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**Centralization of wage bargaining and the unemployment rate:
revisiting the hump-shape hypothesis**

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CENTRALIZATION OF WAGE BARGAINING AND THE UNEMPLOYMENT RATE: REVISITING THE HUMP-SHAPE HYPOTHESIS

by Lorenzo Forni*

Abstract

Is there a relation between wage bargaining institutions and unemployment? The "hump-shape hypothesis", first introduced by Calmfors and Driffill (1988), states that countries with highly centralized and highly decentralized wage bargaining processes have a superior performance in terms of unemployment than countries with an intermediate degree of centralization. Calmfors and Driffill's results were obtained on a sample including data from 1962 up to 1985. This paper shows that the claimed superiority in terms of unemployment of centralized countries over intermediate ones during the '60s and the '70s depended upon their high levels of government expenditure and public sector employment. The evidence shows that from the beginning of the '80s the expansion of the public sector in centralized countries slowed down considerably and, at the same time, the correlation between the degree of centralization and unemployment weakened. This evidence helps reconcile recent findings of poor correlations between measures of economic performance and indexes of bargaining systems with Calmfors and Driffill's original results. The paper concludes by questioning the compatibility of the reported evidence with the theoretical framework proposed by CD to explain the hump-shape hypothesis.

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Contents

"Convincing investigations of the effect of institutions on inflation and unemployment require controls for the aggregate demand and supply balance or measures of the government's policy stance. As the Scandinavian models of trade union behaviour imply, the government policy stance may be correlated with institutional structure and behaviour."

Flanagan (1999), page 1165

1. Introduction[1]

This paper discusses the empirical relation between the degree of centralization in wage bargaining agreements and the performance of the labour market in terms of unemployment. Whether a significant empirical relation can be found is a relevant issue for policy-making.

Recently, policy-makers are becoming aware of the need to introduce more "competitiveness" in the labour market. However, competitiveness can be increased in many ways: reducing hiring and firing costs, making weekly or yearly working hours more dependent on companies' needs, or else introducing some changes in wage bargaining patterns. If the empirical (causal) relationship between these different forms of competitiveness and unemployment is not clear, labour market reforms may be hampered by a poor understanding of the causes of high unemployment.

This paper focuses on the effects of the degree of centralization in wage bargaining on the unemployment level. The degree of centralization in wage bargaining must be intended, at a first approximation, as the level at which the wage is set (and maybe other aspects of labour contracts as well). Traditionally, OECD countries are divided into three groups depending on the level at which the bargaining between unions and employers occurs: at national level, at industry level, or at plant level.

The debate on the relation between centralization and labour market performance dates back to the '80s, when the so-called "corporativism" debate began. In those years, many authors (McCallum, 1983; Bruno and Sachs, 1985; Bean, Layard and Nickell, 1986; Newell and Symons, 1987) argued that centralized wage setting leads to more wage restraint and less unemployment: centralized bargaining forces unions to internalize negative externalities that

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would otherwise affect labour market outcomes; for example, plant or industry level unions may demand high wages without internalizing the effects of their demand on the overall price level.

This position was later revised by Calmfors and Driffill (1988), Freeman (1988) and more recently, among others, Hoel (1991), and Holden and Raaum (1992). They claim that the relation between the degree of centralization and the change in the unemployment rate is not monotonic (that is, as centralization grows, there is more wage restraint and less unemployment) and that it has the shape of an *inverted U* (hence the definition of "hump-shape hypothesis"): countries with both a very high and a very low degree of centralization have a better performance in terms of unemployment than countries with an intermediate degree of centralization.[2] For a recent and extensive review of this literature see Flanagan (1999).

The hump-shape hypothesis also finds support in some more recent papers: Boeri, Nicoletti and Scarpetta (2000) use OECD data to analyze the determinants of the employment rate and write that "the estimated coefficients for the measures of centralization/coordination give some support to the hump-shape hypothesis (Calmfors and Driffill, 1988)"[3]; similar evidence is reported by Daveri and Tabellini (2000). In a recent survey of some of the issues related to wage bargaining institutions, Calmfors (2001) writes: "Broadly speaking, half of the studies [reviewed] have found the relationship [between the degree of bargaining coordination and unemployment] to be hump-shaped in line with Calmfors and Driffill (1988) hypothesis, and half of the studies have found it to be monotonic (with more coordination always leading to lower unemployment)."[4]

Both the approaches mentioned, the "monotonic" and the "hump-shaped", hold that intermediate countries (those with industry wage bargaining) should have a worse unemployment performance than centralized countries. In this paper I intend to discuss the

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[2] In the words of Calmfors and Driffill (1988, pg. 13): "either highly centralized systems with national bargaining (such as in Austria and the Nordic countries) or highly decentralized systems with wage settings at the level of individual firms (such as in Japan, Switzerland and the US) seem to perform well. The worst outcome with respect to employment may well be found in systems with an intermediate degree of centralization (such as in Belgium and the Netherlands)." Note that a good performance in CD language is essentially a moderate increase in the average unemployment rate over the periods of their study, that is 1974-85 averages less 1963-73 averages.

[3] Boeri, Nicoletti and Scarpetta (2000), pg. 27.

[4] Calmfors (2001), pg. 19.

empirical robustness of this result. I will follow the approach of Calmfors and Driffill's (1988), henceforth CD, who first introduced the hump-shape theory.[5]

The point of the paper is that, over the period considered by CD (1962-1985), centralized countries had a higher growth in public expenditure and, to a lesser extent, a higher starting level than other economies. Countries with high levels of public expenditures as a percentage of GDP generally have a large share of employment in the public sector, which is less affected than private sector employment by economic downturns. Moreover, public expenditure may have dampened the negative effects on unemployment of the shocks of the '70s and beginning of the '80s.

