Endogeneity of union density and labour market performance

Daniele Checchi and Luca Nunziata (University of Milan)

preliminary version: November 2004

1. Introduction

In recent years we have witnessed a growing literature on the impact of labour market institutions on labour market performance. Leaving aside the problem of defining a correct measure for institutions (that could lead to infinite revisions of the proposed measures – see OECD 2004), the standard approach takes institutions as exogenous to the process to be analysed, often neglecting two important aspects:

1) institutions come in clusters, and therefore different institutional aspects can be characterised by either substitutability or complementarity.[1]

2) 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. However, institutions evolve at a slower pace than macroeconomic variables., and the common practice to take them as (weakly) exogenous has *prima facie* some reliability.

The importance of these points can be examined with respect to a specific example, which represents the focus of our analysis. When analysing the determinants of unemployment performance across the Atlantic, Nickell (1997) suggested that unions tends to raise wages, and therefore a positive correlation between union activities and unemployment rates was to be expected. However, in the data analysis he did find a stronger effect of union coverage than for union density. Similarly, Nickell and Layard (1999) concluded that "On the wage determination front, unions raise unemployment and reduce labour input. These effects are, however, offset if unions and employers can coordinate their wage bargaining activities"(p.3055). However, from their table 15, the variable "union coverage index (1-3)" was much more significant and positively signed than "union density(%)". Other papers (Blanchard and Wolfers 2000, Bertola, Blau and Kahn 2001), while sharing the same view on the role of unions in reducing the degree of competitiveness in the labour market, are unable to find strong correlations between unemployment indicators and measures of union activity based on union density (interacted with

[1] Bertola 1990 is among the first authors stressing the role of complementarity between wage rigidity and eployment protection legislation. Belot and vanOurs 2001 have extensively explored the issue of institutional complementarities. Blanchard and Tirole 2004 is a recent example of the analysis of the potential complementarity existing between unemployment benefit and employment protection.

macroeconomic shocks). Eventually, Boeri, Nicoletti and Scarpetta (2000) find a significant impact of union density onto the employment rate. Other papers (like Nicoletti, Scarpetta and Boyalud 2000, Nunziata 2004, Nickell et al. 2005) follow the lead of taking labour market institutions as given and use them to account for country differences in unemployment and/or other labour market performance indicators (employment rates, turnover rates, wage dispersion). Overall, we may conclude from this literature that, once union density rates are considered as exogenously determined, they are either uncorrelated or positively correlated with unemployment rates.

On the other side, some authors (Checchi and Lucifora 2002, Checchi and Visser 2005) have argued that whenever unions are perceived as providing workers' insurance against unemployment risk, the union density is positively correlated with unemployment. But this applies only in countries where unions provide effective insurance (as in the so called "Ghent countries" - Finland, Belgium, Sweden and Denmark - where unions are involved in managing the unemployment benefit schemes), 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.[2] As a consequence, if we look at the correlation between unemployment and union density from the perspective of studying the determinants of union activity, we are puzzled by the lack of a coherent view on this issue in the literature.

Whatever the correlation between unemployment and union density may be, a general consensus exist about the fact that both variables have impact onto wage bargaining activity, whereas less is known about potential feedbacks from bargaining outcomes on the incentive to join the unions. In general this may depend on the structure of the extension laws.[3]

In the present paper we study the endogenous determination of unemployment, union density and wages in a sample of 20 OECD countries. Among all the institutional indicators we concentrate on union density because we intend to shed some light on the indeterminacy of the relationship between unions and economic performance. Our task is made easier by the fact that union density provides sufficient variation across countries and across years (Boeri et al. 2001). On the other side, we choose the unemployment rate as indicator of performance since it is the mostly widely used in the literature, despite the fact that it mixes supply and demand variations. Finally, the inclusion of labour costs in our analysis is motivated by the need of capturing in a more detailed way the wage bargaining process.

[2] Other sociological papers (Western 1997, Lange and Scrugg 1999, Oskarsson 2005) have consistent finding with respect to negative correlation between unemployment and union density.

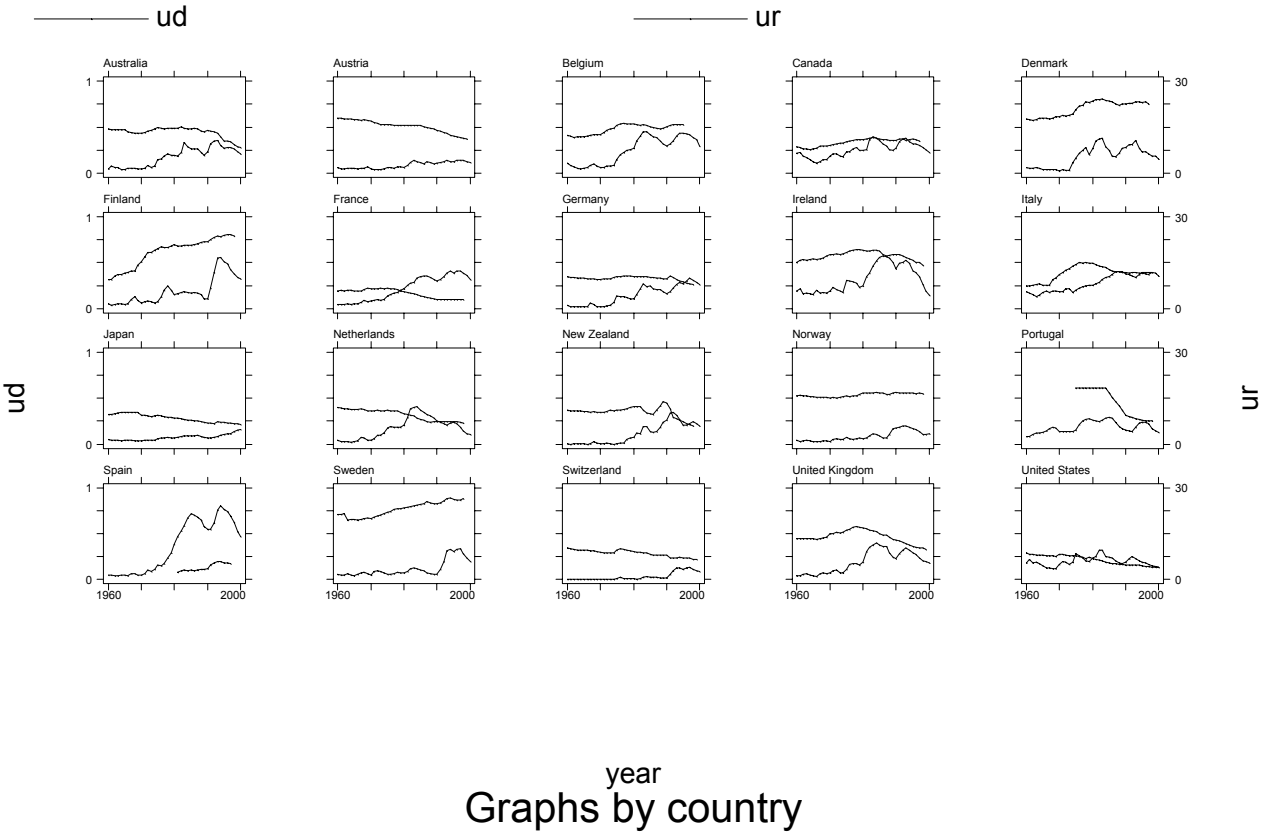
[3] According to Bain and Elsheikh 1976, following Marxian union theory, the erosion of real income is a major motive for workers to turn to the unions and to union action in an attempt to defend their living standards. In Checchi and Visser 2005, the inflation rate has a negative impact on unionisation, but this impact is attenuated by the existence of indexation clauses.

