

269

The relationship between labour share and unemployment: the role of wage-setting institutions*

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TIIVISTELMÄ

Raportissa tarkastellaan funktionaalisen tulonjaon ja työttömyyden välistä riippuvuutta keskeisissä OECD-maissa. Erityishuomion saa kysymys, onko riippuvuus muuttunut tavalla, joka voidaan tulkita ammattiyhdistysliikkeen neuvotteluvoiman laskuksi. Tämän lisäksi tarkastellaan, ovatko palkkaneuvotteluinstituutiot, erityisesti palkkaneuvottelujen koordinaation laajuus, vaikuttaneet riippuvuuden luonteeseen. Ekonometrinen analyysi perustuu teoriakehikkoon, jossa palkkakäyrä on keskeinen analyysiväline. Tutkimuksessa hyödynnetään 20 OECD-maata käsittävää paneeliaineistoa ja ekonometrista välineistöä, joka sopii epästationaaristen paneelien analysoimiseen.

Tulosten mukaan useimmissa OECD-maissa havaittua palkkojen osuuden laskua ei voida selittää työttömyyden nousulla. On erittäin todennäköistä, että lasku on ainakin osittain seurausta heikentyneestä ay-liikkeen neuvotteluvoimasta. Annetulla työttömyysasteen tasolla palkkojen osuus on nykyään alhaisempi kuin aiemmin.

Asiasanat: Palkkojen osuus, työttömyys, palkkakäyrä, neuvottelukoordinaatio, neuvotteluvoima

ABSTRACT

The paper is concerned with the relationship between labour share and unemployment in the major OECD countries. Special emphasis is put on examining whether the relationship has altered in a manner which can be interpreted as an indication of the weakened bargaining power of labour. The econometric analysis is based on the use of the theoretical framework which employs the notion of the wage curve as a central analytical tool. The investigation utilises cross-country panel data for twenty OECD countries over the period from 1972 to 2008 and statistical methods suitable for the examination of non-stationary panels.

According to the results, the decline in the labour share, which is apparent in most major OECD countries, is highly likely due, at least partly, to the weakened bargaining power of labour. With a given level of unemployment, the labour share is nowadays lower than before.

Key words: Labour share, Unemployment, Wage curve, Bargaining coordination, Bargaining power

JEL classification: E24, E25, J52

1. INTRODUCTION

Labour shares have been in decline in most developed countries for a rather long period of time. Even though no common downward trend has been found in the series, the similar pattern of the developments has most probably been one reason for the rise in the number of studies in which developments in the labour share have been analysed within a comparative setting.

It has not come as a surprise that the effects of globalisation and the factors related to production technology have been regarded in these studies as major potential causes of a similar pattern. For example, reports by the European Commission (2007), the IMF (2007), the OECD (2007) and the ILO (2008A, 2008B, 2010) contain comparative analyses in which the importance of these factors is examined. However, it is not obvious which are potentially the most important transmission channels through which globalisation and/or factors related to production technology are assumed to operate.

Varying interpretations have been provided, depending on the theoretical frameworks which various studies have utilised. Not even the use of frameworks that are based on mainstream macroeconomics allows one to outline a consensus interpretation about the importance of these two factors, which may also be associated with each other. According to reports by the European Commission (2007) and the IMF (2007), globalisation has reduced the labour share, but its influence has been small. The largest contribution to the fall in the labour share derives from skill-based technological change.

The results in which the role of technological change is highlighted have typically been based on those standard neoclassical models which utilise the assumption about profit maximizing firms, and, accordingly, demand for labour curves (see, for example, Bentolila and Saint-Paul, 2003; Arpaia *et al.*, 2009). In some econometric studies the theoretical foundations have been relatively loose, but within the major alternative frameworks the determination of the labour share is normally modelled as a part of wage determination.

These frameworks allow for the analysis of one potentially important consequence of globalisation. Because globalisation makes capital more mobile and accelerates the integration of labour markets globally, it puts pressure on labour and may weaken the bargaining power of trade unions in developed countries. The weakening of bargaining power may have been an important cause of the fall in the labour share. This factor has been emphasised in a number of studies (Choi 2001;

Harrison, 2002; ILO 2008B; Jayadev, 2009; Onaran, 2009; Stockhammer, 2009). It is, however, not easy to quantify the effect, nor is it straightforward to specify the transmission channel through which it operates.

One transmission channel may operate through unemployment. There is a long tradition of thought, which goes right back to Marx, according to which the reserve army of the unemployed holds down workers' wage claims. This idea has been central in many schools of thought including both mainstream and heterodox theories.

The integration of the global labour market may have maintained, or even increased, unemployment in developed countries, and especially in Europe, providing pressure on labour. On the other hand, the owners of the more mobile capital may have strengthened their bargaining power, with a given rate of unemployment, because they have the outside option, i. e. the threat to move capital abroad, at their disposal.

Even though the relationship between the labour share and unemployment has not been completely ignored in comparative studies, it deserves further analysis, because the role of unemployment as a factor influencing the labour share has remained vague. For example, Jayadev (2007) analysed the relationship between the labour share and capital account openness, using data for high, middle and low income countries, and found evidence of a negative correlation between the degree of openness and the labour share among the high and middle income countries. Because of the lack of data on unemployment for low and middle income countries he was not able to control the role of unemployment in every case. For high income (OECD) countries it was possible, however. Unemployment was an important explanatory variable. Its use as a control variable decreased the importance of the variable for capital account openness (Jayadev, 2007, Table 6).

In this paper the relationship between the labour share and unemployment in the major OECD countries is the main subject of interest. Special emphasis is put on examining whether the relationship between the labour share and unemployment has changed in a manner which can be interpreted as a consequence of the weakened bargaining power of labour. The nature of the relationship between the labour share and unemployment may be different in various OECD countries, reflecting differences in wage-setting institutions. For example, the adjustment of the labour share to shocks in unemployment may be different in countries with different degrees of bargaining coordination. The presence of differences of this kind is also studied.

Recently, this kind of investigation has not gained much attention. However, the OECD (2004) analyses the importance of wage-setting institutions on some wage outcomes, for example, on the labour share, and concludes that the degree of wage coordination has not affected the labour share in the major OECD countries. One aim of this study is to contribute to analyses of this kind.

The econometric analysis will be based on the use of cross-country data over a time period consisting of almost forty years. In recent years the use of methods for non-stationary panels has gained popularity in the examination of this kind of data. These methods are utilised extensively in this paper. Panel unit root tests, cointegration tests and estimators suitable for utilising non-stationary panels in the estimation of dynamic equations are employed in the investigation of the relationship between the labour share and unemployment. So far, these methods have not been widely used in the comparative analyses of labour shares, even though the presence of time trend in the series depicting developments of the labour share in individual country data may result in spurious regressions when variables including trends are used as explanatory variables.