The claim that the empirical content of the hump-shape hypothesis is weak is not novel. The OECD has devoted a chapter in its *1997 Employment Outlook* to the empirical relation between wage bargaining institutions and some measures of economic performance over the period 1980-1996. After a detailed review of earlier results, the chapter discusses several ways of testing the relationship between centralization and measures of economic performance (among which, the unemployment rate). "To conclude, many of the statistical results show little in the way of significant statistical relations between measures of economic performance and certain indices of bargaining systems, ... A key question is how one can interpret such findings."[6] This paper will help reconcile OECD results with previous ones, in particular those of CD.[7]

The paper is organized as follows. Section 2 will discuss CD's approach and results. Section 3 will present our data and estimation strategy. Section 4 will present the results of the analysis on the same sample period as CD (1962-1985). In section 5 the sample period will be extended up to the year 2000. Section 6 will discuss some extensions and section 7 will conclude.

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[5] Freeman (1988) reaches very similar conclusions to Calmfors and Driffill (1988) using a similar approach. The only difference is that Freeman takes wage dispersion as measure of the degree of centralization in wage bargaining whereas Calmfors and Driffill use a rank based on the degree of centralization.

[6] OECD Employment Outlook 1997, pg. 83.

[7] To my knowledge, the only other paper that moves in the direction of reconciling OECD with CD results is Cukierman and Lippi (1998). They suggest that, in explaining the correlation between unemployment and centralization, a measure of Central Bank independence is a relevant variable.

2. Calmfors and Driffill's rank and approach

CD define the degree of centralization as "the extent of inter-unions and inter-employers cooperation in wage bargaining".[8] The "extent of cooperation", in CD's analysis, is obtained by summing two measures: the first is the *level* (national, industry, plant) at which bargaining takes place; the second is the *degree of coordination* among unions (that is, the *number* of unions and the *extent* of their *cooperation*[9]) and among employers' federations (that is, the *number* of employer federations and the *extent* of their *cooperation*).

Based on these two measures CD assign a level of centralization to 17 OECD countries. Table 1 shows the level of centralization for each country (*1= Centralized, 2= Intermediate, 3= Decentralized*) used by CD and two more updated ranks based on the same criteria as CD: the one developed by the OECD in the 1997 *Employment Outlook* and the one presented by Elmeskov, Martin and Scarpetta (1998), henceforth EMS. The OECD *Employment Outlook* reports values for three years (1980, 1990 and 1994). EMS provide information on the development of the centralization index for 19 OECD countries starting in 1980 and up to the end of the '90s (see Table B.2 of their paper). In Table 1 I have reported the value of the index in three years (1980, 1990 and 1994) and, whereas the development of the degree of centralization is described only qualitatively by EMS (i.e. index equal to 3, gradually to 1 in the '80s), I assume the degree of centralization changes at the midpoint (in the example, the index switches from 3 to 1 in 1986). CD's rank is based on information available at the beginning of the '80s and therefore I have assigned CD's centralization assessment of each country to the year 1980. The two more updated ranks will be used when I extend the analysis to the sample including data up to 2000.

In their paper, CD compute means of the unemployment rate and some macroeconomic performance indexes over two periods (1963-73 and 1974-85). They then show that the change of the average unemployment rate over the two periods had a hump-shaped pattern if plotted against their rank of centralization. They further support their evidence reporting a similar result for a macroeconomic performance index given by the sum of the unemployment rate and the current account deficit as a percentage of GDP. The motivation for this index has a

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[8] Calmfors and Driffill (1988), pg 17.

[9] The extent of cooperation takes values between 1 and 3 and is assigned somewhat arbitrarily by CD.

Keynesian flavour; it is based on the idea that there is a trade-off between unemployment and external balance.

CD propose the following theoretical explanation for the hump-shaped result. Assume a model where "each industry consists of a large number of competitive price-taking firms. Each firm operates with a fixed capital stock but can vary its labour input (with the same constant-elasticity-of-substitution production function). The goods of various industries are imperfect substitutes in demand for each other."[10] The labour market is characterized by unions. Assume prices are given by a mark-up on labour cost and that labour demand is standard, decreasing in the wage. Given these hypotheses, the effect on unemployment of an increase in the degree of centralization depends on the following two opposite forces: i) unions' market power; ii) the effects of wage increases on prices:

i) As unions get larger they acquire market power. At the firm level, workers have little market power since an isolated increase in nominal wages would result in a large fall in employment for that firm: a single firm is unable to raise its output price unless all firms in the same industry do so. However, if the union were to control the labour supply to all firms within the industry, an increase in nominal wages would lead to an increase in the output price for the whole industry. Assuming the price elasticity of demand to be lower for goods produced by different industries than for goods of the same industry, the elasticity of demand for labour with respect to the wage would be lower if the union were to control labour supply at the industry level rather than at the firm level. That is, an industry union has more market power than a plant-level union and therefore on average gets higher nominal wages. This argument can be extended to support the idea that nominal wages tend to become progressively higher as unions encompass more sectors. The larger union enjoys a lower total nominal wage elasticity of demand for its labour than do the constituent members, since a given nominal wage increase results in a larger output price rise.

ii) However, the effect of nominal wages on the aggregate price level provides an opposite incentive. Nominal wage increases achieved by small unions have only small effects on the consumption price level (a single firm is forced to adjust the quantities more than the prices), so that real wages rise by approximately the same amount as nominal wages. As unions become larger the effect of nominal wages on the price level increases and the real

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[10]   Calmfors and Driffill (1988), pg. 31.

wage gain of a given nominal wage increase is reduced. The larger the union, the more it will internalize this moderating effect.

Increased centralization, in CD's opinion, thus produces two opposite effects on wages. The net effect can go in either direction and is likely to be hump-shaped if consumers' demand elasticities of substitution are larger at lower levels of aggregation.

