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Article

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PRZEMYSŁAW WŁODARCZYK^{**}**

Importance Of Employment Protection And Types Of Employment Contracts For Elasticity Of Employment In The OECD Countries

Abstract

This article presents the impact of the global crisis on employment in the OECD countries, and in particular is an attempt to explain why the impact is of a different scope in particular countries. Particular attention has been paid to the question of the role played by labour market institutions (such as employment protection legislation and fixed-term employment).

The global economic crisis has influenced the situation in the labour markets of OECD countries, causing declines in employment and increases in unemployment. Changes in the level of employment in individual countries varied. Between 2007-2012 declines in production took place in the majority of OECD countries. Declines in real wages were also observed in those countries. On the other hand, in the period of 2005-2012 relatively small changes in labour market institutions occurred. With respect to both the stringency of employment protection legislation, as well as the share of fixed-term employment, there were no clearly visible trends in the data during the period of economic crisis.

The econometric verification of theoretical hypotheses was performed using annual data from the 2005-2012 period for 26 OECD countries, and it

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shows that GDP and real wages were statistically significant determinants of employment size in the analyzed period. The study also confirmed the hypothesis of the existence of a non-linear (U-shaped) relationship between employment elasticity with respect to GDP and the level of stringency of employment protection legislation, as well as the share of fixed-term employment in the total number of employment contracts. The results show that the smallest declines in employment during a crisis might be expected in countries where the level of EPL is close to 2, and the share of fixed-term employment in the total number of employment contracts is close to 18%.

Keywords: *employment, labour market institutions, employment elasticity, employment protection, fixed-term employment*

1. Introduction

The global crisis which began in the second half of the first decade of the 21st century has become the recent object of lively debate and investigation in world economic literature. Detailed analyses have been undertaken with respect to its appearance, both from the worldwide as well as particular countries' perspective, and various concepts and hypotheses have been put forward with respect to the causes and determining factors of the crisis. A number of efforts have also been undertaken to identify and assess its basic effects. This widespread focus on the economic crisis issue in the world literature is hardly surprising. The crisis has affected the economies of a decided majority of countries in the world, the financial situations and positions of the entire range of economic entities, left its imprint on governmental activities and policies at all levels of government, and has led to the revision of a whole series of conventional economic theories. Thus it is no wonder the global crisis has become a hot topic in economic debate.

This article¹ focuses on the effects of the global crisis for the labour markets of the OECD countries, in particular with respect to the basic economic factor determining the situation in labour markets, i.e. employment. An attempt is made not only to identify those effects in particular countries, but above all to shed light on the differentiated scopes of such effects. In this regard special attention is paid to the issue of the role of labour market institutions. Taking into account the limited framework of our analysis, we focus on the roles of two

¹ This article is a preliminary version of a much broader study prepared for the IXth Congress of Polish Economists.

labour market institutions, namely employment protection legislation (EPL), and the type of employment contracts. The main aim of this article is thus to assess the influence of these two selected labour market institutions on employment in the OECD countries during the global crisis.

The work consists of six sections. In section two we attempt to show the impact of global crisis on shaping both employment and unemployment, identifying countries in which the largest negative changes in these categories occurred. Section three is a theoretical analysis of the factors determining changes in employment during a crisis. This analysis is based on recognized economic theories, in particular the neoclassical and Keynesian theories. Section four is focused on presenting stylized facts about the determinants of employment changes in the OECD countries during the period of the global crisis. Section five is devoted to econometric verification of the hypotheses concerning the influence of EPL as well as the share of fixed-term employment contracts in the total number of contracts on the changes of employment, based on statistical data concerning the OECD countries. The most important conclusions are presented in section six.

2. Changes in the labour markets of OECD countries in the years 2005-2012

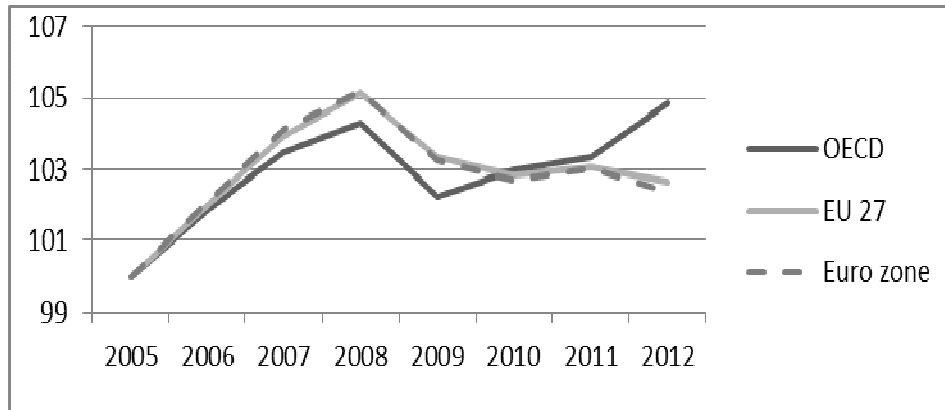
The global crisis caused significant, negative changes in the labour markets of the majority of OECD countries, although the inception of the changes did not appear in particular countries at the same time. The decisive year, in which the negative tendencies gathered force in most of the countries, was 2009, although the effects continued to be felt in many of the countries in subsequent years as well. These effects concerned both employment and unemployment. Below we analyze the trends in more detail.

Chart 1 presents employment trends in three selected groups of countries during the period 2005-2012. The groups are: the OECD, the EU-27, and the Eurozone countries (it should be noted the groups contain significant overlap). While overall declining trends can be seen in all groups, they were stronger and lasted longer in the EU-27 and Eurozone countries than in the OECD countries as a whole. The negative trends in the OECD countries began to reverse after 2009.

