DISCUSSION PAPER SERIES

IZA DP No. 3003

A Positive Theory of the Earnings Relationship of Unemployment Benefits

Laszlo Goerke
Markus Pannenberg
Heinrich W. Ursprung

August 2007

Forschungsinstitut
zur Zukunft der Arbeit
Institute for the Study
of Labor

A Positive Theory of the Earnings Relationship of Unemployment Benefits

Laszlo Goerke
University of Tübingen,
CESifo and IZA

Markus Pannenberg
DIW Berlin, University of Applied Sciences Bielefeld
and IZA

Heinrich W. Ursprung
University of Konstanz
and CESifo

Discussion Paper No. 3003
August 2007

IZA

P.O. Box 7240
53072 Bonn
Germany

Phone: +49-228-3894-0
Fax: +49-228-3894-180
E-mail: iza@iza.org

IZA Discussion Paper No. 3003
August 2007

ABSTRACT

A Positive Theory of the Earnings Relationship of Unemployment Benefits

Evidently, the benefit-structure of the unemployment insurance has a significant influence on profits and trade union utility. We show for a wage bargaining model that a stronger earnings relationship of unemployment benefits may reduce wages and increase employment. This raises the question as to how the benefit structure is determined in the political process. To answer this question, we consider a government that chooses the earnings relationship with a view to maximising its political support. Our model predicts a strong earnings relationship under right-wing governments and a weak one when the unions' influence is pronounced. Deepening international economic integration has ambiguous effects. Using panel data for 19 OECD countries from 1961 to 2003 we find support for the hypothesized domestic influences and show that the earnings relationship varies negatively with openness.

JEL Classification: D72, J51, J65

Keywords: earnings relationship, panel data, political support maximization, wage bargaining, unemployment benefits

Corresponding author:

Laszlo Goerke
University of Tübingen
Department of Economics
Melanchthonstr. 30
D-72074 Tübingen
Germany
E-mail: laszlo.goerke@uni-tuebingen.de

1. Introduction

The level and structure of unemployment insurance benefits vary greatly across countries and the rules which govern unemployment compensation are frequently changed. Such regulations, thus, do not constitute constraints for economic policy. They rather represent the outcome of the political process. While the political-economic determinants of unemployment benefits are fairly well known, the determinants of the maximum duration of unemployment insurance (UI) payments, the linkage between previous income and benefit levels, and the pertinent eligibility conditions are underresearched issues. These structural components of an UI system are, however, of great importance for the labour market consequences of unemployment benefits.

In this paper, we focus on the political-economic determinants of the *earnings relationship* of UI benefits. The earnings relationship is a highly visible, politically sensitive component of UI systems, which changes the payoffs of the directly affected interests in a predictable manner. Moreover, comparable data are available for OECD countries over a long time period. Analyzing the earnings relationship of UI benefits thus improves our understanding of a fundamental feature of the welfare state, and the availability of high quality data allows the derived hypotheses to be tested empirically.

We specifically address the question why the earnings relationship of UI benefits is higher in some countries than in others. Moreover, we investigate how the structure of the welfare state, proxied by the relation between previous earnings and UI benefits, will be affected by international economic integration. We provide answers to the above questions by, first, establishing the link between the earnings relationship of UI benefits and labour market outcomes in a unionised economy (Section 2). We show in particular that a higher earnings relationship will reduce wages if trade unions maximise the employees' bargaining surplus. Second, we analyse how a political support maximizing government chooses the earnings relationship (Section 3). By assuming a given level of benefits, we focus on the benefit *structur*e. Our analysis, thus, complements studies on the political economy of the *level* of unemployment compensation. The theoretical investigation (in Section 4) indicates that trade unions and left-wing governments favour a relatively low earnings relationship. This is because a more pronounced earnings relation can lower the trade union's payoff. International integration also affects the earnings relationship since product market competition reduces the scope for collective negotiations. Third, using data, inter alia, from the OECD's Database on Benefit Entitlements and Gross Replacement Rates for 19 countries for the period 1961 to

2003 we find support for the hypothesized domestic influences. The empirical analysis moreover shows that the earnings relationship varies negatively with openness.

Our paper is related to two different strands of literature: the political-economic theories of UI policy and the corresponding empirical investigations, and analyses of earnings-related UI benefits. The political-economic literature is still rather small. In a voting model of UI benefits, Wright (1986) analyses the individual incentives to establish unemployment insurance and shows that less than full coverage is chosen by the (employed) median worker.[1] Di Tella and MacCulloch (2002) assume that UI benefits are not the result of a direct vote but are determined by the government to maximise its political support. A larger political weight of the firms can reduce benefits. This suggests that the level of UI is higher under left-wing governments. Neugart (2005) explains why countries with majoritarian electoral systems have lower replacement rates than those with proportional systems. Empirical investigations of the determinants of UI benefits generally employ the OECD's Database on Benefit Entitlements and Gross Replacement Rates. Using this dataset, Di Tella and MacCulloch (2002) find a negative correlation between a right-wing orientation of the government and unemployment, on the one hand, and the level of benefits, on the other hand. Gaston and Noel (2004) observe that UI benefits rise with union density, a left-wing orientation of the government, and the openness of the economy, while Saint-Paul (1996) cannot identify any impact of the government's political orientation.[2]

The theoretical literature on earnings-related UI benefits has dealt primarily with the economic consequences of altering the replacement rate. Lingens and Wälde (2006) have clarified that a higher replacement rate generally increases unemployment in models of collective wage determination, irrespective of the nature of the benefit system. A change in the replacement rate can, of course, be decomposed into a variation in the level of benefits and a change in the earnings relationship. Foucssing solely on the latter, that is, holding the level of UI benefits constant, Vijlbrief and van de Wijngaert (1995) show that a stronger earnings relationship increases unemployment in an economy with utilitarian trade unions. Goerke and Madsen (2003) obtain the reverse prediction for a trade union that maximises the gain of the employed workers from having a job. The intuition is that any increase in the unemployed workers' payoffs reduces the gain enjoyed by the employed union members.

---

[1] Atkinson (1990) and Saint-Paul (1996) provide similar results. Pallage and Zimmermann (2001), Dur (2001), and Hassler et al. (2005) extend the model in various directions. Boeri et al. (2003, 2004) and Neugart (2007) investigate the interaction of employment protection and the level of UI.

[2] Botero et al. (2004), using a different data set, establish a positive association between union density and the generosity of a country's social security system - including UI benefits - for 85 countries in 1997.

Beissinger and Egger (2004), assuming a similar objective, derive a positive employment effect of a higher earnings-related replacement rate in a dynamic wage bargaining framework.

The subsequent analysis builds on the investigations of the labour market effects of earnings-related UI benefits and tackles the issues which have been investigated by the existing political-economic literature with respect to the *level* of UI benefits: Namely, what determines the earnings relationship of UI benefits, and are the respective theoretical predictions consistent with the empirical evidence? In order to isolate the consequences resulting from the strength of the linkage between previous wages and UI benefits, and not to confuse these effects with the impact of a change in the level of benefits, the government is assumed to hold the benefit level constant. The instrument variable of the government is therefore the earnings relationship of UI benefits.

2. The Economic Sector

The economy consists of two sectors j, j = s, e. In the sheltered sector s, non-tradable goods are produced selling at a constant price p^s. In the exposed sector e, tradable goods are manufactured. Their price is p^e. The consumer price index is given by p. Wages are determined by collective bargaining.[3] There are many identical firms in each sector and one trade union in each firm. The number of firms - and therefore also the number of unions - is constant. Labour is assumed to be sector specific. Profits π^s per (representative) sheltered sector firm consist of the price times output less labour costs, $\pi^s = p^s f(n^s) - w^s n^s$, where f is an increasing and strictly concave production function ($f' > 0$, $f'' < 0$), n^s the level of employment, and w^s denotes the wage. In analogy, profits of a representative firm in the exposed sector are $\pi^e = p^e f(n^e) - w^e n^e$. Each firm bargains with 'its' union over the wage and then sets employment $n^j(w^j, p^j)$.

A trade union can be utilitarian and maximise the sum of its members' utility. Alternatively, the trade union might be insider-dominated in that it maximises the gain (or rent, if risk-neutral) of its members from employment at the union wage. Which of these two objectives prevails is an open empirical issue (Oswald 1982, 1993, Pencavel 1991, pp. 54, 81-92, and Booth 1995, pp. 87, 101-108). Therefore, we assume that unions of either type may be present in each sector. Let the fraction λ^j, $0 \leq \lambda^j \leq 1$, of all trade unions in sector j be utilitarian and

[3] Although gross union density varied between 10% (France) and 79% (Sweden) in the OECD in 2000, bargaining coverage is substantially higher. The (unweighted) collective bargaining coverage amounted to 60% in 2000 and reached or exceeded 80% in numerous countries (OECD 2004a). Assuming collective negotiations is, therefore, a good approximation for most OECD countries. We also discuss the implications of alternative mechanisms of wage determination en route.

the fraction $(1 - \lambda^j)$ be insider-dominated. Each union has an exogenously given number of M^j members, of which n^j, $n^j \leq M^j$, are employed. A member can be characterised by a strictly concave (indirect) utility function $v(\cdot)$, $v' > 0$, $v'' < 0$, where v is a function of real income. The n^j employed members earn the wage w^j and thus enjoy the utility $v(w^j/p)$. The remaining $M^j - n^j$ members obtain real UI benefits amounting to B^j/p.

Nominal UI benefits B^j consist of a (sector-specific) fixed component a^j, $a^j > 0$, and an income dependent component cw^j, $c \geq 0$: $B^j = a^j + cw^j$. UI benefits are usually independent of the wage for those unemployed workers who have already been without a job before wage determination has taken place. This is the case since earnings-related benefits are a function of past income. The alternative income of workers who lose their jobs because of higher (real) wages will, however, be affected by the strength of the earnings relationship since their benefits are based on the new wage. Capturing these differential effects requires an explicitly dynamic approach. To circumvent this analytical extension, for simplicity, the income when not working at the union wage is assumed to be unemployment compensation.

