2. BÖLÜM / CHAPTER 2

DETERMINANTS OF UNEMPLOYMENT: AN EMPIRICAL ANALYSIS FOR OECD COUNTRIES

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ABSTRACT

Determination of the factors that led to unemployment is quite important in the implementation of policies aimed at solving unemployment, which is one of the main problems in both developed and developing countries. In addition to the negative macroeconomic indicators brought about by the global economic crises, findings on the impacts of labour market regulations on employment have been revealed through empirical studies. In this study, determinants of unemployment are examined with macroeconomic variables and labour market institutions variables by using panel data set related to selected OECD countries. However, unlike many other studies on the subject, panel time series methods are used in this study, and variables affecting unemployment are examined by estimating the panel VAR model. When the findings are evaluated, it is concluded that macroeconomic variables have an apparent effect on unemployment as expected and also labour market institutions such as labour market programmes and minimum wage have a significant effect on unemployment.

Keywords: Unemployment, Labour market institutions, Vector Autoregression, Panel Time Series

1. Introduction

The creation of new employment areas and the reduction of unemployment is one of the main objectives of national economic policy. Unemployment is the most important economic and social problem, especially in countries where the population is increasing rapidly and consequently labour force participation rate is high, and where industrialization has not yet been completed and economic fragility is high. In such countries, there are many factors leading to an increase in unemployment. However, in many developed countries with both a low population growth rate and labour force participation rate, unemployment rate increased rapidly during the 2007-2013 period and then started to decline again. This situation indicates that the unemployment problem cannot be explained only by demographic factors, and moreover that economic conditions and labour market regulations are important factors that affect employment. However, the change in the unemployment rate caused by various factors varies from country to country. The diversity in the variables affecting the labour market plays a major role in this. In this context, it is important to analyze the factors affecting the employment level.

Factors such as the slowdown in global economic growth, limited increase in wages and increase in income inequality and poverty have made labour market policies quite important, particularly in developing countries. Technological developments, globalization and transformations in labour markets caused by demographic changes force the hands of the decision makers in terms of policies for combatting unemployment. In the changing world, the importance of flexible labour market models and policies for high economic performance and employment increases over time. In the relevant studies, including the OECD Jobs Strategy, which is mainly aimed at providing detailed policy recommendations to governments and other economic agents from a broad perspective, the need for basic labour market reforms to combat high unemployment rates, which is a structural problem affecting many countries, is highlighted (OECD, 1994; OECD, 2006; OECD, 2018). The studies on policy reforms related to the labour market is discussed in detail in the 1994 OECD Jobs Strategy. Based on this, empirical studies on the determinants of unemployment conducted in the following years are basically divided into two groups. In the first group studies, microeconometrical techniques were used and various results were obtained by developing different methods. In the second group, the effects of the political and institutional indicators related to the labour market, which are created by OECD, on the labour market were examined by macroeconometrical methods (Bassanini and Duval, 2006: 8).

Also taking into account the recent developments in both theoretical studies and empirical analyses, the aim of this study is to examine the effect of macroeconomic factors and labour market institutions on the determinants of unemployment. In this context, by using the annual panel data set for the period of 1991-2016 from a sample of OECD countries and the VAR model designed within the scope of selected variables, the effects of macroeconomic shocks and labour market institutions on aggregate unemployment is analyzed.

2. Literature

In the literature, studies focusing on the determinants of unemployment and the effects of labour market institutions on unemployment generally include variables such as unemployment benefits, employment protection legislation (EPL), union density, bargaining coordination, tax wedge and active labour market programmes (ALMP). However, these studies show differences in different aspects. The usage of macroeconomic variables in different ways lies in the basis of these differences. For example, in some studies such as Nickell (1997), Belot and Van Ours (2001), Baker et. al. (2003) and Boone and Van Ours (2004), only inflation was used as a control variable. In Elmeskov et. al. (1998) and Nicoletti and Scarpetta (2005), output gap was used as control variable. In many other studies (for example Blanchard and Wolfers, 2000; Bertola et. al., 2001; Nunziata, 2002; IMF, 2003; Nickell et. al., 2005; Bassanini and Duval, 2006; Baccaro and Rei, 2007; Stockhammer and Klar (2011), etc.) macroeconomic shocks are included in the models with real interest rate, labour productivity or total factor productivity, terms of trade, and labour demand shock variables. Another difference between the studies in the literature is that while some empirical studies are based on annual data (for example; Scarpetta, 1996; Elmeskov et. al., 1998; Belot and Van Ours, 2001; IMF, 2003; Bassanini and Duval, 2006, etc.), others have carried out their analyses with longer-term data (for example, Nickell, 1997; Blanchard and Wolfers, 2000; Baker et. al., 2003; Baccaro and Rei, 2007; Stockhammer and Klar (2011), etc.). A general summary of the relevant studies is presented in Table A1.

