Welfare benefits and the rate of unemployment: some evidence from the European Union in the last thirty years

by

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Abstract

Our objective in this paper is to re-examine the hypothesis that welfare benefits may be responsible for the observed differences in cross-country unemployment rates and test its validity by using panel data from 19 countries over the 1970-2000 period. For this purpose, we set up a general equilibrium model encompassing the private and public sectors of the economy, where the government comes to the relief of the unemployed by increasing the welfare benefits per man. From this model, we extract an unemployment rate equation. The results that emerge from the empirical analysis suggest that social benefits per man may indeed adversely influence the rate of unemployment in EU-15. But the results change significantly when the EU member states are classified as high-, low- and average unemployment countries. In particular, we find that, whereas unemployment benefits exert perceptible positive influences in the high and average unemployment sub-groups, their influence in the low unemployment sub-group is nil. This finding, in conjunction with the evidence that the unemployment rate is invariant with respect to social benefits in USA and Canada, leads us to the conclusion that some EU countries may have to restructure their welfare systems, so as to reduce welfare benefits in favour of greater labour market flexibility and self-reliance on the part of workers.

Keywords: unemployment rate, welfare benefits, European Union

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I. Introduction

In the post World War II period, governments in many Western European countries adopted various initiatives to comfort people in financial distress. In general, these initiatives changed the functional and institutional arrangements in the labour market. The legal provisions governing hiring and firing, hours of work, fixed term contracts, minimum wages and welfare state arrangements are indicative of the policies that were introduced for enhancing the protection of worker employment and income by modifying the operation of the market forces. Some other policies took the form of government spending for securing a guaranteed minimum income to individuals and households, irrespective of the market value of their property. Still, other aimed at protecting people from the contingencies of old age, sickness and unemployment via social insurance, social assistance and other benefits. And last, but not least, are the policies that were enacted for the purpose of providing to low-income people cheaper housing, health care and other social services (e.g., Briggs (1961) and Gough (1987)).

For several decades, i.e. till about the late 1970s, the social protection policies stemming from the above-mentioned arrangements performed fairly well, without raising serious objections as regards their logical underpinnings and economic implications. So governments were able to maintain their traditional goals of income redistribution, welfarism and high employment. But during the last two decades, as highlighted for example by Rhodes (1996), powerful neo-liberal arguments for deregulation, in conjunction with efforts by West European states to adjust their economies to international competition, raised serious reservations about the arrangements of welfare state. In particular, the policies of social protection in Western Europe came to be considered responsible for: (a) the slower growth and rising unemployment that was observed in the 1980s relative to earlier decades, and (b) the fact that the jobs created by European economies were predominantly low paying part time jobs. By contrast, during the same period the economy of the United States experienced higher growth, significant reduction in unemployment and generation of plentiful high paying full-time jobs.

The central argument against the welfare state is that it has grown out of proportion, showing clear signs of diseconomies of scale. According to Lindbeck (1995) and Blanchard and Jimeno (1995), the erosion of its economic foundations can be attributed to the following processes: (a) the delayed effects of decisions by private agents facing a basic dilemma between earned wages and the size of social benefits. Such decisions are often accompanied not only by tax distortions, but also by unjustified numbers of beneficiaries due to moral hazard and benefit cheating, (b) the design and enforcement of eligibility criteria for disbursing bene-

fits to unemployed workers after short or long periods of work. This qualification plays a key role in the determination of the ratio of benefit recipients to the number of the unemployed. (c) the possibility of macroeconomic instability, even a recession in the short run, due to a vicious circle caused by very large budget deficits combined with a huge initial debt of the public sector. This prospect can result from expectations of higher interest rates and greater uncertainty about future policies and interest rates, a fall in aggregate demand, a deeper recession, and so on. (d) The political economy hypothesis regarding the combination of specific benefits and general taxes that can generate strong pressures for a continuous expansion of government spending and aggravation of this tendency by the sequential nature of spending decisions. And, (e) the gradual replacement of market risks, mitigated through welfare policies, by political risks arising from the politicians' intentions to reduce the various benefits at times of welfare state crises.[1]