Detailed data on the changes in employment in particular OECD countries indicates the differentiated situation in various countries in the years researched. The countries which have shown continual and significant employment growth are Israel, Chile, and Australia. A second group of countries also experienced a relatively advantageous situation, whereby employment growth was stunted

for only one year and then stabilized at a constant rate. These countries include Austria, Belgium, Canada, the Netherlands, Mexico, New Zealand, Norway, and also Poland. The remaining countries are characterized by strong changes in employment trends, with significant declines in the crisis years.

Chart 1. Dynamics of change in groups of countries during 2005-2012 (2005=100)



Source: OECD internet database.

Table 1. Coefficients of annual variation and indices of negative semi standard deviation of the rate of change in employment in the years 2005-2012 in countries with indices higher than the mean value by $\frac{1}{2}$ of standard deviation

Country	Coefficient of variation	Index of negative semi standard deviation of the rate of change in employment
Greece	5.87%	3.85
Estonia	4.78%	3.57
Ireland	6.05%	3.29
Spain	5.61%	3.07
Iceland	4.14%	2.14
Portugal	3.71%	2.11
Japan	2.08%	1.87

Source: own calculations.

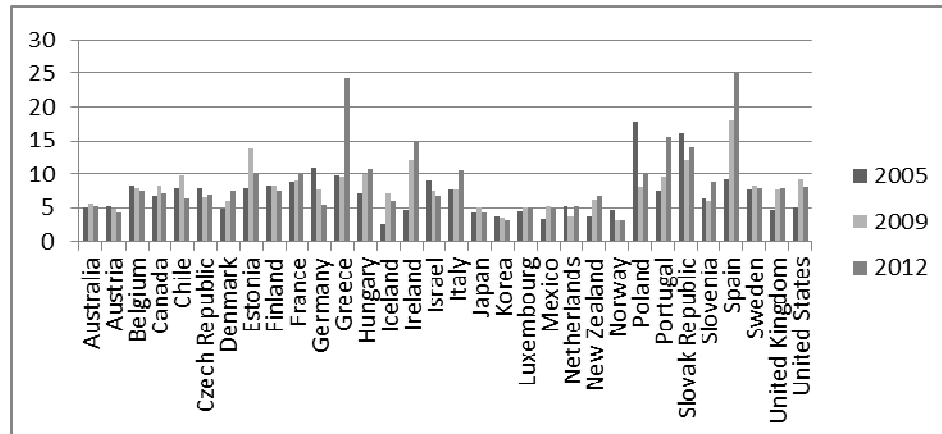
Table 1 presents information about two indices which characterize employment changes in the countries which suffered the largest negative consequences in terms of employment as a result of the global crisis. This concerns the coefficient of variation in the rate of change of employment and the index of negative semi standard deviation of the rate of change in employment in the years 2005-2012 in countries with indices higher than the mean value for the

whole sample by $\frac{1}{2}$ of standard deviation². The table shows that the largest variation in the rate of change of employment took place in Greece, Estonia, and Ireland. Greece, Estonia, Ireland, Spain, Iceland, Portugal, and Japan, were also the countries which demonstrated the biggest falls of employment in the analysed period, measured by the index of negative semi standard deviation of the rate of change in employment. The most difficult situations with respect to employment took place in Greece, Spain, and Portugal, where employment during the years 2008-2012 fell by 17%, 15% and 11% respectively.

The differentiated situation on the labour markets of the OECD countries is also reflected in the various levels and various dynamics of change in the unemployment rate in particular countries. Chart 2 presents the unemployment rate in the researched countries for the years 2005, 2009, and 2012. In the first place, it can be seen that the highest unemployment rates were noted in Slovakia, Poland, Spain, Greece, Portugal and Ireland, with the latter four (Spain, Greece, Portugal and Ireland) recording their highest unemployment rate in 2012, which indicates a longer and continuing economic slump in those countries. In both Poland and Slovakia the highest unemployment rate was recorded in 2005. The lowest unemployment rates were recorded in South Korea, Norway, Japan, Austria, Mexico and the Netherlands. Secondly, the sharp differences in the dynamics of changes in unemployment rates in particular countries should be noted. During the period of the global crisis the steepest increases in the unemployment rate occurred in Spain, Greece, Ireland, Portugal, and Hungary, which indicates these countries' high sensitivity to the overall downturn in employment. Thirdly, in the cases of Slovakia, Slovenia and Poland their unemployment rates dropped in 2009 in comparison to 2005, but unfortunately rose between 2009 and 2012.

The trends with respect to changes in the labour markets of the OECD countries presented above show that the crisis has left a significant imprint on the labour markets, causing decreases in employment and increases in unemployment. The scale of these changes however is strongly differentiated with respect to particular countries. The question thus arises: what are the main reasons for this high degree of differentiation? We begin below by examining the question from the theoretical aspect.

² The index of negative semi standard deviation of the rate of change in employment was calculated according to the following formula: $\sqrt{\frac{\sum_{i=1}^N (x_i - x_0 | x_i - x_0 < 0)^2}{N}}$ where $x_0 = 0$, and x_i is the rate of change of employment in the period i , while N is the number of periods.

Chart 2. Unemployment rate in the OECD countries for the years 2005, 2009 and 2012 (in %)

Source: OECD internet database.

