Pension Benefits, Labor Market Institutions and Unemployment: Theory and Empirical Evidence

Antonis Adam[*]

(DIEES, AUEB)

Abstract

In a simple union model we argue that the existence of a public pension program that pays a benefit during the retirement period conditional on employment when young creates an incentive for wage moderation. This hypothesis is tested in a panel of 14 countries for the 1980-2000 period. We find significant evidence in favor of the theoretical model. The empirical section of the paper also provides important insights about the role of labor market institutions and macroeconomic shocks as determinants of unemployment.

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[*] **Correspondance: Athens University of Economics and Business, Department of International and European Economic Studies, 76 Patission st., 10434, Athens, Greece Tel:+30-210-8203354; fax:+30-210-8203137**
E-mail address: **aadam@aueb.gr**
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1. Introduction

Even though unemployment rates in Europe in the last few years have rapidly declined still unemployment performance in Europe is much worse than in the US. This marked difference between the two regions is attributed by many to differences in the labor market institutions (Siebert, 1997, Nickell, 1997). In turns this diversity in institutions also results into large heterogeneity between European countries. In a recent paper Daveri and Tabellini (2000) argued that the most important of these institutions is the tax system. Any increase in unemployment is closely associated with excessive increases in the labor costs created by high labor taxes. In non- competitive labor markets increases in labor costs reduce labor demand, lowering the marginal productivity of capital as well as investment and growth (Daveri and Tabellini, 2000).

The above analysis focuses exclusively on the revenue side of labor taxes and is only one side of the story. Taxes are used to raise revenues to finance spending. A complete story would require one to take into account if and how these various types of spending affect unemployment. In that respect the only welfare benefit program which has been considered so far to be driving the unemployment rate is the unemployment insurance program. Unemployment benefits by reducing the fear of unemployment directly induce an upward pressure on wages. This is driven by the fact that unemployment benefits are paid only to the unemployed population, reducing the difference between working and non- working welfare and creating a "disincentive" effect for wage moderation.

But as Siebert (1997) points out: "…Any labor market is surrounded by an array of institutional arrangements that form a complex web of incentives and disincentives on both sides of the market." (Siebert, 1997, p.39). In contrast to the unemployment benefit

there are social insurance benefits that are received only by the working population, increasing the utility of being employed, thus creating "incentives" for wage moderation and inducing lower unemployment. In this paper we argue that pension benefits represent a program of that type[1].

Pension benefits are paid during retirement conditional on having worked when young. In the case of occupational pensions, the requirement may be even stricter by demanding one to be on the same profession for a large period of time. Then high unemployment spells lead to reduced pension benefits, or if associated with profession changes with loss of a large part of the benefit. Then when pension benefits are high there will be an additional cost of being unemployed: the unemployed worker does not only lose its wage but also its potential pension benefit.

On the theoretical part of the paper we present a simple union model that illustrates the above mentioned idea. Whereas unemployment benefits create a wage floor for the union members, pension benefits create an incentive for wage moderation. On the other hand taxes have an ambiguous effect on unemployment. As Daveri (2001) points out taxes increase unemployment when the elasticity of demand for labor is not too elastic and the unemployment benefit is untaxed (or taxed at a lower rate than wages). So on the hand pension benefits reduce unemployment whereas labor taxes have an ambiguous effect on unemployment. Then the overall effect of an increase in the pension benefit, financed by an increase in wage taxes, can be unemployment reducing.

At the empirical part of the paper we follow the tradition of Nickell (1997) and we try to pin down the institutional factors that influence the unemployment rate. Besides the tax and benefit system, that are explicitly modeled in our theoretical model, we introduce

[1] Other benefits may include health care or in-kind transfers for the employed workers etc.

other important institutional and macroeconomic variables. We use various specifications for the model to capture all aspects of the theoretical relationship and to ensure that our hypothesis testing is correct. For that reason our regressions are estimated with annual data as well as with five years averaged data.

The results are in accordance with the theoretical priors. We find that all labor market institutions are not rigidities. Moreover high unemployment can be explained both by institutions and macroeconomic variables as well as country specific characteristics. All our results are in line with Nickell (1997) and Blanchard and Wolfers, (1999).

As to the main hypothesis of our paper, we find that the pension benefit indeed has a negative effect on unemployment. This result holds irrespective of the specification of the econometric model. There is a negative effect of the pension benefit on the unemployment rate even when the pension benefit is introduced with lags, or when we allow for different effects across country groups. The results of the theoretical model seem to carry through in all econometric specifications.

The paper is structured as follows: in the next section we present a simple union model to illustrate the main testable hypothesis for the empirical section. In section three we describe the data, in section four we present the results of the empirical investigation and section five concludes.

2. Theoretical Model

We present a simple model to illustrate the main idea of the paper. There is a large number of similar perfectly competitive firms which produce a single homogeneous good only with the use of labor in order to maximize profits. In each firm there is single labor union trying to maximize the lifetime utility of its members. The wage rate is determined by bargaining between the union and the firm. The firm are then free to choose the amount of labor they wish to employ at that wage (Right- to- manage bargaining).

2.1 Firms

There is single sector in the economy producing a homogeneous good with the use only of labor. Firms are perfectly competitive firms and each firm has a production function of the form:

$$Y = f(L) \tag{1}$$

with the usual assumptions that f'(L)>0 and f''(L)<0.

