institutional arrangements (like the unemployment benefit system managed by unions - the so-called `Ghent' system) or by affecting the union attitude in the bargaining process. At the same time, unions are sufficiently coordinated and/or centralised to exert a negative impact onto unemployment (other

[8] Modelling coefficient heterogeneity under potential endogeneity of the related variables is complicated by the lack of degrees of freedom: we would need to estimate 20 coefficients for union density in the unemployment equation plus 20 coefficients for unemployment in the union density equation, all of them being potentially endogenous. This would result in the impossibility to identify such a large system. In order to solve this problem, we estimate the model in its simplest form adding a set of 19 interactions between union density and the country dummies in the unemployment equation, excluding one country chosen from our sample, say, Australia. Similarly, in the union density equation we add 19 interactions between unemployment and the country dummies, once again excluding Australia. In this case we retain the assumption of endogeneity (for Australia), but the coefficient is perturbed by the set of interactions (the remaining 19 countries) that are assumed exogenous. We repeat this procedure recursively for all countries, excluding one country at a time from the interactions and we end up having 20 coefficients for union density and 20 coefficients for unemployment, estimated under the assumption of endogeneity. A similar excercize using a SURE procedure and modelling heterogeneity by means of country by country dummies interacted with the relevant variables has been performed, yielding very similar results.

things remaining constant). The quadrant includes the Nordic countries (Denmark, Finland, Sweden and Norway) plus Canada, with Belgium, Spain, and Italy being close.[9]

When considering the dynamic properties, the stability of the system (estimated under the assumption of homogeneous coefficients) was assured by the negative unemployment coefficient in the wage equation. When allowing for heterogeneous coefficients, the two scenarios depicted above are characterized by an additional stabilising mechanism. For example, in the "union rise" world, an expansion of union density reduces unemployment, which in turn diminishes the incentive to become union member. In the "union decline" scenario a stronger union keeps unemployment high, which in turn reduces the support for union membership.

In terms of the Hall and Soskice classification, looking at the spatial distribution in figure 1 we notice that most of the liberal market economies (LME) are in the south-east quadrant and the majority of coordinated market economies (CME) are in the north-west one. Canada is an exception for the latter group, and the Netherlands is an exception for the former one; Japan and Switzerland are also left out, still being classified as coordinated economies. According to Amable's classification, we can read our graph by placing market-based economies in the south-east quadrant and the social-democratic economies in the north-west one, whereas all the other types would we indistinguishable around the origin. However, once again, we are left a bit puzzled by the position of Canada on one side and Netherlands on the other.[10]

4. Conclusions

We have presented an empirical analysis of the joint data generating process of unemployment, union density and wages for 20 OECD countries. We showed that whenever each of these key labour market variables is estimated by means of a single equation multi-country model, the estimated coefficients tend to be downward biased, confirming that endogeneity may be a relevant issue. We focused on the relationship between unemployment and union density, taking into account of the disciplinary role of unemployment onto wage growth. When we model unemployment, union density and wages as jointly determined, our results suggest that unions play a more relevant role in explaining unemployment than what predicted by single equation estimates. In addition, the impact of unemployment in explaining union density is larger and wages are shown to react more significantly to changes in unemployment.

Furthermore, we generalize our model allowing for heterogeneity in the feedbacks between variables, therefore identifying potentially different labour relations systems as suggested by the data. Our empirical

[9] When we repeat the estimation by country subgroups (where groups are identified according to the position in the quadrants of figure 1, we obtain an estimated opposite sign in the coefficient of dUD/dUR, while on the contrary the coefficient dUR/dUD is imperfectly estimated in the two opposite groups.