The objective of a utilitarian trade union (indexed by u) in sector j, j = e, s, is given by:

$$U^{u,j} = n^j(w^j, p^j)\left[v\left(w^j/p\right) - v\left(B^j/p\right)\right] + M^j v\left(B^j/p\right) \tag{2.1}$$

The objective of an insider-dominated trade union (indexed by i) in sector j equals:

$$U^{i,j} = n^j(w^j, p^j)\left[v\left(w^j/p\right) - v\left(B^j/p\right)\right] \tag{2.2}$$

To analyse aggregate union behaviour, we make use of an 'average' union utility function U^j:

$$U^j = \lambda^j U^{u,j} + (1-\lambda^j)U^{i,j} = n^j(w^j, p^j)\left[v\left(w^j/p\right) - v\left(B^j/p\right)\right] + \lambda^j M^j v\left(B^j/p\right) \tag{2.3}$$

The outcome of wage negotiations is determined by the Nash-solution. Both parties are endowed with the same bargaining power. The fixed fallback payoffs are determined by the situation in which no agreement is reached, and are normalised to zero. In the sheltered sector s maximisation of the Nash-product $U^s\pi^s$ with respect to the wage, ruling out a corner solution, and defining $\varepsilon^s := (\partial n^s/\partial w^s)(w^s/n^s) < 0$, $v := v(w^s/p)$ and $\bar{v} := \bar{v}(B^s/p)$, yields:

$$K^s := \left(\varepsilon^s(v - \bar{v}) + w^s v' - w^s \bar{v}' c\left(1 - \lambda^s M^s / n^s\right)\right)\pi^s - \left\{n^s(v - \bar{v}) + \lambda^s M^s \bar{v}\right\}w^s = 0 \tag{2.4}$$

The first bracketed term is proportional to the union's marginal gain from bargaining and positive for $K^s = 0$. The second-order condition $\partial K^s/\partial w^s < 0$ is assumed to hold (see Appendix I).

Suppose now that the government changes the structure of UI benefits by raising the earnings relationship and lowering the flat-rate component, while holding constant the respective levels B^e and B^s. Taking again the sheltered sector as an example, such a policy requires an increase in the parameter c and a change in the fixed component a^s, so that $dB^s = da^s + w^s dc + c dw^s = 0$ holds, where the change dw^s in the wage will be non-zero if the bargaining outcome is affected by the variation in the structure of benefits. From equation (2.4) we have:

$$\left.\frac{\partial w^s}{\partial c}\right|_{dB^s=0} := w_c^s = \frac{\Psi \pi^s w^s \bar{v}'}{\partial \bar{K}^s / \partial w^s (v - \bar{v})}\left(1 - \frac{\lambda^s M^s}{n^s}\right), \tag{2.5}$$

where $\partial \bar{K}^s / \partial w^s < \partial K^s / \partial w^s < 0$ ($\partial \bar{K}^s / \partial w^s$ being the change in K^s due to a rise in the wage, evaluated at a constant level of benefits; See Appendix I). Thus, a stronger earnings relation of UI benefits will reduce the bargained wage if the fraction λ^s of utilitarian unions is less than the ratio of employment n^s to membership M^s. This restriction is captured by:

$$1 - \lambda^s M^s / n^s > 0 \qquad \text{(condition C)}$$

Given an unemployment rate of substantially less than 20% in most industrialised countries, condition C will definitely be satisfied if the number of utilitarian unions relative to insider-dominated unions is not greater than 4 to 1. We will proceed from this assumption in the following analysis. Since the analysis for the sheltered sector carries over to the exposed sector, the employment performance of an economy locally improves when the earnings relationship of UI benefits becomes stronger (assuming a given level of unemployment compensation).

The intuition for the negative wage effect of a stronger earnings relationship of benefits is the following: The Nash-solution prescribes how the gains from bargaining are shared between the union and the firm. The firm's rise in profits is unaffected by a change in the earnings relationship. However, the union's gain from bargaining will be reduced if condition C holds since the increase in the payoff owing to a higher wage is lower for any given wage and benefit level, that is, the first term in brackets in equation (2.4) shrinks. Accordingly, any wage increase induces a more pronounced expansion in benefits than before the rise in c. Therefore, a given augmentation of the wage induces a smaller gain for the union than before the change in c. Hence, the efficiency requirement of the Nash-solution implies that wages fall.[4]

[4] This negative relationship between the earnings relationship of UI benefits and wages, for a given level of benefits, can also be obtained in efficiency wage models (cf. Goerke 2001).

3. The Political Sector

The government maximises a political support function S which contains the unions' utilities and the firms' profits in both sectors as arguments.[5] The weights for aggregate trade union utility and aggregate profits are denoted by α and 1 - α, $0 < \alpha < 1$. The weight of unions and firms in the sheltered sector relative to that in the exposed sector is β, $\beta \geq 0$. The fixed number of firms is normalised to unity. As mentioned in Section 1, the instrument variable of the government is the earnings relationship of UI benefits c, while the levels B^s and B^e are given. The government can commit to its choice of the earnings relationship, and, as a Stackelberg-leader, takes into account the repercussions of resulting changes in wages and employment. Maximising S with respect to c, holding constant the level of benefits, yields:

$$S_c := \frac{dS}{dc}\bigg|_{dB^s = dB^e = 0} = \alpha\left[\beta U_c^s + U_c^e\right] + (1-\alpha)\left[\beta \pi_c^s + \pi_c^e\right] = 0 \tag{3.1}$$

The second-order condition $S_{cc} < 0$ is assumed to be satisfied. Evaluated at the bargained wage and given condition C, the respective terms in equation (3.1) are given by:

$$U_c^j := \frac{\partial U^j}{\partial c}\bigg|_{dB^j = 0} = \frac{\partial U^j}{\partial w^j} w_c^j = n^j w_c^j \frac{\varepsilon^j (v - \bar{v}) + w^j v'}{w^j p} < 0 \tag{3.2a}$$

$$\pi_c^j := \frac{\partial \pi^j}{\partial c}\bigg|_{dB^j = 0} = -n^j w_c^j > 0 \tag{3.2b}$$

A union's utility decreases with an increasing earnings-sensitivity of UI benefits. First, the negotiated wage is too low from the union's point of view (cf. equation (2.4)), owing to the firm's impact on the bargaining outcome. Therefore, a reduction in wages due to a stronger earnings relationship removes the union further from its optimal position. Second, a higher earnings relationship will reduce the trade union's gain from a given wage increase. This is the case since the impact of the wage on UI benefits rises. Thus, union utility declines for two reasons. In contrast, a firm benefits from a higher earnings sensitivity since wages fall. This induces higher profits. The government balances these counteracting influences at the margin.

4. Determinants of the Earnings Relationship

As outlined in the introduction, the political support maximizing earnings relationship c* may be affected by domestic determinants, such as the political orientation of the government or

[5] Micro-foundations for the political support function approach are provided by Baldwin (1987), Coughlin et al. (1990), Grossman and Helpman (1994), and Yang (1995), inter alia.

the political influence of trade unions and firms, and also by international economic integration. Thus, a change in c* over time or across countries can be explained, for example, by a greater power of unions as compared to firms, i.e., in the final analysis, by a greater influence of employees as compared to owners of firms.[6] A larger weight of trade unions in the political support function is portrayed in our model by a higher value of α.

$$\frac{\partial c^*}{\partial \alpha} = -\frac{S_{c\alpha}}{S_{cc}} = -\frac{\beta U_c^s + U_c^e - (\beta \pi_c^s + \pi_c^e)}{S_{cc}} < 0 \qquad (4.1)$$

Expression (4.1) then gives rise to:

Prediction 1:

For a given level of unemployment compensation and assuming that condition C holds, a larger political influence of the trade unions reduces the earnings relationship c* of UI benefits.

The parameter α may also reflect the political orientation of the government. If a more right-wing or conservative government places less emphasis on workers' interests, a lower value of α can also indicate a more right-wing government. We obtain:

Prediction 2:

For a given level of unemployment compensation and assuming that condition C holds, a right-wing government selects a stronger earnings relationship c* of UI benefits than a left-wing government.

The effects summarised in Predictions 1 and 2 occur because an increase in the earnings relationship, for a given level of UI benefits, will reduce the bargained wage if the share of utilitarian unions is not too high. Since lower wages reduce the trade unions' payoffs, a greater political influence of trade unions or their political representatives will induce the government to lower the earnings relationship. If, however, condition C does not hold, the bargained wage will rise with the earnings relationship of UI benefits. No attempt has yet been made to determine the fraction of utilitarian trade unions. Findings by Goerke and Madsen (2003) for 16 OECD countries suggest that wages and the earnings relationship of UI benefits are negatively correlated. This result is consistent with condition C and Predictions 1 and 2.

Recent decades have not only seen repeated changes in a government's political orientation in many OECD countries but also a deepening of international economic integration, resulting in

[6] See Di Tella and MacCulloch (2002), Saint-Paul (1996) and Gaston and Noel (2004) for according hypotheses with respect to the determinants of the *level* of benefits.

stronger competition on goods and factor markets. In terms of our model, increased international competition can be interpreted as an increase in the *political importance*, or, alternatively, as an increase in the *size* of the exposed sector. Both effects reduce the weight β attached to firms and trade unions in the sheltered sector. Since the payoffs of trade unions and firms vary inversely with the earnings relationship of UI benefits, an increase in the political importance of the exposed sector has ambiguous effects on the optimal earnings relationship c*. A deepening of international economic integration via an increase in international factor mobility, in particular, enhances the mobility of firms across jurisdictions and, thus, raises their political influence (see, for example, Gaston and Noel 2004, Huber and Stephens 1998). If globalisation is viewed in such a manner, it can be modelled as a decline in the political importance of trade unions and will raise the earnings relationship of UI benefits (cf. Prediction 1). Finally, international integration can also give rise to a more competitive environment in the exposed sector. It is shown in Appendix II that the ensuing reduction in the price of tradable goods can lower the earnings relationship. We, therefore, have:

Prediction 3:
A change in the international integration of an economy affects the political support maximizing earnings relationship c* of UI benefits.

Our theoretical considerations suggest a rather complex relationship between the openness of an economy and the earnings relation of UI benefits. Unfortunately, the (joint) consequences of a larger exposed sector, higher firm mobility, and of price reductions for tradeable goods cannot be determined. Thus, the impact of globalisation on the earnings relationship of UI compensation is theoretically indeterminate and remains, ultimately, an empirical issue.