3. Econometric specification

CD analyze the correlation between the centralization rank and the rank based on the change in the mean unemployment rate (over the two periods 1963-73 and 1974-85).[11] Since the correlation is significant, they claim the change in the mean of the unemployment rate depends on the degree of centralization. They do not control for other variables.[12]

In this paper I show that over the sample period countries with a high degree of centralization have had a higher growth in public expenditure as a percentage of GDP; this growth in expenditure has been accompanied by a marked increase in public sector employment. While to some extent the growth in public expenditure has been a general pattern, countries with less centralized wage bargaining have observed a much more moderate increase in public sector employment.

Figure 1 shows the development of the mean (population weighted) unemployment rate grouping the countries by CD's index of centralization. The vertical line is set at 1986 to show visually where the sample period considered by CD ends. The Figure shows the marked increase in the unemployment rate during the '70s and beginning of the '80s in

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[11]   To test directly the hump-shape hypothesis, CD develop a revised centralization ranking in which both very centralized and very decentralized economies rank above the intermediate ones.

[12]   In fact, CD's theoretical framework explains the correlation between the degree of centralization and the level of wages or - for a standard downward sloping labour demand curve - the level of employment. However, it is the correlation between centralization and changes in the unemployment rate that is significant, not the one between centralization and the level of the unemployment rate. In order to explain this fact, CD propose the following argument. During the '60s and the beginning of the '70s most countries in the sample were in full employment: labour demand was so strong as to allow unions to obtain high real wages and full employment. After the oil shocks of the '70s, labuor demand decreased substantially; at the new lower level, unions accepted some unemployment (or an employment level below potential) in order to support real wages. Since most countries were in full employment before the oil shocks, these shocks had a different effect on unemployment depending on the country's wage bargaining structure. This explanation is consistent with the model (1) below that I take as a reference for the empirical analysis.

intermediate economies; centralized and decentralized countries, while starting off from rather different levels, show a similar increase up to 1985. It must be stressed that the dynamic of the unemployment rate changes dramatically for the three groups of countries after 1985: centralized countries (still based on CD rank) show a marked increase in the unemployment rate.

Figure 2 shows the (population weighted) mean by centralization of the number of public employees as a share of total population (EG), of public employee compensations as a share of GDP (CGW) and of total current government expenditure as a percentage of GDP (YPG). The Figure reveals the diverging dynamics of public employment versus employee compensations in centralized countries. That is, in these countries the growth in compensations has been accompanied by a more than proportional increase in the number of public employees. Both employee compensations and total current government expenditure have grown more rapidly in centralized than in other countries, especially before 1985.

3.1 *A preliminary analysis*

The data presented suggest that the hump-shaped relation may reflect the correlation between the degree of centralization and the growth in public employment. A preliminary way to assess this hypothesis is to check the correlation between the degree of centralization and a measure of employment which does not consider public employment. I therefore subtract public employment from total employment in order to define a "private sector" employment rate (PS_EMP_R). I then regress by OLS the change in both the employment rate (EMP_R) and the "private sector" employment rate on three centralization dummies (centralized, intermediate, decentralized) and plot the smoothed fitted values from the two regressions in Figure 3. I use data from the OECD *2001 Economic Outlook* panel data set[13] and consider the same time period (1962-1985) and the same grouping by centralization of the seventeen countries as CD. To limit the effect of the cycle on the estimates, for all variables I take means over six-year periods starting from 1962 and up to 1985.[14] I therefore consider four six-year periods.

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[13]   OECD definitions follow the 1995 System of National Accounts when possible. For a description of the variables and summary statistics of the data see the Data Appendix.

[14]   Note that generally government expenditure is not significantly affected by economic cycles, or not as much as revenue is.

The dummies are all significant and the dummies for centralized countries are statistically different from the ones for intermediate countries in both regressions. From the Figure it emerges that countries with intermediate degrees of centralization experienced a greater average reduction in total employment than other countries (and in particular than centralized countries); there is no such evidence for "private sector" employment.

This evidence, although suggesting a possible weakness of the hump-shape theory, can not be considered conclusive. The main reason is that, although the theory proposed by CD is mainly a market-based explanation, it does not distinguish between private and public sector (consider, for example, that the centralization indexes are computed to include the public sector). After all, the labour demand is negatively sloped in the public sector as well (for evidence on this see, for example, Gregory and Borland, 1999) and therefore a higher degree of centralization may induce wage moderation and more employment in the public sector too. If this is the case, there is no reason to consider public employment separately. In the following I will argue that centralized countries have had a higher starting level and a higher growth rate, not only of public employees but also of total public expenditure, and that this higher level of public intervention has had a significant effect on the overall employment performance of these countries.

3.2 *A simple framework*

In the following I propose a simple model to capture the effect of public expenditure on the unemployment rate. Assume that changes in unemployment depend on how different labour market institutions respond to exogenous shocks (such as the oil shocks of the '70s) and that such response depends also on the level of government intervention in the economy. That is:

(1) $$DUNR_{it} = (\gamma DC_i + X_{it}\delta)\eta_t + \varepsilon_{it}$$

where $DUNR$ is the change in the Total Unemployment Rate, DC is the degree of centralization, X is the level of government intervention (i.e. government expenditure) and η_t is the exogenous shock in period t. In order to limit the effects of cyclical factors on the variables, I take six-year averages of the variables.[15] This approach follows CD's type of

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[15]   I also experimented taking means over longer and shorter periods of time with minor differences in the

analysis. Expressing the variables as means over periods of six-year - the subscript t' refers to the six-year periods - expression (1) can be written as follows:

$$(2) \qquad\qquad DUNR_{it'} = \widetilde{\gamma}DC_i + X_{it'}\widetilde{\delta} + \varepsilon_{it'}$$

where I assume that $\eta_{t'} = \overline{\eta}$ (that is, constant across t') so that $\widetilde{\gamma} = \gamma\overline{\eta}$ and $\widetilde{\delta} = \delta\overline{\eta}$.[16]

Public expenditure affects both the level and the variability of the unemployment rate in several ways. Unemployment benefits are a typical example. Welfare benefits have also been used in some countries to remove from the labour force workers with low productivity or employed in restructuring firms. Certainly a very relevant effect is through public employment: public sector employment is less affected than private sector employment by economic downturns; the higher the level of public employment, the lower the effect of an exogenous shock on the overall unemployment rate[17]. As we have seen, the level of public employment has been higher and growing more rapidly in countries with centralized wage bargaining.