[10] The country grouping suggested by the OECD Economic Outlook (2004b) provides a rather different clustering which does not superimpose to our graph.

analysis confirms the existence of a relevant degree of heterogeneity in the unemployment-union density relationship. We are able to identify at least two alternative scenarios: one is the "union decline" scenario, with unions producing high unemployment, and by doing so eroding their base of support. On the opposite, we identify a "union rise" scenario where an increase in unemployment has a positive impact on union density, either through appropriate institutional arrangements (like the unemployment benefit system managed by unions) or through a different attitude of unions. Blanchard and Philippon (2004) suggest that the quality of labour relations may account for the perception of the role of unions, and therefore their "credibility" in offering a sort of employment protection to workers. While this promise is recognised as credible in countries characterised by better labour relations (limited resort to industrial conflict), the same promise is discarded in more flexible economies, where unions do not play any significant role. As a consequence, in that case unions are only able to exert wage pressure. According to our grouping of countries, continental Europe lies in between: workers still rely on unions for obtaining some employment protection, but unions are unable (or unwilling) to provide any significant wage moderation, thus being irrelevant with respect to employment determination. Our empirical results confirm and qualify previous findings by Nickell (1997) and Layard and Nickell (1999): union support per se does not necessarily have a positive impact onto unemployment, especially when accounting for the wage impact. On our sample period, this effect is limited to the group of flexible economies, located in North-America and in the Pacific area, while it is reversed in Nordic countries.

Table 1 – Descriptive statistics and data source

Variable	Description	Obs	Mean	Std.	Min	Max
UR	Standardised unemployment rate: OECD standardised unemployment rate	666	6.02	4.31	0.00	24.17
UD	Net Union Density: this variable is constructed as the ratio of total reported union members (gross minus retired and unemployed members), as reported in Visser (1996) and Ebbinghaus and Visser (2000).	666	42.82	19.03	8.30	88.60
WAGE	log(labour cost): Labour cost is defined as w-p=log(IE)-log(ET)-log(P_{GDP}), where IE are compensations of employees by resident producers, namely wages, salaries and social security contributions, ET is total employment and P_{GDP} is GDP deflator at factor cost. All data is from CEP - OECD database, updated by authors using the same criteria, except for P_{GDP} that is calculated from GDP at factor cost, current and constant prices, from OECD Business Sector Database.	666	3.75	1.48	0.11	7.09
TW	tax wedge (proportion): equal to the sum of the employment tax rate, the direct tax rate and the indirect tax rate: $TW=t_1+t_2+t_3$. The employment tax rate t_1 is calculated as $t_1=EC/(IE-EC)$, where EC denotes the employers' total contributions and IE denotes wages, salaries and social security contributions. The direct tax rate is defined as $t_2=DT/HCR$ where DT is the amount of direct taxes and HCR is the amount of households' current receipts. The indirect tax rate is defined as $t_3=(TX-SB)/CC$ where TX are total indirect taxes, SB subsidies, and CC private final expenditures. All data come from London School of Economics CEP - OECD data base, updated using the same criteria.	666	0.48	0.13	0.23	0.83
BRR	benefit replacement ratio (percentage): data is provided by the OECD with one observation every two years for each country in the sample. The data refer to the first year of unemployment benefits, averaged over family types of recipients, since in many countries benefits depend on family composition. The benefits are measured as a proportion of average earnings before tax.	666	42.74	20.55	1.04	88.75
BD	benefit duration (index, 0 - 100): we constructed this index as a difference between the unemployment benefit replacement rate received during the second and third year of unemployment and the unemployment benefit replacement rate received during the first year of unemployment, normalized so that the maximum is 100.	666	78.37	18.89	18.25	101.29
EPL	(permanent) employment protection (index, 0 - 4): OECD provides a time-varying employment protection indicator for the time period 1989-99 (Nicoletti et al. 2000) containing information on legislation changes occurred in European countries in the same period. This piece of information is chained with the cross sectional indicators on permanent employment protection provided by the OECD (OECD Employment Outlook (1999) and (2004a)). The legislation changes occurred before 1989 are taken into account using the information provided by Nickell et al. (2005). Their series is built using an interpolation of the data provided by Blanchard and Wolfers (2000), readjusted in the mean with range (0,4), and is increasing with strictness of employment protection. The latter is constructed chaining OECD data with data from Lazear (1990). Notice that the OECD data, used from 1985 onwards, is	666	1.94	1.12	0.00	4.08