5. Data, Variables and Empirical Specifications

Data and Variables

Our dependent variable is a measure of the earnings relationship c of UI benefits. Even though c is not directly observable, it can be calculated on the basis of information from the OECD's Database on Benefit Entitlements and Gross Replacement Rates. This database provides information on gross replacement rates (RR) for *average production workers* (denoted RR_{100}) and workers earning two-thirds of the income of average production workers (RR_{67}) for a substantial time priod. The replacement rates include unemployment insurance and assistance, social welfare payments, as well as housing and family benefits. This data is

available on a biannual basis from 1961 to 2003.[7] The values of RR_{100} and RR_{67} are on hand for different durations of unemployment (0-3, 4-6, 7-12, 13-24, 25-36, 37-48 and 49-60 months and as unweighted summary measures for the 1st year, 2nd&3rd year and 4th&5th year) as well as for three different categories of workers (single persons, persons with a dependent spouse without employment, and persons with an employed spouse).

Using measures of RR_{100} and RR_{67} for different durations of unemployment helps to disentangle the effects of different sources of payments. For short durations, financial compensation is likely to stem primarily from UI benefits, while for longer unemployment periods the most important component may rather consist of social assistance. The respective measures RR_{100}_d and RR_{67}_d for different durations d of unemployment are calculated as unweighted averages of the replacement rates for the three categories of workers.

For each duration of unemployment, the earnings relationship of benefits is derived in the following way: Assuming a linear relation between benefits and earnings, unemployment compensation of a RR_{100} person is defined as $w \cdot RR_{100} = a + c \cdot w$, w being the wage of an average production worker prior to unemployment. For a RR_{67} person we have $0.67 \cdot w \cdot RR_{67} = a + 0.67 \cdot c \cdot w$. From these two definitions, it is straightforward to calculate the measure c for each duration of unemployment d as:

$$c\_d = 3RR_{100}\_d - 2RR_{67}\_d \qquad (5.1)$$

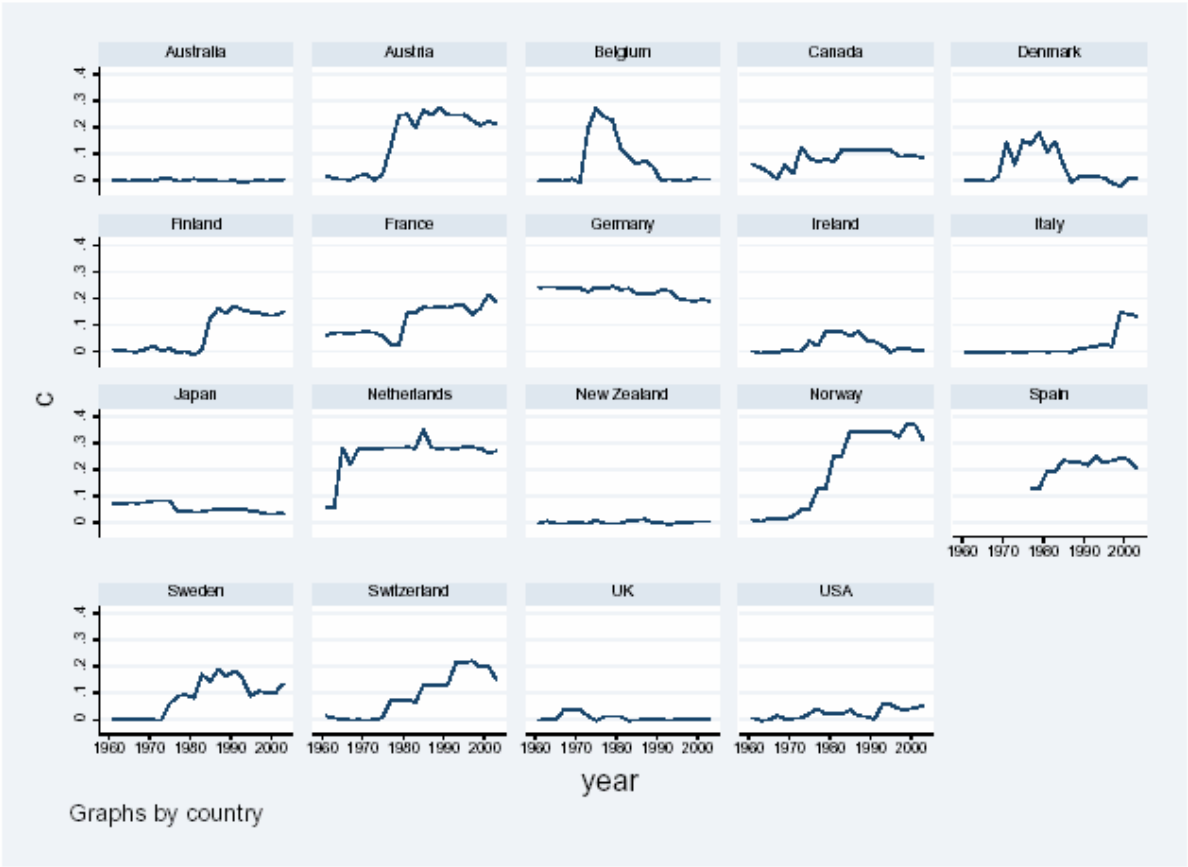
Figure 1 contains plots of unweighted summary measures c of the earnings relationship over the whole time period (1961 – 2003) for all 19 countries included in our sample.[8] It reveals a remarkable variation of c over time and across countries. In Norway and Sweden, for example, there is a large increase, starting in the 1970s and lasting until the 1990s, followed by a (slight) decrease. For France we observe a substantial increase in the 1980s. In Germany, the measure of the earnings relationship is fairly stable over time. Australia, New Zealand and the UK are characterised by a rather flat-rate unemployment compensation. Moreover, there is a great deal of cross-country variation. The summary measure for Norway is, for example, in 2003 roughly 6 times larger than in the US.

---

[7] An average production worker is defined as an adult full-time production worker in the manufacturing sector with average earnings. It could be argued that the disincentive effects of unemployment compensation are not determined by the gross but the net replacement ratio. Since the OECD provides no sufficient time series of net replacement rates, we will use the gross replacement ratio information for our empirical analysis. For further details see OECD (1998, 2004b).

[8] The measure c_d will be negative if actual benefits decline with the previous income. We incorporate negative values of c_d, occuring in about 10% of all cases, into our empirical analysis to avoid any truncation bias. In the theoretical model, $c \geq 0$ is assumed to simplify the exposition. Figures A2-A5 in Appendix III contain plots of the respective values of the earnings relation for each duration d of unemployment we employ in the estimations.

Figure 1: Summary measure of the earnings relationship c (1961-2003)



Source: Own calculations based on OECD Data. See Appendix IV for details.

The raw correlation coefficients between the earnings relationship for different unemployment durations d decrease as the duration of unemployment increases (see Table A1 in Appendix III). The decline in the raw correlation coefficients suggests that the determinants of the earnings relationship vary significantly over time. Moreover, the unweighted average of the earnings relationship c falls with the length of an unemployment spell, amounting to about 0.27 for a unemployment duration of less than 6 months and to almost zero for durations exceeding three years (see Table A2 in Appendix III).

The data consisting of our measures c_d and of the aggregate level of the replacement rate (RR_d), which is computed as an unweighted average of the overall values of RR_{100}_d and RR_{67}_d, are merged with information on the political influence of trade unions, the political preferences of the government, the openness of the economy and labour market tightness.[9]

[9] Descriptive statistics of all variables used in our empirical analysis are given in Appendix III, Table A2. Information for Spain is only used from 1977 onwards. Information on the earnings relationship is missing for New Zealand for the year 1997. There are missing values for some other variables for some countries. Details of data sources and the calculation of all variables used in the regression exercises are outlined in Appendix IV.

Prediction 1 states that the earnings relationship of benefits falls with a stronger political influence of unions. In the theoretical analysis of wage negotiations, union density has, for simplicity, and as it is usual in most models of collective bargaining, been normalised to unity. Nevertheless, in reality, union density is less than complete and the political influence of trade unions, especially in democracies, can be approximated by the number of its members, relative to employment. However, in our model the influence of trade unions is twofold since it is not only present in the political support function but also in the wage setting process. The employment impact of the earnings relationship of UI benefits will be the stronger the more comprehensive collective negotiations are, since the earnings relationship will not affect wages in a competitive labour market. This insight would suggest an indicator of collective-bargaining coverage as a further explanatory variable. However, while bargaining coverage varies substantially over time, no data set with bi-annual measures of the bargaining coverage in the OECD countries is available for the entire time period. As a substitute, we employ a measure of the centralisation of wage bargaining. In particular, we combine information on aggregate net union density[10] with time-variant information on the bargaining level at which wages are determined (from "plant-level" to "central wage setting") (BargUD). The hypothesis is that a union with a given net density has, ceteris paribus, a greater political influence the more centralised the wage setting process is, and that a trade union characterised by a higher density, for a given degree of centralisation, also has more political influence.

Prediction 2 states that a right-wing government selects a more pronounced earnings relationship of UI benefits. To capture government characteristics we, first, use an updated government composition index originally calculated by Cusack (1999). Three groups of governments are distinguished: left governments (L_G) (consisting of social democratic parties and parties to their left), right governments (R_G) (consisting of liberal or conservative parties), and stalemate governments (S_G) (coalitions of parties). This information is included in the form of a dummy variable. Second, we employ a cabinet composition index which measures the percentage of total cabinet posts of "social democratic/other left parties", "centre parties", and "right-wing parties", weighted by the number of days in office. This cabinet

[10] Net union density is defined as the number of employed union members relative to the sum of gainfully employed and unemployed. Gross union density incorporates all union members, including, for example, pensioners and students, into the numerator. It could, hence, be argued that also gross union density is an appropriate proxy of the political influence of trade unions. However, data on gross union densities is available only for a shorter time period and for fewer countries than on net densities. Since, moreover, the levels of and also the changes in gross and net densities are highly correlated for those periods and countries for which both are accessible, we use net union densities.

composition index is multiplied by the "left-right scale" of government composition described above and aggregated across all cabinet parties to obtain a continuous "right-wing government (RW_G)" variable as an alternative to the dummy variable specification.[11]

Finally, Prediction 3 relates the openness of an economy to the political support maximizing earnings relationship of UI benefits. Following, for example, Gaston and Nelson (2004) and Agell (2002), we use the sum of exports and imports of goods and services as a percentage of GDP to arrive at a proxy for the economy's exposure to foreign trade (openness).