3. Determinants of changes in employment during the crisis – theoretical foundations

For many economies the global crisis is a negative shock that descend on their entire network of economic activities, the source of which lay outside their national economic system. In the modern globalized world external crisis impulses are readily transmitted into national economies, in particular through the channels of foreign trade and capital transfers. As a result of these impulses steep declines in exports and capital outflows take place, bringing about a reduction in aggregate demand in the short term. In many countries the effects of the global crisis are most tangible with respect to the negative shock in demand. And this shock is of critical importance to the labour markets. However, changes in employment, and also unemployment, depend not only on the scope of the negative shock, but also on the character of the adjustment processes occurring in the economy in response to the shock. Here we examine this aspect in more detail.

Negative demand shock calls forth adjustment processes in various segments of the economy and in various markets, including, among others, the markets for goods and labour. These processes are of particular interest to us in

terms of our research aim. These processes have been widely examined on the basis of two fundamental theoretical constructs, i.e. neoclassical and Keynesian economic theory.³

In accordance with neoclassical theory, which emphasizes price and wage elasticity, negative shock to demand brings forth above all price and wage adjustments, which relatively quickly eliminate the imbalances created by the shock. This theory implies that, as a result of these adjustments, no significant decline in output occurs, and the imbalances in the labour market are quickly eliminated by the real wage adjustments.

The adjustment process looks different in Keynesian theory. On the basis of this theory, and in particular in new Keynesian economics, a range of concepts have been developed to justify the maintenance of rigid wages and prices (among others the theories of menu costs, implicit contracts, efficiency wage, and insider-outsider). These concepts emphasize that adjustment processes are based above all on quantitative adjustments, which in the case of negative shocks are expressed in declines in output and employment.

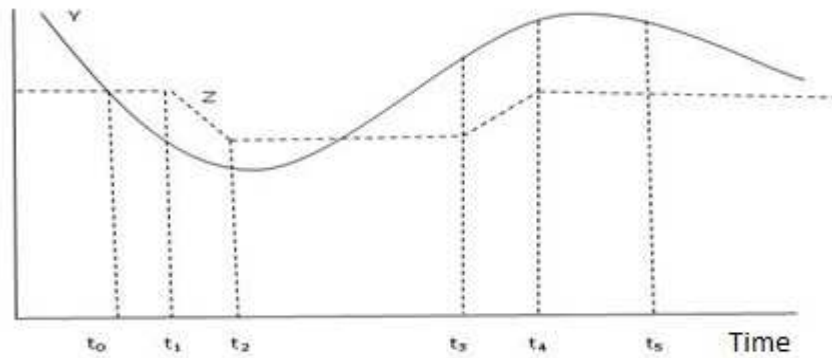
It is no easy task to decide which of these two economic concepts better describes the actual processes of adjustment which take place in an economy. Important factors in choosing which concept better applies are: the time horizon taken into account, actual structures of the analyzed markets, and the position of the two sides in the labour market, i.e. employers and employees, as well as the character of the existing institutions. The most likely hypothesis is that both theoretical concepts have their significance in practice, although neither of them exhaust the rich range of possible explanations for adaptation processes.

A negative shock to demand can bring about a trend toward price decreases in the goods market, especially in those sectors characterized by the absence of monopolistic structures, but this adjustments most certainly do not exhaust the whole range of adjustment processes. A decline in demand can also result in adjustments with respect to the changes in times of delivering goods or changes in product inventories, and if the decline in demand is sufficiently deep and long-term, output declines are almost inevitable. As a result of considerations presented above, one may assert that the scale of the decline in output depends not only on the depth of the drop in demand which results from the negative shock, but also on the range of the above-mentioned adjustment processes used, i.e. price declines, changes in delivery schedules, or changes in product inventories. The greater the scale and scope of the adjustment processes used, the lesser the likelihood of quantitative adjustments in the form of output declines.

³ See Tsoulfidis, 2010, pp. 363-380.

Negative shocks to demand which do lead to declines in output bring about adjustment processes in labour markets. Their appearance results from the disproportion between the previously existing demand for production factors (including the demand for labour), and the reduced demand which results from the lowered production. Viewing this question from the point of view of entrepreneurs, one may state that the reduced cash income of companies associated with limited production (as well as price declines) require adjustments aimed at reducing the costs of production, including the cost of labour. These adjustments may take various forms. Firstly, they bring about a tendency to lower wages, which is strongly espoused in the theories based on the neoclassical traditions. It should be noted however that in the modern world, in which labour unions operate, collective bargaining agreements are in place, as well as minimum wage regulations, and a number of contracts is of a relatively long-term nature, this type of adjustment has a limited scope of application. Secondly, entrepreneurs may attempt to reduce operational costs by reducing the work hours of employees, assuming such a reduction is connected with lower labour costs. Such an approach is characterized not only by a decline in productivity per employee, but may also bring about a decline in productivity per hour of work, if the reduction in work hours is less than the decline in output brought about by reduced demand. In such instances the phenomena of labour hoarding may occur, which may be tolerated by employers for reasons of profitability.⁴ Thirdly, adjustments may take the form of reductions in the number of employees, which is strongly espoused in Keynesian economic theory. However, the experiences of many economies demonstrate that adjustments of employment to the changes in output do not usually occur simultaneously, but rather take place as a delayed reaction, as is shown in Illustration 1 below. Such cyclical employment trends can be explained by the appearance on the labour market of other adjustment mechanisms. Even more, based on such observations one may posit that there is an element of interchangeability between the various types of adjustment mechanisms, i.e. quantitative adjustments in the labour market in the form of employment changes are less pronounced in the event of stronger application of wage adjustments and adjustments to work schedules.

⁴ This phenomenon is extensively described in the Polish literature by P. Strzelecki, R. Wyszynski, K. Sączuk (2009, s. 77-104).

Illustration 1. Changes in production (Y) and employment (Z) in business cycles

Source: Smith, 2003, p. 50.