	constructed on the basis of a more extensive collection of employment protection dimensions compared with data used by Lazear.					
COW	wage bargaining coordination (index, 1-3): constructed as an interpolation of OECD data on bargaining coordination. It is increasing in the degree of coordination in the bargaining process on the employers' as well as on the unions' side and it is provided by Nickell et al. (2005).	666	2.10	0.60	1.00	3.00
LD SHOCK	Labour Demand Shock (LD SHOCK). This series consists of the residuals ε_t of the following 20 by country regressions: $\log(ET_t)=\beta_o+\beta_1\log(ET_{t-1})+\beta_2\log(ET_{t-2})+\beta_3\log(ET_{t-3})+\beta_4\log(YQ_t)+\beta_5\log(WTP_t)+\varepsilon_t$ where ET is total employment and YQ and WTP are respectively real GDP and real labour cost at 1990 prices	666	0.00	0.01	-0.05	0.10
TRADE SHOCK	term of trade shock. This series is equal to $IMP=((MC)/(YC))\Delta\{\log(P_m/P_g)\}$, where MC are imports at current prices, YC is GDP at current prices, P_m is import price deflator and P_g is GDP deflator at market prices, both with 1990 as base year.	666	0.00	0.02	-0.09	0.17
RIRL	long term real interest rate: constructed using long term nominal interest rate and inflation from OECD Economic Outlook Database.	666	0.03	0.03	-0.11	0.14
MMM	Male industrial employment share (MMM): From OECD Labour Force Statistics. When non available, we have resorted to national sources, as computed in Checchi and Visser (2005).	666	22.97	4.74	14.10	37.11
EFFPAR	effective participation in election. Source www.idea.int	666	4.15	1.58	1.96	10.29
VTURN	Voter turnout in each national election, in percentages of electorate that voted.. Source : Huber et al. 1997	666	77.75	13.43	35.00	95.80
WOMENPAR	Seats held by women as a % of total seats in parliament. Source Comparative Welfare State Dataset – Huber et al. 1997	666	12.59	10.40	0.00	42.69
GOVPARTY	Left seats as a % of seats held by all government parties. Source Comparative Welfare State Dataset - Huber et al. 1997	666	2.40	1.49	1.00	5.00
LEFT	% votes for extreme left parties. Source Comparative Welfare State Dataset - Huber et al. 1997	666	4.57	7.58	0.00	34.40
STRIKES	strikes, workers involved (proportion of employees) computed as the ratio between workers involved in strikes and dependent employment. The data source for the numerator is ILO, while the denominator comes from OECD Labour Force Statistics.	666	0.06	0.10	0.00	0.79
TY25	years of schooling of population aged 25 and over, whether studying or not. The data source is Cohen and Soto (2001).	666	9.81	1.74	5.34	12.88
PROD	labour productivity: computed as the Hodrick Prescott trend of log real GDP minus the log of total employment. All data come from London School of Economics CEP - OECD data base, updated using the same criteria.	666	-0.31	0.25	-1.36	0.00

Table 2 - Union density – OLS single equation estimation

	(1) ols	(2) year FE	(3) c/y FE	(4) c/y FE
UNEMPLOYMENT RATE	-0.359	-0.37	0.751	0.784
	[0.166]**	[0.170]**	[0.130]***	[0.132]***
BENEFIT REPLACEMENT RATE	-0.118	-0.23	0.184	0.179
	[0.053]**	[0.046]***	[0.037]***	[0.037]***
BENEFIT DURATION	-0.213	-0.213	0.019	0.008
	[0.042]***	[0.039]***	[0.044]	[0.043]
BENEFIT REPLACEMENT X DURATION	0.163	0.18	-0.112	-0.083
	[0.106]	[0.092]*	[0.085]	[0.082]
EMPLOYMENT PROTECTION LEGISLATION	-7.922	-8.903	-3.193	-2.972
	[0.648]***	[0.615]***	[0.684]***	[0.667]***
MALE-MANUAL-MANUFACTURING	0.062	-0.337	1.314	1.225
	[0.137]	[0.122]***	[0.154]***	[0.148]***
EFFPAR	1.417	2.248	0.256	0.246
	[0.279]***	[0.261]***	[0.386]	[0.388]
ELECTION TURNOUT	0.787	0.685	0.158	0.169
	[0.042]***	[0.039]***	[0.055]***	[0.054]***
LEFT SEATS IN PARLIAMENT	0.426	0.63	-0.129	-0.03
	[0.411]	[0.347]*	[0.178]	[0.180]
EXTREM LEFT VOTES	-0.427	-0.548	0.135	0.058
	[0.104]***	[0.093]***	[0.097]	[0.099]
WOMEN IN PARLIAMENT	1.14	1.502	0.311	0.292
	[0.088]***	[0.080]***	[0.111]***	[0.110]***
YEARS OF EDUCATION	-3.154	-3.919	3.983	3.965
	[0.348]***	[0.413]***	[0.937]***	[0.959]***
STRIKE PARTICIPATION				18.005
				[3.159]***
CONSTANT	yes	yes	yes	yes
YEAR FIXED EFFECTS	no	yes	yes	yes
COUNTRY FIXED EFFECTS	no	no	yes	yes
OBSERVATIONS	666	666	666	664
R-SQUARED	0.54	0.66	0.93	0.93