When the findings in the literature concerning the variables used in this study were evaluated, in the studies of Scarpetta (1996), Nickell (1997), Nickell (1998), Nickell and Layard (1999), Boone and Van Ours (2004) it was found that the ALMP expenditures have a negative effect on unemployment but they have not reached to a common conclusion on the size of the aforementioned effect. On the other hand, certain microeconomic studies examining different types of labour market programmes have stated that the impact on unemployment also varies according to programme types (see, Heckman et. al., 1999; Martin and Grubb, 2001; Kluve and Schmidt, 2002; Betchermann et. al., 2004). Boone and Van Ours (2004)

and Nicoletti and Scarpetta (2005), found that the effect of union density on unemployment is both statistically significant and negative. Similarly, in most of the models estimated in the studies of Scarpetta (1996), Belot and Van Ours (2001), Nunziata (2002), IMF (2003), the coefficient of union density variable is found to be significant. In the study of Nickell (1997) it was concluded that union density-union coverage and ALMP variables have a very important effect on aggregate unemployment. In contrast, there are also studies concluding that union density has no important effect on unemployment (for example, Baker et. al., 2004; Elmeskov et. al., 1998). Also; Elmeskov et. al. (1998) stated that minimum wage variable has no statistically significant effect on unemployment, and findings about ALMP expenditures variable are inconsistent and complex.

In regard to macroeconomic variables, some empirical studies have indicated that interest rates have important effects on unemployment. Fitoussi et. al. (2000) found that the changes in short-term real interest rates and the changes in average unemployment rates are parallel to each other. Blanchard and Wolfers (2000) emphasized the interaction between macroeconomic shocks and labour market institutions. Bassanini and Duval (2006) stated that long-term interest rates have a statistically significant effect on unemployment. Nunziata (2002) and Nickell et. al. (2005) found that the effect of real interest rate shocks on unemployment is different from the designed models and the effect of factor productivity variable is statistically significant in all models. According to the IMF (2003), labour productivity growth and real interest rate shocks have a substantial effect on unemployment.

3. Method

In this study, within the model used to investigate the determinants of unemployment within the context of selected countries and variables, the effects of two different types of shocks on unemployment is examined. The first of these is political and institutional shocks related to the labour market and the second is macroeconomic shocks. Panel time series analysis is chosen and in this context, a panel VAR model including institutional-political variables and macroeconomic variables is estimated.

The panel VAR methodology allows the use of disaggregated data and, to some extent, takes into account the heterogeneity between units and countries in the sample. In this context, the panel VAR method combines the standard VAR approach that treats all variables endogenously in the system and the GMM estimator developed by Arellano and Bond (1991) and allows for unobserved individual heterogeneity (Guerello, 2014: 219). The reduced form of the econometric model can be shown as follows (Boubtane et. al., 2013: 402):

$$X_{it} = \Gamma(L)X_{it} + u_t + \varepsilon_{it} \quad (1)$$

In the Model (1), X_{it} is a vector of stationary variables. In the version of the model adapted to this study, the vector X_{it} consists of the stationary forms of the variables UP , $ALMP$, TU , LW , GDP , r and LP defined in Table 1. In addition, $\Gamma(L)$ is a matrix polynomial in the lag operator, u_t is a vector of country-specific effects and ε_{it} is a vector of errors.