Based on the above it may be postulated that the scale of changes in employment during a crisis period depends to a significant extent on the role played by specific types of adjustment processes on the labour market. If wage reductions and shortening of work time are used, the scale of changes in overall employment is lessened. The question of what type of adjustments are dominant in a given labour market depends above all on the institutions existing in given economy, in particular on legal regulations with respect to compensation (especially minimum wage), work hours, dismissals, and the possibilities with respect to hiring workers on fixed-term or indefinite-term contracts, as well as on the degree of influence and interdependence of the adjustment mechanisms used to reduce costs. With respect to all the above-mentioned factors, a critical role is played by two institutions: the EPL and the availability (or not) of fixed-term contracts of employment.

The EPL is comprised of a collection of binding norms and restrictions concerning employment dismissals, notice requirements for terminations, and requirements concerning severance pay (Cahuc, Zylberberg 2004, p. 734 as well as Boeri, van Ours 2011, p. 255).⁵ The fundamental aim of legal norms governing employment protection is to increase the stability of employment for workers and the security of their remuneration. When the regulations concerning protection of employment are more stringent, employers incur greater costs in connection with the termination of employment relationships, and so they only use these types of adjustments and adaptations when necessary. In other words, increases in the costs of employment termination discourage employers from performing quantitative adjustments of employment in favour of adjustments of

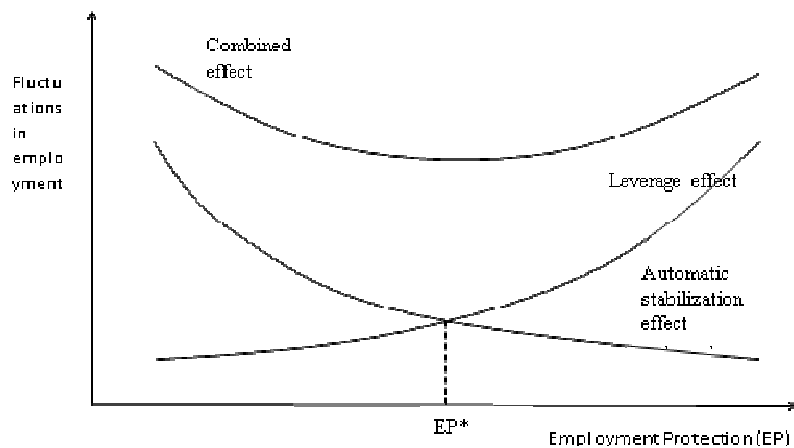
⁵ For more on the topic of employment protection legislation, see Kwiatkowski, Włodarczyk, 2012.

wages and work time. One may thus conclude that highly restrictive regulations protecting employment stabilize the fluctuations in employment/unemployment.

However, the practical experience of numerous countries, as well as the theoretical analyses undertaken in the literature, indicate the impact of EPL on the labour market is much more complex phenomenon. According to E. P. Lazear (Lazear 1990), the introduction of stringent employment protection regulations under the assumption of wage and work elasticity has a neutral influence on employment, because the increased costs associated with employment termination are taken into consideration in wage negotiations with employees (i.e., the wages are established at a lower level), and as a result the adjustments made in time of crisis are focused on reducing wages and work hours, and not on reductions in overall employment.

The situation looks different however in the case of rigid wages. In cases of weak employment protection, negative shocks produce strong quantitative adjustments, which result in reduction in employment. An increase in the stringency of such regulations brings about either a stabilization, or even weakening of fluctuations in employment/unemployment (Blanchard, Summers, 1986). But the consequences do not end there. Restrictive regulations impede, if not make impossible, the rational allocation of the workforce, worsening the profit/loss sheets of companies, which negatively affects labour demand (Greenwald, Stiglitz 1995).

Illustration 2. Employment protection and fluctuations in employment



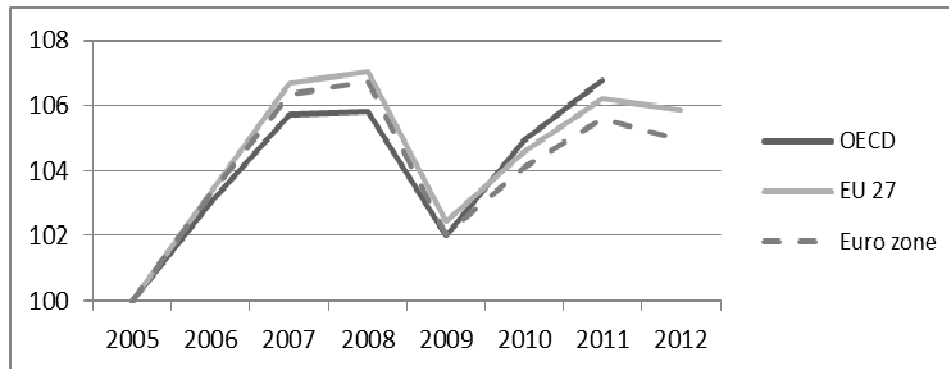
Source: Malul, Rosenboim, Tal, 2011.

These two opposite effects are emphasized in the work of M. Malul, M. Rosenboim and S. Tal (2011), who distinguish between the automatic stabilization effect and the leverage effect (increasing fluctuations in employment/unemployment as a result of lower profits), as shown in Illustration 2 above. Taking into consideration both effects the authors came to the conclusion that the combined effect of the influence of EPL may take the shape of the letter U. This suggests that moderately restrictive regulations may be the optimal solution.