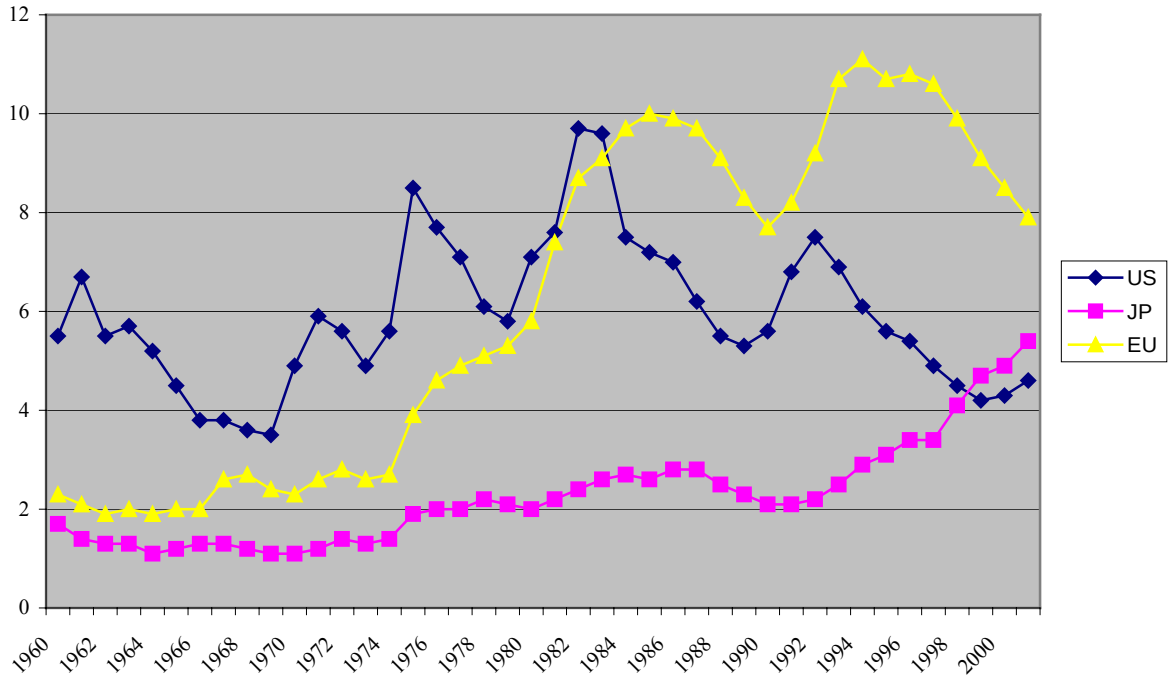
Briefly speaking, the generous welfare provisions in Western Europe, relative to those prevailing in the United States, may have altered employee and employer behaviour. If so, they may have prevented downward movements in wages, thus leading to the propagation and persistence of higher unemployment rates in the European side of the Atlantic. Considerable evidence in favour of this hypothesis can be found, for instance, in Bean (1994), Nickell (1997) and Siebert (1997), as well as the literature cited there in. But, on the other hand, the empirical findings from cross-national comparisons that were presented in a volume edited by Blank (1994), for the National Bureau of Economic Research, suggest that social protection policies have little or no effect on economic flexibility.[2] Thus, the reasons for the divergences observed in the behaviour of the unemployment rate within the European Union (EU) and between EU and non-EU countries continue to be clouded in uncertainty.

Our objective in this paper is to re-examine the hypothesis that welfare benefits may be responsible for the observed differences in unemployment rates and test its validity by using panel data from 19 countries over the 1970-2000 period. For this purpose in Section II we present the stylised facts regarding the intertemporal variation of unemployment rates in the EU and non-EU countries. In Section III initially we set up a general equilibrium model encompassing the private and public sectors of the economy, where the government comes to the relief of the unemployed by increasing welfare benefits per man, and then we use it to derive an estimating equation expressed in terms of the determinants of the unemployment rate. Section IV elaborates on the data, describes the definitions and the measurement of variables employed in the estimations, and discusses the results stemming from our empirical analysis. And, finally, Section V contains our conclusions.

II. Stylised facts and brief review of the literature

Differences in the evolution of labour market institutions and policies in Japan, the US and the EU in the last forty years have been mapped on the intertemporal behaviour of the corresponding unemployment rates. These differences, as depicted in Figure 1 below, reveal the following: (a) the unemployment rate has been lower in Japan than in the other two regions, although it has exhibited a mildly rising trend over time, (b) parallel to the movement

Figure 1
Unemployment Rates in EU, USA and Japan



of the Japanese rate of unemployment, albeit twice as high till the mid-seventies, has been the performance of the corresponding European rate. Since 1974, the EU unemployment rate has demonstrated a rising cyclical pattern having the shape of letter *M* with flattened tails, the highest peaks being 10.0% and 11.1% in the years 1985 and 1994, respectively. (c) The unemployment rate in the US has followed a completely different pattern vis-à-vis that of its EU counterpart. It fluctuated at higher levels relative to the European rate till 1983 and at lower levels since then. Its cyclical pattern resembles the shape of two consecutive *W*s till the year 1992 with the peaks placed at 6.7 %(1961), 5.9%(1971), 8.5%(1985), 9.7%(1982) and 7.5%(1992). Since 1992 this rate has exhibited a downward movement to reach the neighbourhood of 4.4%, which was even lower than that of Japan by about 0.7 percentage points at the turn of the century.

Turning to the rates of unemployment in the EU region, Nickell (1997) has found that their pattern is far from uniform. To characterize the differences observed in the last four decades, in Table 1 below we have classified the fifteen EU member states into three groups. Group I con-

Table 1. Ranking the EU-15 Economies in the 1960-2001 period, according to the criterion: $u_i - u_{EU}$, $i = 1 \ldots 15$.

	Country	$u_i - u_{EU} > 0$	$u_i - u_{EU} < 0$	$u_i - u_{EU} \cong 0$	Group
1.	Spain	39	1	2	High
2.	Ireland	37	5	0	High
3	Italy	32	8	2	High
4	France	24	14	4	Average
5	Belgium	17	25	0	Average
6	Finland	16	25	1	Average
7	Greece	16	26	0	Average
8	United Kingdom	15	27	0	Average
9	Portugal	13	29	0	Average
10	Netherlands	9	33	0	Low
11	Denmark	7	32	3	Low
12	Austria	2	39	1	Low
13	Germany	0	42	0	Low
14	Luxembourg	0	42	0	Low
15	Sweden	0	42	0	Low