Since all of our theoretical predictions are conditional on a given level of unemployment compensation, the relevant aggregate level of the gross replacement rate (RR_d) is also included in our estimation procedures. Finally, we use the unemployment rate (UR) to take country-specific labour market slack into account.

Empirical Specifications

Given the nature of our data, it is natural to exploit econometric panel data techniques in the empirical analysis. In a first step we employ Maddala and Wu's unit root test for panel data (Breitung and Pesaran 2005) to test for the time series properties of the (biannual) c_d data. We can reject the null-hypothesis that all panel-specific c_d time series are non-stationary. Moreover, in preliminary regressions the test-statistics based on Wooldridge's test for serial correlation (Wooldridge 2002, Drukker 2003) indicate that we have to reject the null hypothesis of no serial correlation in the idiosyncratic errors of a standard linear panel data model with fixed country and fixed year effects. Therefore, the idiosyncratic errors are modelled as a stationary AR(1) process. We include the contemporaneous level of the gross replacement rate since our theoretical predictions rely on a constant amount of UI benefits. This assumption can also be justified empirically. Using a test of strict exogeneity as suggested by Wooldridge (2002), we cannot reject the null hypothesis that the gross replacement rate is strictly exogenous for any specification in our sample. In our theoretical model the product of "bargaining level" and "net union density" (BargUD) as well as the measure of openness might have an impact on the earnings relationship of benefits via the political support function. Therefore, we use lagged values of both variables in our regression excercises. There is weak evidence that the contemporaneous unemployment rate is not strictly exogeneous, using Wooldrige's test of strict exogeneity. To take this into account, we also include lagged values of the unemployment rate. We end up with the following linear panel data model specification:

[11] This combined variable is similar to the political information employed by Di Tella and MacCulloch (2002).

$$c_{i,t\_d} = \alpha_0 + \alpha_1 \text{BargUD}_{i,t-1} + \alpha_2 \text{Openness}_{i,t-1} + \alpha_3 S_{Gi,t} + \alpha_4 R_{Gi,t} + \alpha_5 \text{UR}_{i,t-1} + \alpha_6 \text{RR}_{i,t\_d} + u_i + \eta_t + \varepsilon_{i,t} \quad (5.2)$$

$$\text{with: } \varepsilon_{i,t} = \rho \varepsilon_{i,t-1} + \nu_{i,t} \text{ and } |\rho| < 1, \ \nu_{i,t} \ \text{iid}(0, \sigma_\nu^2)$$

where c_{i,t_d} is the duration specific earnings relationship of UI benefits, u_i is a time invariant country effect, η_t is a fixed time effect and the remainder disturbances $\varepsilon_{i,t}$ follow a stationary AR(1) process. All other regressors in equation (5.2) are defined as described above. As a check of robustness we also estimate a slightly modified version of (5.2) where we use our continuous "right-wing government" variable (RW_G) as an alternative to the two dummy variables S_G and R_G. We employ three econometric procedures: (1) a Prais-Winston regression with fixed country effects, fixed year effects and "panel-corrected standard errors", i.e. the standard errors are assumed to be heteroscedastic, first-order autocorrelated within panels with a common ρ and contemporaneously correlated across panels (Beck and Katz 1995), (2) a within estimator of a two-way fixed-effects linear panel data model with an AR(1) disturbance (Baltagi 2001), and (3) a random-effects estimator with random country effects, fixed year effects, and an AR(1) disturbance (Baltagi and Wu 1999).

6. Results

The parameter estimates of the two specifications for the summary measure of the earnings relationship c of UI benefits are shown in Table 1.

Table 1 about here

The estimates for BargUD, the interaction of net union density and the bargaining level, are always significant and indicate a negative correlation of the summary measure c of the earnings relationship and the political power of trade unions. Hence, the greater the political power of the trade union is, the weaker the earnings relationship of UI benefits becomes (for a given level of unemployment compensation). This is in line with Prediction 1. The size of the estimated effect might be illustrated as follows: In a fictitious country with a central wage setting system (e.g. Norway) and the mean value of our summary earnings relationship c, a 10 percentage point decrease in net union density induces, ceteris paribus, a 4.5% increase in the earnings relationship.

The parameter estimates of the government dummy variables S_G and R_G (L_G is the reference dummy) suggest that right-wing governments choose a significantly higher summary earnings relationship c than left or stalemate governments (columns 1-3). Our results imply that a change in government (in a fictitious country) from Francois Mitterand to George W. Bush

leads to an increase of roughly 10 % in the earnings relation. The same qualitative result will be obtained if we estimate the parameters of our second specification including the continuous variable RW_G (columns 4-6). Hence, there is supportive evidence for Prediction 2.

According to Prediction 3, global goods market integration affects the earnings relationship of benefits. The estimated parameters for our proxy for global goods market integration (Openness) are always significantly negative. A standard deviation increase in openness (31.574) goes along with a 25% decrease in the overall earnings relationship.

All of the theoretical predictions are conditional on a given level of UI benefits. Our parameter estimates for the summary replacement rate RR are always positive and highly significant. Hence, a more generous level of UI compensation goes hand in hand with a higher earnings relationship. Moreover, note that the parameter estimates for the lagged unemployment rate are never significantly different from zero in the specifications for the summary earnings relationship c of UI benefits. We, thus, find no evidence of an impact of the level of unemployment on the earnings relationship of UI benefits.

Our summary measure of the earnings relationship is based on data which include unemployment insurance payments, unemployment assistance and other transfers. The sensitivity of social assistance payments and housing benefits, for example, are likely to be determined by a government in a different manner than the earnings relationship of UI benefits. This might lead to measures of c which do not accurately describe the earnings relationship of the UI system, which is portrayed in our theoretical model. We, therefore, use measures of c for different durations of unemployment in our regression exercises to check for the robustness of our results. Table 2 shows the parameter estimates of the Prais-Winston regresssions with a robust variance matrix ("PCSE") for both specifications of (5.2):[12]

Table 2 about here

With respect to unemployment durations of up to 6 months, which in most countries are covered by UI systems, the only significant parameter estimate is that for the respective level of the replacement rate. Considering the estimated parameters for c_45, i.e. for very long unemployment durations of four to five years, we additionally find evidence that the political power of the trade unions and c_45 are negatively correlated. Moreover, for the two measures of the earnings relationship c (c_712 and c_23), which result from unemployment insurance, unemployment assistance and welfare payments and, hence, vary substantially across OECD

[12] Results for the two other specifications are in line with those presented in Table 2 and available upon request.

countries, we observe parameter estimates similar to the ones obtained for the summary measure of the earnings relationship c. In particular, we find that trade union power, as well as (a lagged measure of) openness and the respective c_d values, are negatively correlated, and that right-wing governments tend to prefer higher earnings relationships of UI benefits – given the level of the replacement rate.

7. Summary

In this paper we model endogenous labour market regulation with the political support function approach. It is based on the insight that well-organised interests directly affected by a given policy measure will, in the final analysis, determine the political outcome. Assuming a unionised labour market, we show that the political influence of trade unions can reduce the earnings relationship of unemployment compensation. The reason is that a strong earnings relationship reduces wages (if the fraction of utilitarian unions is not too high). Lower wages, however, reduce union utility and thereby the union's political support for the government. Moreover, we show that left-wing governments prefer a weaker earnings relationship of UI payments than centre or right-wing governments, and that globalisation exerts a distinct influence on the earnings relationship. To test these predictions we created a new data set for 19 OECD countries covering the period 1961 - 2003. The panel analysis provides evidence in support of our theoretical predictions and, thereby, gives credence to the first positive theory of the earnings relationship of UI benefits.

References

Agell, Jonas (2002), On the Determinants of Labour Market Institutions: Rent-Seeking vs. Social Insurance, *German Economic Review* 2(2), 107-135.

Armingeon, Klaus, Leimgruber, Philipp, Beyeler, Michelle and Sarah Menegale (2005), "Comparative Political Dataset 1960-2003" Institute of Political Science, University of Berne.

Atkinson, Antony B. (1990), Income Maintenance for the Unemployed in Britain and the Response to High Unemployment, *Ethics* 100(3), 569-585.

Baldwin, Richard (1987), Politically Realistic Objective Functions and Trade Policy, *Economics Letters* 24(3), 287-290.

Baltagi, Badi H. (2001), *Econometric Analysis of Panel Data*, John Wiley & Sons.

Baltagi, Badi H. and Ping X. Wu (1999), Unequally Spaced Panel Data Regressions with AR(1) Disturbances, *Econometric Theory* 15(6), 814-823.

Beck, Nathaniel and Jonathan N. Katz (1995), What To Do (and Not To Do) with Time-Series Cross-Section Data, *American Political Science Review* 89(3), 634–47.

Beissinger, Thomas and Hartmut Egger (2004), Dynamic Wage Bargaining if Benefits are Tied to Individual Wages, *Oxford Economic Papers* 56(3), 437-460.

Boeri, Tito, Conde-Ruiz, José and Vincenzo Galasso (2003), Protecting against Labour Market Risk: Employment Protection or Unemployment Benefits, IZA Discussion Paper No. 834.

Boeri, Tito, Conde-Ruiz, José and Vincenzo Galasso (2004), Cross-Skill Redistribution and the Trade-off between Unemployment Benefits and Employment Protection, IZA Discussion Paper No. 1371.

Booth, Alison L. (1995), *The Economics of the Trade Union*, Cambridge University Press.

Botero, Juan, Djankov, Simeon, La Porta, Rafael, Lopez-de-Silanes and Andrei Shleifer (2004), The Regulation of Labor, *Quarterly Journal of Economics* 119(4), 1339-1382.

Breitung, Joerg and M. Hashem Pesaran (2005), Unit Roots and Cointegration in Panels, CESIfo Working Paper No. 1565.

Coughlin, Peter, Dennis C. Mueller and Peter Murell (1990): A Model of Electoral Competition with Interest Groups, *Economics Letters* 32(4), 307-311.

Cusack, Thomas R. (1999), Some Political Data for 20 OECD Countries, WZB, Berlin.