In every firm there exists a firm specific union and the firm can employ labor from that union only. There is no entry or exit of firms[2] or mobility of workers between firms (or unions). The objective of each firm is to maximize the present value of its profits[3] (i.e. the stream of differences between revenues and cost).

2.2 Unions

Given the large number of firms in the economy, there is also (the same) large number of unions, each taking the economy wide variables (i.e. the wage in other firms) as given. The objective of each union is to maximize the expected utility of its risk-

[2] Implicitly we assume that firms are owned by a separate class in the economy with a fixed size (i.e. there is no mobility between classes of workers and firm owners). Firms are inherited from one generation of owners to the next. So the behavior of the firm owners does not affect the macroeconomic equilibrium.
[3] This under the current setting of the model is equivalent into maximizing each period's profits, since there are no dynamics in the model.

neutral[4] members. The expected utility of the union (and of the workers) if an agreement between the union and the firm is reached is:

$$V = k\left[L\left(w_t(1-\tau) + B\overline{w}_{t+1}\right) + (N-L)b\overline{w}_t\right] \quad (2)$$

where L is firm employment, N the number of workers in each firm, τ is the tax rate on wages, w the wage rate of the firm at time t, b and B the unemployment benefit and pension benefit replacement ratio respectively and $\overline{w}_t$ the economy wide wage at t and k is a constant[5]. Equation (2) can be directly derived from a household utility maximization problem in an Overlapping Generations model, where households have a Cobb- Douglas utility function (see Adam, 2004).

If an agreement is reached the firm hires L workers at the wage rate w. These workers at their retirement period are eligible to receive a (public) pension benefit which is calculated as a fixed amount B over the next period average wage rate. After the wage agreement, (N-L) workers remain unemployed and receive an unemployment benefit which is equal to bw_t.

Each union takes into account not only the working period income but also the (future) retirement income that the workers will receive. We have assumed that there is no mobility of workers between firms. If an agreement is not reached in the wage bargaining, the union members receive an unemployment benefit which is calculated as a fixed percentage of the economy wide (average) wage. So the fallback utility of the union is:

$$\overline{V} = kb\overline{w}_t \quad (3)$$

[4] When unions are risk neutral expected income maximization is equivalent to expected utility maximization.

[5] Which is a function of the rate of time preference of the workers.

2.3 Government

The government collects labor taxes and uses them to finance two social security programs: unemployment and old- age pension benefits. The government budget constraint is of the form:

$$\tau \bar{w}_t L_t = b\bar{w}_t (N - L_t) + B\bar{w}_{t-1} L_{t-1} \quad (4)$$

Both social security programs pay benefits according to the economy wide wage. Public pension benefits are not calculated separately for each worker according to his past wage but are calculated as a proportion of the average wage in the economy. This reflects the intra- generational redistributive aspect of the pension system. In reality pension benefits are calculated according to working period wage income but at the same time in all countries there is an aspect of intra- generational redistribution either in the form of a maximum pension benefit. This contrasts highly with private pensions where benefits are the future value of contributions, with no intra- generational redistribution. We chose to model public pensions as a fully intra- generational redistributive program in order to highlight an important difference with the private pension system.

2.4 Bargaining

To determine the equilibrium wage and employment we adopt the right- to- manage model of bargaining (see Hart and Moutos, 1995). The firm and the union first bargain about the wage rate and then the firm unilaterally chooses employment. In the bargaining process the unions want to maximize the expected utility of their members. On the other hand the firm wants to maximize their profits. The outcome of the bargaining process is the solution of the following generalized Nash product:

$$\max_{w_t} \Omega = \left[f(L_t) - w_t L_t \right]^a \left[L\left(w_t(1-\tau) + B\overline{w}_t - b\overline{w}_t \right) \right]^{1-a} \tag{5}$$

Given the wage rate determined from (5), the firm is then free to choose the amount of labor to employ. Taking w as given the firm chooses L to maximize profits, i.e.::

$$\max_{L_t} \left[f(L_t) - w_t L_t \right] \tag{6}$$

which gives us the standard neoclassical labor demand function:

$$w_t = f'(L) \tag{7}$$

According to (7) if the firm at the last stage of the game is free to choose the amount of labor to employ taking as given the wage rate from the bargaining process then it must end up on its labor demand schedule. Then the maximization of (5) at the first stage of the game must be consistent with the decision of the firm at the second stage. Taking the inverse of (7) into (5) and maximizing the Nash product results into the following first order condition:

$$\frac{f(L)}{wL} = \frac{(1-a)e_L(1-\tau+B-b)+(1-\tau)+a(B-b)}{(1-a)\left[e_L(1-\tau+B-b)+(1-\tau)\right]} \tag{8}$$

where we have drop the subscripts, given that there are not dynamics in the model[6].

If we solve (7) and (8) for w and L we get:

$$L = l\left(\overset{(-)}{\tau}, \overset{(-)}{b}, \overset{(+)}{B}, \overset{(-)}{a} \right) \tag{9}$$

$$w = w\left(\overset{(+)}{\tau}, \overset{(+)}{b}, \overset{(-)}{B}, \overset{(+)}{a} \right) \tag{10}$$

The signs above variables give the partial derivatives of the left hand side with respect to the policy variables. The intuition behind the effect of τ,b,α is quite standard

[6] If there was capital and population growth in the model then in equation (8) instead of B we would have $B\frac{1+n}{1+r}$

(see for example Hart and Moutos, 1995). What needs more explanation is the effect of B. An increase in B increases post retirement income. This income is received conditional on employment when young and does not depend on the wage received when working. Further the pension benefit goes untaxed (or, in reality, taxed at a lower rate). Thus a wage increase when young increases expected working period income at a lower rate that it decreases retirement expected income. Then the worker has an incentive to show wage moderation in the bargaining process, when young, in order to be eligible for the pension benefit.