In application of panel VAR methodology, to eliminate the constraints on parameters, individual heterogeneity is allowed by adding fixed effects to the model. However, since the fixed effects are correlated with the regressors due to the lags of dependent variable, the estimations made with the mean differencing procedure which is used to eliminate the fixed effects will be biased (Love and Zicchino, 2006: 195). To overcome this problem, the strategy proposed by Love and Zicchino (2006) is followed and forward mean-differencing (orthogonal deviations) method, also known as the “Helmert procedure”, is applied. In this procedure, all variables in the model are transformed in deviations from forward means (Boubtane et. al., 2013: 402). This transformation preserves the orthogonality between lagged regressors and transformed variables. Thus, lagged regressors can be used as a instrumental variable and coefficients can be estimated by the system GMM method (Love and Zicchino, 2006: 195).

In this study, empirical analysis mainly focuses on orthogonalized impulse-response functions. The impulse-response functions, while keeping all other shocks equal to zero, explain the response of one variable to one unit of shock in another variable in the system (Guerello, 2014: 219). However, if the variance-covariance matrix of error terms is not diagonal, it is necessary to decompose the residuals orthogonally to observe the effect of shocks on only one of the variables in the model (Love and Zicchino, 2006: 194). Thus, when the shocks are orthogonalized, the effect of selected variables on unemployment can be interpreted separately.

Also, in order to analyze the impulse-response functions, the confidence intervals of these functions need to be estimated. Since the matrix of impulse-response functions is formed by the estimated VAR model coefficients, standard errors should also be considered. Therefore, the standard errors of the impulse-response functions are calculated and the confidence intervals are estimated by Monte Carlo simulation (Love and Zicchino, 2006: 195). In this study, the impulse-response functions are interpreted with 95% confidence intervals obtained with Monte Carlo simulation with 500 replicates.

Finally, the variance decomposition analysis, which shows the percentage of variation in another variable explained with the shock given to one variable, is applied. Variance

decompositions show the aggregate effect of one variable on another variable over time. In this study, the aggregate effect over a period of 10 years is reported. In this context, the designed VAR model is estimated by GMM using forward orthogonal deviations. Then, impulse-response functions, which are calculated by using the estimated VAR model, are interpreted. Additionally, the results of Panel Granger Causality Test showing the causality relationships between variables and the results of variance decomposition analysis are also mentioned. Considering the aim of the study, only the results and interpretations of the models in which the unemployment rate (*UP*) is dependent variable are included in the study.

4. Data and Empirical Results

In this study, the annual panel data set of nine OECD member countries (Australia, Belgium, Canada, France, Japan, the Netherlands, New Zealand, Spain, United States) for the period 1991-2016 is used. The sample of the study is formed from OECD member countries with a high income level, and taking into account the availability of the variables included in the analysis and data for the period examined, the sample is limited. In addition to efforts to ensure homogeneity between countries in terms of observation values and designation of a balanced panel data set, another reason for limiting the sample only with OECD countries is to obtain reliable data, particularly on labour market indicators (such as labour market policies or labour market reforms).

As a result of the regulations and policies implemented in the labour market, the findings on the effects of the decrease in labour market flexibility on unemployment are revealed in the previous studies (See Table A1). Accordingly, in the light of previous theoretical and empirical studies, the variables related to the political and institutional determinants of unemployment can generally be listed as ALMP, unemployment benefit, tax regulations, union density, collective bargaining coverage, employment protection legislation (EPL) and minimum wage (Bassanini and Duval, 2006: 9). But, in many empirical studies, it is concluded that employment protection legislations, unemployment benefits and dismissal legislations mostly effect the employee turnover and the duration of unemployment (Brada et. al., 2014: 559). In this study, the variables selected to reveal the effect of labour market regulations on unemployment are active labour market programmes (ALMP), minimum wage and union density. As stated in the second part of this study, in which the literature is summarized, some empirical studies emphasize that ALMP expenditures have unemployment-reducing effects and are important instruments in combatting unemployment (Scarpetta, 1996; Nickell, 1997, 1998; Green and Hendershott, 2001; Boone and Van Ours, 2004; Nickell et al., 2005).