While in principle we share the view that all institutions should be considered endogenous under a political economy approach, we are forced to set most of them as exogenous, in order to restrict our investigation to a manageable dimension. Nevertheless we think that our effort has important methodological implications for the future of institutional analysis. Our approach does not consider true source of exogeneity rooted in the history of national legal systems (as in Nicoletti and Scarpetta 2001 or in Botero et al. 2003), but focuses on two sources of variation: the institutional framework of a country (as captured by a set of institutional variables and their interactions) and the macroeconomic environment (described by a series of macroeconomic shocks).

2. Our strategy

We have collected data on 20 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) over the period 1960-2000. The graphs of the two main variables, union density (UD) and unemployment rate (UR) are reported in the next graph. Descriptive statistics are reported in the appendix.

Figure 1 – Union density and unemployment – OECD countries – 1960-2000



Whether labour market institutions should stay on the left hand side or on the right hand side is an endless discussion. We believe the right answer consists in a joint determination through a system of equations. Denote with u_{it} unemployment in country i in year t, and m_{it} the corresponding union density rate. Our strategy should consist of estimating the system

$$\begin{cases} u_{it} = \alpha_0 + \alpha_1 m_{it} + \alpha_2 \tau_{it} + \alpha' \mathbf{X}_{it} + \delta_i + \phi_t + \varepsilon_{it} \\ m_{it} = \beta_0 + \beta_1 u_{it} + \beta_2 \pi_{it} + \beta' \mathbf{X}_{it} + \eta_i + \gamma_t + \omega_{it} \end{cases} \quad (1)$$

where possible identifying restrictions are given by including the tax wedge τ in the unemployment equation and the male employment manufacturing share π in the density equation. $\mathbf{X}_{it}$ is a vector of common covariates (unemployment benefit coverage and duration, employment protection, bargaining coordination, minimum wage), δ_i and η_i are country dummies, ϕ_t and γ_t are year dummies, and ε_{it} and ω_{it} are random errors with $Cov(\varepsilon, \omega) \neq 0$. If we add to the previous system a wage equation w_{it}, which is identified through the inclusion of a productivity term χ, we can now explore the complexity of the interactions between these three variables.

$$\begin{cases} u_{it} = \alpha_0 + \alpha_1 m_{it} + \alpha_2 \tau_{it} + \alpha_3 w_{it} + \alpha' \mathbf{X}_{it} + \delta_i + \phi_t + \varepsilon_{it} \\ m_{it} = \beta_0 + \beta_1 u_{it} + \beta_2 \pi_{it} + \beta_3 w_{it} + \beta' \mathbf{X}_{it} + \eta_i + \gamma_t + \omega_{it} \\ w_{it} = \sigma_0 + \sigma_1 m_{it} + \sigma_2 u_{it} + \sigma_3 \chi_{it} + \sigma' \mathbf{X}_{it} + \lambda_i + \kappa_t + \psi_{it} \end{cases} \quad (2)$$

3. Empirical Analysis

Tables 1 and 2 present the results of our estimations. Table 1 reports separate estimates of each equation in system (2) obtained using OLS and fixed effects. Columns 1, 4 and 7 introduce the basic specification, whereas columns 3, 6 and 8 consider potential interactions among the institutional variables; columns 2 and 5 replicates the basic model introducing the possibility of feedbacks from wage bargaining onto unemployment and/or union density. Our regressions are very much in line with previous studies, especially in the case of the unemployment and the union density equations[4]. The benefit and taxation variables seem to play the most relevant role in the unemployment equation. The effect of the benefit replacement ratio is reinforced in presence of longer benefit duration.[5] Employment protection has a positive impact on unemployment when introduced without interaction

[4] See the union density equation in Checchi and Lucifora (2001) and the unemployment model in Nickell et al (2005), and Bertola and al (2001), among the others.

[5] Note that in what follows all interactions between institutional variables are calculated as interaction between deviations from the world average. In this way the coefficient of each institution in levels can be read as the coefficient of the "average country", i.e. the country characterized by the average level of that specific institutional indicator, since for this average country, the interaction terms are zero.

(column 1), but changes sign when additional controls are introduced. Other relevant variables with a positive coefficient are the ratio of minimum to median wage and the (log) oil price in national currency, whereas the oil price in US dollars has the opposite impact: the combination of the two variables suggest that depreciation against the dollar has a positive impact, while the cost of oil has a negative impact onto employment. These variables summarize adverse global macro-economic conditions[6]. As regards union density we find a positive impact onto unemployment, in line with previous studies, though mitigated by higher bargaining co-ordination.