Di Tella, Rafael and Robert MacCulloch (2002), The Determination of Unemployment Benefits, *Journal of Labor Economics* 20(2), 404-434.

Dur, Robert (2001), Wage-Setting Institutions, Unemployment, and Voters' Demand for Redistribution Policy, *Scottish Journal of Political Economy* 48(5), 517-531.

Drukker, David (2003), Testing For Serial Correlation in Linear Panel-data Models, *Stata Journal* 3(2), 168-177.

Gaston, Noel and Douglas Nelson (2004), Structural Change and the Labor-Market Effects of Globalization, *Review of International Economics* 12(5), 769-792.

Goerke, Laszlo (2001), Bismarck versus Beveridge, *Finanzarchiv* 57(3), 243-260.

Goerke, Laszlo and Jakob B. Madsen (2003) Earnings-Related Unemployment Benefits and Unemployment, *Economic Systems* 27(1), 41-62.

Golden, Miriam and Michael Wallerstein (2004*), Union Centralization Among Advanced Industrial Societies: Update to 1995/2000*, Version 3.1, 7/28/2004.

Grossman, Gene and Elhanan Helpman (1994), Protection for Sale, *American Economic Review* 84(4), 833-850.

Hassler, John, Mora, José V. Rodríguez, Storesletten, Kjetil and Fabrizio Zilibotti (2005), A Positive Theory of Geographic Mobility and Social Insurance, *International Economic Review* 46(1), 263-303.

Huber, Evelyne and John D. Stephens (1998), Internationalization and the Social Democratic Model - Crisis and Future Propects, *Comparative Political Studies* 31(3), 353-397.

Lingens, Jörg and Klaus Wälde (2006), Pareto-Improving Unemployment Policies, CESifo Working Paper 1807.

Neugart, Michael (2005), Unemployment Insurance: the Role of Electoral Systems and Regional Labor Markets, *European Journal of Political Economy* 21(4), 815-829.

Neugart, Michael (2007), The Choice of Insurance in the Labor Market, *Public Choice*.

Nickell, Stephen J. and Luca Nunziata (2001), Labour Market Institutions Database, Version 2.0.

OECD (1997), Economic Performance and the Structure of Collective Bargaining, 63-92, in: *Employment Outlook*, Paris.

OECD (1998), *The Tax/Benefit Position of Employees 1995-1996,* Paris.

OECD (2000), Eligibility Criteria for Unemployment Benefits, 129-153, in: *Employment Outlook*, Paris.

OECD (2004a), OECD (2004b), Wage Setting Institutions and Outcomes, Chap. 3, *Employment Outlook*, 127-181.

OECD (2004b), *Benefits and Wages – OECD Indicators 2004 Edition*, Paris.

Oswald, Andrew J. (1982), The Microeconomic Theory of Trade Unions, *Economic Journal* 92, 576-595.

Oswald, Andrew J. (1993), Efficient Contracts are on the Labour Demand Curve: Theory and Evidence, *Labour Economics* 1(1), 85-113.

Pallage, Stéphane and Christian Zimmermann (2001), Voting on Unemployment Insurance, *International Economic Review* 42(4), 903-923.

Pencavel, John H. (1991), *Labor Markets under Trade Unionism*, Blackwell.

Rothschild, Kurt W. (1986), 'Left' and 'Right' in 'Federal Europe, *Kyklos* 39, 359-376.

Saint-Paul, Gilles (1996), Exploring the Political Economy of Labour Market Institutions, *Economic Policy* 11, 265-315.

Vijlbrief, Hans and Rob van de Wijngaert (1995), Unemployment Insurance Policy and Union Wage Formation, *Labour* 9, 233-251.

Wooldridge, Jeffrey M. (2002), *Econometric Analysis of Cross Section and Panel Data*, MIT Press.

Wright, Randall (1986), The Redistributive Roles of Unemployment Insurance and the Dynamics of Voting, *Journal of Public Economics* 31(3), 377-399.

Yang, C. C. (1995), Endogenous Tariff Formation Under Representative Democracy: A Probabilistic Voting Model, *American Economic Review* 85(4), 956-963.

Tables

Table 1: Determinants of the earnings relationship of unemployment benefits (1961-2003)

- c -

Variables	Prais-Winston Regression with robust VC ("PCSE")	Within-Estimator with AR(1) errors	Random-Effects-Estimator with AR(1) errors	Prais-Winston Regression with robust VC ("PCES")	Within-Estimator with AR(1) errors	Random-Effects-Estimator with AR(1) errors
$BargUD_{i,t-1}$	-0.0001* (0.00004)	-0.0001^{+} (0.0001)	-0.0001* (0.00005)	-0.0001* (0.00005)	-0.0001+ (0.0001)	-0.0001* (0.00004)
$Openness_{i,t-1}$	-0.0007** (0.0002)	-0.0008* (0.0004)	-0.0006^{+} (0.0003)	-0.0007** (0.0002)	-0.0008* (0.0004)	-0.0006^{+} (0.0003)
$S_{Gi,t}$	0.0060 (0.0049)	0.0074 (0.0055)	0.0069 (0.0055)	--	--	--
$R_{Gi,t}$	0.0090* (0.0043)	0.0084^{+} (0.0048)	0.0090^{+} (0.0047)	--	--	--
$UR_{i,t-1}$	-0.0010 (0.0009)	-0.0008 (0.0012)	-0.0008 (0.0012)	-0.0010 (0.0009)	-0.0008 (0.0012)	-0.0009 (0.0012)
$RR_{i,t}$	0.5134** (0.0432)	0.4691** (0.0446)	0.4685** (0.0393)	0.5155** (0.0430)	0.4695** (0.0446)	0.4696** (0.0391)
RW_G	--	--	--	0.0045* (0.0021)	0.0041^{+} (0.0024)	0.0044^{+} (0.0023)
ρ	0.6625	0.7736	0.7757	0.6563	0.7724	0.7744
fixed country effects	yes/**	yes	--	yes/**	yes	--
fixed year effects	yes/**	yes	yes	yes/**	yes	yes
Wooldridge_SCE (χ^2; dof)		17.001** (1)			16.250 ** (1)	
Wald_X (χ^2; dof)	37250.25** (44)	147.25** (25)	217.19** (26)	36612.08** (43)	147.60** (24)	218.91** (25)
R^2	0.65	0.18	0.22	0.65	0.18	0.22
Baltagi-Wu-LBI	--	0.60	0.60	--	0.59	0.59
Bhargava et al. Durbin-Watson	--	0.53	0.52	--	0.52	0.51
N	378	359	378	378	359	378

Source: Sample of 19 OECD countries 1961-2003 (*biannual data*). See Appendix IV for details. Standard errors are in parentheses.
Fixed country/year effects: / Wald-Test with with H_0: No joint significance of all country, respectively year dummies.
Wooldridge_SCE: Wooldridge Test for serial correlation in the idiosyncratic errors of a linear panel data model with H_0: No first-order autocorrelation.
Wald_X: Wald-Test with H_0: No joint significance of all regressors.
Baltagi-Wu-LBI: Baltagi/Wu's (1999) locally best invariant test statistic that ρ=0.
Bhargava et al. Durbin Watson: Baltagi/Wu's (1999) modified version of Bhargava et al.'s Durbin-Watson statistic.
** significant at 1 %-level; * significant at 5 %-level; $^{+}$ significant at 10 %-level.

Table 2: Determinants of short and long-run earnings relationships of unemployment benefits

-Prais-Winston Regression with robust VC ("PCSE")/ 1961-2003 -

Variables	unemployment duration: up to 6 Months *- c_06 -*	unemployment duration: 7 – 12 Months *- c_712 -*	unemployment duration: 2 – 3 years *- c_23 -*	Unemployment duration: 4 – 5 years *- c_45 -*
$BargUD_{i,t-1}$	0.0001	-0.0002^{+}	-0.0001**	-0.00004^{+}
	(0.0001)	(0.0001)	(0.0001)	(0.00002)
$Openness_{i,t-1}$	-0.0007	-0.0008*	-0.0009**	-0.00004
	(0.0005)	(0.0004)	(0.0002)	(0.0001)
$S_{Gi,t}$	0.0120	0.0184	0.0100^{+}	-0.0035
	(0.0127)	(0.0114)	(0.0058)	(0.0039)
$R_{Gi,t}$	0.0112	0.0197^{+}	0.0109*	0.0009
	(0.0118)	(0.0102)	(0.0052)	(0.0037)
$UR_{i,t-1}$	-0.0044	-0.0050*	-0.0002	-0.0011^{+}
	(0.0028)	(0.0022)	(0.0012)	(0.0006)
$RR_{i,t}$	1.1383**	0.7862**	0.6158**	0.1082**
	(0.0692)	(0.0437)	(0.0382)	(0.0245)
ρ	0.5467	0.5540	0.6484	0.6666
RW_G	0.0048	0.0103*	0.0052*	0.0008
	(0.0058	(0.0047)	(0.0026)	(0.0018)
fixed country effects	yes/**	yes/**	yes/**	yes/**
fixed year effects	yes/**	yes/**	yes/**	yes/**
Wooldridge_SCE (χ^2; dof)	15.928 ** (1)	5.672* (1)	20.527** (1)	130.124 ** (1)
R^2	0.76	0.81	0.75	0.53
Wald_X (χ^2; dof)	9.57e+07 ** (44)	228697.4 ** (44)	298033.33 ** (44)	137309.01 ** (44)
N	378	378	378	378

Source: Sample of 19 OECD countries 1961-2003 (*biannual data*). See Appendix IV for details.
Standard errors are in parentheses.
Fixed country/year effects: / Wald-Test with with H_0: no joint significance of all country, respectively year dummies.
As in Table 1 there are two specifications for each unemployment duration:
Specification I includes $S_{Gi,t}$ and $R_{Gi,t}$. and is documend in its entirety in Table 2.
Specification II incorporates RW_G. Only the estimated coefficients for RW_G are documented.
Test statistics are provided for specification I.
Wooldridge_SCE: Wooldridge Test for serial correlation in the idiosyncratic errors of a linear panel data model with H_0: No first-order autocorrelation.
Wald_X: Wald-Test with H_0: no joint significance of all regressors.
** significant at 1 %-level; * significant at 5 %-level; $^{+}$ significant at 10 %-level.