The paper is organised as follows. First, some major alternative theoretical approaches which have been utilised in the examination of the determinants of the labour share are introduced. Then, some descriptive evidence of the developments of labour shares and unemployment is presented. The main results are presented in the fourth section. In the fifth section they are used in the discussion about the relevance of the framework utilised in the examination. The final section concludes.

2. THE LABOUR SHARE AND UNEMPLOYMENT: THEORY

The most convenient way of analysing the relationship between the labour share and unemployment is to utilise an analytical framework within which the determination of the functional distribution of income is a part of (real) wage determination. Within the class of such frameworks those frameworks which describe wage determination as a part of the conflict between trade unions and employers are the most appealing. Those frameworks include both mainstream and heterodox theories. Some authors have characterised the conflict as the “battle of mark-ups” (Blanchard, 1986; Burda and Wyplosz, 2001).

Nowadays, theories, especially the mainstream ones, typically utilise models which are based on game theory. Within one important class of models the outcome of the negotiations between a representative union and a representative employer is typically represented by a curve which represents a wage claim as a function of unemployment (or employment) and some other factors

like the tax wedge and the replacement ratio. Various authors have given the curve various names. Here it is called the wage curve.

The conflict theory which utilises wage curves has played a very important role in the analysis of unemployment in Europe, and it has been used extensively when the estimates of the NAIRU have been estimated. Layard *et al.* (1991) was one of the main sources of inspiration for those studies (see also, for example, Stockhammer and Klär, 2011). However, it can also be utilised in the examination of the functional distribution of income.

Even though the wage claim is normally expressed as a real wage claim, some reasonable assumptions allow one to express the overall outcome of the negotiations as a claim concerning the labour share - see, in particular, Rowthorn (1999B) (for other examples, see Broer *et al.* 2000; Draper and Huizinga, 2001; Nymoen and Rødseth, 2003). Formally, the wage curve can be expressed as

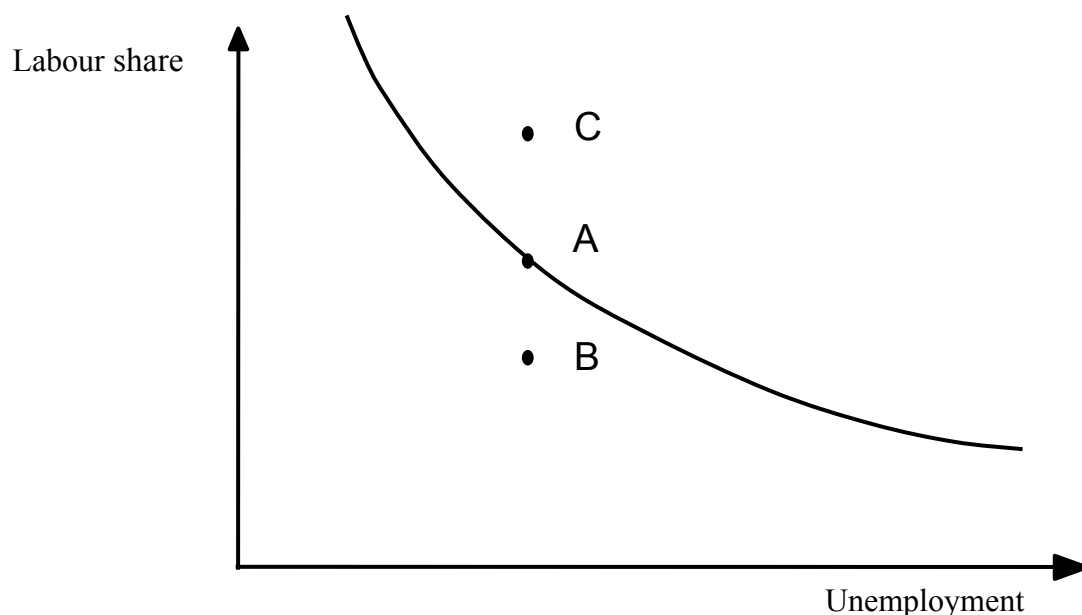
$$(1) \quad WL/PY = f(U,Z),$$

where WL/PY denotes the labour share, U unemployment and vector Z other factors affecting the labour share.

The higher the level of unemployment is, the weaker is the trade unions' bargaining position and the smaller is the labour share. It must be remembered, however, that the bargaining position is not the same as the bargaining power. Negotiation models include a distinct parameter for bargaining power. That parameter acts as a shift parameter. When, for example, the trade unions' bargaining power weakens, the wage curve shifts downwards. Thus, with a given rate of unemployment, the weakening of the trade unions' bargaining power lowers the labour share.

Figure 1 provides one example of the wage curve. When the rationalization of the wage curve is based on rational choice models, it can be regarded as an equilibrium relationship between the labour share and unemployment (and some other factors). With a given level of unemployment it shows the level of the labour share that wage setters, in particular trade unions, are ready to accept (for example, point A in Figure 1). Consequently, if the realized level is below that level (indicated by point B in Figure 1) upward wage pressure is induced. Accordingly, if the realized level is higher (point C) wage setters accept wage moderation. Obviously, the equilibrium is partial, because the level of unemployment is assumed to be given.

Fig. 1. The wage curve.



The use of game-theoretical rationalizations is only one alternative, however. The rationalization can be linked to that strand of heterodox literature in which wage determination is governed by real wage or labour share targets (see, for example, Cripps and Godley, 1976; Sawyer, 1982, Ch 5; Arestis, 1986; Dalziel, 1990; Dutt, 1992; Lavoie, 1992 ch 7; Cassetti, 2003; Godley and Lavoie, 2007, Ch 11). If this approach is used, the wage curve represents the target real wage, or labour share, as a function of unemployment and possibly of other factors. In this literature, target real wages are normally used, but the use of target labour shares can also be used. In Rowthorn (1977) one early example of conflicting claims models is introduced. In the model, both negotiated labour shares and target profit shares play an important role. The use of the labour share target may give rise to wage dynamics which differs from the one which is based on the use of the real wage target. This depends, of course, on the manner in which productivity growth is taken into account in the formulation of the real wage target.