The above result represents the main testable hypothesis that we examine in the following section.

3. The Data

Our objective in this section is to estimate a linear version of (9) and (10). The theoretical model of the previous section however, does not capture all aspects of the real world. For that reason we need to add more explanatory variables in our regression equation. Given the heterogeneity of wages in the economy, the correct specification of the wage equation in (10) would require the use of micro data at the individual level (as for example Blanchflower and Oswald, 1995). There are sufficient micro data sources which can be used to explain the earnings of each worker according his individual characteristics. There are no however sufficient measures for the policy parameters at the individual level, as for example the average tax rate faced by each individual or more importantly for the issue at hand the future pension benefit for each worker. This is more

important given the heterogeneity of the pension benefits across professional groups or income categories.

For the above two mentioned reasons we follow the tradition of Nickell (1997), Blanchard and Wolfers (1999) and Daveri and Tabellini (2000) and with the use of using macroeconomic data[7] we try to pin down the institutional and the economic factors that influence the unemployment rate. In other words we estimate the macroeconomic equivalent of (9)[8]. The dataset covers the period from 1980 until 1999 for 14 OECD countries (the countries are listed in the appendix). In the panel analysis we are using annual data and so the major limitation in our dataset comes from the fact that most labor market institutions do not vary widely in time. Further in many cases the conventional measures of these institutions are not available annually for all countries. This limits the size of the dataset. In addition there are country specific labor market institutions for which data are not available. For these two reasons the proper estimation method is the Fixed Effects- within regression (regression on the deviations from each country's means) which wipes out all unobserved or unavailable constant in time variables. In this respect all country specific and constant across time variables are wiped out from the estimated equation and the model does not suffer from omitted variables bias. As we shall see later on, the use of this estimation method is supported also by proper econometric testing. To remain in line with the existing literature we also estimate a cross section of the five years averages of the data.

[7] When instead of the unemployment rate we used as dependent variable the wage rate, then all macroeconomic and institutional variables become insignificant and only the time and country specific fixed effects explain the overall level of wages in the economy. For that reason we chose not to model the relationship between pensions and wages.

[8] Note that we also tried to estimate (10) with macroeconomic data, the results even though with respect to the expected signs of the variables were just as predicted from our theory, the overall significance of the model was poor, so we choose not to present these results here.

The dependant variable in all equations is the unemployment rate (U) taken from OECD's Economic Outlook.

To control for the effects of unions we introduce two variables. The first captures the effects of the centralization of the bargaining system, (BARGLEV), and it is taken from Golden et. al. (2002). This is a categorical variable taking values from 1 to 5, with 1 denoting lower levels of wage bargaining (plant level) and 5 higher level of bargaining (sectoral wage setting with sanctions). We expect lower levels of bargaining to be associated with higher unemployment than higher levels (see Calmfors, 1993).

The other variable that measures union effects is net union density (NETDEN) variable also taken from Golden et. al. (2002). It is defined as the number of union members minus self-employed and retired divided by total labor force. As pointed out by Nickell (1997) net union density does not measure the coverage of the wage agreement, since in many countries wage negotiations by union members also determine the wage of non- union member. For this reason the net union density variable can be better interpreted as the strength of the trade unions on the negotiations.

With respect to government policies four variables are included: the tax rate, the unemployment benefit, the active labor market programs and, the one we are interested in, the pension benefit. All variables are constructed using data taken from OECD's Revenue Statistics, National Accounts, Economic Outlook and Social Security Expenditures databases.

To measure the tax burden on wages we compute the effective tax rate on labor income (TAX) following the methodology of Mendoza et. al.(1994). TAX is the product of the personal income tax (t_{per}) and wages and salaries (W) plus the total social security

contributions (2000) and taxes on payroll and workforce (3000) over the sum of the wages and salaries (W) plus employers' social security contributions (2200).

The unemployment benefit replacement ratio (B) refers to the percentage of wage income received in compensation as unemployment income, and it is computed as total expenditure on unemployment benefits divided by the number of unemployed persons times the average wage rate in the economy. This summary measure used here is an average of replacement ratios for various categories of benefit earners. In practice there are however large differences in replacement ratios according to marital status, pre-unemployment income or employment duration etc, differences which at the aggregate level are suppressed by the average measure employed here.

Apart from the level of the unemployment benefit as determined by the average replacement rate, another important factor influencing the income of the unemployed is the maximum benefit duration (BENDUR). It is widely argued that generous unemployment benefits on their own are not a bad thing for unemployment, unless they are associated with extended benefit duration. Unemployment benefits that run for a long time represents a disincentive for job search. Thus countries that have a high duration of the unemployment benefit are expected to have higher unemployment. The data for the benefit duration are taken from Layard et.al. (1991) and Nickell (1997) and updated according to SSA (1999). Note that the variability of BENDUR is very low because it is determined by law in discrete time periods. So it is only introduced in the cross section regression. In the panel data estimation the effect of this variable is absorbed by the each country's fixed effect.