Source: European Commission, *European Economy*, No 70, 2000, Table 3. Own computations. The classification of countries into the groups "high", "low" and "average" implies that, most of the time, the unemployment rates of the countries in question have been higher than, lower than, or fluctuated around the average unemployment rate, u_{EU}, of the 15 EU countries during the 1960-2001 period. For instance, in the 42-year period examined, the unemployment rate in Spain has been greater than the EU average rate in 39 years, lower in 1 year, and fluctuated around it in 2 years.

sists of countries with unemployment rates fluctuating, most of the time, at levels *higher* than the EU average rate of unemployment. The countries in this group are Spain, Ireland and Italy. Group II comprises countries whose unemployment rates have fluctuated at levels *lower* than the EU average. These countries are Luxembourg, Germany, Sweden, Austria, Denmark and the Netherlands. Finally, Group III includes Belgium, Greece, Finland, France and the UK, whose unemployment rates fluctuated around the EU *average* rate. Considering the differences in these three groups it is worth observing that the countries in Group II experienced unemployment rates

which evolved in a pattern similar to that of Japan and the US rather than those relating to their partners in Groups I and III. In the rest of the paper, the countries in Groups I, II, and III are referred to as *high*, *low*, and *average* unemployment rate countries, respectively.[3]

In view of the above, several interesting questions come to mind. What are the reasons for the wide intertemporal differences in the behaviour of the unemployment rates within EU and between EU and non-EU countries? Are the observed differences due to the social protection schemes? And if so, to what extent are such arrangements as the wage bargaining institutions, the mobility of workers among professions and regions, and the mix of macroeconomic policies responsible for their persistence? Do welfare benefits contribute to differences in unemployment rates? How do rates of unemployment in individual EU and non-EU countries react to external shocks and/or to changes in the world economy? The available empirical evidence suggests that sluggish adjustments to changing economic conditions bear a great degree of responsibility for the aggravation of the unemployment rate. On the contrary, higher labour market flexibility in adjusting to changing economic conditions is accompanied by relatively low rates of unemployment. See, for instance, McMorrow (1996) and Nickell (1997).

Labour market flexibility is meant to imply (a) real wage flexibility and (b) non-labour cost flexibility. The latter is distinguished into employment adaptability (the speed with which employment adjusts to output fluctuations), geographical and occupational labour mobility, and labour flexibility in terms of working time and work schedules. On the basis of these criteria, McMorrow (1996) has argued the following: (a) Japan has been characterized by flexible real wages. (b) The flexibility of real wage in the US although not substantially different from that in the EU has been counterbalanced by a high degree of employment adaptability. And (c) the EU has exhibited real wage rigidity and inflexible employment to output fluctuations. Moreover, these findings are in agreement with the intertemporal performance of unemployment rates in these regions as well as with the evidence reported by Bentola and Bentolila (1990), Bean (1994), Nickell (1997), Saint Paul (1997), and Siebert (1997).

Drawing on the above, one might be tempted to infer that the relatively stronger welfare state in the EU gives rise to higher unemployment rates relative to the other two regions. Yet, the size of the welfare state may be a necessary but not a sufficient condition for such an outcome. As an example to this effect consider Austria and Sweden, which have been identified as countries with the highest social expenditure among all OECD nations. For long time spans these two countries have exhibited unemployment rates lower than the EU average, and not too far off from the corresponding rates in the US. Such a performance seems to have been attributed to the ultra corporatist nature of their wage bargaining system, where trade

unions and governments used to make collective choices by taking into account the interests of both insiders and outsiders.[4]

Not surprisingly, the coincidence of the preceding factors can give rise to a variety of distortions, which create and maintain a *quasi-market* of unemployment. These distortions appear as: (a) disincentives to work, which should be attributed to a narrowing of the gap between unemployment benefits and market wages, the relatively long periods of entitlement, and the looseness of the eligibility rules, (b) habits, social norms, and social attitude and ethics favouring the maintenance of the status quo on learned helplessness ("citizens' rights" on generous unemployment benefits), and (c) tolerance for and/or support of the above status quo by the political system, i.e., the government and the opposition parties, due to political cost considerations and/or possibly weak adjustments in the opposite direction, in case of serious macroeconomic imbalances.

In conclusion, in recent decades the EU-15 experienced higher unemployment rates than both the US and Japan. As a matter of fact, whereas the unemployment rate in the EU was lower that that in the US before the 1970s, since then it has climbed significantly above the corresponding US levels without showing any tendency to decline. The reasons for such developments have been attributed to changes in the functional and institutional workings of labour markets brought about by policies enacted to safeguard employment and comfort people in economic distress. However, in the course of time, these policies have created a *quasi* market in which unemployed people demand and governments supply various social benefits. So, our first task is to model the linkages of this market to the rest of the economy and analyse its implications.

III. Theory

We consider an economy consisting of h households, f private firms and a government, g. Households offer their labour services to private firms and the government or remain unemployed. They also finance the construction of capital, which they rent to firms. The firms hire labour and capital services from households and employ them in conjunction with services from social capital to produce output in the form of consumer and producer goods. For the sake of simplicity we assume that all public capital takes the form of a common good, which is used by households and firms on a fee basis. The government taxes all incomes at a uniform tax rate and with the revenues finances three categories of expenditures. More specifically, the government: (a) pays the salaries of civil servants, (b) supplies and maintains public capital services, and (c) provides social benefits to the unemployed. The government budget is always balanced and there is no public debt.