To test model (2) I use data from the OECD *2001 Economic Outlook* panel data set. To start with, I consider the same time period (1962-1985) and the same grouping by centralization of the seventeen countries as the one used by CD. Since for all variables I take means over six-year periods starting from 1962 and up to 1985, in this section I consider four six-year periods.

As a measure of public intervention in the economy I consider both the level of Government Current Disbursement (YPG) and the level of expenditure for Government

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results.

[16] I would like to point out that - assuming model (2) - I do not mean to assume that an increase in X causes an increase in $DUNR$. I simply assume a linear conditional expectation function $E(DUNR/DC, X)$ and try to get unbiased estimates of $\widetilde{\gamma}$ and $\widetilde{\delta}$.

[17] Evidence of the fact that employment changes in the private sector are more strongly correlated with cyclical movements in the economy than is the case for public sector employment is reported by Freeman (1987) for the United States and by Blank (1993) for the United States and the UK. These authors claim that the lower degree of cyclicality of public sector employment may reflect either the fact that the demand for public sector output is less sensitive to business cycle fluctuations or that governments choose to smooth employment fluctuations to achieve welfare or macroeconomic policy objectives.

Consumption Wages (CGW).[18] This last variable records the level of expenditure on public employment as a percentage of GDP, while Current Disbursement sum up all current expenditures including expenditure on public employment, social expenditures and interest payments as a percentage of GDP. I obtain the same qualitative results when I consider Current Disbursement excluding Gross Government Interest Payments.

It is likely that both Current Disbursement and Government Consumption Wages are not exogenous to the change in the economic environment (and, in particular, in the unemployment rate). Current Disbursement includes expenditure for unemployment policies that automatically grow with the unemployment rate. Moreover, as I have argued, governments often increase expenditure and/or public employment to mitigate the effects of a downturn. In order to control for endogeneity I use an Instrumental Variable approach.

A proper instrument has to be correlated with YPG or CGW but not with the error term. Two IV candidates are Government Consumption Excluding Wages ($CGNW$) and Subsidies paid by the Government ($TSUB$)[19]: they are part of Current Disbursement (YPG) and therefore ought to be correlated with it; they are also correlated with Government Consumption Wages (CGW), as the main components of public expenditure generally tend to move together. As potential instruments I also consider the lagged values of both endogenous variables, $LYPG$ and $LCGW$. Table 3 reports the correlation coefficients between the endogenous variables and the instruments. From the Table it emerges that the correlations between $CGNW$, $TSUB$ and the endogenous variables are in the range 0.36-0.76; the correlations are higher when considering the lagged endogenous variables.

As for the instruments' exogeneity, the lagged endogenous variable are exogenous by definition. Government Consumption Excluding Wages ($CGNW$) and Subsidies paid

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[18] The level and the dynamics of Government Consumption Wages can be affected by the different definitions of public sector across time and countries: for example, in countries where a significant part of hospitals and/or schools are private - or even if they are publicly owned, but are classified outside the general government because they are privately managed - the costs borne by the government (as salaries) may be classified in the budget accounts under other categories (such as social payments). Therefore, it is important to consider a variable which includes all social payments, such as Current Disbursement.

[19] Government Consumption Excluding Wages ($CGNW$) includes: intermediate goods used in the production of public goods and services, transfers in kind to the household sector (i.e. pharmaceuticals) and depreciation allowances. Subsidies ($TSUB$) include all grants on current account made by the government to private firms and public corporations; these grants are often made to compensate firms for operating losses due to the government's policies to maintain prices at a level below production costs. All automatic and non-automatic unemployment benefits are not included in Subsidies ($TSUB$) but in Social Benefits paid by the Government ($SSPG$).

by the Government ($TSUB$) should be only weakly dependent on the unemployment rate. In fact, Government Consumption Excluding Wages includes mainly intermediate consumption by general government and expenditure for pharmaceuticals; Subsidies paid by the Government does not include unemployment-related expenditure but mainly grants to industries to compensate them for the cost of government imposed price controls.

Overall, as I will show below (see Table 6), the results of the instrumental variable regressions are intuitive: except for the CGW variable on the sample period 1962-2000, the bias goes in the direction of increasing the OLS coefficient of government spending.

4. Results

In this section I will first replicate CD's results and then test model (2). Table 2 reports the results of the OLS regressions of the change in the unemployment rate ($DUNR$) on the CD measure of centralization (*1=Centralized, 2=Intermediate, 3= Decentralized*) and its square for the periods 1962-1985, 1985-2000 and 1962-2000. Whether the coefficient on the squared term is significant or not (and negative) provides a direct test for the hump-shape hypothesis. The first column of the Table (sample 1962-1985) shows that the degree of centralization is significant; the negative coefficient on the degree of centralization squared indicates that indeed there is a hump-shaped relationship between the change in the unemployment rate and the degree of centralization.