Another factor influencing employment fluctuations during the global crisis is popularity of fixed-term employment contracts. This can be measured by the share of employees working on the basis of fixed-term contracts in the overall number of employees. Several arguments can be put forth to suggest that the influence of the increase in the number of fixed-term employment contracts on employment fluctuations also takes the shape of the letter U, although it is more flattened out at low indicator levels. This is connected with the fact that employment protection is usually greater in the case of contracts for an indefinite period than in the case of fixed-term contracts. In cases where the share of employees working on fixed-term contracts is very minimal (i.e. the basic form of employment is the contract for an indefinite period, which implies a high degree of employment protection), the effect may be a strongly irrational allocation of resources, leading in the end to increased employment fluctuations. An increase in the number of workers on fixed term contracts may initially reduce fluctuations in employment as a result of the more rational allocation of resources, but further increases in the share of fixed-term contracts can lead to increases in employment fluctuations due to the ease of terminating employment.

4. The determinants of changes in employment in the OECD countries – stylized facts

Based on the theoretical analyses presented in part three above, it can be seen that in terms of occurrence of negative economic shock – GDP, real wages, the stringency of employment protection regulations as well as the role of various types of employment contracts play a crucial role in determining the situation on a given labour market. In this section we will more closely examine the dynamics and trends visible in those factors in the OECD countries during the years 2005-2012. Our analysis is based on annual data from the OECD internet database for 31 OECD countries for the years 2005-2012.

Chart 3. Dynamics of GDP changes in groups of countries during the years 2005-2012 (2005=100)

Source: OECD internet database.

One of the fundamental factors influencing the level and scope of reduction of employment in time of crisis is the size of output created in an economy, measured by Gross Domestic Product (GDP). Chart 3 presents the dynamics of changes in the size of GDP in the analyzed groups of countries for the years 2005-2012. As can be seen, all the analyzed countries experienced a growth in production during the period 2005-2008, albeit the growth in 2008 was decidedly weaker than in previous years. The greatest decline in GDP was noted in 2009. Beginning in 2010 we can observe a return to growth tendencies, although in the case of the EU countries this growth rate was significantly slowed in 2012, which was the result primarily of the fiscal crisis which struck several Eurozone countries, such as Greece, Spain, Portugal and Italy.

Table 2 below presents a summary of changes in GDP in the OECD countries in the years 2005-2012. It can be seen that during this period most of the countries suffered from an economic downturn, which resulted in limited production. In the case of twelve countries the decline in GDP began in 2007, while for fifteen countries the first decline was noted in 2008. In nineteen countries the crisis ended in 2009, and in two countries in 2010. In Greece, Spain, Portugal, Italy and Hungary successive declines in GDP lasted until 2012, which was mainly connected with the growing fiscal crisis and the need for significant cuts in the budgetary expenses of these countries. Only three countries – Israel, South Korea, and Poland – did not record an absolute decline in GDP during the period analyzed.

The greatest declines in GDP during the crisis took place in: Greece (21.9 p.p. over five years). Estonia (20.9p.p. over two years), Iceland (11.7p.p. over two years), Finland (9.4p.p. in one year), Slovenia (9.2p.p. in one year), Ireland (9.1p.p. over three years), and Italy (7.2p.p. over five years). The smallest declines in GDP took place in: Chile (1.2p.p.), Norway (1.7p.p.), New Zealand

(1.9p.p.), Canada (2.9p.p.), and Belgium (3p.p.). In these countries declines in GDP were recorded for a single year only.

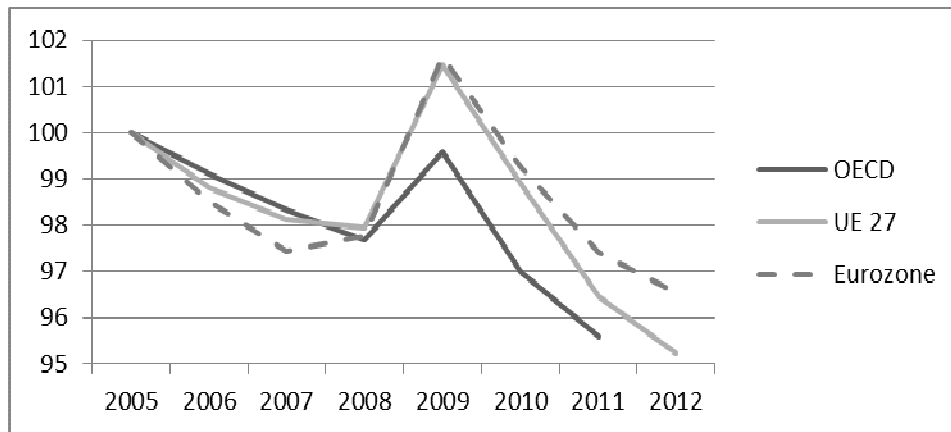
Table 2. Changes in GDP in the OECD countries during 2005-2012