If the wage curve in Figure 1 represents the labour share target, points A, B and C can still be interpreted as they were earlier. Unemployment also has a similar role. If unemployment decreases, trade unions become more ambitious, but this does not necessarily mean that their bargaining power increases. Bargaining power increases if, with a given rate of unemployment, the target labour share is increased. Changes in bargaining power are reflected as shifts in the wage curve.

If the wage curve is given one of the two interpretations above, it has a special role in the empirical time series analysis of wage and labour share determination. It works as an error-correction mechanism in empirical dynamic wage equations.

To give an example, assume that the wage curves are of the form

$$(2) \quad \ln(WL/PQ)^* = \alpha - \beta \ln(U), \quad \alpha, \beta > 0,$$

where $\ln(WL/PQ)^*$ is the log of the target labour share and U is the unemployment rate. Because the unemployment rate is the only explanatory variable, the curve is as simple as possible.

One example of a dynamic equation in which equation (2) acts as an error-correction term is as follows.

$$(3) \quad \begin{aligned} \Delta \ln(WL/PQ)_t &= -\gamma \Delta \ln(U)_{t-1} - \lambda (\ln(WL/PQ) - \ln(WL/PQ)^*)_{t-1}, \\ &= -\gamma \Delta \ln(U)_{t-1} - \lambda (\ln(WL/PQ) - \alpha + \beta \ln(U))_{t-1}, \quad \gamma, \lambda > 0, \end{aligned}$$

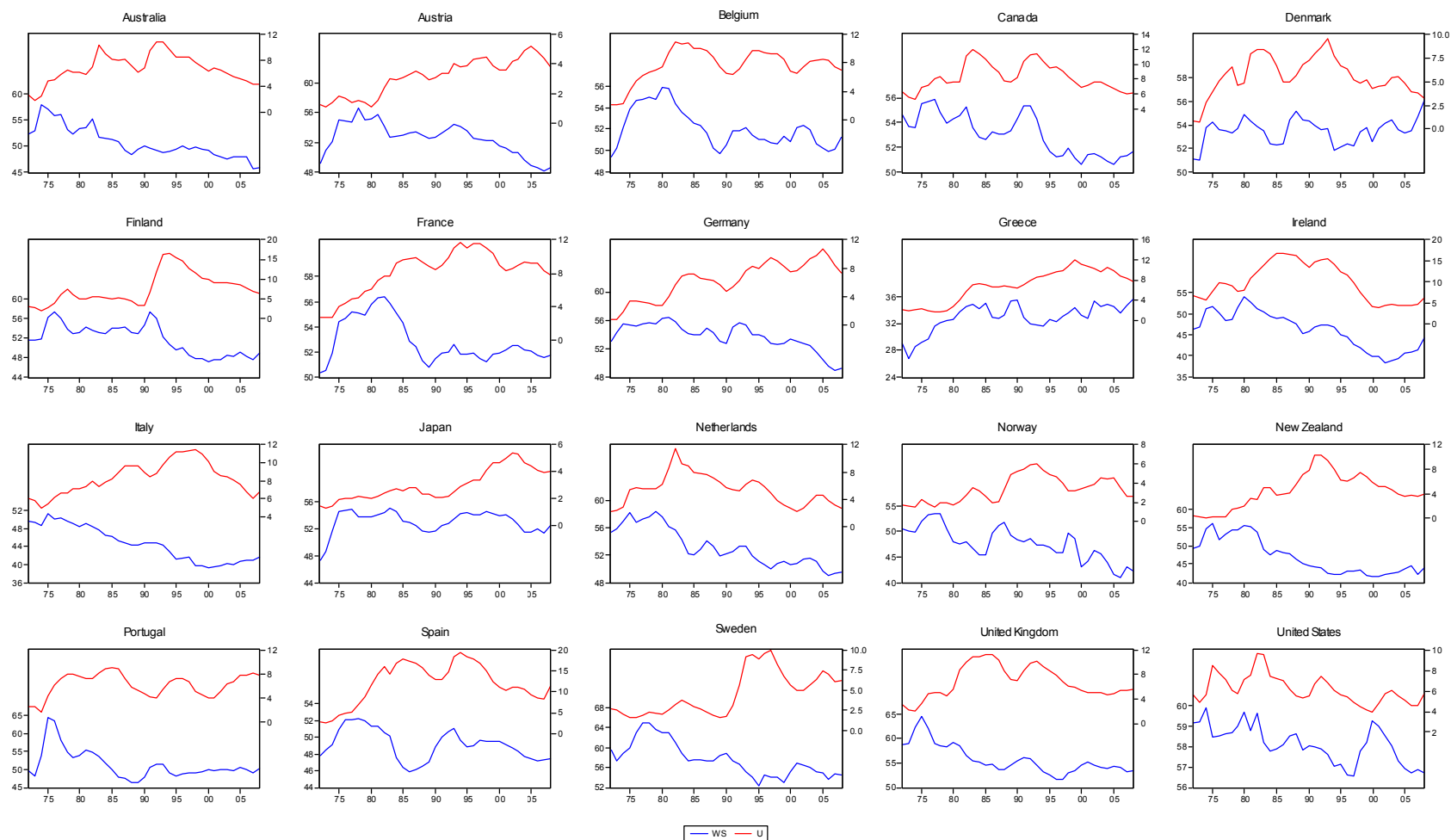
i.e., in addition to the error-correction term the equations may include lagged changes in the unemployment rate as explanatory variables. Sargan (1964) is an early example of the use of such models. Parameter λ describes the speed of adjustment towards the wage curve.

If the empirical analysis of labour shares is based on the utilisation of theoretical frameworks in which the determination of the labour share is a part of the determination of wages, the estimation of wage curves suggests itself. If only wage curves are estimated, only a part of the wage-price dynamics represented by conflicting claims models is modelled. Nevertheless, it allows one to pay special attention to the role of wage-setting institutions as a potentially important factor that affects the functional distribution of income.

3. THE LABOUR SHARE AND UNEMPLOYMENT: DESCRIPTIVE EVIDENCE

In recent comparative analyses the start of the decline in the labour share has typically been dated to the late 1970s or the early 1980s. Figure 2 confirms this kind of interpretation. Since the late 1970s the labour share has declined in most major OECD countries. Figure 2 also shows that during the same period unemployment has risen in most of these countries.

Fig. 2. The labour share and unemployment in twenty OECD countries 1972-2008.



Note: The labour share is denoted by WS and the unemployment rate by U. (The scales for WS and U are indicated by the left and right axes, respectively.) The labour share is defined as the share of compensation of employees in GDP at current market prices. The period from 1972 till 2008 is the longest period for which data on the labour share is available for all countries.

Source: AMECO database of the European Commission.