As argued above, the effect of the degree of centralization on the unemployment rate dynamics must be assessed controlling for the role of the government. Table 5 reports mean levels over the years 1962-67 and mean growth rates over the period 1962-1985 by centralization of Current Disbursement (YPG) and Consumption Wages (CGW) as a percentage of GDP. The Table shows that the degree of centralization is highly correlated with the growth rate of expenditures over the sample period and that it is also correlated, to some extent, with the level of government expenditure at the beginning of the sample period. The Table reports also the mean level and the mean growth rates by centralization of Current Disbursement (YPG) and of Consumption Wages (CGW) instrumented with the two sets of instruments considered.[20] Using the instrumented measures, mean Current Disbursement

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[20]   The results of first stage regressions are reported in Table 4.

(YPG) as a percentage of GDP at the beginning of the sample (1962-67 mean) is 0.305 for centralized, 0.289 for intermediate and 0.279 for decentralized countries; there is no such pattern for the instrumented measure of the government wage bill. The evidence on growth rates is much stronger: taking first stage results using $CGNW$ and $TSUB$ as instruments, the average yearly growth rate over the sample period for Current Disbursement as a percentage of GDP is 2.1%, 1.7% and 1.2% respectively for centralized, intermediate and decentralized countries; the corresponding figures for Consumption Wages are 1.7%, 1.3% and 0.9%; the difference in growth rates between centralized and intermediate countries is greater when using the lagged dependent variables as instruments.

To assess the correlation between the growth in current expenditures and the change in the unemployment rate I regress $DUNR$ on centralization dummies and the chosen measures of government intervention as in (2). In Table 6 I present results of both OLS and IV regressions. As for the sample period 1962-1985, Table 6 shows that in fact the correlation between centralization and unemployment rate is mainly captured by the measures of government intervention and not by the centralization variables.

5. Extending the sample to the '90s

In this section I discuss the results obtained by extending the sample up to the year 2000. In order to capture the changes in the degree of centralization over time, I use the centralization index reported by EMS (1998), which is based on OECD data. The EMS index is the most updated one I could find and, for most countries, gives information on the year a given country moved from one degree of centralization to a different degree. I will also discuss the results using the degree of centralization by country reported by OECD 1997 for the three years 1980, 1990 and 1994.

The third column of Table 2 shows the results of the OLS regression of the change in the unemployment rate on the degree of centralization for the extended sample. The hump shape is apparently robust to the extension of the data to the year 2000. However, when the sample is restricted to the period 1980-2000 (second column of Table 2) no significant relation exists. Moreover, using the information on the degree of centralization reported by the OECD

(1997), on the sample 1962-2000 the coefficient of the degree of centralization squared is only significant at the 10% level.

The test of model (2) is reported in Table 6. The correlation between changes in unemployment and centralization vanishes (as in the smaller sample) when introducing the measures of government spending. In the longer sample, however, the overall fit of the model is much worse; in particular, all the coefficients of the government intervention variables are not significant. This is due to the fact that, after the mid '80s, the differences in public employment and expenditure trends across groups of countries characterized by different degrees of centralization have been limited (see Figure 2), while the behavior of unemployment has been very different across countries and more volatile than in the previous sample period (see Figure 1).

6. Extensions

6.1 *Playing with the indexes*

I have already used three different indexes of centralization (CD, OECD 1997 and EMS). However, Flanagan (1999) suggests using a measure of bargaining coordination (instead of a composite measure of bargaining level and coordination). The main difference between the two measures regards Japan. Japan is usually classified as decentralized (or intermediate) based on measures of both centralization and coordination; it is classified as centralized based on the sole coordination index. In Japan wage bargaining takes place at company level (therefore very decentralized), but it is usually highly coordinated across firms and sectors.

I repeated the analysis with the coordination index reported by Elmeskov, Martin and Scarpetta (1998) - see Table 1 last column. The evidence in favour of the hump-shape hypothesis on the sample 1962-1985 is now significant only at the 6% (the *t statistic* on the coefficient of centralization squared is equal to 1.930). In this case, too, this evidence evaporates when controlling for public sector intervention. First stage regressions show a very good fit: in particular, the coefficients on coordination and coordination squared are now more significant than when using the centralization index. When restricting the sample to the period 1980-2000, there is no evidence in favour of the hump-shape theory.

6.2   *Multiple tiers of bargaining and the role of non-union sectors in centralized economies*

In centralized economies a second level of negotiations often exists (at the industry or plant level) to give an operative content to the guidelines of national agreements. These negotiations often introduce wage drifts that can partly neutralize the wage restraint efforts of centralized bargaining. The literature on the subject, mainly on Scandinavian data, shows that lower tiers of bargaining do not usually completely offset the effect of centralized negotiations. This may be due to the high fraction of public employees in Scandinavian countries, together with the fact that wage drifts are presumably smaller for public employees than for private sector employees. Similarly, non-union sectors might reduce the correlation between bargaining structure and unemployment dynamics: in an environment where there is a significant component of the labour force which is not unionized, even centralized unions may not internalize the effects of wage increases, while firms may find it difficult to pass on pay increases to consumers even if the bargaining takes place at the country or sectorial level.

However, on top of the fact that is very difficult to have detailed data on these institutional elements, it must be noted that the OECD (*Job Studies 1995-1997*) acknowledges that features other than the level of bargaining and the degree of coordination among unions and employer associations, such as multiple bargaining levels and union density (that is, the fraction of trade union members out of all wage and salary earners), are less relevant for the bargaining outcomes. The possibility of more than one bargaining level tends to shift the structure of wage bargaining to a more decentralized one.

Finally, the fact that in some countries union density is decreasing has recently raised some doubts about the capacity of unions to affect the bargaining outcomes in those countries. However, the OECD reckons that union density has a limited role, since in many European countries the degree of coverage (that is the degree of extension of collective agreements to non-union members) remains very high.