The active labor market policies measure (ACTIVELAB) is as in Nickell (1997), i.e. the active labor market expenditure per unemployed person divided by the (real) GDP per working age individual. The variable measures the activities undertaken by the government to bring the unemployed back into work. These activities include training, job search policies, subsidized employment etc. (Nickell, 1997). ACTIVELAB is expected to have a negative influence on unemployment. Increases on active labor market programs reduce wages by maintaining effective labor force participation (Calmfors and Lang, 1995).

For the pension benefit replacement ratio (PENSION) there is no comprehensive data source for our time period. The only available data come from Blondal and Scarpetta (1998). Their measure of the average pension replacement ratio is calculated using detailed microeconomic data. Even in this respect their dataset is constructed for decade averages. To calculate the average replacement ratio for each year in our dataset we follow a simple methodology. First we assume that the long run employment rate of those receiving pension in period 1980-1999 (time span of our dataset) was stable during their working life. In other words we assume that the ratio of those eligible for pension to total population aged above 65 during 1980-1999 was constant. Given this assumption we divide all old age expenditure (total amount paid to pensions) with the population above 65. This gives, with the above assumptions in mind, up to a constant the pension expenditure per pensioner. Then we divide this with the current period wages. Further note that differences on the ratio of those eligible for pension to total population above 65 across countries do not affect our results, given that the model estimation is done with the within estimator which measures on the across time variation of each country and not the

variation across countries. To check the consistency of our results and the validity of the PENSION variable as a measure of the average pension replacement ratio we also use in the cross section analysis Blondal and Scarpetta (1998) measures of pension replacement ratio (denoted as variable PENSION2).

Finally to capture the economic factors that affect unemployment we include in the estimated equation the inflation rate (INFLATION) to capture the usual Phillips curve relationship between unemployment and inflation, the real long run interest rate (IRLONG), to capture the governmental policies that affect investment and job creation. Finally we also add the growth in productivity (GPROD) to account for technology shifts in the labor demand. All variables are taken from OECD's Economic Outlook.

4. Model Specification and Results

Our primary interest lies in testing the effect of public pensions on unemployment. The secondary objective is to examine how institutional and macroeconomic forces affect the labor market. Since we are interested in hypothesis testing we need to find the correct econometric specification of the model. To choose among alternative specifications we performed a series of tests. As a first step we wanted to be sure that our results are not spurious due to non-stationarity of the individual series. Stationarity tests were performed in all variables. Here we discuss the results for the dependent variable U and IRLONG. IRLONG was the only case where the stationarity hypothesis was rejected. For the U variable there are ample previous evidence and theoretical priors that may imply that the variable is non- stationary (Roed, 1997).

The Levin-Lin test for panel stationarity (see Baldagi 2001) on U gave a t-star value of 5.230 rejecting the hypothesis of non- stationarity at all levels of statistical significance[9]. Even though the Levin- Lin test is the most widely used test for stationarity it suffers from low power when there is individual heterogeneity (Balatgi and Kao, 2000). The dynamic behavior of the unemployment rate in each country is expected to be different, given the different labor market institutions. For that reason we also employed an Im- Pesaran- Shin stationarity test to take account of this heterogeneity (see Baldagi, 2001). The test also rejected the non- stationarity hypothesis at all levels (Psi-bar=3.057 with P-value=0). So we concluded that even if we take account of the heterogeneity in the individual series the unemployment rate is always stationary.

In contrast we found that the real long run interest rate is non- stationary. The Levin-Lin test[10] gave a t- star= 0.059 (P-value=0.477). So in the results we present next we present the model with the IRLONG series both in levels and in first differences. The overall results hold irrespectively of the way IRLONG is introduced.

In the previous section we argued that the proper theoretical specification of our model is a fixed effects model. We also want to test whether our argument is econometrically valid. In other words we perform a Hausman test to establish whether the random effects model is accepted against the alternative of a fixed effects model.

Another important issue of specification is whether we have a one way or a two way error component. In other words we want to establish whether there are, besides the fixed

[9] To determine the appropriate number of lags we used the general to specific methodology. We first estimated the Augmented Dickey Fuller regression with the maximum amount of lags that our data allowed. We then re-estimated the model dropping the last lag if it was statistically insignificant. The number of lags used in the test mentioned above is that number of lags as for the last lag to be statistically significant. Here 6 lags were chosen.

[10] With 5 lags.

country specific effects, also time specific effects. In all equations the F- test on both country as well as time effects rejected the null that the effects are zero. Thus we concluded that the correct specification of the model is a two- way fixed effects model.

[Insert Table 1 Here]

In the first and in the second column of table 1 we present the results from simple fixed effect estimation. In the second column we use instead of the long run real interest rate the first difference of the long run interest rate. The results in both cases are qualitative the case, with the exception of the effect of the IRLONG variable. When the variable is introduced in levels it is statistically significant and positive, as it is expected by the theory, whereas when introduced in first difference becomes negative, implying that increases in the cost of capital that decrease the amount of capital employed, results into decreases in unemployment. Even though the econometrically sound practice would be to keep the interest rate in first difference[11] we also report all results when the interest rate is kept at levels (columns II and I respectively). In all cases the results are robust on how the interest rate is introduced.