However, there is less consensus on the effects of union density and collective bargaining coverage on unemployment (Bassanini and Duval, 2006: 9). Unions which have the capability to increase wages can lead to a decrease in employment and the resulting unemployment primarily affects the groups that are flexible in labour supply (Bertola et. al., 2002: 12). However, Traxler and Kittel (2000) state that in wage-setting, the effect of union participation on unemployment varies according to the content of collective bargaining. Finally, a minimum wage set above the equilibrium level in the labour market is expected to reduce labour demand and increase unemployment. (Bassanini and Duval, 2006: 75).

On the other hand, real GDP growth rate is highly important in explaining unemployment since it shows the general situation of the economy. Considering the relevant studies and theory, it is expected that high GDP growth rates decrease unemployment rate. However, in some empirical studies, several variables have been used together with or instead of economic growth to directly determine the effect of macroeconomic shocks on unemployment as a whole. Also in this study, considering the recent empirical literature, in addition to economic growth (*GDP*) variable, the variables of interest rate (*r*) and labour productivity (*LP*) are included in the analysis. The adverse effect of a change in long-term interest rates on investments is generally accepted in economic theory. Therefore, an increase in real interest rates is expected to affect capital accumulation and labour productivity negatively and consequently, at a certain wage level, to reduce labour demand and to increase unemployment (see e.g. Blanchard, 1999, 2000). This is because, while other variables are constant, an increase in real interest rate will increase the cost of capital used, investments will decrease, in time capital accumulation will decrease and employment will decrease. This process will continue until wages are equilibrated and the increase in capital cost is balanced with the increase in profit rate (Blanchard, 1999: 3). On the other hand, a higher than expected increase in factor productivity reduces unemployment, albeit temporarily. In this case, the labour productivity variable is expected to have a negative effect on the unemployment rate. The resistance in real wages is another reason of why the expected sign of change in labour productivity variable is negative. If the rate of increase in labour productivity slows down, employee's increase demand in real wages as in the past will increase unemployment. Similarly, unemployment will decrease if the increase in labour productivity accelerates and the employees do not increase their wage demands (Baccaro and Rei, 2005: 7).

Explanations and data sources of the main variables selected for examining the determinants of unemployment are shown in Table 1.

Table 1

Explanation of Selected Variables

	Definiton (Source)
<i>Explained Variable</i>	
<i>UP</i>	Unemployment, total (% of total labour force) (modeled ILO estimate) (The World Bank - Data)
<i>Labour Market Institution Variables</i>	
<i>ALMP</i>	Public expenditure on Labour Market Programmes - Active measures (as a percentage of GDP) (%) (OECD.Stat)
<i>TU</i>	Trade union density (%) (OECD.Stat)
<i>Lw</i>	Logaritmic real minimum wage (level) (OECD.Stat)
<i>Macroeconomic Variables</i>	
<i>GDP</i>	Gross domestic product – Growth rate (%) (OECD.Stat)
<i>r</i>	Long-term interest rate (ratio) (OECD.Stat)
<i>LP</i>	Annual growth in labour input (GDP per person employed, constant prices) (%) (OECD.Stat)

In this respect, the effects of labour market institutions and macroeconomic indicators on unemployment within the scope of selected variables were investigated by panel VAR method, and the interaction between variables and shocks was also taken into consideration.

Firstly, in the analysis of the determinants of unemployment, the stationarity of the variables in the model was tested with first and second generation panel unit root tests. The results are shown in Table 2.

The Levin, Lin and Chu (2002) and Im, Pesaran and Shin (2003) tests, which are first generation panel unit root tests, are applied and according to the results of both tests, the null hypothesis that is “panels contain unit roots” for all variables except *Lw*, is rejected at 1% significance level. It is found that *Lw* variable is not stationary at the level according to results of IPS and LLC unit root test and it becomes stationary after taking of its first difference.