7. Concluding remarks

In this paper I have reviewed the empirical content of the hump-shape hypothesis introduced by Calmfors and Driffill (1988), which states that countries with highly centralized and decentralized wage bargaining processes have a superior performance in terms of

unemployment than intermediate ones. The objective of the paper has been to show that the effect of centralization on unemployment depends heavily on the existing positive correlation between public expenditures (and public employment) and centralization. To this end, I have regressed the changes in the unemployment rate on indexes of centralization including measures of government intervention in the economy; in order to overcome the endogeneity of these measures, I have followed a two stage IV estimation. The results show that the claimed superiority of centralized wage negotiations during the '60s and the '70s rests on the strong growth of the public sector in centralized economies. During the second part of the '80s and the '90s the hump-shaped relation between centralization and unemployment vanished.

Is this evidence consistent with the theoretical framework that CD proposed to explain the hump-shape hypothesis? There are several reasons why the CD framework (discussed in Section 2) is not easily extendable to public employment. Gregory and Borland (1999) show that the empirical literature on the public sector labour market finds: i) a negative wage elasticity of employment for most categories of labour in the public sector; ii) that the main effect of unions on public sector employment is to increase the employment level; iii) that union effects on employment are likely to operate through a (positive) demand shift effect and that this effect is larger where strong forms of union representation exist. Therefore, as far as the public sector is concerned, more centralization in wage bargaining leads to higher employment mainly through political influence on government choices (more than through wage moderation).

Even if one is willing to believe that the expansion of public employment in centralized countries over the period 1960-80 was the result of the forces described by CD (essentially wage moderation), their framework can not explain why the correlation between centralization and labour market performance vanished starting in the '80s, when the expansion of the public sector in centralized countries started to slow down.

On these issues further research is needed. The analysis presented shows that, in order to assess the effect of wage bargaining institutions on the dynamics of the unemployment rate there is a clear need to get a better understanding of the determinants of public sector employment levels and of the functioning of public sector wage negotiation.

Appendix: Data description

Current Disbursement as a percentage of GDP (YPG) is defined as the GDP percentage of the sum of: Government Consumption, excluding wages ($CGNW$); Government Consumption, wages (CGW); Property Income paid by the Government ($YPEPG$); Subsidies ($TSUB$); Social Benefits paid by the Government ($SSPG$); Other Current Transfers paid by the Government ($TRPG$).

Change in mean Unemployment Rate ($DUNR$) is defined as the absolute change in the means of the Unemployment Rate (UNR) taken over six-year periods starting from 1962.

Sample 1962 to 1985

Variable	Obs	Mean	St.Dev.	Min	Max
UNR	67	3.44	2.66	0.00	9.97
$DUNR$	50	1.46	1.45	-0.38	5.71
YPG	53	0.35	0.10	0.13	0.58
CGW	60	0.11	0.03	0.06	0.19
$CGNW$	56	0.07	0.03	0.01	0.14
$TSUB$	57	0.02	0.01	0.00	0.05