All transactions take place in competitive markets with the following qualifications. The differences in the equilibrium wages that prevail in the private and the public sector of the economy reflect the existing institutional arrangements. In particular, unlike public servants, private sector employees do not enjoy tenure and they do work for a fixed number of hours per week. In the "quasi-market" for unemployment, the prevailing rate of social benefits is administratively set. This rate together with an upward sloping "demand" for unemployment determines the equilibrium level of unemployment in the sense that an increase (decrease) in this rate leads, ceteris paribus, to an increase (decrease) in the numbers of unemployed. As for the nature of "social benefits", these are presumed to encompass the impact of employment protection legislation (mandated severance pay, required period before dismissals, maximum number of dismissals as a percent of total employment per firm) and unemployment benefits (eligibility, relative size of benefit recipients to total unemployment, relative size of their average monetary benefits to average earnings, duration).

Finally, we assume that the economy modelled creates a sufficient number of jobs to secure full employment for all native workers. But a certain percentage of them consider some jobs as inferior because they pay wages lower than their expected opportunity cost plus welfare benefits. Thus, whereas on the one hand the foreign sector permits an influx of foreign workers who fill the vacancies so generated, on the other hand the native workers who refuse the "low-grade" jobs register as unemployed and become eligible for welfare benefits.

1. The model

Our objective here is to set up a general equilibrium model so as to analyse the effects of the decisions of economic agents and government on the rate of unemployment.

A. Households

The representative household j, j=1…h, is presumed to behave as if it maximizes a static utility function, U, subject to a budget constraint. To account for wealth effects, the arguments entering the utility function include, in addition to consumption and leisure, the value of capital owned by the household as well the value of public capital. More specifically, this household is envisioned to solve the problem:[5]

$$
\begin{aligned}
&\text{Max} \qquad U_j(Q_j, L_j^l, K_j^f, K_j^g) && \text{(i)} \\
&\{L_j^f, L_j^g, L_j^u, K_j^f, K_j^g\} \\
&\text{s.t.} \quad pQ_j = [w^f L_j^f + w^g L_j^g + rK_j^f](1-z) - r_l K_j^g + w^b L_j^u - K_j^p && \text{(ii)} \\
&\qquad\qquad L_j^l = \bar{L}_j - (L_j^f + L_j^g + L_j^u) && \text{(iii)}
\end{aligned}
\tag{1}
$$

where 1(i) is a well-behaved utility function and the symbols have the following meaning:

U_j = Static utility function,

Q_j = Quantity of consumer goods,

$\bar{L}_j$ = Total household time for work and leisure,

L_j^l = Household time devoted to leisure,

L_j^f = Working time supplied to private firms,

L_j^g = Working time supplied to government,

L_j^u = Time deliberately declared as "unemployment" at the going wage rates,

K_j^f = Private capital,

K_j^g = Social capital,

p = Price index of consumer goods,

w^f = Wage rate paid by firms,

w^g = Wage rate of civil servants,

w^b = Welfare benefits per "unemployed" person,

z = General tax rate, applying equally to incomes from wages and interest,

r = Interest rate at which interest income accrues to households,

r_l = Charge per unit of infrastructure used.

Solving the first order conditions and summing the resulting equations over all households, we obtain the following economy-wide supply and demand functions:

$$
\begin{aligned}
L_S^n &= L_S^n[\frac{w^f}{p}, \frac{w^g}{p}, \frac{w^b}{p}, \frac{r}{p}, \frac{r_l}{p}, z], \quad n = f,\ g,\ u && \text{(i)} \\
K_{hS}^f &= K_{hS}^f[\frac{w^f}{p}, \frac{w^g}{p}, \frac{w^b}{p}, \frac{r}{p}, \frac{r_l}{p}, z] && \text{(ii)} \\
K_{hD}^g &= K_{hD}^g[\frac{w^f}{p}, \frac{w^g}{p}, \frac{w^b}{p}, \frac{r}{p}, \frac{r_l}{p}, z] && \text{(iii)} \\
Q_D &= (w^f L_S^f + w^g L_S^g)\frac{(1-z)}{p} - \frac{r_l K_{hD}^s}{p} + \frac{w^b}{p} L_S^u - \frac{K_S^f}{p} && \text{(iv)}
\end{aligned}
\qquad (2)
$$

where L_S denotes supply of labour, and the superscript n stands for f, g and u, indicating firms, government and unemployment, respectively; K_{hS}^f is the value of producer's durables

that households rent to private firms; and, K^{g}_{hD} and Q_D denote the amounts of public capital and consumer goods demanded by households.

B. Firms

The representative firm i, i=1…f, is presumed to produce two homogeneous goods: a consumer good, which is destined for the market, and a capital good, which is retained in the firm for productive purposes. In other words, we think of the firm as consisting of two departments: one building the capital good on account of the households who finance its construction, and another producing the consumer good. The production of the consumer good is effected by means of a well-behaved production function. The firm is envisioned to solve the following profit maximization problem:

$$\underset{\{L^{f}_{i}, K^{f}_{i}, K^{g}_{i}\}}{\text{Max}} \quad pQ_i(L^{f}_{i}, K^{f}_{i}, K^{g}_{i}) - w^{f}L^{f}_{i} - rK^{f}_{i} - r_{l}K^{g}_{i} \tag{3}$$