Moreover, it is stated that the first generation unit root tests do not take into account the inter-unit correlation and that the null hypothesis may be rejected incorrectly if there is a horizontal cross-sectional dependence in the series (O’Connel, 1998: 1-19). For this reason, second generation panel unit root tests that take into consideration inter-unit correlation are recommended. In this context, whether there is a correlation between units for all variables is examined by Pesaran (2004) CD test and the null hypothesis, which represents cross-sectional

independence for each variable, is rejected at 1% significance level (See Table 2). In this respect, the stationarities of the series of variables is examined by Pesaran (2007) panel unit root test (CIPS) which is a second generation unit root test. The results show that the level values of *UP*, *ALMP* and *Lw* variables have unit root and the other variables are stationary. The first differences of *UP*, *ALMP* and *Lw* variables are stationary (See Table 2).

Table 2

Results of Panel Unit Root Tests

Variables	First Generation Panel Unit Root Tests		Pesaran (2004) CD test	Second Generation Panel Unit Root Tests (CIPS)			
	IPS (2003)	LLC (2002)		CIPS Test Stat.	Critical Values		
	Test Stat. (p-value)	Test Stat. (p-value)			10%	5%	1%
<i>UP</i>	2.72 ^a (0.0032)	-3.22 ^a (0.0006)	7.30 ^a (0.000)	-2.026	-2.21	-2.33	-2.57
<i>ALMP</i>	-1.65 ^b (0.0486)	-4.89 ^a (0.0000)	13.02 ^a (0.000)	-1.986	-2.21	-2.33	-2.57
<i>TU</i>	-4.82 ^a (0.0000)	-6.05 ^a (0.0000)	19.05 ^a (0.000)	-3.156 ^a	-2.21	-2.33	-2.57
<i>Lw</i>	0.30 (0.6201)	-0.92 (0.1777)	12.00 ^a (0.000)	-2.011	-2.21	-2.33	-2.57
<i>GDP</i>	-7.95 ^a (0.0000)	-7.56 ^a (0.0000)	14.48 ^a (0.000)	-4.263 ^a	-2.21	-2.33	-2.57
<i>r</i>	-3.89 ^a (0.0000)	-3.07 ^a (0.0011)	28.62 ^a (0.000)	-2.847 ^c	-2.73	-2.86	-3.1
<i>LP</i>	-9.97 ^a (0.0000)	-10.07 ^a (0.0000)	6.10 ^a (0.000)	-4.615 ^a	-2.21	-2.33	-2.57
ΔUP	-	-	-	-3.294 ^a	-2.21	-2.33	-2.57
$\Delta ALMP$	-	-	-	-4.955 ^a	-2.21	-2.33	-2.57
ΔLw	-8.51 ^a (0.0000)	-8.42 ^a (0.0000)	-	-3.659 ^a	-2.21	-2.33	-2.57
Notes: ^a , ^b and ^c represent the significance at 1%, 5% and 10% levels respectively.							

Considering that there is a correlation between the units, the results of the CIPS test are taken into account when designing the VAR model. Subsequently, the lag length of the VAR model including stationary forms of the variables is determined as 1 according to the MAIC information criterion and the VAR(1) model is estimated. The estimation results of the model are shown in Table 3. In addition, since all eigenvalues of the model are in the unit circle, it can be said that the model meets the stability conditions.

Table 3

Estimation of Panel VAR Model

Equation Variable : ΔUP_t	Coef.	Z (P-value)
ΔUP_{t-1}	0.723 ^a	16.51 (0.000)
$\Delta ALMP_{t-1}$	-9.947 ^a	-14.36 (0.000)
TU_{t-1}	-0.010	-0.35 (0.726)
ΔLw_{t-1}	7.064 ^a	5.65 (0.000)
GDP_{t-1}	0.053	1.30 (0.195)
r_{t-1}	0.073 ^b	2.41 (0.016)
LP_{t-1}	-0.296 ^a	-6.61 (0.000)
N obs 180		
N countries 9		
Notes: VAR model is estimated by GMM. Final GMM Criterion Q(b) = 0.786. ^{a, b} and ^c represent the significance at 1%, 5% and 10% levels respectively.		

At this stage, primarily, the Granger Causality Test is performed by VAR(1) model and the results are presented in Table 4.