The union density equation in fourth and sixth columns shows that density is increasing in unemployment, benefits, the proportion of workers involved in strikes and males in manual manufacturing jobs over total employment. Notice that we also control for educational attainment of the population, finding a positive impact onto density. Finally, the wage equations reported in the final two columns suggest that productivity is the main determinant, with significant impact of tax wedge and unemployment benefit, in accordance with a bargaining theory of wage determination. Notice that both union density and unemployment rates have the expected sign in this equation (positive for density, as it implies a stronger bargaining power, and negative for unemployment, suggesting a lowering of the reservation wage). In turn, the bargained wage has positive and significant correlation with the unemployment rate, whereas it exhibits a weakly negative correlation with density rates.

[6] Muellbauer and Nunziata (2004) show that the oil price is a key variable in forecasting the US business cycle over the last 50 years, with an asymmetric effect over recession and expansion periods. Considering the US as the leader OECD country, the real oil price can be considered as a good proxy of global macroeconomic conditions.

Table 1 – OLS single equation fixed effect regressions

variable name	variable label
bd	benefit duration
brr	benefit replacement rate
cow	bargaining coordination
ep	employment protection index
kaitz	minimum to median wage
mmm	(male/manual/manufacturing) % of male worker in industry dependent employment
loil	log oil price in national currency = oild*exchange rate against USdollar
prod	Hodrick-Prescott trend of labour productivity
tw	tax wedge
ty25	average years of education in the population aged >25
ud	union density rate
ur	unemployment rate
wage	log labour cost
wiet	strikes, workers involved (proportion of total employment)

dependent variable:	(1) UR	(2) UR	(3) UR	(4) UD	(5) UD	(6) UD	(7) WAGE	(8) WAGE
UD	0.105	0.081	0.047				0.000	0.006
	(6.87)***	(6.14)***	(3.72)***				(0.56)	(9.56)***
UR				0.606	0.615	0.664	-0.001	-0.011
				(6.43)***	(6.25)***	(8.34)***	(0.36)	(6.56)***
WAGE		6.242			-2.609			
		(16.57)***			(1.70)*			
BENEFIT=BRR*BD	16.904	5.729		15.892	21.059		0.729	
	(12.78)***	(4.13)***		(4.84)***	(6.11)***		(8.87)***	
BRR			2.203			22.491		-0.041
			(2.44)***			(12.31)***		(0.97)
BD			1.587			-3.049		0.203
			(2.56)***			(1.98)**		(7.10)***
devBRR*devBD			1.057					0.029
			(7.12)***					(4.19)***
EP	0.502	-0.812	-0.759	1.269	1.775	0.405	0.089	0.093
	(2.29)**	(4.00)***	(3.91)***	(2.60)***	(3.44)***	(0.93)	(7.04)***	(10.30)***
COW	-2.817	-2.767	-1.723	2.553	2.399	2.548		
	(8.27)***	(9.50)***	(5.71)***	(3.47)***	(3.22)***	(3.84)***		
KAITZ	4.675	0.604	1.784				0.482	0.369
	(5.44)***	(0.72)	(2.17)**				(8.39)***	(8.90)***
TW			10.399				0.496	-0.108
			(5.10)***				(3.92)***	(1.10)
MMM				69.714	78.001	62.281		
				(6.84)***	(6.90)***	(6.42)***		
WIET				23.762	23.976	24.527		
				(7.30)***	(7.38)***	(8.30)***		
TY25				1.328	2.130	5.612		
				(3.36)***	(3.59)***	(9.40)***		
EP*BRR*BD				-1.534	-1.124			
				(3.64)***	(2.62)***			
UD*COW			1.121					
			(7.85)***					
LOIL			1.719				0.081	0.025
			(16.14)***				(10.38)***	(4.24)***
PROD							1.177	0.937
							(21.62)***	(23.48)***
TIME TREND						-0.551		0.018
						(8.98)***		(25.79)***
Constant	2.282	-14.391	-5.762	-2.999	-4.787	-46.777	1.113	1.901
	(2.16)**	(10.65)***	(5.56)***	(0.56)	(0.86)	(7.20)***	(14.66)***	(28.91)***
Country fixed effects	yes	yes	yes	yes	yes	yes	yes	yes
Observations	764	744	717	724	705	724	702	702
Number of country	20	20	20	20	20	20	20	20
RMSE	2.84	2.41	2.11	5.53	5.45	4.98	0.13	0.09
R2	0.36	0.53	0.63	0.26	0.29	0.40	0.83	0.92

Absolute value of t statistics in parentheses* significant at 10%; ** significant at 5%; *** significant at 1%

Table 2 shows the analogous equations jointly estimated as a system using SUR and 3SLS. Most of the results are retained in the system estimations. The next step is to estimate the three equations in a joint system in order to take into account of the endogeneity issue. Our preferred specification, estimated by means of 3SLS, is presented in Table 2 . We notice that many of the results of the single equations still hold. In particular the marginal effect of each institution is significant and with expected coefficient. The only notable exceptions are the negative coefficients of employment protection and union density in the unemployment equation. The same system is also estimated by SURE. In this case all regressors are considered as exogenous while the equations are related through the modelling of contemporaneous correlations. In this case the coefficient of union density returns to a positive value.

Table 3 contains the same models but including labour costs in the unemployment and density equations. This variable should not necessarily be controlled for, as in principle our unemployment equation is a reduced form derived theoretically from a solved out standard macro model of output, employment and wages[7]. However, we first want to test if our results are robust to the inclusion of this variable, and secondly the labour cost variable maybe relevant in explaining density. Indeed our estimates show that, when assumed exogenous, density is a relevant explanatory variable in the wage equation, as shown by the results of the SURE estimation. However, when we account for endogeneity as in the 3SLS estimation, we find that the causal relationship goes mainly in the opposite direction, with density being lower when wages are higher, as if there were fewer incentives to join a union in this case. The picture we get from our estimates is then one where workers are willing to join a union if unemployment is higher, while they become less committed in presence of an increase in wages. The effect of union on wages disappears.