Appendix:

I) Second-Order Condition for Model of Section 2

The second-order condition implies $\partial K^s/\partial w^s < 0$. Assuming a constant labour demand elasticity and omitting the superscript s on the right-hand-side of (I.1), $\partial K^s/\partial w^s$ equals:

$$\frac{\partial K^s}{\partial w^s} = \left\{(\varepsilon+1)(v'-\bar{v}'c) + w(v''-\bar{v}''c^2) + \frac{\lambda M}{n}(\bar{v}'c(1-\varepsilon) + w\bar{v}''c^2)\right\}\pi - \underbrace{(n(v-\bar{v}) + \lambda M\bar{v})}_{+}$$

$$- nw\underbrace{\left[\frac{\varepsilon}{w}(v-\bar{v}) + v'-\bar{v}'c + \frac{\lambda M}{n}\bar{v}'c\right]}_{\text{positive from FOC}} + \underbrace{(n_W(v-\bar{v}) + n(v'-\bar{v}'c) + \lambda M\bar{v}'c)}_{\text{positive from FOC}}w < 0 \qquad \text{(I.1)}$$

The second-order condition will unambiguously hold if the term in the curly brackets in (I.1) is negative. If K^s is differentiated with respect to the wage w^s for a given level of UI benefits B^s, the wage change alters neither $\bar{v}(B^s)$ nor $\bar{v}'(B^s)$. This differential $\overline{K}_W := \partial K^s/\partial w^s \,\big|\, dB^s = 0$ is clearly negative for $(1 - \lambda M/n) \geq 0$, given the second-order condition.

$$\overline{K}_W := \left[(\varepsilon+1)v'-\bar{v}'c + wv'' + \frac{\lambda M}{n}\bar{v}'(1-\varepsilon)c\right]\pi - n\left[\varepsilon(v-\bar{v}) + w(v'-\bar{v}'c)\right] - \lambda M\bar{v}'cw$$

$$- \left[n(v-\bar{v}) + \lambda M\bar{v} + w\left(n_W(v-\bar{v}) + nv'\right)\right] = \frac{\partial K^s}{\partial w^s} + \underbrace{\pi\varepsilon\bar{v}'c}_{-} + \underbrace{\left(1-\frac{\lambda M}{n}\right)cw\underbrace{\left[\bar{v}''c\pi - n\bar{v}'\right]}_{-}}_{-\text{ if C holds}} \qquad \text{(I.2)}$$

II) The Open Economy Case (Prediction 3)

Assume that international integration reduces the prices of tradable goods. To capture this effect, let ϕ, $0 < \phi \leq 1$, be a measure of the economy's openness and suppose, furthermore, that the price p^e is a function of output, as long as the market for tradable goods is not perfectly competitive. The price p^e can then, for example, be written as:

$$p^e = \Theta(\phi)(f^e)^{\phi-1}, \qquad \text{(II.1)}$$

where $\partial p^e/\partial\phi < 0$ holds by assumption. For $\phi = 1$, the output price equals the constant world market price: $\Theta(1) = 1$. Thus, an increase in ϕ, starting from a positive value below unity, indicates stronger international competition. Suppose, in addition, that the production function in the exposed sector is given by $f^e = (n^e)^\delta$, $0 < \delta < 1$. Profits can then be expressed as:

$$\pi^e = \Theta(\phi)(n^e)^{\delta\phi} - w^e n^e \qquad \text{(II.2)}$$

Maximising profits with respect to employment and solving for n^e yields:

$$n^e = \left(w^e/\Theta\delta\phi\right)^{1/(\delta\phi-1)} \qquad \text{(II.3)}$$

The labour demand elasticity is $\varepsilon^e = 1/(\delta\phi - 1) < -1$. Moreover $\varepsilon^e_\phi = -\delta/(\delta\phi - 1)^2 < 0$ holds. The direction of the employment change (for a given wage) is ambiguous:

$$n^e_\phi = \frac{\partial \ln(n^e)}{\partial \phi} n^e = n^e \left[\frac{-\delta}{(\delta\phi - 1)^2} \ln\left(\frac{w^e}{\Theta \delta \phi} \right) - \frac{\Theta_\phi \phi - \Theta}{(\delta\phi - 1)\Theta\phi} \right] = \frac{n^e}{1 - \delta\phi} \left[\frac{\partial p^e}{\partial \phi} \frac{1}{p^e} + \frac{1}{\phi} \right] \tag{II.4}$$

Holding the wage constant, profits $\pi^e = w^e n^e (1/(\delta\phi) - 1)$ decline with ϕ:

$$\frac{\partial \pi^e}{\partial \phi} = w^e \left[n^e_\phi \left(\frac{1 - \delta\phi}{\delta\phi} \right) - \frac{n^e}{\delta \phi^2} \right] = w^e n^e \frac{p^e_\phi}{\phi \delta p^e} < 0 \tag{II.5}$$

The wage in the exposed sector is (implicitly) defined by equation (2.4). Assume now that v is homogeneous in consumer prices,[13] and goods are consumed in fixed proportions, so that the consumer price index can be normalised to $p = p^s + p^e$. Cancelling common terms and substituting for n^e, the first-order condition for $v^e := v^e(w^s/p)$ and $\bar{v}^e := \bar{v}^e(B^s/p)$is:

$$K^e = \varepsilon^e + w^e \frac{v^{e\prime} - \bar{v}^{e\prime} \left(1 - \lambda^e M^e / n^e \right) c}{v^e - \bar{v}^e} - \left(\frac{\delta\phi}{1 - \delta\phi} + \frac{w^e \lambda^e M^e \bar{v}^e}{(v^e - \bar{v}^e)\pi^e} \right) = 0 \tag{II.6}$$

For a given level of benefits, a rise in the parameter ϕ will unambiguously decrease the wage in the exposed sector if employment weakly increases with ϕ, that is if $n^e_\phi \geq 0$:

$$w^e_\phi := \frac{\partial w^e}{\partial \phi}\bigg|_{dB^e = 0} = - \frac{\underbrace{\varepsilon^e_\phi}_{(-)} + \underbrace{\frac{w^e \lambda^e M^e}{v^e - \bar{v}^e}}_{(+)} \left[\underbrace{\frac{\bar{v}^e \pi^e_\phi}{(\pi^e)^2}}_{(-)} - \underbrace{\frac{c\bar{v}^{\prime e}}{(n^e)^2} n^e_\phi}_{(-) \text{ if } n^e_\phi > 0} \right] - \underbrace{\frac{\delta}{(1 - \delta\phi)^2}}_{+}}{\partial \bar{K}^e / \partial w^e} \tag{II.7}$$

where $\partial \bar{K}^e / \partial w^e < 0$ is defined by $\partial K^e / \partial w^e$ evaluated at $dB^e = 0$. The wage effect arises since an increase in ϕ reduces the rent to be shared. Moreover, the labour demand elasticity ($\varepsilon^e < 0$) rises in absolute value. Profits in the exposed sector fall and the Nash-bargaining solution requires a decline in wages. As employment increases with globalisation, a stronger earnings relation reduces the union's payoff by less than before the rise in competition, also fostering a wage reduction. In the sheltered sector, the wage is not affected by ϕ, since the firm's revenues remain constant and because of the assumption of a homogeneous utility function.

Taking into account the wage effects summarised above, the consequences of an increase in ϕ on the government's optimal choice of the earnings relationship c* are determined via:

$$\frac{\partial S_c}{\partial \phi}\bigg|_{dB^e = dB^s = 0} = \alpha\beta \underbrace{U^s_{c\phi}}_{-} + \alpha \underbrace{U^e_{c\phi}}_{+/-} + (1 - \alpha)\beta \underbrace{\pi^s_{c\phi}}_{=0} + (1 - \alpha) \underbrace{\pi^e_{c\phi}}_{(+)} \tag{II.8}$$

---

[13] The assumption of homogeneity allows for a comparison of the changes in utility levels $v^e(w/p)$ and $v^e(B/p)$ owing to price variations. Therefore, the subsequent findings will also hold if either the utility function v is homogeneous in consumer prices of degree k, k > 0, or if v is linear.

Assuming that condition C holds and the linkage between the earnings relationship of benefits and the wage to be unaffected by a change in ϕ, i.e. $\partial w_c^j / \partial \phi = 0$, the impact of an increase in ϕ on the union's marginal utility U_c^s - for a given level of benefits ($dB^s = 0$) - is negative:

$$U_{c\phi}^s := \frac{\partial U_c^s}{\partial \phi}\Big|_{dB^s=0} = -n^s w_c^s \frac{(\varepsilon^s(v-\bar{v}) + w^s v')}{w^s p^2} p_\phi^e = -\frac{U_c^s p_\phi^e}{p} < 0 \qquad \text{(II.9)}$$

The overall change in the marginal utility of the union in the exposed sector is determined by:

$$U_{c\phi}^e := \frac{\partial U_c^e}{\partial \phi}\Big|_{dB^e=0} = \underbrace{n_\phi^e \frac{U_c^e}{n^e}}_{(-) \text{ if } n_\phi^e > 0} + \underbrace{\varepsilon_\phi^e w_c^e n^e \frac{v^e - \bar{v}^e}{w^e p}}_{(-)} + \underbrace{\frac{\partial U_c^e}{\partial w^e} w_\phi^e}_{(-) \text{ for } w_\phi^e < 0} - \underbrace{\frac{U_c^e p_\phi^e}{p}}_{(+)} \qquad \text{(II.10)}$$

The last term in (II.10) captures the same effect as in the sheltered sector. The third term, the wage effect, will also contribute to an increase in the union's opposition to a stronger earnings relationship if globalisation reduces wages ($w_\phi^e < 0$, cf. equation (II.7)). A proof is available upon request. Finally, the direct employment impact will reduce the union's marginal gain from a stronger earnings relationship if $n_\phi^e > 0$ holds. But irrespective of the sign of n_ϕ^e, the overall impact of a change in ϕ on the union's marginal utility in the exposed sector is ambiguous, due to the second term, the elasticity effect.