Sample 1962 to 2000

Variable	Obs	Mean	St.Dev.	Min	Max
UNR	118	5.02	3.30	0.00	15.09
$DUNR$	101	0.88	2.00	-3.38	10.41
YPG	101	0.39	0.10	0.13	0.62
CGW	108	0.12	0.03	0.06	0.19
$CGNW$	104	0.07	0.03	0.01	0.14
$TSUB$	105	0.02	0.01	0.00	0.05
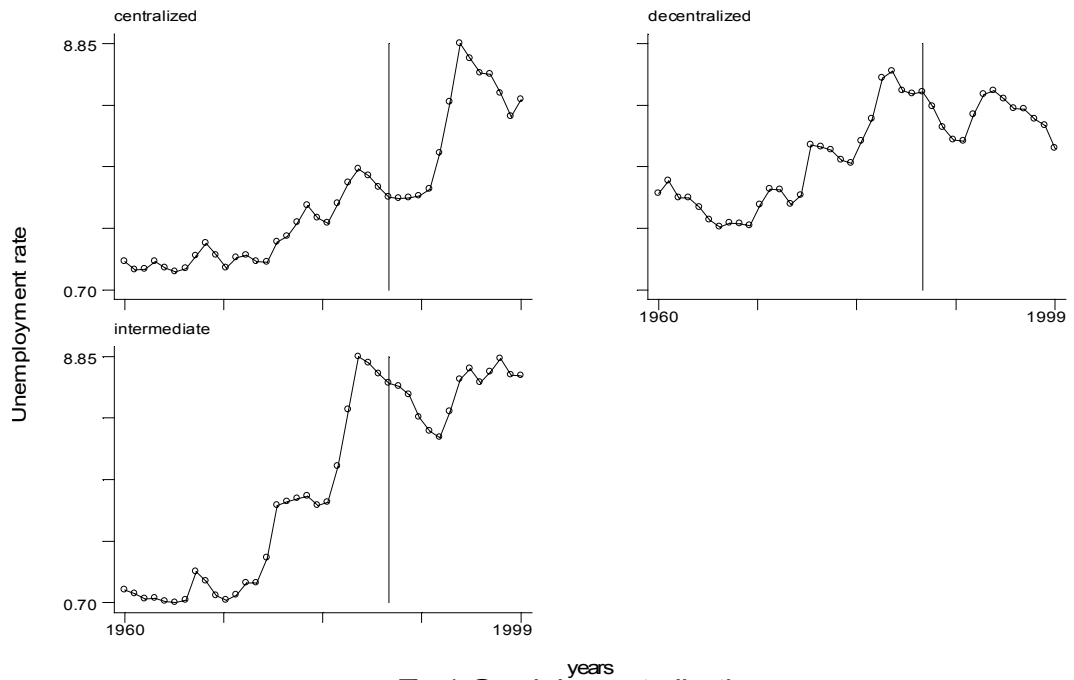
Fig.1-Graph by centralization
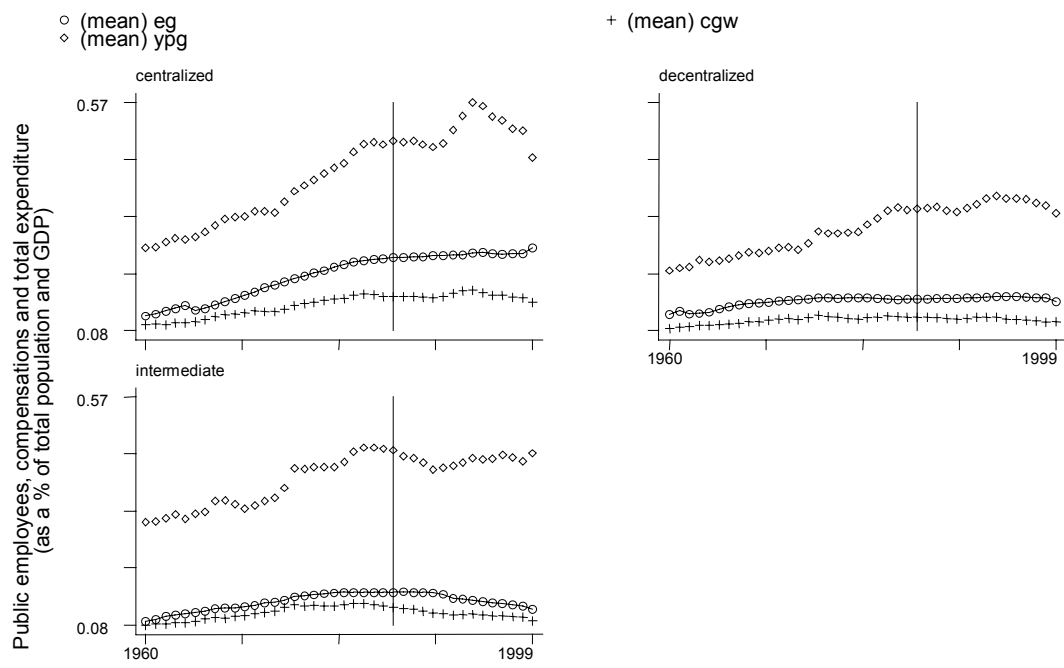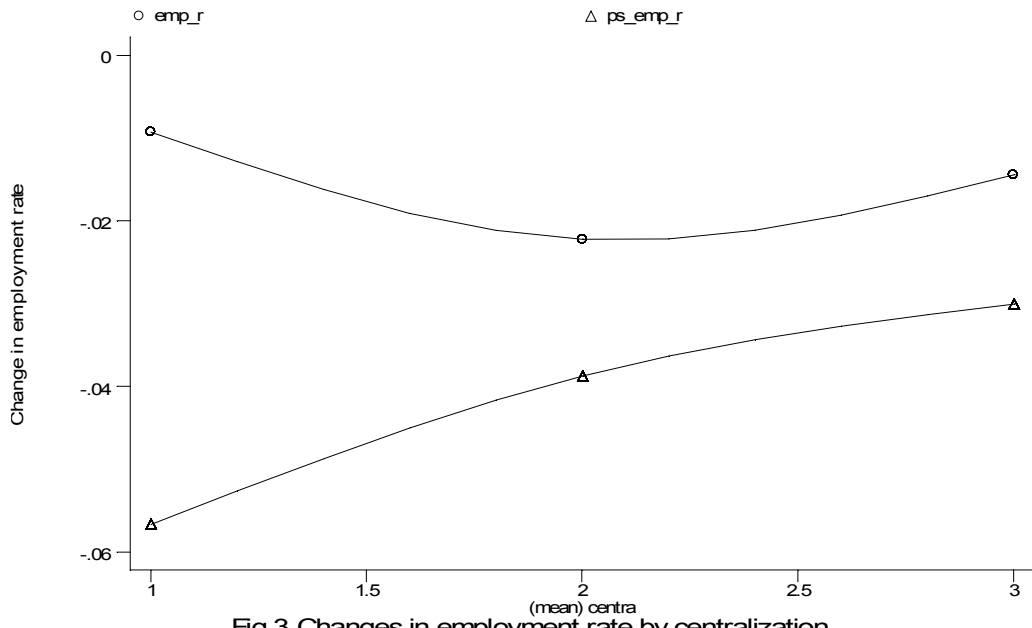
Fig.2-Graph by centralization

Fig.3-Changes in employment rate by centralization

Table 1 – Centralization Indexes

Country	Year	CD (1988)	OECD (1997)	EMS (1998)	EMS (1998) Coordination
Austria	1980	1	1	1	1
	1990	--	1	1	1
	1994	--	1	1	1
Denmark	1980	1	1	1	1
	1990	--	2	1	1
	1994	--	2	1	1
Finland	1980	1	1	1	2
	1990	--	1	2	2
	1994	--	1	2	2
Norway	1980	1	1	1	1
	1990	--	1	1	1
	1994	--	1	1	1
Sweden	1980	1	1	1	1
	1990	--	1	2	3
	1994	--	2	2	2
Australia	1980	2	1	2	2
	1990	--	1	3	3
	1994	--	3	3	3
Belgium	1980	2	2	2	2
	1990	--	2	2	2
	1994	--	2	2	2
Germany	1980	2	1	1	1
	1990	--	1	1	1
	1994	--	1	1	1
Netherlands	1980	2	2	2	2
	1990	--	2	1	1
	1994	--	2	1	1
New Zealand	1980	2	3	2	3
	1990	--	3	2	3
	1994	--	3	3	3
Canada	1980	3	3	3	3
	1990	--	3	3	3
	1994	--	3	3	3
France	1980	3	3	2	2
	1990	--	2	2	2
	1994	--	2	2	2
Italy	1980	3	3	3	2
	1990	--	3	3	2
	1994	--	1	1	1
Japan	1980	3	2	3	1
	1990	--	2	3	1
	1994	--	2	3	1
Switzerland	1980	3	2	--	--
	1990	--	2	--	--
	1994	--	2	--	--
UK	1980	3	3	2	3
	1990	--	3	3	3
	1994	--	3	3	3
US	1980	3	3	3	3
	1990	--	3	3	3
	1994	--	3	3	3

Sources: Calmfors and Driffill, 1988 (CD); OECD Employment Outlook, 1997 (OECD); Elmeskov, Martin and Scarpetta, 1998 (EMS).