[7] See Nickell 1998, for a good example.

Table 2 – System estimation: SUR and 3SLS regressions (excluding wage feedbacks)

	(1)	(2)	(3)	(4)	(5)	(6)
estimation technique	SURE	SURE	SURE	3SLS	3SLS	3SLS
dependent variable	UR	UD	WAGE	UR	UD	WAGE
UR		1.070	-0.001		0.800	-0.022
		(11.33)***	(0.42)		(4.39)***	(6.04)***
UD	0.092		0.003	-0.251		0.002
	(6.29)***		(5.25)***	(6.80)***		(1.45)
TW	4.908			14.805		
	(2.27)**			(5.19)***		
BENEFIT=BRR*BD	4.143	26.089	0.126	13.054	28.265	0.362
	(2.98)***	(8.22)***	(2.35)**	(7.27)***	(8.71)***	(4.88)***
EP	-0.680	-0.335	0.043	-1.032	-0.765	0.034
	(3.68)***	(0.69)	(5.86)***	(4.72)***	(1.56)	(4.38)***
COW	-0.268			-0.584		
	(0.96)			(1.86)*		
KAITZ	3.620		0.319	4.182		0.389
	(4.30)***		(9.32)***	(4.25)***		(10.29)***
LOIL	3.411		-0.025	4.239		0.064
	(10.67)***		(1.87)*	(10.76)***		(3.11)***
EP*BRR*BD		-2.382			-3.011	
		(6.10)***			(6.43)***	
MMM		18.640			28.555	
		(1.88)*			(2.88)***	
WIET		18.118			14.489	
		(6.07)***			(4.82)***	
TY25		4.039			3.835	
		(6.77)***			(6.43)***	
PROD			0.793			0.869
			(24.20)***			(22.97)***
TIME TREND	-0.110	-0.514	0.023	-0.210	-0.442	0.019
	(3.38)***	(5.76)***	(17.43)***	(5.21)***	(4.92)***	(12.49)***
Constant	-7.158	-25.371	1.791	0.030	-24.184	1.623
	(5.54)***	(3.32)***	(28.40)***	(0.02)	(3.15)***	(20.44)***
country dummies	yes	yes	yes	yes	yes	yes
time dummies	yes	yes	yes	yes	yes	yes
trend	yes	yes	yes	yes	yes	yes
Observations	665	665	665	665	665	665
Number of countries	20	20	20	20	20	20
RMSE	1.89	4.82	0.07	2.33	4.77	0.08
R2	0.81	0.93	1.00	0.71	0.94	1.00

Absolute value of z statistics in parentheses * significant at 10%; ** significant at 5%; *** significant at 1%

Table 3 – System estimation: SUR and 3SLS regressions (including wage feedbacks)

	(1)	(2)	(3)	(4)	(5)	(6)
estimation technique	SURE	SURE	SURE	3SLS	3SLS	3SLS
dependent variable	UR	UD	WAGE	UR	UD	WAGE
UR		1.037	0.005		1.345	-0.021
		(10.73)***	(3.29)***		(6.45)***	(5.55)***
UD	0.086		0.003	-0.208		0.001
	(5.98)***		(5.03)***	(5.59)***		(1.07)
WAGE	5.212	0.073		1.196	-19.233	
	(7.59)***	(0.03)		(1.17)	(4.63)***	
TW	3.264			14.972		
	(1.55)			(5.20)***		
BENEFIT=BRR*BD	4.087	26.427	0.078	11.501	24.258	0.360
	(3.01)***	(8.28)***	(1.46)	(6.57)***	(6.78)***	(4.86)***
EP	-0.605	-0.399	0.045	-0.991	-0.151	0.037
	(3.35)***	(0.80)	(6.12)***	(4.73)***	(0.27)	(4.69)***
COW	-0.189			-0.366		
	(0.69)			(1.16)		
KAITZ	1.246		0.303	3.384		0.348
	(1.42)		(8.85)***	(3.14)***		(9.28)***
LOIL	3.456		-0.047	4.305		0.059
	(11.04)***		(3.46)***	(11.28)***		(2.87)***
EP*BRR*BD		-2.405			-3.054	
		(5.91)***			(5.82)***	
MMM		13.974			87.455	
		(1.06)			(4.58)***	
WIET		17.851			15.164	
		(5.94)***			(4.63)***	
TY25		4.082			3.972	
		(6.83)***			(6.18)***	
PROD			0.768			0.893
			(23.51)***			(22.64)***
TIME TREND	-0.246	-0.528	0.024	-0.240	0.172	0.019
	(6.74)***	(4.31)***	(18.08)***	(5.42)***	(0.98)	(12.55)***
Constant	-22.080	-24.944	1.854	-5.456	17.333	1.612
	(9.61)***	(2.69)***	(29.44)***	(1.66)*	(1.42)	(19.72)***
country dummies	yes	yes	yes	yes	yes	yes
time dummies	yes	yes	yes	yes	yes	yes
trend	yes	yes	yes	yes	yes	yes
Observations	665	665	665	665	665	665
Number of countries	20	20	20	20	20	20
RMSE	1.85	4.81	0.07	2.18	5.14	0.08
R2	0.82	0.93	1.00	0.75	0.92	1.00

Absolute value of z statistics in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%