A firm's payoff in the sheltered sector is not affected by an increase in ϕ ($\pi_{c\phi}^s = 0$). The gain from a higher earnings relationship of UI benefits for firms in the exposed sector will unambiguously be positive if employment weakly rises with greater competition ($n_\phi^e \geq 0$):

$$\pi_{c\phi}^e := \frac{\partial \pi_c^e}{\partial \phi}\Big|_{dB^e=0} = -w_c^e (n_\phi^e + n_w^e w_\phi^e) > 0, \qquad \text{if } n_\phi^e \geq 0 \text{ and C holds} \qquad \text{(II.11)}$$

Summing up, we find that the costs of a stronger earnings relationship suffered by the union in the sheltered sector increase with ϕ. The firm in the sheltered sector is unaffected. Moreover, the impact on the union in the exposed sector is ambiguous, while the gain of firms in the exposed sector rises, given condition C. Thus, a more competitive exposed sector reduces the earnings relation of UI benefits for a given level of unemployment compensation, as long as the political weight of trade unions in the sheltered sector is sufficiently high.

III) Descriptive Statistics

Table A1: Raw correlation coefficients for different measures of the earnings relationship of benefits

	c_06	c_712	c_23	c_45
c_06	1.00			
c_712	0.86	1.00		
c_23	0.61	0.69	1.00	
c_45	0.12	0.17	0.40	1.00

Sample of 19 OECD countries 1961-2003 (*biannual data*). N=409
See Appendix IV for details.

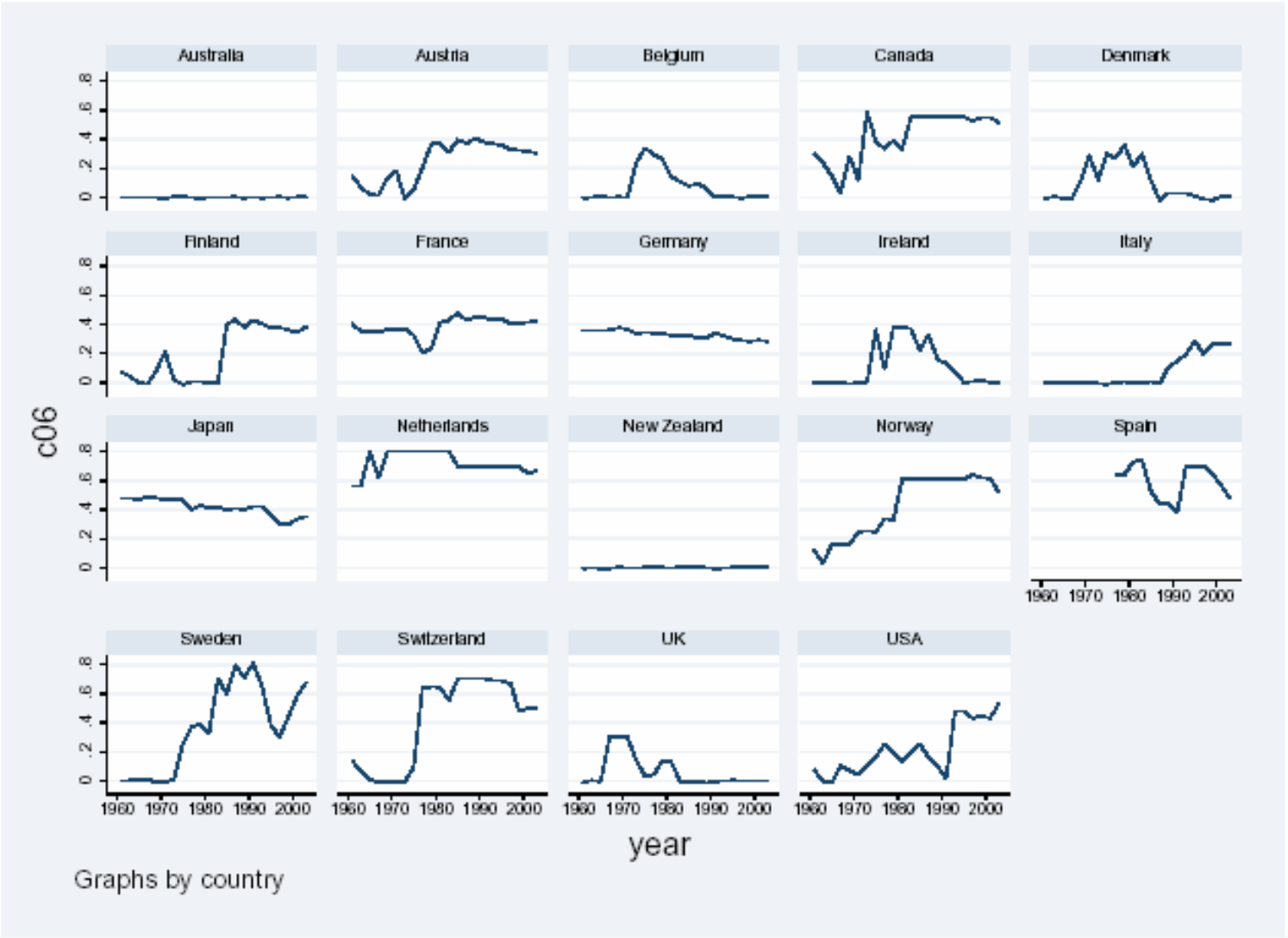
Table A2: Descriptive Statistics

Variable	Mean	Std. Dev.
c	0.089	0.101
c_06	0.266	0.247
c_712	0.206	0.237
c_23	0.082	0.130
c_45	0.023	0.063
RR	0.221	0.140
RR_06	0.468	0.189
RR_712	0.362	0.243
RR_23	0.210	0.187
RR_45	0.136	0.136
Net Union Density (UD)	41.661	18.051
Bargaining Level	2.353	1.034
BargUD	107.908	81.629
Openness	50.940	31.574
Unemployment Rate (UR)	5.432	4.017
Stalemate Gov. (S_G)	0.386	0.487
Right Gov. (R_G)	0.362	0.481
Right-Wing Gov. (RW_G)	2.059	0.771

Sample of 19 OECD countries 1961-2003 (*biannual data*). N=409 (*for measures of earnings relationships c and of gross replacement rates RR).*
See Appendix IV for details on all variables and missing values.

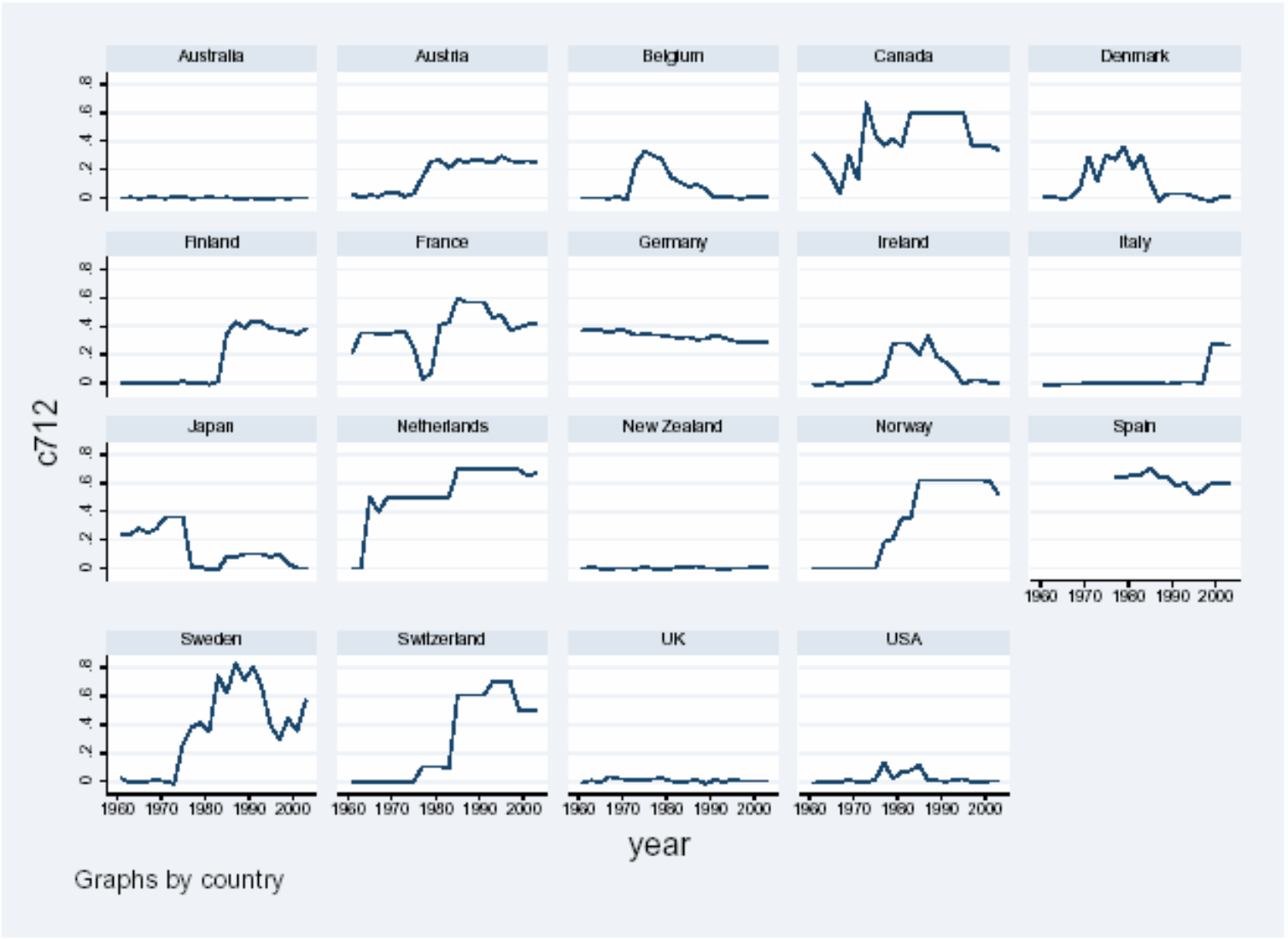
Figures A2 – A5

Figure A2: Earnings relationship c_06 for unemployment durations of 0-6 months (1961-2003)