* significant at 10%; ** significant at 5%; *** significant at 1%
Robust standard errors in parenthesis

Table 3 – Unemployment rate – OLS single equation estimation

	(1) ols	(2) year FE	(3) c/y FE
UNION DENSITY RATE	-0.007	-0.004	0.049
	[0.009]	[0.007]	[0.013]***
TAX WEDGE	-1.29	-1.231	3.433
	[1.404]	[1.343]	[2.264]
BENEFIT REPLACEMENT RATE	0.057	0.027	0.004
	[0.009]***	[0.007]***	[0.010]
BENEFIT DURATION	0.05	0.018	0.014
	[0.008]***	[0.007]***	[0.012]
BENEFIT REPLACEMENT X DURATION	-0.056	0.006	0.106
	[0.019]***	[0.016]	[0.023]***
EMPLOYMENT PROTECTION LEGISLATION	0.657	-0.319	-0.125
	[0.200]***	[0.160]**	[0.186]
BARGAINING COORDINATION	-2.312	-1.508	-0.574
	[0.288]***	[0.231]***	[0.302]*
LONG TERM REAL INTEREST RATE	48.574	26.639	23.641
	[4.885]***	[5.512]***	[4.457]***
LABOUR DEMAND SHOCK	-22.422	-25.726	-19.213
	[12.289]*	[12.701]**	[6.805]***
TRADE SHOCK	-11.527	-0.226	-4.125
	[7.285]	[9.899]	[6.702]
AVERAGE YEARS OF EDUCATION	-0.606	-1.306	0.515
	[0.112]***	[0.130]***	[0.220]**
CONSTANT	yes	yes	yes
YEAR FIXED EFFECTS	no	yes	yes
COUNTRY FIXED EFFECTS	no	no	yes
OBSERVATIONS	666	666	666
R-SQUARED	0.36	0.57	0.85

* significant at 10%; ** significant at 5%; *** significant at 1%
Robust standard errors in parenthesis

Table 4 – Labour cost – OLS single equation estimation

	-1 ols	-2 y FE	-3 c y FE
UNION DENSITY RATE	0.013	0.014	0.001
	[6.27]***	[0.002]***	[0.001]**
UNEMPLOYMENT RATE	-0.116	-0.118	-0.005
	[10.54]***	[0.014]***	[0.001]***
TAX WEDGE	5.302	5.334	0.319
	[11.06]***	[0.500]***	[0.084]***
BENEFIT REPLACEMENT RATE	0.021	0.021	0
	[8.55]***	[0.003]***	[0.000]
BENEFIT DURATION	0.023	0.024	0
	[9.67]***	[0.003]***	[0.000]
BENEFIT REPLACEMENT X DURATION	0.008	0.005	0.001
	[1.64]	[0.005]	[0.001]
EMPLOYMENT PROTECTION LEGISLATION	0.046	0.062	-0.008
	[0.83]	[0.057]	[0.009]
LONG RUN LABOUR PRODUCTIVITY TREND	1.086	1.366	0.859
	[6.70]***	[0.217]***	[0.043]***
CONSTANT	yes	yes	yes
YEAR FIXED EFFECTS	no	yes	yes
COUNTRY FIXED EFFECTS	no	no	yes
OBSERVATIONS	666	666	666
R-SQUARED	0.51	0.53	0.99