The partial derivatives in (3) are positive. Solving again for the first order conditions and summing the resulting equations over all firms, we obtain the following economy-wide demand and supply functions:

$$\begin{aligned} L^{f}_{D} &= L^{f}_{D}\left(\frac{w^{f}}{p}, \frac{r}{p}, \frac{r_{l}}{p}\right) \qquad \text{(i)} \\ K^{f}_{D} &= K^{f}_{D}\left(\frac{w^{f}}{p}, \frac{r}{p}, \frac{r_{l}}{p}\right) \qquad \text{(ii)} \\ K^{g}_{fD} &= K^{g}_{fD}\left(\frac{w^{f}}{p}, \frac{r}{p}, \frac{r_{l}}{p}\right) \qquad \text{(iii)} \\ Q_S &= Q_S\left[L^{f}_{D}, K^{f}_{D}, K^{g}_{fD}\right] \qquad \text{(iv)} \end{aligned} \tag{4}$$

where L^{f}_{D} and K^{f}_{D} stand for the quantities of labour and capital demanded by firms from households, K^{g}_{fD} is the amount of public capital demanded by firms from the government, and Q_S is an index of consumer and producer goods supplied to the economy.

C. The Government

The government maximizes its social welfare function subject to two constraints: its budget and the native labour force constraints. In formal terms, the government is presumed to solve the following problem:

$$
\begin{aligned}
&\underset{\{L^g, L^u, K^g\}}{\text{Max}} \quad W(L^g, L^u, K^g) && \text{(i)}\\
&\text{s.t.} \quad (w^f L^f + w^g L^g + rK^f)z + r_l K^g = w^g L^g + w^b L^u + K^g && \text{(ii)}\\
&\qquad\qquad L = L^f + L^g + L^u && \text{(iii)}
\end{aligned}
\tag{5}
$$

where W indexes social welfare and L is total labour available in the economy. The partial derivatives in 5(i) with respect to L^g and K^g are positive, whereas the partial derivative with respect to L^u may be positive, if the government is bureaucratic, and negative if it is not. Using 5(iii) we eliminate the variables L^f from 5(ii) and apply straightforward maximization. In turn, solving for the first order conditions, we obtain the following behavioural equations:

$$
\begin{aligned}
L^g_D &= L^g_D[L, \frac{w^f}{p}, \frac{w^g}{p}, \frac{w^b}{p}, \frac{r}{p}, \frac{r_l}{p}, z] && \text{(i)}\\
L^u_D &= L^u_D[L, \frac{w^f}{p}, \frac{w^g}{p}, \frac{w^b}{p}, \frac{r}{p}, \frac{r_l}{p}, z] && \text{(ii)}\\
K^g_S &= K^g_S[L, \frac{w^f}{p}, \frac{w^g}{p}, \frac{w^b}{p}, \frac{r}{p}, \frac{r_l}{p}, z]. && \text{(iii)}
\end{aligned}
\tag{6}
$$

where L^g_D, L^u_D and K^g_S denote the demand for labour and "unemployment" and the supply of social capital, respectively.

D. Equilibrium conditions

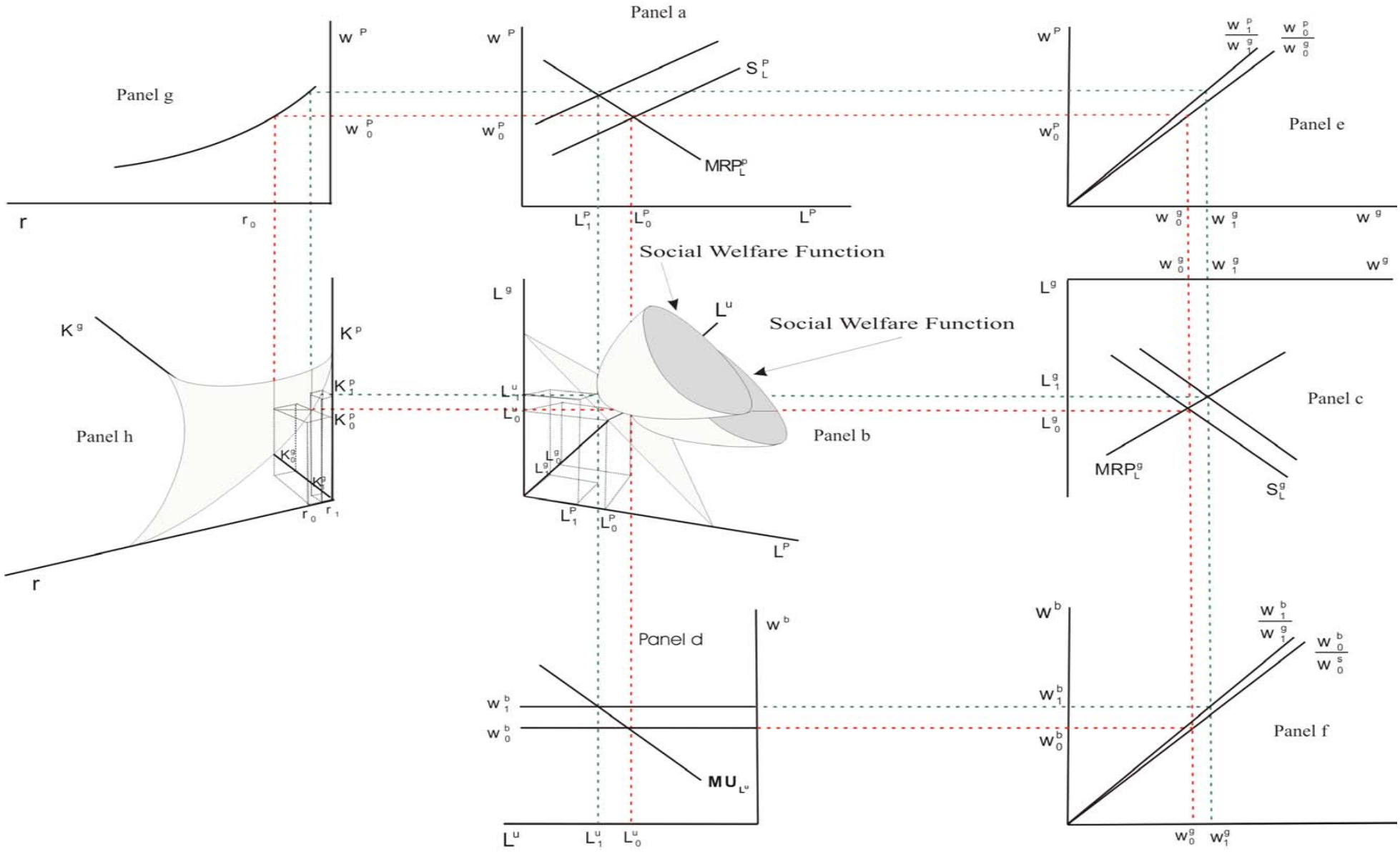
Denoting the equilibrium values of variables without subscripts, the (desired and realized) levels of employment, unemployment,[6] capital services, and output are given by:

$$
\begin{aligned}
&\text{Labour market} \quad L^f = L^f_D = L^f_S, \quad L^g = L^g_D = L^g_S, \; L^u = L^u_D = L^u_S, && \text{(i)}\\
&\text{Capital market} \quad K^f = K^f_D = K^f_S, K^g = K^g_{hD} + K^g_{fD} = K^g_S && \text{(ii)}\\
&\text{Output market} \quad Q = Q_D = Q_s. && \text{(iii)}
\end{aligned}
\tag{7}
$$

Moreover, it should be noted that once the equilibrium levels for L^f, L^g, and L^u have been determined, the corresponding level of leisure L^l is automatically determined from the constraint (5iii) that defines the allocation of available domestic labour force.

The working of the model is presented in Figure 2 below. Panels a, c and e present the determination of equilibrium conditions in the three segments of the labour market, notably those of the private sector, the state sector and the labour offices. Panel f describes the

Figure 2 Tracing the effects of a rise in unemployment benefits



maximization of social welfare. Panel h shows the relationship between the real wage determined in the private sector and the real interest rate. Panel g shows the relation among private capital, state capital and the interest rate. Finally, panels b and d are auxiliary; they show the relations between the equilibrium wages in the private and state sectors, and the equilibrium wage in the state sector and the welfare benefit, respectively.

Starting from panel e it is easy to trace the effects from an increase of the unemployment benefits in the economy. Assume that the economy is in a long-run equilibrium (all variables in all panels are marked with subscript 0). Consider now a ceteris paribus increase in the social benefits per person from w_0^b to w_1^b (panel f). This has the following consequences: (a) The number of the unemployed increases from L_0^u to L_1^u (panel d) at the expense of those working in the private and state sectors, the numbers of which decrease from L_0^p, and L_0^g to L_1^p and L_1^g (panel a). (b) As a result, the wage rates in the private and state sectors rise from their initial positions to L_1^p, and L_1^g (panels a and c), respectively. (c) The wage rate of those working in the private sector and the welfare benefits for the unemployed, both as ratios of the wage rate paid by the government to civil servants, rise to their new levels w_1^p/w_1^g and w_1^b/w_1^g (panels e and f) respectively. (d) With an unchanging national output, the rate of return on private capital falls from r_0 to r_1 (panel g), which corresponds to more private and less social capital, namely K_1^p and K_1^g (panel h).

2. The estimated model

The above general equilibrium model enables us to extract, in principle, a reduced form equation for steady state unemployment, which is of the form:

$$L^u = L^u(L, L^g, K^g; P, z) \tag{8}$$

where $P = \{\frac{w^f}{p}, \frac{w^g}{p}, \frac{w^b}{p}, \frac{r}{p}, \frac{r_l}{p}\}$ is the vector of real prices.

Moreover, since our interest in this paper is to investigate the phenomenon of unemployment across countries, equation (8) should be adjusted to allow for differences in the size of their labour force. To this effect, we divide all non-price variables in (8) by L and obtain a long-run equilibrium relationship:

$$u_{ct}^* = u(l_{ct}^g, k_{ct}^g; P_{ct}, z_{ct}), \text{ for } c = 1, ,..., n \tag{9}$$

where for country c at time t the variables have the following meaning: $u_{ct}^* = L_{ct}^u/L_{ct}$ is the equi-

librium rate of unemployment; $l^g_{ct} = L^g_{ct}/L_{ct}$ is the ratio of state employment to the labour force; and $k^g_{ct} = K^g_{ct}/L_{ct}$ is the ratio of public capital to total labour force.