The model has high predictive power with an R square around 0.85. Further we note that the fixed country and time effects are very significant. In other words the unemployment rate is affected but unmeasured fixed institutional parameters that are not explicitly introduced in the equation. Also there are common shocks (i.e. time effects) that influence symmetrically all countries. In all equations the residuals are normally distributed[12] showing that the (econometric) model is correctly specified. Finally the Hausman test for Fixed Effects (Hausman FE), suggests that the correct specification of

[11] Due to the non- stationarity of the variable.
[12] The Shapiro- Francia is a one-sided test of the null that the variable (here the residuals) is normally distributed and its critical values are taken from the Standardize Normal distribution.

the panel model is the Fixed Effects model. Finally when the error term was found to be heteroskedastic we estimated the equation with robust standard errors.

All variables have the expected signs, with the exception of the unemployment benefit replacement ratio, which is negatively signed. More generous unemployment benefits are associated with lower unemployment. This is a rather unintuitive result. Nickell (1997) and Blanchard and Wolfers (1999) both found positive and insignificant effect of the unemployment benefits, which suggested that a generous unemployment benefit on its own does not lead to higher unemployment. This result however, carries over to all but the cross section specification of the model[13].

The overall conclusion of table 1 is that both institutional features as well as macroeconomic variables influence the unemployment rate. The inverse relationship between the inflation rate and unemployment is verified in our sample, suggesting that to a large extend unemployment may be driven by demand factors. On the other hand changes in labor productivity have a positive effect on unemployment, which establishes the notion that technological change may lead to higher unemployment, at least in the short run.

Turning to the institutional features that affect unemployment the bargaining level is not found to be significant. This may be due to a non- linear effect of the bargaining level on unemployment rather than an overall insignificant effect of the bargaining structure. The NETDEN variable on the other hand is significant and positive. Union tend to raise wages above the market clearing wage and thus it is reasonable one to expect higher power on the behalf of the unions to be associated with increased unemployment. This

[13] In this respect the results presented here are in line with all previous studies which almost universally estimated five year averages cross sectional data.

view is confirmed in Table 1, with the NETDEN variable being positive and always statistically significant.

As for the policy variables there is a positive relationship between the effective tax rate and unemployment as in Daveri and Tabellini (2000). Taxes on labor act as taxes on jobs reducing the utility from being employed. At the same time they also act as a wage moderation device: if unions push for a higher wage part of the wage increase will go to the government as taxes and unemployment will increase according to the amount of the (pre-tax) wage increase. Which of the two effects is greater depends on the wage setting institutions, the elasticity of labor demand and labor supply and the way the tax system treats the unemployment benefits. When unemployment benefits are taxed at the same rate as wage income then when taxes increase the outside option for workers is equally unattractive as being employed (as discussed in Pissarides, 1998). The above suggest that the positive effect of labor taxes on unemployment is not a priori clear. Empirically however it seems that labor taxes tend to increase unemployment[14].

Further the active labor market policies turn out to be very effective in fighting unemployment. This result is in line with Nickell (1997). This confirms the widespread belief among economists that active labor market programs are highly effective in reducing unemployment. At the same time explains the widespread resistance from employed- insiders on such programs, since they reduce their power in wage setting.

Finally turning to the PENSION variable that we are most interested in, we can see that a higher pension benefit is associated with lower unemployment. Increased pension

[14] In Nickell, 1997, the effective tax rate variable also included the effective consumption tax rate. Consumption taxes however tax at the same rate the wage and the unemployment benefit income. Then an increase in consumption taxes as argued above will not affect labor costs. Then a shift of the tax burden from labor taxes on consumption taxes that leaves the total tax burden the same, will affect the labor costs.

benefit replacement ratios increase the life- time income of the employed without affecting the income of the unemployed. The utility of being employed is then higher. The result confirms our theoretical priors. This is significant at all level of statistical significance. Further the size of the coefficient does not vary much across various specifications.

By examining how the data are constructed one may point that there exists a possibility of endogeneity of the PENSION variable because of "reverse causation": a decrease in unemployment is associated with higher social security contributions by the current employees and thus results in higher available funds for pension benefits and thus an increase in the effective pension replacement ratio. The same holds by construction for B and ACTIVELAB. To test whether such reverse causation is the driving force behind our results in Table 1 we re-estimated the model with Instrumental Variables[15] (IV) and performed a standard Hausman test. In all cases we strongly rejected the IV Fixed Effects estimator in favor of the simple OLS Fixed Effects estimator[16].

One further way to exclude the possibility of endogeneity of the PENSION variable is to estimate the same equation with one period lagged PENSION (PENSION(-1)). The results of this task are presented in columns III and IV. The estimated coefficients of all variables remain the same and more importantly the PENSION(-1) has the same sign, statistical significance and coefficient as PENSION.

The essence of our argument so far does not take into account the wide heterogeneity of the welfare systems around the world and more importantly the profound heterogeneity of the pension programs. Following Rhodes (1996) we can identify three

[15] The instrument of each variable is lagged one period variable.
[16] The results of this test are presented under the line Hausman IV.

types of welfare system in our sample: Anglo- Saxon, Scandinavian (corporatist) and Continental Europe[17]. For example in the Anglo- Saxon system pensions are mainly flat rate means tested benefits, whereas in the continental and Scandinavian system public pensions are earnings related with no means test. Thus we expect in the Anglo- Saxon system, where employment and wage history is negatively related to the level of the benefit (due to the means test), pensions to have a positive or insignificant effect on unemployment. For this reason we re- estimated the above equation allowing for different slopes on the coefficient of PENSION. Examining Table 2 where we allow for different slope on PENSION we establish that such heterogeneity exists in the way that the pension benefit affects the unemployment rate: whereas in the continental and corporatist system (CONTINENT and CORP) pension benefits negatively affect unemployment, in countries with Anglo- Saxon welfare system the relationship is positive, but insignificant[18]. An F-test of slope equality always rejects equality of the PENSION coefficient across welfare systems[19].