Given the negative sign of union density in the unemployment equation we want to investigate if our findings are genuine or driven by the restriction of homogeneous coefficients across countries imposed on the system. In other words, we want to check whether the data suggest some degree of heterogeneity in the correlations between unemployment and union density. However this task is complicated by the fact that in order to test this assumption we need to estimate 20 coefficients for union density (UD) in the unemployment equation plus 20 coefficients for unemployment (UR) in the union density equation, all of which have to be considered endogenous. This would result in the impossibility to identify the system. In order to solve the problem, our strategy is to estimate the system recursively, assuming both union density and unemployment as endogenous but imposing a set of perturbations in the coefficients that allow some degree of heterogeneity across countries. More specifically, we estimate the model in its simplest form adding a set of 19 interactions between UD and the country dummies, excluding, say, Australia from the dummies in the unemployment equation. We do the same for the union density equation, i.e. we add 19 interactions between UR and the country dummies excluding Australia. In this case we retain the assumption of endogeneity, but the coefficient

is perturbed by the set of interactions that are assumed exogenous. We follow this procedure recursively for all countries, excluding one country at a time from the interactions and we end up having 20 coefficients for UD and 20 coefficients for UR, estimated under the assumption of endogeneity. Finally we plot the estimated coefficients in order to check if we can find a pattern in the mutual influence of union density and unemployment. Figure 2 shows the scatter plot of the impact of unemployment onto density on the impact of density onto unemployment. What we find is a clear negative relationship that is even more clear if we look at figure 3 where the two outliers Portugal and New Zealand are excluded. We can identify two clear patterns: in the south-east region we find the "union decline" scenario, where unions have a positive impact onto unemployment, but the raise of unemployment reduces the incentive to join the union. This is what Burda (1990) ingenuously termed the "Cheshire cat" union. United States and France are typical examples of this occurrence. On the contrary, in the north-west region of the graph, we find the "union rise" scenario: here an increase in unemployment has a positive impact on union density, either through appropriate institutional arrangements (like the unemployment benefit system managed by unions, as in Sweden and Finland) or through different union cultures. In the same group of countries, unions are sufficiently coordinated and/or centralised to exert a negative impact onto unemployment (other things remaining constant).
These results therefore confirm and reinforce 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 wage impact.

Figure 2 – 3SLS with perturbations: union density and unemployment coefficients

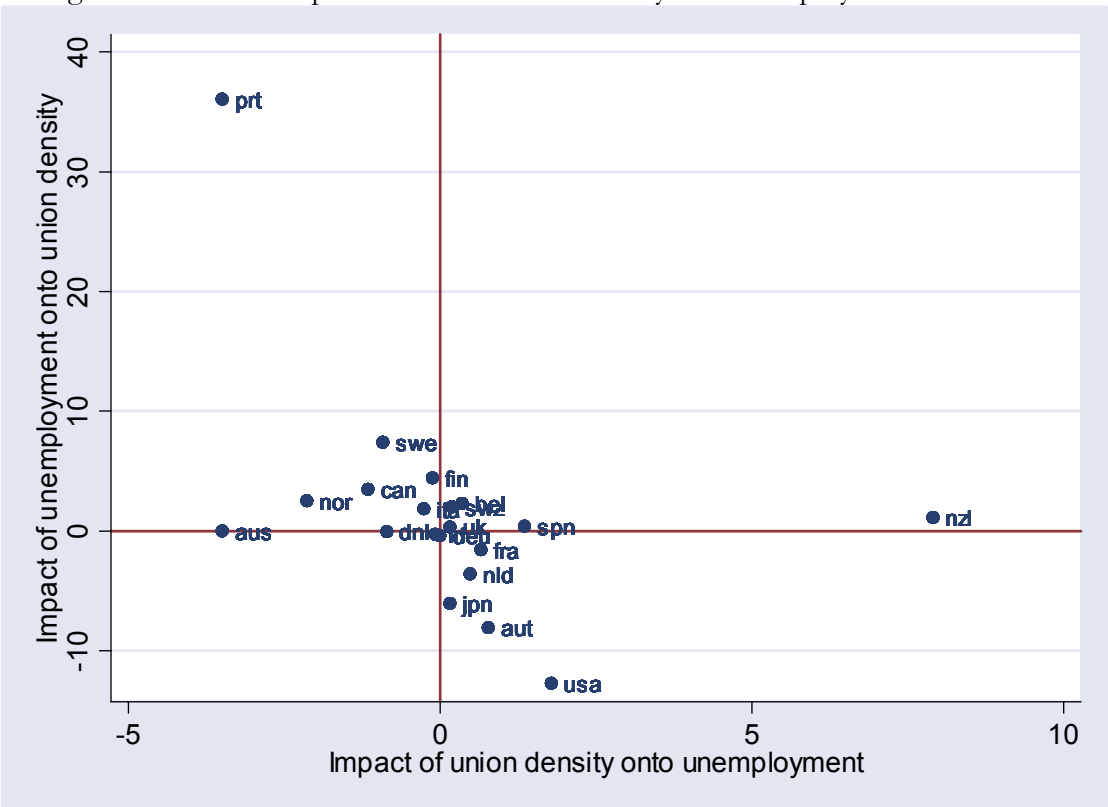
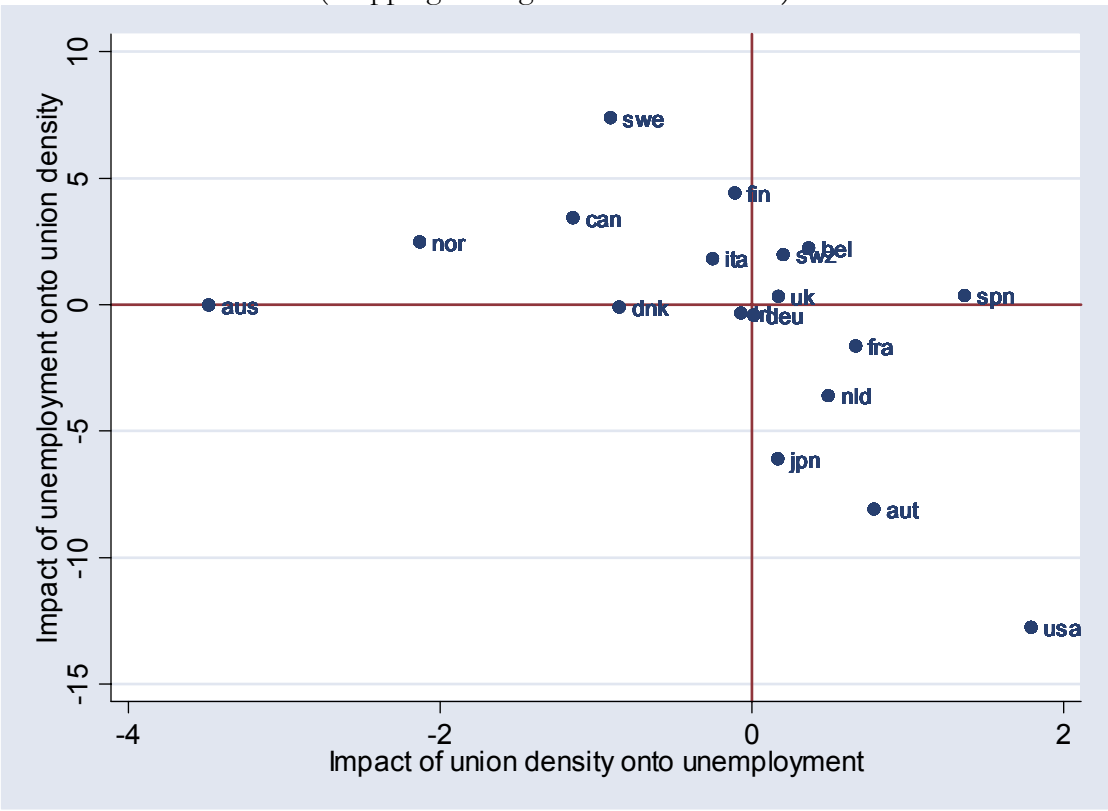