Table 1 provides a more detailed picture of the developments. The labour share has declined in seventeen of the twenty countries. The only exceptions are Denmark, Greece and Japan. The level of unemployment has risen in sixteen countries, with Canada, Ireland, the Netherlands, and the U.S. being the exceptions.

Table 1. The labour share and unemployment rate in twenty OECD countries 1972-2008.

	labour share					unemployment rate				
	1970s	1980s	1990s	2000s	change*	1970s	1980s	1990s	2000s	change*
Austria	53.6	53.6	53.2	49.8	-3.9	1.4	2.7	3.9	4.3	2.9
Australia	54.7	51.5	49.5	47.6	-7.1	4.4	7.6	8.8	5.5	1.1
Belgium	53.1	52.9	51.3	51.0	-2.1	4.6	9.5	8.5	7.7	3.1
Canada	54.7	53.6	52.9	51.2	-3.6	6.9	9.4	9.6	6.9	0.0
Denmark	53.0	53.8	53.1	54.0	1.0	3.8	6.7	6.9	4.5	0.7
Finland	53.9	53.5	51.5	48.1	-5.8	4.2	4.8	11.9	8.4	4.2
France	53.4	54.1	51.8	52.1	-1.3	4.1	8.5	10.5	8.7	4.7
Germany	55.0	54.8	53.9	51.2	-3.7	2.4	5.8	7.6	8.8	6.4
Greece	29.9	33.9	33.0	34.3	4.4	2.0	6.1	9.0	9.7	7.7
Ireland	49.3	49.7	44.9	40.4	-8.9	7.9	14.2	12.1	4.6	-3.2
Italy	49.7	46.5	42.5	40.3	-9.4	6.2	8.4	10.3	8.0	1.8
Japan	52.4	53.4	53.6	52.5	0.1	1.8	2.5	3.1	4.6	2.8
Netherlands	57.1	54.0	51.7	50.3	-6.7	4.5	8.2	5.4	3.4	-1.1
New Zealand	52.9	49.8	43.1	42.8	-10.1	0.6	4.3	7.9	4.4	3.9
Norway	51.6	48.3	47.7	43.5	-8.2	1.8	2.8	4.8	3.7	1.9
Portugal	55.7	50.7	49.5	49.9	-5.8	5.1	7.5	5.6	6.4	1.3
Spain	50.6	48.3	49.7	48.1	-2.5	4.9	15.4	15.9	10.2	5.3
Sweden	61.5	59.1	55.0	55.3	-6.2	2.1	2.6	7.2	6.0	3.9
United Kingdom	60.3	55.6	53.8	54.2	-6.1	3.8	9.5	8.0	5.1	1.4
United States	58.9	58.5	57.5	57.7	-1.2	6.4	7.3	5.7	5.1	-1.3
mean	53.1	51.8	49.9	48.7	-4.4	3.9	7.2	8.1	6.3	2.4

Note: * difference between the figures for the 1970s and the 2000s.

Source: AMECO database of the European Commission; author's calculations

A first look at the developments does not contradict the interpretation that the decline in the labour share may have been associated with the rise in the average level of unemployment. In thirteen countries the decrease in the labour share has been associated with the rise in the average level of unemployment. In three countries, Ireland, the Netherlands and the U.S., both the labour share and unemployment have decreased, while in Denmark, Greece and Japan both the labour share and unemployment have increased. In Canada the labour share has declined but the unemployment rate has remained unchanged.

Obviously, it is impossible to analyse country-specific peculiarities in the relationship between the labour share and unemployment only by the use of descriptive analysis. Even among those

countries in which the decline in the labour share has been associated with the rise in unemployment, the nature of the relationship may differ.

One source of differences may be differing wage-setting institutions. One characteristic of the wage-setting institutions that is important is bargaining coordination. It may be true that the determination of the functional distribution of income is different in countries in which pay negotiations are less coordinated. In particular, the relationship between the labour share and unemployment may be different. In countries with a high degree of bargaining coordination, changes in the average level of unemployment may be reflected more directly, and more rapidly, in pay negotiations than in countries where negotiations are less coordinated. This question was analysed, for example, in the OECD (2004) without any clear answer, however. The patterns of developments in Figure 2 motivate further analysis of this question.

In this paper the classification used by the OECD (2004) has been utilised in classifying the countries according to the degree of bargaining coordination. The twenty OECD countries can be divided roughly into two groups. The first one consists of countries where the degree of bargaining coordination is high and the second one where it is not so high. All Anglo-Saxon countries belong to the second group. The classification is illustrated by Table 2.

Table 2. Wage-setting institutions in twenty OECD countries, 1970-2000.

	1970-74	1975-79	1980-84	1985-89	1990-94	1995-2000	1970-2000 average
Australia	4	4	4.5	4	2	2	3.4
Austria	5	5	4.5	4	4	4	4.4*
Belgium	4	3.5	4	4	4	4.5	4.0*
Canada	1	3	1	1	1	1	1.3
Denmark	5	5	3	4	3	4	4.0*
Finland	5	5	4	5	5	5	4.8*
France	2	2	2	2	2	2	2.0
Germany	4	4	4	4	4	4	4.0*
Greece	-	-	-	-	-	-	-
Ireland	4	4	1	2.5	4	4	3.3
Italy	2	2	3.5	2	3	4	2.8
Japan	4	4	4	4	4	4	4.0*
Netherlands	3	4	4.5	4	4	4	3.9
New Zealand	4	4	4	4	1	1	3.0
Norway	4.5	4.5	3.5	4.5	4.5	4.5	4.3*
Portugal	5	4	3	3	4	4	3.8
Spain	5	4	4	3.5	3	3	3.8
Sweden	4	4	3.5	3	3	3	3.4*
United Kingdom	3	4	1	1	1	1	1.8
United States	1	1	1	1	1	1	1.0

Notes: The degree of coordination:

1 = Fragmented company/plant bargaining, little or no coordination by upper-degree associations.

2 = Fragmented industry and company-degree bargaining, with little or no pattern-setting.

3 = Industry-degree bargaining with irregular pattern-setting and moderate coordination among major bargaining actors.

4 = a) informal coordination of industry and firm-degree bargaining by (multiple) peak associations;

b) coordinated bargaining by peak confederations, including government-sponsored negotiations (tripartite agreements, social pacts), or government imposition of wage schedules;

c) regular pattern-setting coupled with high union concentration and/or bargaining coordination by large firms;

d) government wage arbitration.

5 = a) informal coordination of industry-degree bargaining by an encompassing union confederation;

b) coordinated bargaining by peak confederations or government imposition of a wage schedule/freeze, with a peace obligation.