Table 4

Results of Panel Granger Causality Test

Equation Variable : ΔUP			
Excluded Variables	χ^2	df	Prob.
$\Delta ALMP$	206.209 ^a	1	0.000
TU	0.123	1	0.726
ΔLw	31.952 ^a	1	0.000
GDP	1.679 ^c	1	0.095
r	5.818 ^b	1	0.016
LP	43.715 ^a	1	0.000
Notes: ^{a, b} and ^c represent the significance at 1%, 5% and 10% levels respectively.			

When the findings are evaluated, it is seen that there is a causality relationship between the ALMP, Lw, GDP, r and LP variables and the UP variable. The results of variance decomposition analysis are presented in Table 5.

Table 5
Results of Forecast-Error Variance Decomposition

Response Variable and Forecast Horizon	Impulse Variable						
	ΔUP	$\Delta ALMP$	TU	ΔLw	GDP	r	LP
ΔUP 1	1	0	0	0	0	0	0
2	0.8451	0.1022	0	0.0129	0.0171	0.0012	0.0213
3	0.7488	0.1822	0.0004	0.0254	0.0203	0.0056	0.0169
4	0.6898	0.2275	0.0016	0.0319	0.0201	0.0138	0.0150
5	0.6473	0.2563	0.0033	0.0354	0.0186	0.0248	0.0139
6	0.6113	0.2773	0.0053	0.0388	0.0168	0.0374	0.0127
7	0.5783	0.2929	0.0074	0.0434	0.0150	0.0512	0.0115
8	0.5479	0.3037	0.0093	0.0491	0.0136	0.0657	0.0104
9	0.5197	0.3104	0.0110	0.0558	0.0126	0.0808	0.0094
10	0.4937	0.3137	0.0125	0.0631	0.0119	0.0962	0.0856

According to the results of variance decomposition, *ALMP* expenditures are very important in explaining the changes in the unemployment rate.

As mentioned before, this study mainly focuses on the results of the impulse-response functions. Accordingly, the graphs of the impulse-response functions estimated by the VAR(1) model are shown in Figure 1.

When the results of the impulse-response functions are analyzed, it is generally seen that the response of unemployment rate to a shock in the *ALMP* variable is negative and its response to the shock in the *dLw* variable is positive. Additionally, the response of the unemployment rate to a shock in the *TU* variable is found to be statistically insignificant, and this finding is consistent with the Granger Causality Test results. On the other hand, the findings obtained from the impulse-response functions including unemployment rate and macroeconomic variables are found to be statistically significant. The unemployment rate has a positive response to a shock in the *GDP* and *r* variables, and a negative response to a shock in the *LP* variable. These findings are consistent with the theoretical expectations and literature.

When the graphs in Figure 1 are examined in detail, the negative response of the unemployment rate to a shock in the *ALMP* variable does not disappear over time and appears to be permanent. Likewise, the positive response of the unemployment rate to a shock in the *dLw* variable is found to continue for a long time. Although the negative effect of a shock on *GDP* and *LP* variables on unemployment is statistically significant, it is seen that this effect disappears within 3-4 years. Meanwhile, the effect of a shock in variable *r* on unemployment is permanent and persists in every period.

Figure 1. Impulse-Response Functions

5. Conclusion

Unlike many other studies, in this study, panel time series analysis (panel VAR method) is used to examine the determinants of unemployment using up-to-date OECD data on labour market policies and institutions. In addition to this, by ignoring the interactions between the variables included endogenously in the model, any effects of the selected variables on unemployment are interpreted by discriminating. In order to examine the effect of macroeconomic shocks on unemployment, the labour productivity variable, which is a more specific variable, is used.

According to the findings, it is seen that the ALMP expenditure and minimum wage variables, which are labour market institutions variables, have a significant effect on unemployment rate and the trade union density variable has no effect. In addition, consistent with the expectations and the results of previous studies, the effect of the ALMP expenditures on the unemployment rate is negative and the effect of minimum wage is positive. Additionally, it is concluded that economic growth, real interest rate and labour productivity variables which are selected macroeconomic variables have a statistically significant effect on unemployment. It has been found that economic growth and labour productivity decreases unemployment and an increase in interest rates increases unemployment. Thus, the signs of macroeconomic

variables are consistent with the literature and expectations. Particularly, when the results of the impulse-response functions are interpreted, it is seen that the effect of macroeconomic indicators, such as economic growth and labour productivity on unemployment, disappears in the short term. At the same time, the effect of labour market institutions is extended over the long term and its effect on unemployment is permanent. In this context, although labour market policies and institutions seem to be important in explaining changes in unemployment rates, macroeconomic conditions are of great importance. Negative labour productivity shocks, slowdown in economic growth or increases in long-term real interest rates are all found to increase aggregate unemployment.