Country	Upper turning point of the business cycle		Lower turning point of the business cycle		Changes in GDP (in p.p.)
	Maximum (Index of changes in GDP2005=100)	Year	Minimum (Index of changes in GDP 2005=100)	Year	
Greece	109.2	2007	87.3	2012	21.9
Estonia	118.3	2007	97.5	2009	20.9
Iceland	112.3	2008	100.6	2010	11.7
Finland	110.3	2008	100.9	2009	9.4
Slovenia	117.0	2008	107.9	2009	9.2
Ireland	111.1	2007	102.1	2010	9.1
Italy	103.9	2007	96.8	2012	7.2
Japan	103.9	2007	97.2	2009	6.8
Denmark	105.0	2007	98.3	2009	6.7
Mexico	109.9	2008	103.3	2009	6.6
Slovakia	126.6	2008	120.4	2009	6.2
Portugal	103.8	2007	97.9	2012	6.0
Sweden	107.8	2007	101.7	2009	6.0
Hungary	104.9	2008	99.0	2012	5.9
Spain	108.7	2008	103.2	2012	5.5
Germany	108.3	2008	102.7	2009	5.5
Czech	116.7	2008	111.4	2009	5.3
Great Britain	106.3	2007	101.1	2009	5.2
Austria	109.1	2008	104.9	2009	4.2
Australia	118.3	2011	114.2	2012	4.1
Holland	109.4	2008	105.4	2009	4.0
USA	104.6	2007	101.0	2009	3.6
France	104.8	2007	101.4	2009	3.4
Belgium	106.7	2008	103.7	2009	3.0
Canada	105.8	2008	102.9	2009	2.9
New Zealand	105.3	2007	103.4	2008	1.9
Norway	105.1	2008	103.4	2009	1.7
Chile	114.8	2008	113.6	2009	1.2
SouthKorea	127.6	2012	-	-	-
Israel	133.6	2012	-	-	-
Poland	134.0	2012	-	-	-

Source: own calculations.

Real wages constitute the next factor which exercises an influence on employment changes in an economy. Changes in the level of wages in response to an economic slump enable economic entities to limit the scope of quantitative adjustments in employment. As can be seen in Chart 4, during the period analyzed real wages underwent a slight declining trend in 2005-2006, followed by a relatively dynamic growth in the years 2007-2009, and then a declining trend after 2010. This indicates that real wages in the OECD countries had a delayed reaction to the negative economic shock.

Chart 4. Dynamics of changes in real wages in groups of countries during the years 2005-2012 (2005=100)



Source: OECD internet data base.

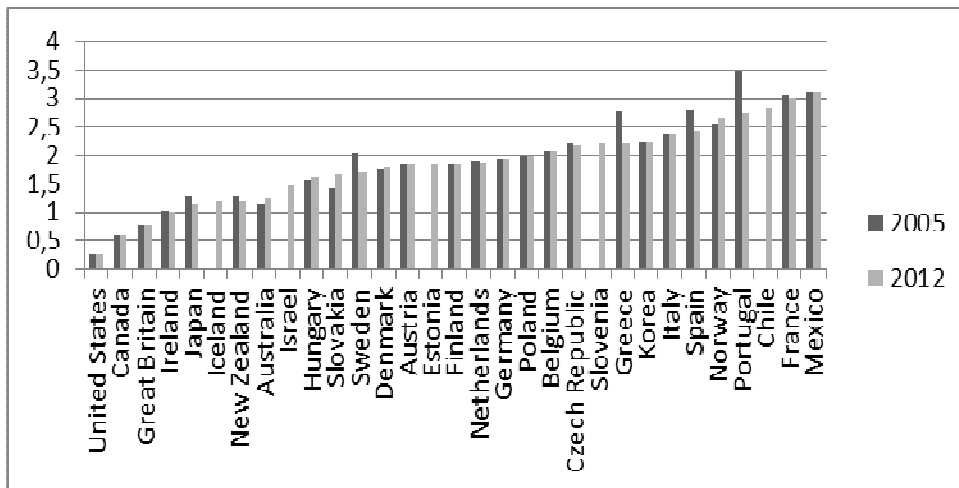
Analysis of the detailed data concerning real wages dynamics allows for the assertion that although a decline in real wages took place in most of the OECD countries during the economic crisis, the decline was relatively moderate, usually not exceeding 2% per year. A rather strong downward wage adjustment is visible in South Korea, Denmark, Ireland and Estonia, and the largest decline was recorded in Iceland, reaching 11% annually.

Factors of an institutional nature also have an influence on the scope of quantitative adjustments to employment in times of a negative economic shock. These factors include the degree of stringency of employment protection regulations as well as the share of fixed-term employment contracts in overall employment.

In order to assess the degree of restrictiveness of employment protection regulations we used the EPL (Employment Protection Legislation) index, a standard measure used in research and elaborated and calculated by the OECD. This summary index is the weighted average of 21 elements used to describe the degree of stringency of legislation adopted in various countries aimed at the

protection of employment. The index is based on values of 0 (least stringent) to 6 (most stringent).⁶

Chart 5. Summary index of restrictiveness of employment protection legislation(EPL) in the OECD countries for the years 2005 and 2012 (0 – least stringent; 6 –most stringent)



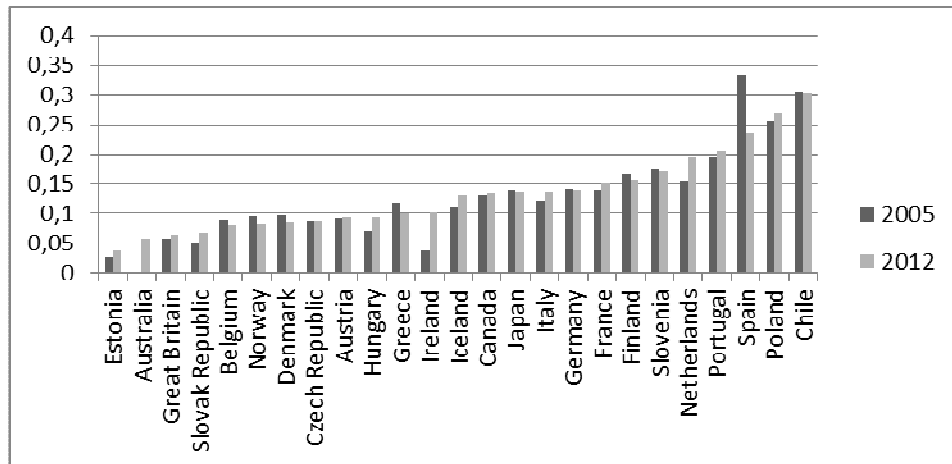
Source: OECD internet data base.