The countries which are classified as countries with a high degree of bargaining coordination are indicated by *. A country belongs to that class if the average value of the scores for the period from 1970 until 2000 is at least four. The only exception is Sweden, which was classified by the use of subjective assessment.

Greece was not classified in the OECD (2004). Here it has been classified as a country with a relatively low degree of bargaining coordination.

Source: OECD (2004), Table 3.5 p. 151; author's calculations.

However, the classification of countries is not straightforward (for a discussion see, for example, Aidt and Tzannatos, 2002, pp. 80-90; OECD, 2004, pp. 149-156). Furthermore, the classification of a country may change because of a major change in wage-setting institutions. According to Table 2, substantial changes have taken place at least in Australia, Ireland, New Zealand, and the United Kingdom. Because the econometric analysis in this paper is based on the assumption that the

classification of the countries remains the same, these changes should be taken into account in the interpretation of the results.

An obvious alternative for the use of a measure describing the degree of bargaining coordination would have been a measure describing only the level of bargaining. The measure used in this paper also takes into account informal bargaining coordination, which may influence the speed by which wage-setters react to macroeconomic disturbances. For example, within the classification used in this paper, Japan is a country with a high degree of bargaining coordination mostly because of a high degree of informal bargaining coordination.

In what follows, the relationship between the labour share and unemployment is analysed by the utilisation of the framework introduced in Section 2. One general aim of the analysis is to examine, by the utilization of the data on twenty OECD countries, the goodness of the framework in the examination of the relationship between the functional distribution of income and unemployment. The main specific questions are as follows. Do wage curves exist in those countries? How well do movements in unemployment explain movements in the labour share? Have wage curves shifted downwards perhaps as a consequence of the weakened bargaining power of labour? Have the wage-setting institutions affected the nature of the relationships between the labour share and unemployment? Does the degree of bargaining coordination affect the relationship? In particular, does the degree of bargaining coordination affect the speed by which the labour share adjusts after a macroeconomic shock which has caused, for example, a rise in unemployment?

4. THE LABOUR SHARE AND UNEMPLOYMENT: ECONOMETRIC ANALYSIS

When the estimation of wage curves is based on the above framework, a most important feature of the wage curve can be seen: it represents an equilibrium relationship between the labour share and unemployment. As illustrated earlier, this is in accordance with the use of wage curves as error-correction mechanisms in empirical dynamic wage or labour share equations. But this means that the wage curve also defines a cointegrating relation between the labour share and unemployment.

Consequently, the existence of wage curves can be analysed by examining whether the labour share and unemployment are cointegrated. This is the manner in which the relationship between the labour share and unemployment is studied in this paper. If investigation supports the conclusion that

the labour share and unemployment are cointegrated, movements in the labour share are associated with movements in unemployment.

In this paper the relationship between the labour share and unemployment is analysed by the construction of a panel data set from the data on individual countries and by the utilisation of econometric methods which are suitable for the analysis of such data. One reason for the rise in the popularity of this approach is obvious. Statistical properties of tests which are used in the analysis of the time series data on individual countries may be worse than those of the tests which are utilised in the analysis of country panel data. Unit root and cointegration tests are examples of such tests. Therefore, the conclusions which are based on the use of panel data should, in principle, be more reliable.

An additional reason for the use of country panel data in this study is the desire to analyse whether different wage-setting institutions result in differences in the relationship between the labour share and unemployment. This question can be analysed by grouping the countries according to the wage-setting institutions. For example, in countries where pay negotiations are coordinated, the relationship between the labour share and unemployment may be different from the relationship prevailing in those countries where negotiations are less coordinated.

Obviously, the analytical framework introduced earlier is best suited for the description of wage or labour share determination within the institutional setting in which the degree of bargaining coordination is at least relatively high. For example, in countries where wages are set by centrally negotiated incomes policy agreements it is easier for the trade union movement to set aggregate labour share targets than in countries where the degree of coordination is relatively low. In addition, they can more easily adjust their wage claims according to the changes in the general level of economic activity.

The interpretation of the wage curve as a cointegrating relation, and the use of country panel data, specifies the nature of the analysis which follows. First, a necessary condition for the existence of a cointegrating relation between the labour share and unemployment is that the variables are non-stationary first-order integrated $I(1)$ variables, i.e. their first differences are stationary. Therefore the unit root properties of the variables are first examined. Because the examination is based on the use of panel data, these are examined by the utilisation of panel unit root tests. If they are plausible, panel cointegration tests are conducted thereafter.

When these tests are conducted, three groups of countries are separated: the whole panel of twenty countries, the countries where the degree of bargaining coordination is high, and the countries where the degree of coordination is relatively low. The classification of the countries is based on the classification presented by Table 2. Moreover, the robustness of the results is examined by changing the classification of some countries.

The results for the panel unit root tests are reported in Appendix in Tables A1 and A2, respectively. The results for the labour share are relatively easy to interpret. According to most tests, the labour share is a trend stationary $I(1)$ variable. The results for unemployment are harder to interpret. According to them, at least some panels are stationary even though the test statistics for the differenced series do not indicate the presence of over-differencing.

Even though these results do not provide unambiguous evidence about the existence of unit roots in both variables in all countries, they motivate testing cointegration. Four tests are used in testing cointegration. Three of them have been developed by Pedroni (1999). They are extensions of the Engle-Granger two-step residual-based cointegration tests. The fourth one is a Fisher-type test which is based on individual Johansen trace tests for cointegration (see Maddala and Wu, 1999). All these tests are based on the assumption that country-specific cointegrating relations may differ from each other.

Table 3 reports the results for the panel cointegration tests. If the cointegrating relationship is assumed to contain a constant (but not a trend), the Fisher test based on the Johansen trace test supports the hypothesis that the labour share and unemployment are cointegrated, while the Group rho and Group PP tests do not. The group ADF test supports the hypothesis in the group of countries with a high degree of bargaining coordination. If the cointegrating relationship is assumed to contain both a constant and a trend, the hypothesis about the existence of the cointegrating relationship is supported by the majority of the tests. This result is in accordance with the earlier result that the labour share can be regarded as a trend stationary $I(1)$ variable. Even though unemployment can explain movements in the labour share it cannot completely explain the downward trend which is apparent in the labour share series in many countries. In addition, there is some more evidence about the existence of the cointegrating relation in the group of countries with a high degree of bargaining coordination.

Table 3. Panel cointegration tests.