Figure 3 – 3SLS with perturbations: union density and unemployment coefficients (dropping Portugal and New Zealand)



As regards the coefficient of employment protection in the unemployment and wage equation, we plot two figures (figures 4 and 5) in order to check if the negative effect on unemployment may derive from heterogeneity. What we find is that the negative coefficient is mainly driven by Finland. When we drop this outlier the resulting figure show that most of the countries are concentrated across the north-west section of the figure. However few countries remain in the south-west region (notably Japan), which could reflect either compositional effects[8] or different job culture.

[8] OECD 2004 finds that employment protection measures are negatively correlated with male core age unemployment, and positively correlated with female and young unemployment rates.

Figure 4 – 3SLS with heterogeneous effect of EP on unemployment and wages

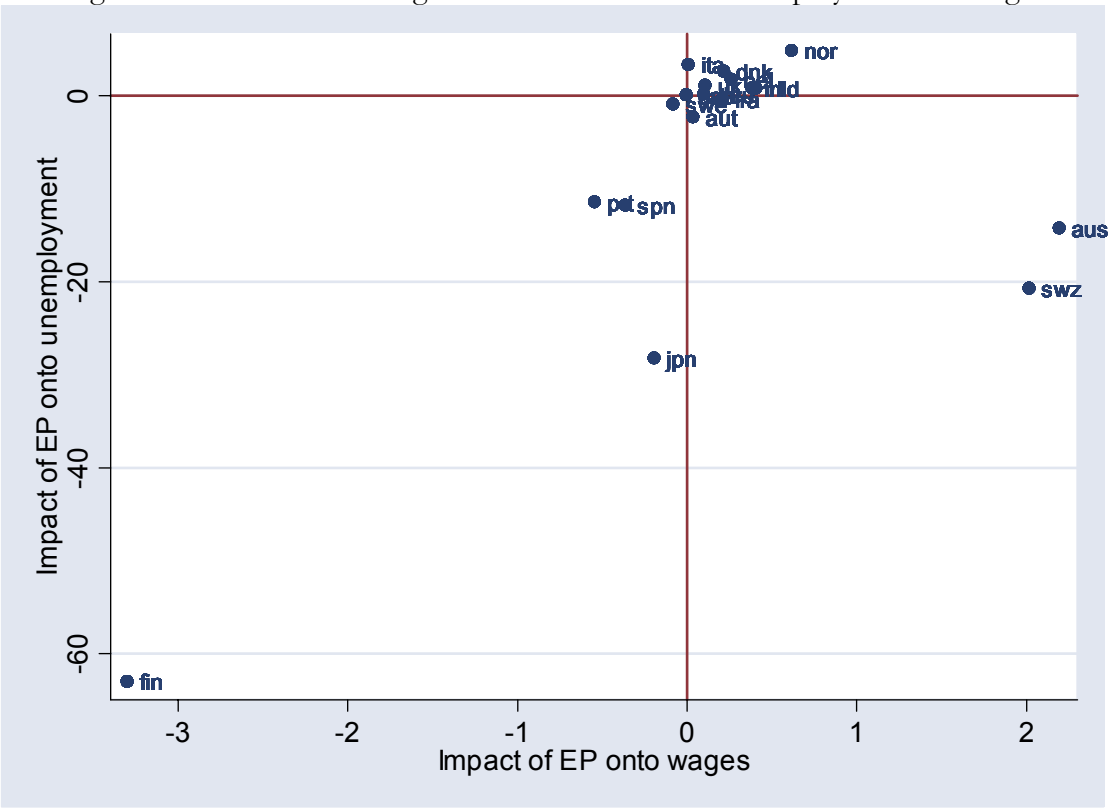
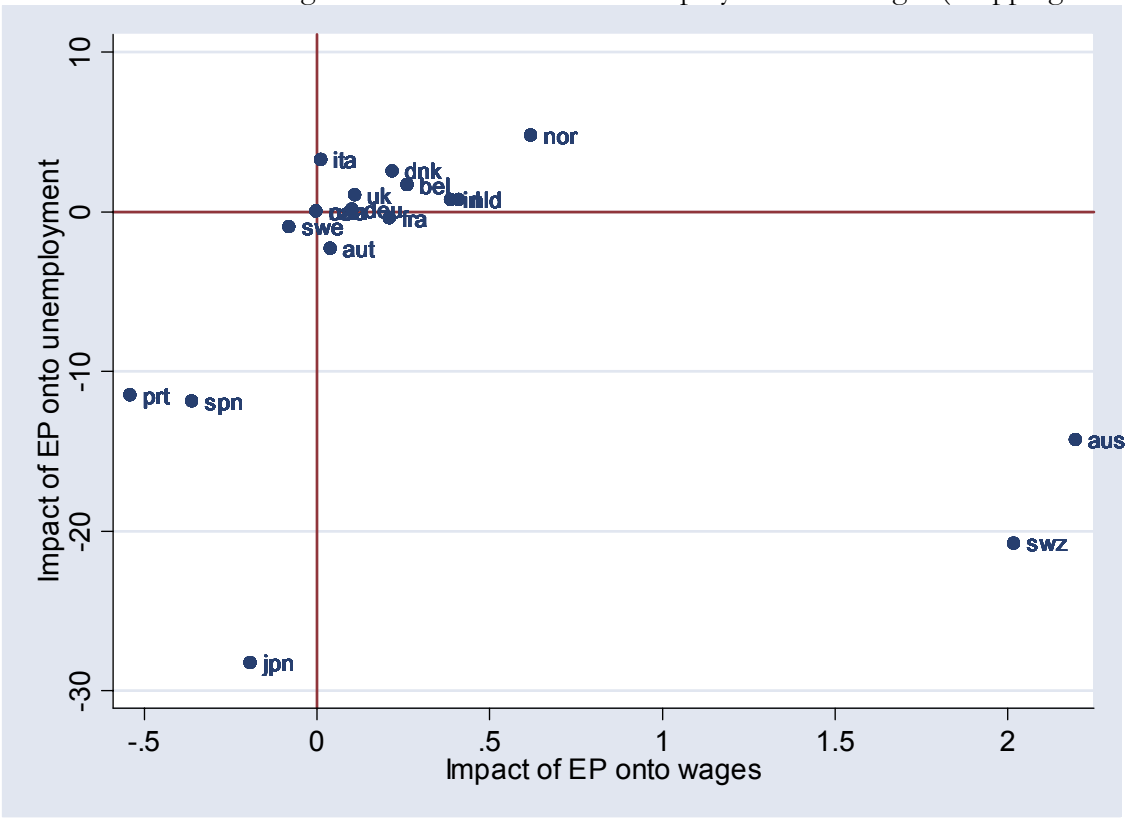