Table 2 – CD results: OLS regressions*

Dependent variable: **DUNR**	Sample 1962-1985	Sample 1980-2000	Sample 1962-2000
Centralization	1.673	0.895	1.562
	(4.058)	(1.328)	(3.915)
Centralization squared	-0.393	-0.308	-0.466
	(-2.607)	(-1.225)	(-3.074)
N. of observations	50	48	95
R^2	0.544	0.039	0.206
F statistic	0.000	0.405	0.000

* t statistics in parenthesis

Table 3 – Correlation coefficients between instruments and endogenous variables
(variables expressed as % of GDP)

Sample 1962-1985

	YPG	CGW	LYPG	LCGW	CGNW	TSUB
YPG	1.00					
CGW	0.77	1.00				
LYPG	0.95	0.63	1.00			
LCGW	0.78	0.91	0.73	1.00		
CGNW	0.76	0.57	0.78	0.63	1.00	
TSUB	0.48	0.36	0.44	0.32	0.07	1.00

Sample 1962-2000

	YPG	CGW	LYPG	LCGW	CGNW	TSUB
YPG	1.00					
CGW	0.74	1.00				
LYPG	0.89	0.54	1.00			
LCGW	0.79	0.88	0.78	1.00		
CGNW	0.66	0.37	0.64	0.47	1.00	
TSUB	0.46	0.53	0.24	0.36	0.06	1.00

Table 4 - First stage regressions*

	Sample 1962-1985				Sample 1962-2000			
Dependent variable	**YPG**		**CGW**		**YPG**		**CGW**	
CGNW	2.621		0.598		2.453		0.412	
	(9.190)		(4.465)		(9.585)		(4.943)	
TSUB	5.356		1.490		4.686		1.612	
	(8.491)		(5.026)		(6.528)		(6.895)	
LYPG		0.990		-0.500		0.598		-0.120
		(10.903)		(-1.504)		(8.796)		(-6.837)
LCGW		0.665		1.198		0.967		1.214
		(2.505)		(12.328)		(3.836)		(18.608)
Centralization	0.051	-0.007	0.043	0.015	0.131	0.101	0.059	0.039
	(1.554)	(-0.261)	(2.754)	(1.567)	(3.547)	(3.920)	(4.952)	(5.858)
Centralization squared	-0.009	-0.000	-0.009	-0.005	-0.029	-0.029	-0.013	-0.011
	(-0.958)	(-0.058)	(-2.104)	(-1.910)	(-2.715)	(-4.077)	(-3.740)	(-6.249)
N. of observations	53	39	53	39	101	85	101	85
R^2	0.984	0.995	0.967	0.994	0.975	0.992	0.970	0.993
Prob > F statistic	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

*t statistics in parenthesis

Table 5 – Average level and average yearly growth rate, normal and instrumented values
(variables expressed as % of GDP)

		normal		instrumented			
				Instruments: CGNW, TSUB		Instruments: LYPG, LCGW	
		YPG	CGW	YPG	CGW	YPG	CGW
62-67 average level	Centralized	27.6	9.6	30.5	9.9	--	--
	Intermediate	27.5	8.5	28.9	10.2	--	--
	Decentralized	25.3	9.3	27.9	9.4	--	--
62-85 average growth rate	Centralized	3.3	2.6	2.1	1.7	3.5	2.8
	Intermediate	2.5	1.9	1.7	1.3	2.7	2.6
	Decentralized	2.6	1.2	1.2	0.9	2.3	1.3

Table 6 - OLS ad IV regressions*

	Sample 1962-1985						Sample 1962-2000					
Dependent variable: **DUNR**	**OLS**		**IV** Instruments: CGNW, TSUB		**IV** Instruments: LYPG, LCGW		**OLS**		**IV** Instruments: CGNW, TSUB		**IV** Instruments: LYPG, LCGW	
YPG	5.898 (2.979)		5.441 (2.364)		4.568 (2.067)		1.067 (0.461)		0.302 (0.106)		1.215 (0.506)	
CGW		12.924 (1.957)		9.615 (1.455)		8.258 (1.201)		6.180 (0.807)		7.027 (0.892)		8.018 (0.982)
Centralization	-1.060 (-1.044)	-0.281 (-0.271)	-0.805 (-0.700)	0.310 (0.289)	-0.350 (-0.305)	0.606 (0.534)	0.876 (0.656)	0.608 (0.488)	1.300 (0.821)	0.355 (0.272)	0.753 (0.537)	0.151 (0.111)
Centralization squared	0.318 (1.123)	0.130 (0.457)	0.253 (0.795)	-0.044 (-0.148)	0.128 (0.401)	-0.127 (-0.402)	-0.280 (-0.749)	-0.217 (-0.628)	-0.393 (-0.898)	-0.145 (-0.402)	-0.238 (-0.605)	-0.082 (-0.216)
N. of observations	41	47	41	41	39	39	89	95	89	89	85	85
R^2	0.671	0.605	0.647	0.637	0.649	0.621	0.182	0.211	0.180	0.186	0.228	0.179
Prob > F statistic	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.001

*t statistics in parenthesis

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