All countries			
		constant	constant and trend
Group rho-Statistic		1.29	0.83
Group PP-Statistic		0.82	-1.60+
Group ADF-Statistic		-1.00	-5.88***
Johansen Fisher Statistic from trace test	H0: None	83.74***	89.79***
	H1: At most 1	5.12	44.63
Countries with a high degree of bargaining coordination			
		constant	constant and trend
Group rho-Statistic		-0.19	0.50
Group PP-Statistic		-0.63	-1.42+
Group ADF-Statistic		-2.22*	-4.57***
Johansen Fisher Statistic from trace test	H0: None	35.90**	40.30***
	H1: At most 1	13.08	19.90
Countries with a relatively low degree of bargaining coordination			
		constant	constant and trend
Group rho-Statistic		1.82	0.67
Group PP-Statistic		1.58	-0.91
Group ADF-Statistic		0.51	-3.86***
Johansen Fisher Statistic from trace test	H0: None	47.84**	49.49**
	H1: At most 1	32.04	24.73

Notes: Countries with a high degree of bargaining coordination are Austria, Belgium, Denmark, Finland, Germany, Japan, Norway and Sweden, and countries with a relatively low degree of bargaining coordination are Australia, Canada, France, Greece, Ireland, Italy, the Netherlands, New Zealand, Portugal, Spain, the UK and the U. S., respectively.

The group tests by Pedroni (1999) are based on individual Engle-Granger two-step cointegration tests. In the tests the regression equations for the residuals differ. The Group rho –statistics is based on the Phillips and Perron rho-statistic, the Group PP-statistics on the Phillips and Perron t-statistics, and the Group ADF-statistic on the Augmented Dickey-Fuller statistics. The combined statistics is obtained as a group mean. In each test the null hypothesis is no cointegration, which is tested against the hypothesis that at least in some countries the variables are cointegrated.

The Johansen Fisher test statistic is a combination of individual Johansen’s cointegration trace tests. In this case, they are obtained by the estimation of individual two-variable VAR models. The null hypothesis is that there is no cointegrating relation. It is tested against the hypothesis that there is at most one cointegrating relation.

Statistical significance: + p<0.1, * p<0.05, ** p<0.01, *** p<0.001.

These results motivate the estimation of dynamic wage share or wage equations in which wage curves act as error-correction mechanisms. According to the cointegration tests, the trend-like decline in the labour share should be controlled for in these equations. In this article this is done by simply including, in addition to unemployment, time trend as an explanatory variable in the cointegrating relationship. Ideally, one could use a good indicator for bargaining power as an

explanatory variable, but good indicators are not available. Flanagan (1999, p. 1172) has remarked that union coverage, for example, does not capture bargaining power.

The use of time trend makes the interpretation of the possible causes of the decline difficult, or impossible. However, it allows one to answer the important question as to whether the labour share has declined after changes in unemployment have been controlled for. This is one of the basic questions when the framework utilising the wage curve is used. Furthermore, even though the use of time trend only allows speculation about the causes of the decline, it enables one to analyse whether the decline has been different in countries with differing wage-setting institutions.

The basic form of the dynamic equation to be estimated is as follows.

$$(4) \quad \Delta \ln(WL/PQ)_{it} = \alpha_i - \theta_i \Delta \ln(U)_{i,t-1} - \lambda_i (\ln(WL/PQ) - \beta_i \ln(U) - \gamma_i \ln(\text{Trend}))_{i,t-1},$$

$$\alpha_i, \beta_i, \gamma_i, \theta_i, \lambda_i > 0.$$

Here $\alpha_i, \theta_i, \lambda_i$ are country-specific short-run parameters, whereas β_i and γ_i are the slope parameters of the wage curve which defines the long-run equilibrium relationship. When panel data is utilised in the estimation, various estimators can be utilised. Differing assumptions about the heterogeneity or homogeneity of the relevant parameters lead to differing estimators.

At the one extreme are dynamic fixed effects (DFE) estimators for which only intercepts α_i are allowed to be different across countries. At the other extreme, separate equations are estimated for each country and the unweighted means of these regressions coefficients are computed. These are called Mean-Groups (MG) estimates (Pesaran and Smith, 1995). The pooled Mean Groups (PMG) estimator (Pesaran *et al.*, 1999) is an intermediate estimator. It allows for short-run parameters (here $\alpha_i, \theta_i, \lambda_i$) to differ across countries (i.e. it allows for short-run cross-country heterogeneity), but constrains the long-run parameters (here β_i and γ_i) to be homogenous. In what follows, results from the use of these three types of estimators are presented.

Table 4. Dynamic equations for the labour share: three estimators.

	All countries			Countries with a high degree of bargaining coordination			Countries with a relatively low degree of bargaining coordination		
	MG	PMG	DFE	MG	PMG	DFE	MG	PMG	DFE
ECORR									
lnU	-0.13***	-0.21***	-0.10***	-0.14*	-0.13***	-0.09***	-0.13***	-0.20***	-0.11***
lnTrend	-6.28***	-7.33***	-7.69***	-4.5*	-1.80	-3.88**	-7.47**	-10.06***	-9.68***
SR									
ECORR(-1)	-0.26***	-0.11***	-0.14***	-0.24***	-0.18***	-0.22***	-0.27***	-0.13***	-0.13***
$\Delta \ln U(-1)$	-0.02**	-0.03***	-0.04***	-0.02	-0.02**	-0.03***	-0.02***	-0.03***	-0.04***
Cons	13.81***	6.47***	9.04***	10.28+	3.19***	7.40**	16.17***	10.23***	9.71***
Hausman									
MG vs PMG		18.97***			1.89			14.25***	
Hausman									
MG vs DFE		0.0			0.0			0.0	

Notes. For the classification of countries, see notes listed under Table 3. The results are presented as a two-equation model: the normalised cointegrating vector (given by ECORR) and the short-run coefficients (given by SR). Statistical significance: + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

In the Hausman test the null hypothesis is that differences in the long-run coefficients are not systematic. If the null hypothesis is rejected the MG estimator is preferable.

Table 4 summarises the results. In most cases, the estimates are statistically significant and properly signed. In comparing the cointegrating vectors among the two classes of countries we note that the estimates for unemployment (the long-run elasticity of the labour share with respect to unemployment) are similar in these groups if the MG or DFE estimators are used. If the PMG estimator is used, the estimate is slightly bigger in countries with a relatively low degree of bargaining coordination. However, the wage curves seem to have been shifting downwards distinctly faster in countries with a relatively low degree of bargaining coordination. If this shift is interpreted as a change in bargaining power, the results indicate that bargaining power has decreased faster in these countries.