Recall now that in a long-run equilibrium, the actual rate of unemployment u_{ct} is equal to u^*_{ct}. However, the increase of the welfare benefits from w^b_0 to w^b_1 derails the economy from its long-run state and moves it to a new equilibrium (variables denoted by subscript 1 in all panels of Figure 2). The impact of that shock is transmitted to the equilibrium u^*_{ct} by means of Koyck's adjustment mechanism:

$$u_{ct} - u_{ct-1} = \beta(u^*_{ct} - u_{ct-1}) + \varepsilon_{ct} \tag{10}$$

where ε_{ct} denotes the error term. Solving now (9) in terms of u^*_{ct} and substituting the resulting expression into (10) yields the basic model to be estimated:

$$u_{ct} = \beta u(l^g_{ct}, k^g_{ct},; P_{ct}, z_{ct}) + (1 - \beta)u_{ct-1}, \text{ for } c = 1,,..., n \tag{11}$$

The estimated version of (11) is expected to shed some light on the determinants of the unemployment rates in low-, average-, and high-unemployment rate EU countries and among EU and non-EU regions.

IV. Data, measurement of variables, and interpretation of results

The empirical estimations are based on a sample of annual observations covering the time interval from 1970 to 2000. The majority of the data employed in this paper come from the *AMECO Database* (aggregate macroeconomic data) of the European Commission.[7] The AMECO data originate from various sources, namely, the Eurostat, national publications and the OECD. The national accounts data for the EU Member States are based on the ESA (European System of Accounts) 95. These data start in the late 1980s-early 1990s for Austria, Germany, Ireland, Portugal and Sweden; year 1995 for Spain, Greece and Luxembourg; and longer time periods for Belgium, Denmark, France, Italy, Netherlands, Finland and the UK. The ESA 79 data are used for the earlier years. Data for Norway, Canada, Japan and the US are based on the System of National Accounts (SNA). The employment data for Ireland come from Ireland's Central Statistics Office, whereas for Greece and Canada have been obtained from the *Quarterly National Household Survey* and the *Census of Population* by the *National Statistical Service of Greece* and *Statistics Canada*, respectively.

In view of the diversity of the sources of the variables in the AMECO database and the inconsistencies involved, especially in the employment series of the countries under investigation, we have (re-) constructed a number of the variables required for the purposes of our empirical analysis.[8] In particular, to obtain the public sector employment series L^{g}_{ct}, we have subtracted the private sector employment L^{f}_{ct} (NETP) and total unemployment L^{u}_{ct} (NUTN) from the total labour force L_{ct} (NLTN) series. The unemployment rate u_{ct} has been computed as the ratio of total unemployment to total labour force. The respective estimates are almost identical to the corresponding Eurostat and OECD figures for the EU member states and the non-EU countries, respectively. The employment figures are in thousands of persons.

As for the capital stock variables in the private and government sectors, these were computed as follows. First we calculated the series of real net capital stock in the private sectors of the 19 countries via the perpetual inventory method. More specifically, we applied the equation $K^{f}_{ct} = I^{f}_{ct} - \delta^{f} K^{f}_{ct-1}$ by setting $\delta^{f} = 0.1$ and $K^{f}_{c1970} = 3.5 * GDP_{1970}$, with 1970 being the initial year. Then, subtracting the series of deflated net capital stock in the private sector from the series of net capital stock in the economy, as reported in the AMECO database (variable OKND), we obtained the series of real net capital stock in the government sector in each country.

Finally, the user cost of capital in each country was defined and measured as $UC_{ct} = q_t(r_{ct} + \delta - q_t/q_t)$, where r_{ct} is the long-run lending rate, δ is a flat depreciation rate equal to 0.1 and q_t is the investment deflator, whereas social benefits are transfers other than in kind and were obtained from the AMECO database (variable UYTGH).

Table 2 presents a variety of estimates of equation (11). These refer to all nineteen countries of the sample taken both as a whole (column 1) and in several subgroups (columns 2-9). The subgroups involve the EU-15, the high unemployment (Spain, Ireland and Italy), average unemployment (France, Belgium, Finland, Greece, the UK and Portugal) and low unemployment rate (the Netherlands, Denmark, Austria, Germany, Luxembourg and Sweden) EU countries, the four Scandinavian countries (Finland, Denmark, Sweden and Norway), Japan, and the US and Canada taken together. With two exceptions, the results suggest that the real social benefits per man of the current period or lagged one period exert a positive influence in the rate of unemployment. The exceptions are the low unemployment rate EU countries and the US plus Canada (columns 5 and 8, respectively). It is worth comparing here the size and the strength of the relevant regression coefficients pertaining to the three EU subgroups. In particular, the social benefits coefficient of the high unemployment rate EU countries is greater in size, i.e. 0.00119 and stronger in terms of statistical significance (column 3), than the respective

Table 2. Estimated versions of the unemployment rate equation (11)