[Insert Table 2 Here]

Besides slope heterogeneity the pooling of the data hides other important differences across countries. Wage setting institutions differ widely across our sample. Even though we introduced the bargaining level variable in our estimation to account for such differences, we expect that the bargaining structure will also affect all the underlying parameters of the model.

[17] Note that in our sample we do not have any Southern European country because of data unavailability. How the countries are split into the three groups is presented in appendix 1.
[18] We have taken the Anglo- Saxon system as the baseline to avoid the dummy variable trap.
[19] Note however that the results of Table 1 (and the subsequent results) where the slope heterogeneity is not taken into account are still unbiased and efficient and represent the average effect across countries.

Further there exists one other aspect not present in the theoretical model we presented: in Calmfors (1993) terminology, an "unemployment externality" may be present. When the bargaining is decentralized if a worker (or a whole firm specific union) is found unemployed because of high wages then it is expected to be easier for him to find another job since a single worker (or a single firm specific union) has a small effect on the unemployment rate[20]. In that case the pension benefit received in his retirement will not have an important bearing in his decision to push for higher wages. If the bargaining is centralized then the unemployment externality is internalized. A rise in unemployment implies that it is more difficult for all workers to find another job. Then the fear of not receiving a pension benefit when old is an incentive to show wage moderation. The "unemployment externality" mentioned above provides a closer link between pension benefits and unemployment in countries with centralized than in countries with decentralized bargaining. To test this approach we split our sample into two groups according to the value of the BARGLEV variable. A country is on "centralized" bargaining level when BARGLEV is greater to 3. When BARGLEV is less than or equal to 3 then the country is categorized as "decentralized"[21].

[Insert Table 3 Here]

Table 3 present the different effect of PENSION on unemployment across bargaining systems. The results across the two bargaining systems are quite distinct. In countries with centralized bargaining PENSION is signed as expected (negative) and statistically

[20] In equilibrium if all workers –unions are the same then his expectations may not be fulfilled and may remain "permanently" unemployed.

[21] We also adopted another approach by categorizing a country into "decentralized" when BARGLEV is equal to one and into "centralized" when BARGLEV was greater or equal to 3. The results are exactly the same to the ones presented here. If this latter approach is followed we have smaller sub-samples than the ones we included in text.

significant. In contrast, in countries with decentralized bargaining PENSION variable is insignificant. Further in the decentralized model the macroeconomic variables (IRLONG, GPROD, INFLATION) are more important than in countries with centralized bargaining. In countries with decentralized bargaining the macroeconomic shocks affect more the unemployment rate since the bargaining over the wage rate does not take into account the overall macroeconomic conditions in the economy. Where the bargaining is centralized this externality is internalized and thus unemployment is not affected that much by the macroeconomic shocks. The difference between decentralized and centralized bargaining is also tested with a standard Chow test which rejects at 5% level of significance the equality of coefficients.

Finally as a final robustness check of our theory and to be more consistent with the existing literature (as in Blanchard and Wolfers, 1995; Daveri and Tabellini, 2000) we re-estimated our model using a cross section of five year averages across countries. The results of the cross section regressions are given in Table 4.

[Insert Table 4 Here]

In this regression we now introduce the benefit duration (BENDUR).[22] In the fixed effects estimation this variable was dropped because of its low variability in time and its effect was picked up by the country specific fixed effects. It is known in the literature (Nickell, 1997) that the duration of unemployment benefits affect the unemployment rate. So for the cross section equation to be correctly specified this variable must be introduced.

[22] The BDURATION variable when introduced in the standard fixed effects equation was differenced out (i.e. its effect was captured by the fixed country effect).

Further note that the long run interest rate was found to be highly correlated with all the variables in the model. So the IRLONG variable in table 4 is made orthogonal to the rest of the explanatory variables[23]. Another way to avoid the multicollinearity caused by IRLONG we also estimated the model with DIRLONG instead (columns II and IV).

The R square of the model is 0.7 suggesting very high predictive power of the cross section model. With respect to the estimated coefficients, again the results do not change much, with the exception of B which becomes positive and insignificant, as already suggested by the literature. The TAX variable is positive and statistically significant (as in Daveri and Tabellini, 2000). The fact that the duration of unemployment benefits (BENDUR) is statistically significant and positive whereas the replacement ratio (B) is insignificant, verifies the conventional wisdom that the unemployment benefit system affects positively the unemployment rate only when the benefit runs for a long time and not when the level of the benefit is high. Further the active labor market programs (ACTIVELAB) seem to have a decreasing effect on unemployment. With respect to the other variables the only change is on the BARGLEV which becomes significant and negative. A more centralized bargaining system results into lower unemployment. The effect of the pension benefit is always negative and highly significant. Further all macroeconomic variables remain significant and their signs are according to out priors. This implies that macroeconomic policies along with labor market institutions affect both the short run and the long run unemployment rate.