Chart 5 shows the levels of the EPL index for OECD countries, with the least stringent overall being on the left side of the chart and the most stringent overall on the right side. In 2005 the most stringent employment protection regulations were in place in Portugal, Mexico, France, Spain, Greece and Norway. In 2012 however countries with the most stringent employment protection regulations were Mexico, France, Chile, Portugal, Norway and Spain. The least stringent EPL index values, both in 2005 and 2012 were noted in the Anglo-Saxon countries: United States, Canada, Great Britain, Ireland, New Zealand, Australia, as well as in Japan.

Changes in the EPL index between 2005 and 2012 occurred rather slowly and to a great degree were associated with the deregulation of labour markets. Decreases in the stringency of employment protection regulations were noted in ten countries, with the greatest declines in restrictiveness occurring in Portugal, Greece, Sweden and Japan. Changes increasing the degree of stringency were implemented in five countries: Slovakia, Norway, Australia, Hungary and Denmark. In absolute terms, the EPL index declined overall, reflecting a loosening of the restrictiveness of employment protection regulations.

⁶ The methods for measuring employment protection legislation and the methods for establishing EPL index values are extensively described in: Kwiatkowski, Włodarczyk, 2012, pp. 3-5.

Chart 6. Changes in the share of persons working on fixed-term contracts in the overall number of persons employed in the OECD countries for the years 2005 and 2012



Source: OECD internet data base.

The second factor of an institutional nature which is analyzed herein is the share of fixed-term employment contracts in the overall number of work contracts. Chart 6 shows the shape of that share in the OECD countries for the years 2005 and 2012. In 2005 the largest share of fixed-term contracts was noted in Spain, Chile, South Korea, Poland, and Portugal, and the lowest share of fixed-term contracts was observed in Estonia, Ireland, Slovakia, Great Britain and Hungary. In 2012 the share of fixed-term contracts in overall employment was highest in Chile, Poland, Spain, Portugal, and the Netherlands, and lowest in Estonia, Australia, Great Britain and Slovakia.

It should be noted that, similar to the situation concerning the stringency of legal regulations, the absolute difference in the scope of the use of fixed-term employment contracts is not very large, and overall there is an increase in the use of such contracts. Increases could have been observed in fourteen countries, with the largest percentage increase taking place in Ireland (6.5p.p.), the Netherlands (4p.p.), Hungary (2.4p.p.) and Iceland (2.1p.p.). A decrease in the use of fixed-term employment contracts was noted in only ten countries, with the largest decrease by far taking place in Spain (9.7p.p.), followed by Greece (1.9p.p.) and Norway (1p.p.).

5. Econometric analysis

The hypotheses described in the previous sections of this paper relating to the effect of GDP, real wages and institutional factors on employment patterns in conditions of negative economic shock were subjected to econometric verification using econometric methods for panel data.

The econometric model used was based on traditional function of demand for labour, which took into consideration both neoclassical and Keynesian determinants of employment, i.e. production and real wages. This model can be expressed using the following equation:

$$\ln(Z_{i,t}) = \beta_1 \ln(PKB_{i,t}) + \beta_2 \ln(RWage_{i,t}), \quad (1)$$

where: $Z_{i,t}$ – the number of workers, according to LFS in i -th country in period t ,

$PKB_{i,t}$ – the level of GDP in i -th country in period t ,

$RWage_{i,t}$ – real wages in i -th country in period t .

In order to verify the hypotheses concerning the influence of factors of an institutional nature on the size and scope of employment adjustments, we added to our model interactive variables describing the influence of the degree of stringency of employment protection regulations (using the EPL index) as well as the share of fixed-term employment contracts in the total number of employment contracts on the relationship between employment and GDP. The nonlinear character of this relationship was taken into consideration.

The model used in our empirical research thus took the form:⁷

$$\ln(Z_{i,t}) = \beta_1 \ln(PKB_{i,t}) + \beta_2 \ln(RWage_{i,t}) + \gamma_1 \ln(PKB_{i,t}) \cdot EPL_{i,t} + \gamma_2 \ln(PKB_{i,t}) \cdot EPL_{i,t}^2 + \gamma_3 \ln(PKB_{i,t}) \cdot Uokr_{i,t} + \gamma_4 \ln(PKB_{i,t}) \cdot Uokr_{i,t}^2, \quad (2)$$

where: $EPL_{i,t}$ – level of the EPL index in i -th country in period t ,

$Uokr_{i,t}$ – share of persons employed on fixed-term contracts in the total number of persons employed in i -th country in period t .