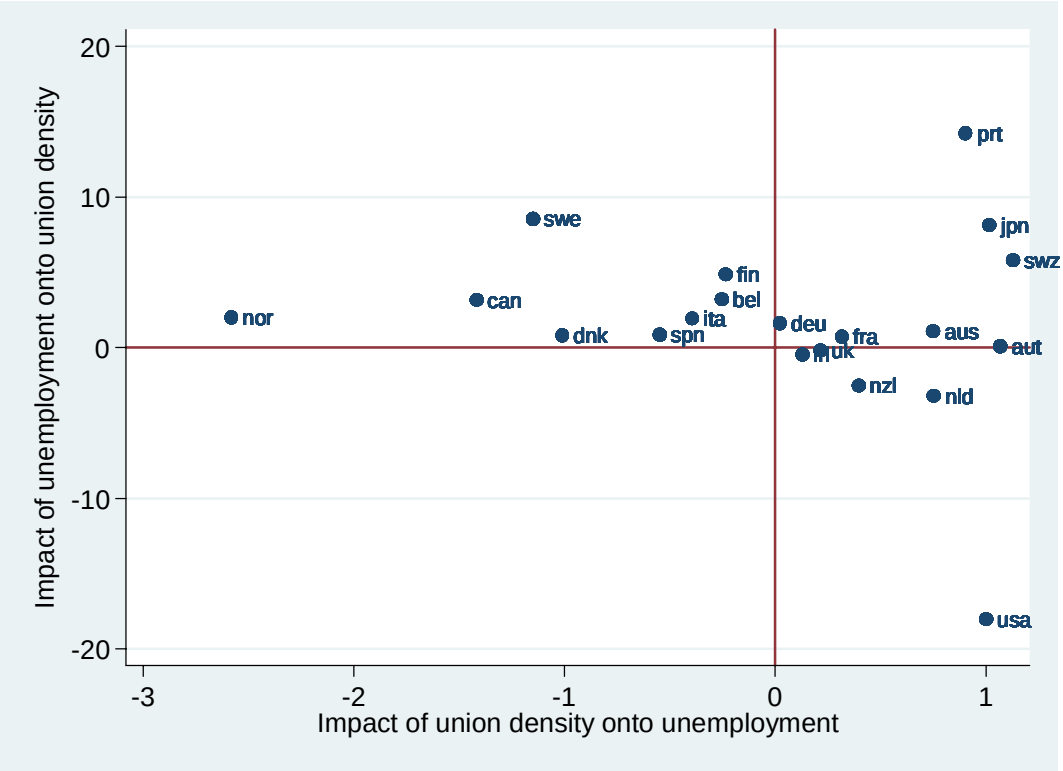
* significant at 10%; ** significant at 5%; *** significant at 1%
Robust standard errors in parenthesis

Table 5 –Joint estimation of unemployment rate, union membership and labour cost – 3SLS estimation