Explanatory Variables:	All Countries (1)	EU-15 (2)	EU: *High u* countries (3)	EU: *Average u* countries (4)	EU: *Low u* countries (5)	Scandinavian countries (6)	Japan (7)	USA and Canada (8)	(9)
$\left(w^b/p\right)_{ct}$	…	…	…	0.00034 (2.33)	…	…	0.00045 (3.07)	…	…
$\left(w^b/p\right)_{ct-1}$	0.00040 (2.83)	0.00038 (2.20)	0.00119 (4.09)	…	0.00023 (0.65)	0.00071 (2.72)	…	0.00087 (0.90)	…
l^g_{ct}	-0.35485 (-6.86)	-0.36455 (-6.00)	-0.43758 (-5.88)	-0.21586 (-2.61)	-1.27787 (-6.56)	-0.46083 (-3.17)	-0.71273 (-7.15)	0.51390 (1.92)	0.53081 (3.05)
k^f_{ct}	-0.7630 (-3.00)	-0.8269 (-2.76)	-0.3171 (-1.14)	-1.7409 (-2.18)	-6.8389 (-3.44)	-2.3819 (-2.25)	-0.0192 (-0.48)	-0.0587 (-0.08)	…
$\left(w^g/p\right)_{ct}$	…	…	…	…	-0.0088 (-2.19)	…	…	…	…
UC_{ct-1}	…	…	…	…	…	…	…	3.67E-06 (1.62)	4.34E-06 (2.10)
UC_{ct-2}	2.57E-06 (2.51)	5.78E-06 (2.09)	1.10E-05 (2.89)	…	…	…	…	…	…
UC_{ct-3}	…	…	…	…	…	…	5.45E-07 (2.41)	…	…
AR(1)	1.6263 (33.79)	1.5911 (31.87)	1.4783 (19.89)	1.7485 (22.40)	1.5266 (14.13)	1.7698 (18.09)	0.8453 (9.98)	0.8960 (6.22)	0.9331 (6.65)
AR(2)	-0.9334 (-11.49)	-0.7766 (-12.36)	-0.6017 (-8.17)	-1.1606 (-8.66)	-0.6742 (-5.90)	-1.1833 (-7.08)	…	-0.2928 (-2.44)	-0.2970 (-2.47)
AR(3)	0.2057 (4.36)	…	…	0.3388 (4.48)	…	0.3498 (3.76)	…	…	…
AR(4)	…	0.08269 (2.90)	…	…	…	…	-0.6724 (-6.18)	…	…
AR(6)	…	…	…	…	0.0899 (2.25)	…	…	…	…
AR(7)	…	…	0.0766 (2.28)	…	…	…	…	…	…
Total panel obs. (balanced)	437	330	114	156	66	100	21	50	50
Time series obs. (adjusted)	26	26	26	29	28	28	25	27	27
$\overline{R}^2$	0.968	0.968	0.945	0.941	0.976	0.944	0.979	0.846	0.850
D.W. statistic	2.03	1.89	1.98	1.99	2.04	1.99	2.03	1.80	1.86
Log Likelihood	1553.1	1158.8	433.8	555.7	240.2	346.0	116.8	175.3	174.8
Prob (F-stat.)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Notes:
(1) Sample period: 1972-2000. (2) Method: Pooled Least Squares. (3) Fixed effect estimators (no weighting).
(4) "…" = Statistically insignificant in alternative estimated versions of the equation (not presented here). (5) t- ratios are in parentheses.
(6) The high, average and low *u* (unemployment rate) countries are presented in Table 1.
(7) Scandinavian countries: Denmark, Finland, Norway and Sweden.
(8)The definitions of the explanatory variables are given in Section IV. (9) obs. = observations

mated coefficients concerning the last two groups are 0.00034 and non-different from zero, respectively (columns 4 and 5, respectively). These findings emphasize the greater similarity in terms of performance between the low unemployment EU countries and North America (US plus Canada) than among the three EU subgroups of countries. In short, the empirical evidence indicates that the level, structure and procedures of enforcement of social benefits in the European Union may have to be restructured with the objective of reducing the unemployment differences across the EU states and alleviating the unemployment problem. Our results are in agreement with Nickel's (1997) argument that differences within Europe are much greater than are differences between the European average and North America.

Furthermore, the results indicate that an increase in employment in the state sector negatively influences the rate of unemployment in all cases but the US and Canada. With three exceptions, increases in the capital-labor ratio of the private sector tend to reduce the unemployment rate. The exceptions are the high unemployment rate EU countries, Japan, and the US plus Canada (columns 3, 7 and 8), the respective regression coefficients of which are not different from zero.

V. Conclusions

In this paper we have tested the theoretical proposition that the welfare benefits per person have been responsible for the observed differences in unemployment rates in the nineteen countries of our sample. The results are mixed. They indicate that the more aggregated the sample size is the greater is the positive impact of rising welfare benefits on the unemployment rate. This is especially true in the cases of all nineteen countries taken as a whole and EU-15. However, the most interesting findings are obtained in the cases of the less aggregated data. There we observe that the unemployment benefits exert stronger, weaker and zero influences (in the statistical sense) on the high, average and low unemployment rate EU countries, respectively. Positive is also the impact of the unemployment benefits on unemployment in Japan and the four Scandinavian countries taken together. However, the unemployment benefits do not seem to affect the unemployment rate in North America. The above results suggest that a careful study of the inter-country differences regarding the institutional framework of providing the welfare benefits to the persons in need is a sine qua non condition for alleviating the unemployment problem within the EU.

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Endnotes

[1] Lindbeck (1995) has tabbed developments (a) and (c) - (e) as hazardous dynamics.
[2] See especially the papers by Blank and Freeman (1994), Abraham and Houseman (1994) and Blank (1994) appearing in Blank, ed., (1994).
[3] On the basis of the 1995 performance of a sub-group of the EU countries at issue, namely the EU-12, Vinals and Jimeno (1997) classify them as low, high, and very high unemployment countries.
[4] For a criticism of the system where the state acts as employer of last resort see Alogoskoufis et al., (1995).
[5] See also Kurz (1968).
[6] In the setting of our model all reported unemployment is considered as voluntary, the rationale being that the economy creates a sufficient number of jobs for all domestic labour force.
[7] This is a working database of the Directorate General Economic and Financial Affairs (DG ECFIN).
[8] Acronyms in parentheses are the names of the variables in the AMECO database.