One last test for our theory is to use the pension variable constructed by Blondal and Scarpetta (1998) (PENSION2) instead of the measure of the pension replacement ratio

[23] If we introduce IRLONG then only BARGELEV and IRLONG are statistically significant whereas all other variables become insignificant.

we constructed. This variable has limited time availability (available only for 1980 and 1990 decade average). Thus it gives us only two observations for each country. Even though this results in serious loss of degrees of freedom and may not be appropriate to directly test theory it can be greatly instructive given that PENSION2 is constructed with a more refined strategy, taking into account the microeconomic differences across pension beneficiaries, than the PENSION variable we constructed here. All of our previous results are unchanged and in this regression. Most importantly the PENSION2 variable is negative, significant and very close to the estimates obtained so far. We can thus conclude from the above that the results derived from all other specifications do not depend on the measure of the pension replacement ratio that we constructed, but it is robust even if we use the more sophisticated measure.

5. Conclusions

Labor market institutions influence unemployment. However all market institutions are not rigidities. In this paper we argued that the old- age pension benefit program creates an incentive for wage moderation and leads to lower unemployment. On the other hand higher effective tax rates lead to increased labor cost and higher unemployment. Our results partly contradict the statement made by Daveri and Tabellini (2000) that "…the long-run benefits of pension reform could be very large" (Daveri and Tabellini, 2000, p.87). If one looks solely the negative effects of labor taxes on unemployment such an assertion is true. Taxes however increase government revenues which are used to finance benefits. The distribution of tax revenues on various governmental (social security) programs can have an important bearing on the macroeconomic equilibrium in the economy.

This result is not however the last word on the issue. There are important limitations to the analysis. The most important is the need for a more detailed and more refined measure of the pension replacement ratio. This would make the results more robust. We must note however when such a measure is used, our results carry through. The other limitation comes from the use of macroeconomic data. A better way to understand the issue is to have micro data and examine the effect of the expected pension benefit on the bargained wage rate[24]. Further one can never ignore the endogeneity of the policy variables with the bargaining process (as discussed in Saint –Paul, 1996). Such an endogeneity exists it would represent an important and interesting challenge to our work.

[24] For the limitations on the use of macroeconomic data in understanding unemployment Daveri, 2001 provides an excellent discussion.

The empirical model presented here provides also other insights on the determinants of unemployment. First of all we replicated the results of Nickell (1997) and Blanchard and Wolfers (1999) about the effects of institutions on unemployment. These result seem to hold even in a dynamic model of unemployment.

Another important insight of the paper is about the dynamics of unemployment. In our panel sample we can establish that there is relatively low persistence of unemployment. This may be due to the heterogeneity of our country sample. Note however that the (pure) hysterisis hypothesis is rejected also when we took into account this cross country heterogeneity.

Finally we found that the U-curve hypothesis between centralization of bargaining and economic performance also holds in our model. This represents further evidence in favor of the existence of such a U-curve.

The overall conclusion of the paper is that there are many links across government programs which may affect the macroeconomic outcomes. In that case one has to examine carefully these links before undertaking a reform. This is very relevant if one takes into account that in the last few years there are many arguments in favor of a privatization of the public pension system. Such a reform, even if it turns out to be financially feasible, may have ramifications well beyond those perceived by the policy makers.

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APPENDIX

Country List:

Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Japan, Netherlands, Sweden, Switzerland, UK, USA.

Anglo- Saxon system: UK, USA, Canada, Australia.

Scandinavian - Corporatist system: Austria, Denmark, Finland, Sweden.

Continental system: Belgium, France, Germany, Japan, Netherlands, Switzerland.

Table 1: Fixed Effects Estimation				
	I	II	III	IV
PENSION	-3.903*	-5.479***		
	-(1.73)	-(2.34)		
PENSION(-1)			-4.457*	-5.503**
			-(1.87)	-(2.16)
B	-3.710***	-3.615***	-4.114***	-4.315***
	-(4.31)	-(4.27)	-(3.86)	-(3.91)
ACTIVELAB	-5.233***	-5.480***	-4.791***	-4.986***
	-(6.33)	-(6.27)	-(5.83)	-(5.74)
TAX	14.430***	11.571***	13.825***	10.915***
	(3.68)	(2.70)	(3.43)	(2.37)
IRLONG	0.334***		0.400***	
	(4.29)		(4.61)	
DIRLONG		-2.516***		-2.658***
		-(2.21)		-(2.22)
INFLATION	-27.556***	-10.190*	-34.089***	-10.714*
	-(4.15)	-(1.95)	-(4.46)	-(1.85)
NETDEN	0.137***	0.144***	0.143***	0.157***
	(4.68)	(4.70)	(4.77)	(4.78)
GPROD	10.459	16.402***	11.209	17.817***
	(1.60)	(2.25)	(1.60)	(2.34)
BARGLEV	0.087	-0.046	0.188	-0.023
	(0.41)	-(0.21)	(0.82)	-(0.09)
R Square	0.85	0.85	0.86	0.85
F-test (country)	51.62	70.79	49.89	69.67
F-test (time)	3.82	2.92	4.09	3.12
Hausman IV	23.79	6.09	4.91	4.81
Breusch Pagan Heterosk.	6.4	4	6.14	3.76
Hausman FE	42.07	55.15	33.07	47.98
Shapiro Francia	-1.459	0.507	-0.794	0.926
Observations	280	280	266	266

*,**,*** denotes statistical signifficance at 10%,5% and 1% level respectively.