	(1) UD	(2) UR	(3) WAGE	(4) UD	(5) UR	(6) WAGE
UNION DENSITY RATE		0.127***	0.00125		0.114***	0.00351***
		(0.041)	(0.0013)		(0.034)	(0.0011)
UNEMPLOYMENT RATE	0.586*		-0.0220***	0.898***		-0.0200***
	(0.36)		(0.0030)	(0.34)		(0.0029)
LABOUR COST	27.31***			21.94***		
	(6.83)			(6.55)		
TAX WEDGE		2.807	0.740***		4.737	0.625***
		(3.83)	(0.14)		(3.34)	(0.12)
BENEFIT REPLACEMENT RATE	0.0886***	-0.0160	-0.0011***	0.104***	-0.0158	-0.0013***
	(0.033)	(0.0098)	(0.00037)	(0.031)	(0.0097)	(0.00036)
BENEFIT DURATION	-0.0559	0.0446***	0.000529	-0.0683*	0.0437***	0.000490
	(0.042)	(0.012)	(0.00046)	(0.040)	(0.012)	(0.00046)
BENEFIT REPLACEMENT X DURATION	0.0242	-0.0170	0.000765*	0.0405	-0.0147	0.000667
	(0.038)	(0.013)	(0.00046)	(0.037)	(0.012)	(0.00045)
EMPLOYMENT PROTECTION LEGISLATION	-2.792***	-0.249	-0.0312***	-2.273***	-0.311	-0.0219**
	(0.67)	(0.25)	(0.0099)	(0.65)	(0.23)	(0.0092)
MALE-MANUAL-MANUFACTURING	-0.181			0.0370		
	(0.32)			(0.30)		
AVERAGE YEARS OF EDUCATION	0.503**	-0.255***		0.989***	-0.234***	
	(0.20)	(0.054)		(0.20)	(0.052)	
EFFPAR	0.379			0.378		
	(0.40)			(0.37)		
ELECTION TURNOUT	0.142**			0.149**		
	(0.063)			(0.059)		
LEFT SEATS IN PARLIAMENT	-0.253			-0.161		
	(0.18)			(0.17)		
EXTREM LEFT VOTES	-0.0553			-0.159*		
	(0.089)			(0.084)		
WOMEN IN PARLIAMENT	0.447***			0.368***		
	(0.076)			(0.071)		
STRIKE PARTICIPATION				13.94***		
				(2.48)		
BARGAINING COORDINATION		-1.080***			-0.974***	
		(0.29)			(0.27)	
LABOUR DEMAND SHOCK		-18.62***			-19.49***	
		(5.74)			(5.73)	
TRADE SHOCK		-5.782			-3.952	
		(5.71)			(5.68)	
LONG TERM REAL INTEREST RATE		23.54***			22.78***	
		(3.65)			(3.60)	
LONG RUN LABOUR PRODUCTIVITY TREND			0.872***			0.836***
			(0.038)			(0.036)
CONSTANT	yes	yes	yes	yes	yes	yes
YEAR FIXED EFFECTS	yes	yes	yes	yes	yes	yes
COUNTRY FIXED EFFECTS	yes	yes	yes	yes	yes	yes
OBSERVATIONS	666	666	666	666	666	666
COUNTRIES	20	20	20	20	20	20
R-SQUARED	0.37	0.66	0.90	0.40	0.66	0.91
RMSE	5.759	1.8710	0.0766	5.625	1.8628	0.0756

* significant at 10%; ** significant at 5%; *** significant at 1%
standard errors in parenthesis

Figure 1 - 3SLS heterogeneous system with perturbations: union density and unemployment coefficients



References

Aghion, P., Y.Algan and P.Cahuc. (2008). Can policy interact with culture ? Minimum wage and the quality of labour relations. IZA DP. 3680.

Amable, Bruno (2003). *The diversity of modern capitalism*. Oxford University Press.

Baker, D., A. Glyn, D. Howell and J. Schmitt (2004), "Labor Market Institutions and Unemployment : A Critical Assessment of the Cross-Country Evidence", in D.Howell (ed.), *Fighting Unemployment: The Limits of Free Market Orthodoxy*, Oxford, Oxford University Press.

Bassanini, A. and R. Duval. (2009). Unemployment, institutions and reform complementarities: Re-assessing the aggregate evidence for OECD countries, *Oxford Review of Economic Policy*, 25(1), 40-59

Bertola, G. and W.Koeninger, (2007) Consumption Smoothing and Income Redistribution. *European Economic Review*, 51:8 (2007), 1941-1958

Bertola, G., F.D. Blau, and L.M. Kahn, (2001). Comparative Analysis of Labor Market Outcomes: Lessons for the US from International Long-Run Evidence. in A.Krueger and R.Solow (eds.), *The Roaring Nineties: Can Full Employment Be Sustained*?, Sage.

Besancenot, D. and R.Vranceanu. (1999). A trade union model with endogenous militancy: interpreting the French case. *Labour Economics* 6:355-373.

Blanchard, O. (2006), European Unemployment: the Evolution of Facts and Ideas, *Economic Policy*, vol.21(45), 7-59.

Blanchard, O., and J. Wolfers, (2000).The Role of Shocks and Institutions in the Rise of European Unemployment: the Aggregate Evidence. *The Economic Journal*, 110(462).

Blanchard, O., and T. Philippon, (2004). The Quality of Labor Relations and Unemployment, NBER WP.10590.