The estimates for the short-run dynamic coefficients indicate that the error-correction term is an important explanatory variable in all cases. The speed of adjustment estimates are bigger in countries with a relatively high degree of bargaining coordination if the PMG or DFE estimators are used, whereas it is slightly bigger in countries with a relatively low degree of bargaining coordination if the MG estimator is used.

In assessing these results, one should have an idea about the relative merits of the three estimators. The PMG estimator, like the DFE estimator, constrains the long-run coefficients to be equal across all panels. These estimators provide efficient and consistent estimates if the restrictions are true. If

the true model is heterogeneous, the PMG and DFE estimates are inconsistent. However, the MG estimates are consistent in either case. The heterogeneity of the true model can be tested by the well-known Hausman test. The Hausman test statistics in Table 4 test whether the always consistent MG estimator is preferable to PMG or DFE estimators. The results indicate that when the total sample is used, the MG estimator is preferable to the PMG estimator because there are systematic differences in country-specific long-run coefficients. However, the estimates obtained by the use of the DFE and MG estimators do not differ systematically. Therefore results obtained by using the DFE estimator are preferable, because it provides efficient estimates.

For countries with a relatively high degree of bargaining coordination, the estimates obtained by using the PMG estimator do not differ systematically from the estimates obtained by the use of the MG estimator. Therefore, the PMG estimator is preferable to the MG estimator. On the other hand, the DFE estimator is also preferable to the MG one. Therefore the results obtained by the use of the two efficient and consistent estimators are preferable to the results obtained by using the MG estimator. For countries with a relatively low degree of bargaining coordination, the results are identical to the results regarding the whole sample. The DFE estimator is preferable.

Overall, the use of this kind of preference order confirms the above conclusions regarding the long-run coefficients. The slope coefficients for unemployment are similar in both classes of countries with the magnitudes of the slopes being about 0.1. Interestingly, Blanchflower and Oswald (1994) called this number an empirical law of economics. As regards the long-run coefficients, the second main finding was that wage curves have shifted downward faster in countries with a relatively low degree of bargaining coordination.

If the results provided by the use of the DFE estimator are also used in the characterisation of the short run-coefficients, the main conclusion is that the speed of adjustment of the labour share to deviations from the long run is somewhat faster in countries with a relatively high degree of bargaining coordination. This supports the view that in coordinated wage negotiations the state of the whole economy can be taken into account better than in negotiations which are less coordinated.

However, it seems that the results from the econometric analysis are not robust to some changes in the classification of the countries to the two groups. If the classification is changed so that some of the countries classified as countries with a relatively low degree of bargaining coordination are reclassified as being countries with a relatively high degree of bargaining coordination, the above

results regarding the speed of adjustment may change.¹ It should be remembered that the classification of some countries may have changed during the time period under consideration. Therefore, strong conclusions regarding the relative importance of wage-setting institutions as the determinants of the labour share cannot be drawn on the basis of the econometric analysis.

5. WAGE CURVE OR PHILLIPS CURVE?

This study has been based on the assumption that for both countries with a relatively high degree of bargaining coordination and countries with a relatively low degree of bargaining coordination the use of the framework which utilises the wage curve as the central analytical tool is expedient. Even though the results of the unit root and cointegration tests were not fully unambiguous, they did not give compelling reasons not to utilise the framework. The results reported in Table 4 also support the use of the framework. The error-correction term is an important explanatory variable in every regression equation.

Anyhow, as the unit root tests showed, unemployment may be a stationary variable, at least in the case of some countries. For those countries the use of the Phillips curve instead of the wage curve may be preferable. In this study the rough division of twenty OECD countries into two groups did not classify the countries into those for which the wage curve is preferable and into those for which the Phillips curve is preferable. In principle, one could expect that when bargaining is completely uncoordinated or decentralised, the whole macroeconomic situation of the economy (depicted, for example, by points A, B and C in Figure 1) does not affect wage dynamics, but the tightness of the labour market does. In that case, the Phillips curve would be preferable.² According to the results of this study, the adjustment of the labour share to deviations from the wage curve was slower in countries with a relatively low degree of bargaining coordination but, still, the wage curve acted as an error-correction mechanism.

In this paper, two country groups and not individual countries have been the object of the investigation. Yet there are some comparative studies which are useful in the interpretation of the

¹ The results from the robustness checks are available upon request.

² It is therefore not surprising that in countries where bargaining over wages has traditionally been decentralised the estimation of Phillips curves has been the dominant way of modelling wage dynamics. The U.S may be the best example. According to Blanchard and Katz (1999), for example, the Phillips curve is supported by macrodata in the U.S. while dynamic wage equations containing error-correction mechanisms are supported in Europe. They regard the greater role of trade unions in Europe as a major cause of the difference (for a discussion, see also Montuenga-Gómez and Parreño, 2005).

results obtained in this study and which are based on the estimation of individual country wage equations. In the OECD (1997) wage equations for twenty-one OECD countries were estimated (in addition to the countries in this article Switzerland was included). For seven countries (Canada, the U.S., Australia, Greece, Ireland, Portugal, and Switzerland) Phillips curve specifications were reported. Six of these countries also belong to the group of countries which in this article were classified as countries with a relatively low degree of bargaining coordination. For the rest, the specifications included error-correction terms, but they were not defined by a wage curve but by a labour share target represented by a constant.

In Drèze and Bean (1990, Table 1.4, pp. 24-25) wage equations for eleven European countries and the United States were estimated. With the exception of France, they embody wage curves as error-correction terms. That kind of wage equation was also estimated for the U.S., but Drèze and Bean add that in contrast to the U. S., wage formation in Europe is dominated by trade unions which are concerned about distributional fairness. In a number of studies the difference between Europe and the U.S. is highlighted even though, for example, the originators of the wage curve, Blanchflower and Oswald (1994, 2005), maintain that the wage curve is also valid in the U.S. The data they use is not, however, aggregative time series data but regional data (for a survey of wage curve studies, see Nijkamp and Poot, 2005).

Overall, even though there is evidence that in countries with a relatively low degree of bargaining coordination wage inflation is best represented by Phillips curves, and in countries with a relatively high degree of bargaining coordination inflation is best represented by dynamic equations in which the wage curve defines the error correction mechanism, that evidence is not yet overwhelming. Furthermore, finding strong evidence for such conclusions by the use of cross-country panel data may be very difficult. The reliability of the statistical tests requires that the number of countries should be large, and wage-setting institutions in various countries should remain relatively stable over time in order to make the classification of countries possible. Drastic changes make statistical analysis difficult.