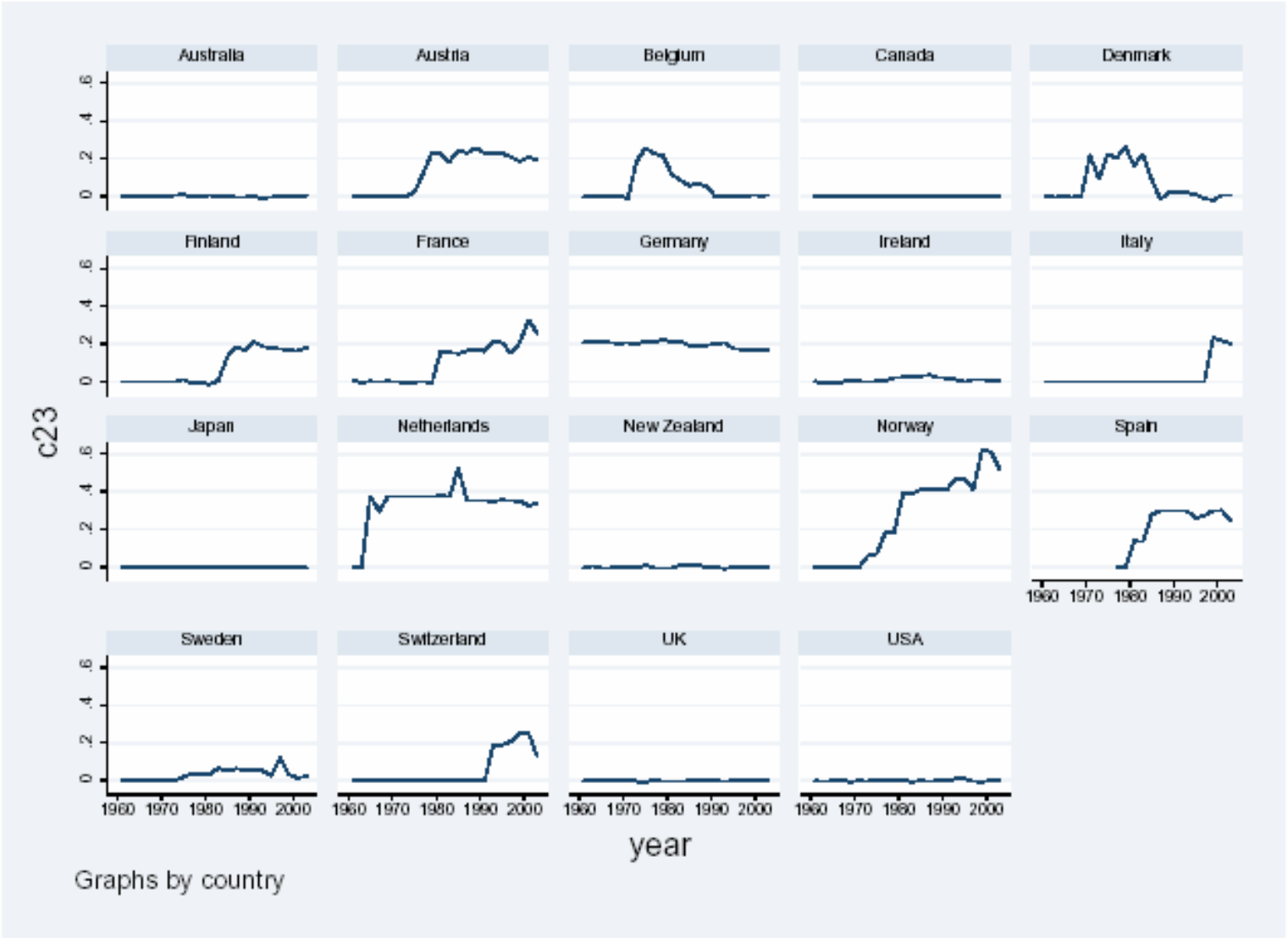
Source: Own calculations based on OECD Data. See Appendix IV.

Figure A3: Earnings relationship c_712 for unemployment durations of 7-12 months (1961-2003)



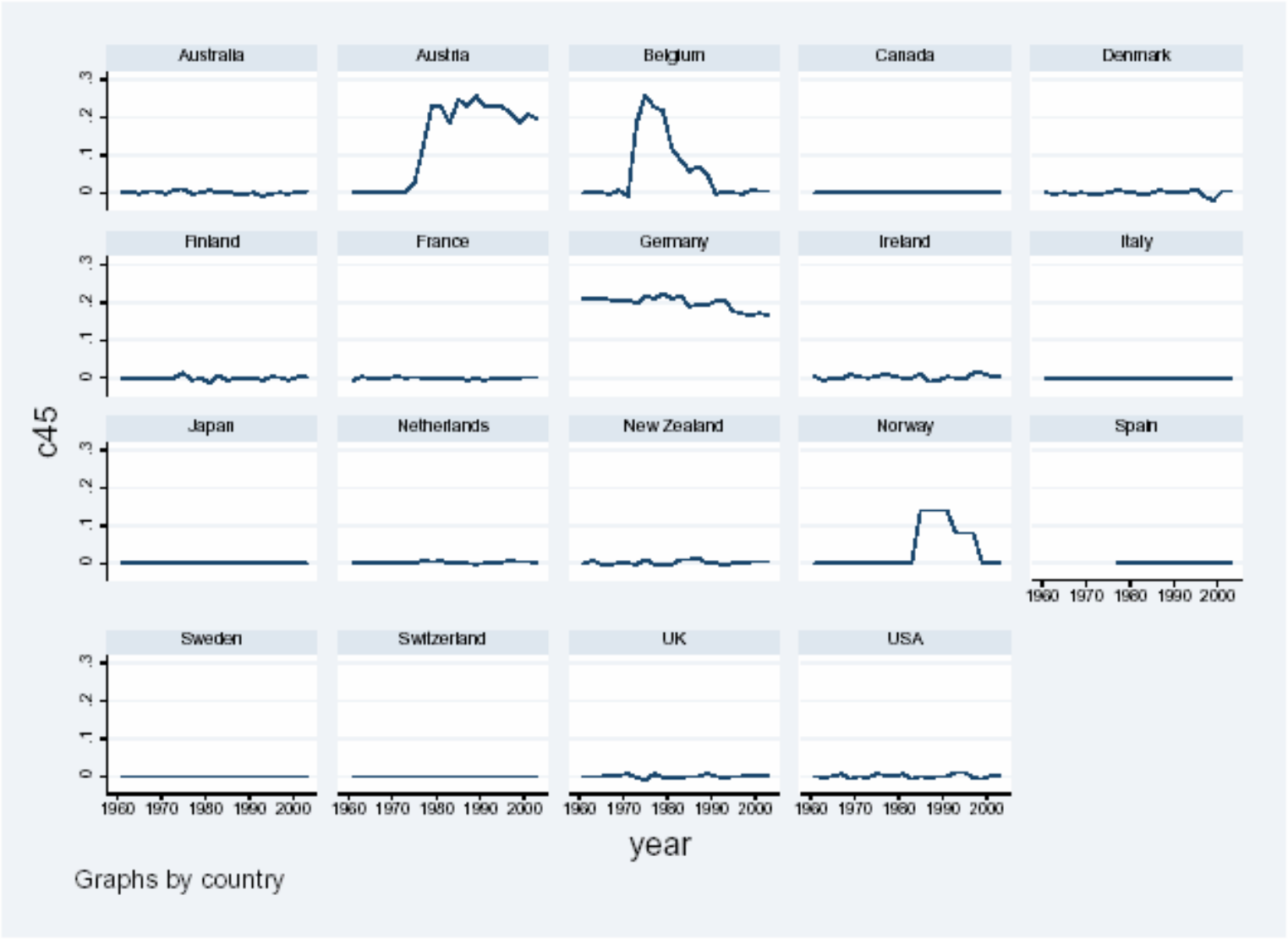
Source: Own calculations based on OECD Data. See Appendix IV.

Figure A4: Earnings relationship c_23 for unemployment durations of 2-3 years (1961-2003)



Source: Own calculations based on OECD Data. See Appendix IV.

Figure A5: Earnings relationship c_45 for unemployment durations of 4-5 years (1961-2003)



Source: Own calculations based on OECD Data. See Appendix IV.

IV) Data

Information on the earnings relationship of unemployment benefits (c_d's) is derived from the OECD's Database on Benefit Entitlements and Gross Replacement Rates for the years 1961 – 2003 as described in the main part of the paper. Countries included in our sample are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Spain, Sweden, Switzerland, UK, and the US. Information for Spain is only used from 1977 onwards. Information on the earnings relationship c is missing for New Zealand for the year 1997.

The unemployment rate (UR) is the standardized unemployment rate from the "Labour Market Institutions Database (LMIDB)" collected by Nickell and Nunziata (2001) and is updated using information from OECD's Employment Outlook.

The union density is the net union density from Nickell and Nunziata's (2001) LMIDB. It is updated using a file generously provided by Hagen Lesch (IW Köln). Data for 2003 is missing.

The information on the bargaining level at which wages are determined is from Golden and Wallerstein (2004) ["barglev1"] and updated for 2001 by own calculations. It is coded as follows: 1 = plant-level wage setting; 2 = industry-level wage setting; 3 = central wage setting without sanctions; 4 = central wage setting with sanctions. Sanctions refer to legally enforceable sanctions against industrial conflict or situations in which lower levels do not have access to strike funds without authorization from above (Golden and Wallerstein 2004, p. 31).

Openness is the sum of exports and imports of goods and services as a percentage of GDP. It is derived from information by the OECD and the World Bank's World Development Indicators (WDI). For Denmark (3), France (1), Germany (4), New Zealand (2) and Switzerland (2) we observe missing values.

The dummies left governments (L_G) (consisting of social democratic parties and parties to their left), right governments (R_G) (consisting of liberal or conservative parties), and stalemate governments (S_G) (coalitions of parties) are based on a government composition index (govcomp) generously provided by Thomas Cusack (WZB). It is an extended version of an index initially suggested by Rothschild (1986) and has been updated by our own calculations for 2001 and 2003.

The variable right-wing government (RW_G) is derived from two sources. First, we make use of information on cabinet composition by means of "social democratic/other left parties", "centre parties", and "right-wing parties" percentage of total cabinet post weighted by days. The data stems from Armingeon et al. (2005), "Comparative Political Dataset 1960-2003" Institute of Political Science, University of Berne. Second, we employ the government composition index from Cusack described above. The variable right-wing government (RW_G) is the product of the two sources, i.e. percentages of total cabinet posts are weighted by a "left-right scale" of government composition and aggregated across all cabinet parties.