Figure 5 – 3SLS with heterogeneous effect of EP on unemployment and wages (dropping Finland)



Further analysis to be developed:

⇨ heterogeneity in the unemployment benefit coefficient

⇨ dynamic simulations

⇨ counterfactuals (unemployment rate in continental Europe under US institutional set-up).

4. Conclusions

Main finding:

* support to previous results on union density and wage determinants

* evidence on country heterogeneity with respect to the impact of union density on unemployment

* three feedback mechanisms in OECD economies:
    - unemployment-union density
    - unemployment-real wage
    - union density-real wage

* methodological suggestion on how to cope with institutional endogeneity.

References

Bain, G.S. and Elsheikh, F. 1976. *Union Growth and the Business Cycle*. Oxford: Blackwell.

Belot, M. and Ours, J C van. 2001. Unemployment and labor market institutions: an empirical analysis. *Journal of the Japanese and International Economics*, 15, pp. 403–418.

Bertola, G. 1990. Job Security, Employment and Wages. *European Economic Review*. Vol. 34 (4): 851-79.

Bertola, G., Blau, F.D., and Kahn, L.M. 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?,* 2001.

Blanchard, O. and Tirole, J.. 2004. The Optimal Design of Unemployment Insurance and Employment Protection. A First Pass. NBER Working Papers: 10443.

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

Blau, F., and L.Kahn, Institutions and laws in the labor market, in O.Ashenfelter and D.Card, *Handbook of labor economics*, vol3a, North Holland 1999

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

Boeri, T., G. Nicoletti and S. Scarpetta (2000), "Regulation and labour market performance", *CEPR* wp.2420.

Botero, J., A.Shleifer, S.Djankov, R.La Porta and F. Lopez-de-Silanes 2003. The Regulation of Labor. *NBER Working Paper* No. 9756, June 2003

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* 2002 vol.17, n.2: 362-401.

Checchi, D. and J.Visser. 2005. Pattern persistence in European trade union density. fortcoming in *European Sociological Review*

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.

Muellbauer, J. and Nunziata, L., Forecasting (and Explaining) US Business Cycle, *CEPR Discussion Paper*, 2004.

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, *Economic Journal*, 1998, 108, (448), 802-16.

Nickell, S. and R.Layard. 1999. Labour market institutions and economic performance, in O.Ashenfelter and D.Card, *Handbook of labor economics*, vol3c, North Holland 1999

Nickell,S., Nunziata, L. and Ochel, W., Unemployment in the OECD since the 1960s. What do we know?, *Economic Journal*, forthcoming January 2005.

Nicoletti, G. and S.Scarpetta. (2001). "Interactions between product and labour market regulations: do they affect employment ? Evidence form OECD countries". forthcoming as OECD Economic Department Working paper

Nicoletti, G., Scarpetta, S. and Boylaud, O. (2000), "Summary indicators of product market regulation with an extension to employment protection legislation", *OECD*, Working Papers n. 226.

OECD 2004, Employment protection regulation and labour market performance, chapter 2 of Economic Outlook., Paris.

Oskarsson, Sven (forthcoming). "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.

Western, Bruce (1997). *Between class and market – Post-war unionization in the capitalist democracy*. Princeton University Press.