6. CONCLUSIONS

The report by the OECD (OECD, 2004) summarised its main findings regarding the relationship between the labour share and unemployment as follows (2004, p. 129; italics in the report). ‘*The evolution of aggregate wages suggests a trend towards wage moderation in the majority of OECD*

member countries since the end of the 1970s, as reflected in a deceleration of nominal wage inflation and declines in the wage share of total income generated in the business sector. However, it is unclear whether there has been a correspondingly broad trend towards reduced upward pressure on the level of real wages relative to productivity, at an *unchanged* rate of unemployment, which theoretical arguments identify as the most relevant measure of wage restraint.’

According to the results presented in this paper, it is clear that there has been a trend-like decline in the labour share in most major OECD countries at an unchanged rate of unemployment. With a given level of unemployment, the labour share is nowadays lower than before. The interpretation of this kind of decline is not straightforward, but it is highly likely due, at least partly, to the weakened bargaining power of labour. Furthermore, in comparison to countries with a relatively high degree of bargaining coordination, the decline seems to have been more pronounced in countries with a relatively low degree of bargaining coordination. It is logical to think that, in countries with a high degree of bargaining coordination, labour is more powerful than in countries with a relatively low degree of bargaining coordination. The results support the interpretation that, even though labour has also lost its bargaining power in countries with a relatively strong trade union movement, weakening has not been so drastic as in countries where labour has traditionally been relatively weak.

The results also indicate that, in countries with a relatively high degree of pay negotiation coordination, the speed of adjustment of the labour share (and real wages) to macroeconomic disturbances which affect the functional distribution of income and unemployment is faster than in countries with a relatively low degree of bargaining coordination. When wage negotiations are coordinated, the situation of the whole economy can be taken into account better than in less coordinated negotiations. Yet, even in countries with a relative low degree of bargaining coordination the state of the whole economy can be taken into account.

However, the conclusions regarding behavioural differences in the two country groups are not robust to some changes in the classification of the countries into the two groups. If the classification is changed, the results may also change. It should be remembered that it is not straightforward to classify a country as being permanently a country with a relatively high or low degree of bargaining coordination. When wage-setting institutions change, the classification may change. This aspect was not taken into account in the econometric analysis conducted in this study.

Even though some of the results of this study were not very affirmative, they suggest that, also in theoretical analyses, it may be useful to differentiate models according to wage-setting institutions. This applies to both mainstream and heterodox traditions. The target real wage or labour share models are likely to be best suited for the description of wage and labour share determination within the institutional setting which is based on a relatively high degree of bargaining coordination, while models embodying Phillips curves may be better in the description of wage and labour share dynamics in countries with a relatively low degree of negotiation coordination. In this paper this hypothesis could not be verified or falsified, and it is therefore one area in need of further investigation.

In the 1970s Francis Cripps (Cripps, 1977) summarised his critique of the Phillips curve as follows (1977, p. 110): ‘The institutional evidence and supporting econometric studies are by now sufficient to demonstrate that the Phillips curve, whether in its original or in its new form, and the associated postulate that money wages are determined by atomistic competition in the labour market, are incomplete and misleading in modern conditions.’ The institutional and econometric evidence Cripps was referring to was about the UK. The evidence which has accumulated over thirty years supports a more nuanced modern interpretation.

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APPENDIX: PANEL UNIT ROOT TESTS

The reported panel unit root tests are based on three different statistics which share the common assumption that in the panel data the unit root processes are individual, i.e. they are not assumed to be the same for each country. It is natural to use such tests because there is no reason to assume that the processes are the same. The three tests are the Im, Pesaran, and Shin (IPS), and the Fisher-ADF and Fisher-PP tests (for details of these tests, see Im, Pesaran and Sin, 2003; Maddala and Wu, 1999; Choi, 2001, and for a general discussion of panel unit roots tests, see, for example, Baltagi, 2008). All tests are based on individual unit root tests which are combined in order to get an overall test statistic. The IPS and Fisher-ADF tests are based on individual Augmented Dickey-Fuller tests and the Fisher-PP test on individual Phillips-Perron tests. In all tests the null hypothesis is that all panels contain unit roots. The null hypothesis is tested against the hypothesis that at least some panels are stationary.

Table A1. Panel unit roots tests: the labour share.

All countries				
	lnws		Δ lnws	
	constant	constant & trend	none	constant
IPS	-0.65	-3.68***		-14.64***
ADF-Fisher	41.90	71.44**	500.5***	279.72***
PP-Fisher	37.3	49.0	473.6***	351.77***

Countries with a high degree of bargaining coordination

	lnws		Δ lnws	
	constant	constant & trend	none	constant
IPS	-0.70	-2.712**		-10.87***
ADF-Fisher	19.49	30.78*	191.37***	131.65***
PP-Fisher	20.83	24.33+	187.72***	144.35***

Countries with a relatively low degree of bargaining coordination

	lnws		Δ lnws	
	constant	constant & trend	none	constant
IPS	-0.26	-2.50**		-14.30***
ADF-Fisher	22.40	40.65*	309.13***	215.99***
PP-Fisher	16.48	24.66	285.91***	207.42***

Notes: Countries with a high degree of bargaining coordination are Austria, Belgium, Denmark, Finland, Germany, Japan, Norway and Sweden, and countries with a relatively low degree of bargaining coordination are Australia, Canada, France, Greece, Ireland, Italy, Netherlands, New Zealand, Portugal, Spain, the UK and the U.S., respectively.

Test statistics have been computed both for levels and first differences. Individual equations for levels have contained either a constant or a constant and a trend. Equations for first differences have had at most a constant. Statistical significance: + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table A2. Panel unit root tests: unemployment.

All countries				
	lnu		none	Δ lnu
	constant	constant & trend		constant
IPS	-4.56***	-0.98		-12.78***
ADF-Fisher	83.67***	51.14	356.27***	240.87***
PP-Fisher	87.70***	29.16	352.48***	233.64***

Countries with a high degree of bargaining coordination				
	lnu		none	Δ lnu
	constant	constant & trend		constant
IPS	-3.08***	-2.49**		-7.85***
ADF-Fisher	36.48**	31.05*	138.91***	95.02***
PP-Fisher	49.48***	16.60	130.85***	86.50***

Countries with a relatively low degree of bargaining coordination				
	lnu		none	Δ lnu
	constant	constant & trend		constant
IPS	-3.36***	0.82		-10.08***
ADF-Fisher	47.18**	20.10	217.36***	145.85***
PP-Fisher	38.22*	12.56	221.63***	147.14***

Note: See notes in Table A1.