Böckerman, P. and R. Uusitalo, (2006). Erosion of the Ghent System and Union Membership Decline: Lessons from Finland. *British Journal of Industrial Relations* 44(2): 283-303.

Boeri, T., A. Brugiavini and L.Calmfors (eds.), with A. Booth, M. Burda, D. Checchi, B. Ebbinghaus, R. Freeman, P. Garibaldi, B. Holmlund, R. Naylor, M. Schludi, T. Verdier, and J. Visser (2001). *The future of collective bargaining in Europe.* Oxford: Oxford University Press.

Botero, J., S. Djankov, R. La Porta, F. Lopez-de-Silanes and A. Shleifer, (2004), The Regulation of labor, *Quarterly Journal of Economics* Vol. 119, No. 4, November.

Burda, M. (1990). Membership, Seniority and Wage-Setting in Democratic Labour Unions. *Economica*, 57/228: 455-66.

Checchi, D. and C. Lucifora. (2002). Unions and labour market institutions in Europe. *Economic Policy*, vol.17(2): 362-401.

Checchi, D. and J. Visser. (2005). Pattern persistence in European trade union density. *European Sociological Review* 21(1): 1-22

Cohen, D. and M. Soto. (2001). Growth and human capital: good data, good results. OECD Development Centre Technical paper n.179.

Colonna, F. (2008). European Union Membership, labor disputes and employment protection. Bank of Italy, mimeo

Crouch, Colin. (1993). *Industrial Relations and European State Traditions.* Oxford: Oxford University Press

Di Tella R. and R. MacCulloch. (2002) The Determination of Unemployment Benefits, *Journal of Labor Economics*, April, 20(2): 404-34.

Engle, R. F., Hendry, D. F., and Richard, J.-F. (1983). Exogeneity. *Econometrica*, 51, 277--304.

Hall, P. and D. Soskice (2001). *Varieties of capitalism: the institutional foundations of comparative advantage*. Oxford University Press

Holmlund, B. and P. Lundborg, (1999). Wage bargaining, union membership, and the organization of unemployment insurance. *Labour Economics*, 6: 397--415.

Huber, E., Ragin, C. and Stephens, J. D. (1997). Comparative Welfare States Data Set, Northwestern University and University of North Caro

Lange, Peter and Lyle Scruggs (1999). Where have all members gone? Union density in an era of globalization. *Stato e Mercato*, Vol. 55, pp. 39-75.

Nickell, S. (1997). Employment and labor market rigidities: Europe versus North America, *Journal of Economic Perspectives*, 11/3: 55-74.
Nickell, S. (1998). Unemployment: Questions and Some Answers, *The Economic Journal*, 108, (448), 802-16.
Nickell, S. and R. Layard. (1999). Labour market institutions and economic performance, in O. Ashenfelter and D. Card,(eds) *Handbook of labor economics*, vol.3c, North Holland 1999
Nickell, S., Layard. R. And Jackman (2005), *Unemployment. Macroeconomic Performance and the Labour Market*, Oxford University Press.
Nickell, S., L. Nunziata and W. Ochel, (2005) Unemployment in the OECD since the 1960s. What do we know?, *The Economic Journal*, Vol. 115, 1-27, January.
Nicoletti, G., S. Scarpetta and O. Boylaud, (2000), "Summary indicators of product market regulation with an extension to employment protection legislation", OECD, Working Papers n. 226.
Nunziata, L. (2005). Institutions and Wage Determination: a Multi-Country Approach, *Oxford Bulletin of Economics and Statistics*, Vol. 67, Issue 4, 435-466, August.
OECD (2004a), Employment protection regulation and labour market performance, *Economic Outlook*, Chapter 2, Paris.
OECD (2004b), Wage setting institutions and outcomes, *Economic Outlook*, Chapter 3, Paris
Oskarsson, S. (2001). "Class struggle in the wake of globalization -- union organization in an era of economic integration". In L. Magnussen and J. Ottosson (eds.), *Europe: One Labour Market?* Brussels: Peter Lang.
Saint-Paul G. (1996), Exploring the political economy of the labour market institutions, *Economic Policy* 23, 263-31.
Western, Bruce (1997). *Between class and market -- Post-war unionization in the capitalist democracy*. Princeton University Press.