Table 2: Welfare State Systems (FE Estimation)		
	I	II
PENSION	2.020	2.440
	(0.71)	(0.88)
PENSION*CORP	-13.790***	-18.126***
	-(3.27)	-(4.87)
PENSION*CONTINENT	-8.351**	-6.807
	-(1.96)	-(1.55)
B	-3.032***	-2.852***
	-(3.37)	-(3.97)
ACTIVELAB	-5.442***	-5.452***
	-(6.57)	-(6.40)
TAX	12.102***	8.555**
	(3.09)	(2.41)
IRLONG	0.259***	
	(3.34)	
DIRLONG		-2.913***
		-(2.50)
INFLATION	-24.653***	-11.193***
	-(3.79)	-(2.14)
NETDEN	0.111***	0.107***
	(3.82)	(3.61)
GPROD	11.618**	16.431***
	(1.73)	(2.48)
BARGLEV	0.128	-0.013
	(0.59)	-(0.06)
R square	0.86	0.86
F-test (country)	22.12	27.39
F-test (time)	3.4	2.88
Breusch Pagan Hetorosk.	4.04	1.92
Shapiro Francia	0.806	0.891
Hausman FE	34.23	32.94
Observations	280	280
Pension*Continent.=Pension*Corp=Pension	4.59###	10.15###

*,**,*** denotes statistical signifficance at 10%,5% and 1% level respectively.
denotes rejection of the null (equality of coefficients) at 1% level of statistical signifficance.

Table 3: Bargaining Structure (FE Estimation)				
	Decentralized I	**Decentralized II**	**Centralized I**	**Centralized II**
PENSION	-0.768	-0.538	-14.378***	-13.698***
	-(0.28)	-(0.18)	-(3.58)	-(3.65)
B	-3.745***	-3.833***	-2.647	-3.142
	-(4.71)	-(3.96)	-(1.00)	-(1.32)
ACTIVELAB	-4.711***	-4.694***	-5.145***	-5.117***
	-(3.85)	-(3.70)	-(4.27)	-(3.90)
TAX	15.276***	12.267***	14.050**	14.382**
	(3.67)	(2.73)	(2.07)	(2.10)
IRLONG	0.461***		-0.057	
	(3.87)		-(0.61)	
DIRLONG		-2.963**		0.930
		-(1.96)		(0.39)
INFLATION	-36.103***	-15.854***	-5.315	-8.447
	-(4.38)	-(2.31)	-(0.52)	-(0.84)
NETDEN	0.160***	0.190***	0.206***	0.202***
	(3.63)	(3.46)	(4.06)	(4.10)
GPROD	3.467	13.598*	37.224***	37.503***
	(0.43)	(1.81)	(2.37)	(2.49)
R square	0.88	0.87	0.89	0.89
F-test (country)	23.64	56.69	15.44	16.38
F-test (time)	2.19	2.31	2.29	2.07
Breusch Pagan Hetorosk.	8.28	4.87	2	2.03
Shapiro Francia	8.824	8.731	3.689	3.574
Hausman FE	47.97	62.15	---	---
Observations	191	191	89	89
Chow Test			1.94##	2.01##

*,**,*** denotes statistical signifficance at 10%,5% and 1% level respectively.

denotes rejection of the null (equality of coefficients) 5% level of statistical signifficance.

Table 4: Cross Section (5-year Averages)				
	I	II	III	IV
TAX	12.120***	10.785***	27.358***	29.198***
	(3.58)	(2.49)	(4.53)	(3.89)
PENSION	-7.475***	-7.039***		
	-(3.09)	-(2.31)		
PENSION2			-13.164***	-14.809***
			-(3.90)	-(3.27)
INFLATION	29.903**	42.231***	24.787	18.719
	(2.20)	(2.28)	(1.52)	(0.90)
GPROD	59.375**	49.040	14.798	21.266
	(2.00)	(1.30)	(0.40)	(0.48)
NETDEN	0.011	0.009	0.019	0.023
	(0.66)	(0.43)	(0.83)	(0.87)
BENDUR	0.883***	0.836***	0.491*	0.534
	(3.95)	(2.97)	(1.81)	(1.65)
B	1.837	2.629	-3.287*	-4.015*
	(1.20)	(1.33)	-(1.93)	-(1.81)
ACTIVELAB	-8.277***	-7.359***	-7.939***	-8.176***
	-(4.08)	-(2.83)	-(3.31)	-(2.88)
BARGLEV	-1.540***	-1.496***	-1.300***	-1.367***
	-(4.38)	-(3.39)	-(3.16)	-(2.78)
IRLONG*	1.453***		1.112***	
	(5.49)		(2.70)	
DIRLONG		-9.858*		6.212
		-(1.69)		(0.76)
CONSTANT	5.766***	5.099***	7.152***	7.821***
	(4.32)	(2.97)	(4.18)	(3.56)
R Square	0.7	0.53	0.79	0.71
Breusch Pagan Heterosk.	2.89	3.93	1.58	0.66
Shapiro Francia	0.352	1.902	0.802	0.508
Observations	56	56	28	28

*,**,*** denotes statistical signifficance at 10%,5% and 1% level respectively.