Table A.1 - Descriptive statistics – country means

country	ud	ur	wage	benefit	tw	ep	kaitz	loil	mmm	wiet	ty25
Australia	44.6	5.381	10.35	.2212	.3345	.9716	.2203	2.363	.207	.1427	11.15
Austria	51.08	2.633	12.66	.1666	.5636	1.721	0	5.108	.2683	.0083	9.222
Belgium	47.87	7.399	13.77	.3858	.4527	2.701	.3132	5.99	.2602	.0106	8.413
Canada	33.53	7.566	10.41	.1311	.4289	.8	.358	2.452	.2005	.033	10.61
Denmark	70.46	5.337	12.14	.3855	.5259	2.049	0	4.197	.2138	.0293	9.969
Finland	61.76	5.852	11.75	.1846	.5441	2.264	0	4.138	.2142	.0968	8.78
France	16.68	6.707	12.04	.1889	.6192	2.265	.5182	3.983	.2311	.0628	8.101
Germany	32.95	4.585	10.76	.2337	.4806	2.564	0	4.207	.2988	.0061	11
Ireland	57.56	9.313	9.665	.1991	.331	.6928	.0124	1.674	.1955	.0295	7.735
Italy	38.71	8.382	17.42	.0107	.5888	3.335	0	9.212	.2245	.2796	6.976
Japan	28.1	2.325	15.23	0	.283	2.062	.1747	7.606	.2038	.0175	10.22
Netherlands	31.88	5.169	11.07	.3195	.5107	2.576	.4686	3.219	.2357	.0047	9.444
Newzealand	34.95	3.446	10.31	.3108	.3038	.9409	.4523	2.471	.2444	.0648	10.04
Norway	53.52	2.659	12.23	.172	.5976	2.87	0	4.178	.2223	.0073	10.23
Portugal	45.24	5.531	14.24	.1251	.3515	3.84	.2545	6.508	.1858	.0496	4.392
Spain	11.01	10.97	14.7	.0825	.3563	3.737	.323	6.811	.2402	.1361	6.673
Sweden	76.58	3.689	12.29	.0225	.6698	2.169	0	4.06	.2358	.0116	9.846
Switzerland	28.79	1.032	10.99	.0323	.3397	1.1	0	3.084	.2894	2.1e-04	11.74
Unitedkingdom	46.66	5.721	9.464	.1892	.4479	.5226	.0188	1.606	.2541	.0463	10.2
Unitedstates	21.41	5.926	10.37	.0451	.4153	.2	.3932	2.275	.2009	.0111	11.25
Total	41.57	5.485	12.18	.1705	.4673	1.937	.1754	4.257	.2327	.0521	9.299

Table A.2 - Descriptive statistics – country standard deviations

country	ud	ur	wage	benefit	tw	ep	kaitz	loil	mmm	wiet	ty25
Australia	5.837	3.025	.1542	.0445	.0447	.1152	.3002	1.251	.0534	.0733	1.162
Austria	6.526	1.102	.2542	.1214	.0571	.4921	0	.8294	.0224	.013	1.071
Belgium	5.307	4.443	.3748	.0338	.0412	.6139	.2716	.9792	.0552	.0067	1.038
Canada	4.059	2.295	.1501	.0136	.0679	0	.1856	1.17	.0408	.0248	1.285
Denmark	8.208	3.312	.2085	.166	.1004	.3593	0	1.082	.0306	.0382	1.081
Finland	15.59	4.451	.2164	.1256	.0896	.1037	0	.9058	.0223	.0787	1.447
France	4.678	3.937	.2118	.078	.0487	.7927	.1739	1.164	.0404	.0563	1.21
Germany	2.288	3.154	.287	.01	.0358	.8249	0	1.086	.0355	.0053	1.388
Ireland	4.568	4.429	.1789	.0294	.0648	.338	.0831	1.345	.0146	.0228	.8286
Italy	8.234	2.708	.3396	.027	.0538	.4798	0	1.464	.0273	.1775	1.234
Japan	4.49	1.118	.2779	0	.0474	.0739	.1513	.7872	.0098	.0154	1.136
Netherlands	6.024	3.451	.1055	.1343	.0546	.2429	.2268	.8794	.0516	.0036	1.024
Newzealand	5.981	3.317	.0373	.037	.0172	.1293	.1712	1.409	.0543	.0389	.9724
Norway	2.097	1.621	.1974	.1349	.053	.1073	0	1.063	.0445	.0126	1.191
Portugal	15.54	1.802	.3947	.1136	.062	.2447	.2222	1.795	.0092	.0206	1.112
Spain	3.548	8.243	.3764	.0864	.0984	.4182	.1896	1.388	.0202	.1319	.9705
Sweden	7.912	2.723	.188	.0165	.1367	1.366	0	1.216	.0495	.0263	1.103
Switzerland	3.656	1.353	.0643	.068	.025	0	0	.6843	.0612	3.4e-04	.7452
Unitedkingdom	6.838	3.486	.2771	.0314	.0523	.1346	.0882	1.276	.0636	.0356	1.386
Unitedstates	5.146	1.47	.1265	.0121	.0399	0	.1366	1.069	.0312	.0075	1.001
Total	18.28	4.195	2.077	.141	.1294	1.132	.2397	2.327	.0503	.0893	2.099

Table A.3 - Descriptive statistics – observations

country	ud	ur	wage	benefit	tw	ep	kaitz	loil	mmm	wiet	ty25
Australia	41	43	37	40	26	44	45	43	39	45	41
Austria	40	42	36	40	41	44	45	43	33	45	41
Belgium	36	41	41	40	41	44	45	43	40	45	41
Canada	38	43	40	40	41	44	45	43	43	45	41
Denmark	40	43	41	40	41	44	45	43	43	45	41
Finland	39	43	31	40	41	44	45	43	43	45	41
France	39	43	37	40	41	44	45	43	43	43	41
Germany	39	43	41	40	41	44	45	43	43	45	41
Ireland	39	43	30	40	41	44	45	43	43	45	41
Italy	39	43	41	40	41	44	45	43	43	45	41
Japan	42	43	36	40	41	44	45	43	43	45	41
Netherlands	39	43	32	40	41	44	45	43	43	45	41
Newzealand	39	43	29	36	12	44	45	43	43	45	41
Norway	39	43	39	40	36	44	45	43	43	45	41
Portugal	24	43	41	25	26	29	45	43	11	28	41
Spain	38	43	40	40	37	44	45	43	43	42	41
Sweden	39	43	41	40	41	44	45	43	40	45	41
Switzerland	40	42	25	40	41	44	45	43	43	45	41
Unitedkingdom	40	43	41	40	41	44	45	43	43	45	41
Unitedstates	41	43	41	40	41	44	45	43	41	45	41
Total	771	856	740	781	752	865	900	860	806	878	820