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Appendix:

Table A1. A Summary of Selected Empirical Studies on the Determinants of Unemployment in OECD Countries

	Data (Period)	Estimation Technique	Labour Market Institution Variables	Macroeconomic Variables
Scarpetta (1996)	Annual panel data of 15 to 17 OECD countries depending on specifications (1983-1993)	FGLS random effects	1, 2, 3, 4, 5, 6, 7	10, 11, 14
Nickell (1997)	Panel data with two 6-year averages of 20 OECD countries (1983-1994)	FGLS random effects	1, 2, 3, 4, 5, 6, 7	18
Elmeskov, Martin and Scarpetta (1998)	Annual panel data of 19 OECD countries (1983-1995)	FGLS random effects	1, 3, 4, 5, 6, 7, 8	10
Blanchard and Wolfers (2000)	Panel data with 5-year averages of 20 OECD countries (1960-1996)	OLS fixed effects	1, 2, 3, 5, 6, 7, 8	11, 12, 14, 15
Belot and Van Ours (2001)	Annual panel data of 18 OECD countries (1960-1995)	OLS fixed effects	1, 3, 4, 6	18
Bertola, Blau and Kahn (2001)	Panel data of OECD countries (1960-1996)	OLS fixed effects	1, 2, 3, 4, 5, 6, 7	11, 12, 15, 18
Nunziata (2002)	Annual panel data of 20 OECD countries (1960-1995)	Fixed effects, FGLS, dynamic panel	1, 2, 3, 4, 5, 6	11, 12, 15, 16
IMF (2003)	Annual panel data of 20 OECD countries (1960-1998)	Fixed effects FGLS, dynamic panel	1, 2, 3, 4, 5, 6	11, 13, 14
Baker, Glyn, Howell and Schmitt (2003)	Panel data with 5-year averages of 20 OECD countries (1960-1999)	FGLS random effects	1, 2, 3, 4, 5, 6	18
Boone and Van Ours (2004)	Annual panel data and panel data with 5-year averages of 19 OECD countries (1985-1999)	OLS fixed effects and FGLS random effects	1, 3, 7	18
Nicoletti and Scarpetta (2005)	Annual panel data of 20 OECD countries (1980-2002)	Fixed effects	1, 2, 3, 4, 5, 6, 9	10
Nickell, Nunziata and Ochel (2005)	Annual panel data of 20 OECD countries (1961-1995)	FGLS random effects, dynamic panel	1, 2, 3, 4, 5, 6	11, 12, 14, 15, 16
Bassanini and Duval (2006)	Annual panel data of 21 OECD countries (1982-2003)	Dynamic panel	1, 2, 3, 4, 5, 6, 7, 9	11, 12, 14, 15
Baccaro and Rei (2007)	Panel data with 5-year averages of 18 OECD countries (1960-1998)	Dynamic panel	1, 2, 3, 4, 5, 6	11, 13, 14, 15
Stockhammer and Klar (2011)	Panel data with 5-year averages of 20 OECD countries (1960-2003)	OLS fixed effects	1, 2, 3, 4, 5, 6	11, 12, 14, 15, 17

Notes: *Labour Market Institution Variables:* 1- Unemployment benefit replacement ratio; 2- Unemployment benefit duration; 3- Union density; 4- Employment protection legislation (EPL); 5- Collective bargaining coverage / Bargaining coordination; 6- Tax wedge; 7- Active labour market policy (ALMP); 8- Minimum wage; 9- Product market regulation. *Macroeconomic Variables:* 10- GDP / Output gap; 11- Real interest rate; 12- Total factor productivity; 13- Labour productivity; 14- Terms of trade; 15- Labour demand shock; 16- Money supply; 17- Capital accumulation; 18- Inflation