With the aim of avoiding non-stationarity of the variables used in our model, which could result in the appearance of so-called 'spurious regression',⁸ our

⁷ This model is based on the model used in: Kwiatkowski, Włodarczyk, 2012.

model was transformed into a form based on first differences. Taking into account this functional form of the model we did our estimations in a version without a constant term:

$$\begin{aligned}
 \Delta \ln(Z_{i,t}) = & \beta_1 \Delta \ln(PKB_{i,t}) + \beta_2 \Delta \ln(RWage_{i,t}) \\
 & + \gamma_1 [\Delta \ln(PKB_{i,t}) \cdot EPL_{i,t} + \ln(PKB_{i,t}) \cdot \Delta EPL_{i,t}] \\
 & + \gamma_2 [\Delta \ln(PKB_{i,t}) \cdot EPL_{i,t}^2 + \ln(PKB_{i,t}) \cdot 2EPL_{i,t} \\
 & \cdot \Delta EPL_{i,t}] \\
 & + \gamma_3 [\Delta \ln(PKB_{i,t}) \cdot Uokr_{i,t} + \ln(PKB_{i,t}) \cdot \Delta Uokr_{i,t}] \\
 & + \gamma_4 [\Delta \ln(PKB_{i,t}) \cdot Uokr_{i,t}^2 + \ln(PKB_{i,t}) \cdot 2Uokr_{i,t} \\
 & \cdot \Delta Uokr_{i,t}]
 \end{aligned} \tag{3}$$

Lagged explanatory variables were introduced to the model. We obtained statistically significant estimations of the parameters for real wages lagged by one or two periods, as well as interactive variables describing the strength of the impact of stringency of employment protection legislation on the elasticity of employment to changes in GDP, lagged by two periods.

In this model parameters β_1 and β_2 take on an elasticity interpretation and inform us by how many percentage points employment is reduced/increased if the GDP/real wages increase/decrease by one percentage point. The parameters γ_1 , γ_2 , γ_3 and γ_4 are of an interactive nature. Parameters γ_1 and γ_2 show us by how many percentage points elasticity of employment to GDP changes if the EPL index increases or decreases by 1. These parameters need to be interpreted together. The parameters γ_3 and γ_4 on the other hand tell us by how many percentage points elasticity of employment to GDP increases if the overall number of persons employed increases or decreases by 1. Like the previous parameters, these need to be interpreted together.

Basing on the theoretical considerations presented in part three of this work, we can formulate the following expectations concerning the desired sign of the model's parameters' estimates:

- in accordance with Keynesian theory one should expect the existence of positive relationship between employment and the size of aggregate demand and production. The value of parameter β_1 should thus be positive,

⁸ For more on the topic of non-stationarity of time series see: Charemza, Deadman, 1997, pp. 108-113. With respect to non-stationarity in panel data, see: Baltagi, 2005, pp. 237-238; 250-252.

- neoclassical theory indicates the existence of a negative relationship between employment and real wages, which should lead to a negative value of parameter β_2 ,
- the hypothesis concerning the nonlinear influence of the level of stringency of employment protection legislation on the elasticity of employment with respect to GDP would be confirmed if a negative value is attained for parameter γ_1 and a positive value is attained for parameter γ_2 ,
- on the other hand, confirmation of the hypothesis concerning the nonlinear relationship between the share of fixed-term contracts and the elasticity of employment with respect to GDP would occur in the case of obtaining negative values for parameter γ_3 and positive values for parameter γ_4 .

The model was estimated using the Panel EGLS method.⁹ Annual statistical data from the OECD data base (<http://stats.oecd.org>) was employed. This data concerned 26 OECD member states. Owing to the lack of available information in some data categories and/or the lack of a sufficiently long sample the model does not take into account Chile, Israel, Luxemburg, Mexico, New Zealand, Switzerland, Turkey and the United States. The effective sample period is 2005-2012.

The estimation results are presented in Table 3. The model results cover the entire period of 2005-2012, as well as the sub-period of the global crisis, i.e. years 2008-2012. All of the estimated values of parameters are in accordance with the theoretical expectations formulated above.

The values obtained for the parameters of equation (3) indicate that both throughout the entire period as well as during the crisis period, GDP and real wages were statistically significant determinants of employment in the OECD countries. The fact that the elasticity of employment was lower than that of real wages during the crisis may reflect the fact that, in times of negative economic shock, employment inertia is increased. This suggests that the adjustment mechanisms described in section three of this work acted in that period, resulting in occurrence of the phenomenon of labour hoarding.

The hypothesis that employment protection legislation influences the elasticity of employment to GDP was confirmed, both for the entire period studied as well as for the years 2008-2012. It should be noted that the effect of changes in the level of employment protection legislation are visible only after two periods. This may be connected with the fact that changes in employment protection regulations are taken into account only upon the signing of new employment contracts with workers. The hypothesis that the share of persons employed on fixed-term contracts in the total number of persons employed

⁹ Compare: Chen, Lin, Reed, 2005, p. 22; Cizkowicz, Rzońca, Wojciechowski, 2012, p. 73.

influenced employment elasticity was confirmed only with respect to the period of the global economic crisis. This indicates the critical role played by this factor in the employment adjustment processes in the times of crisis.

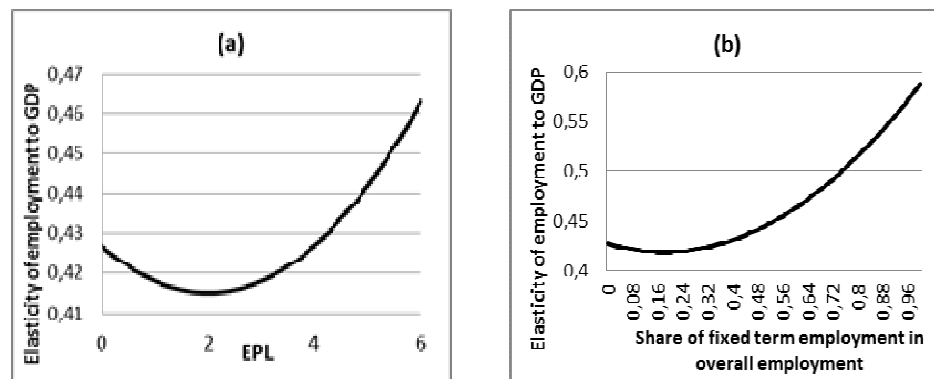
Table 3. Results of the estimation of parameters of the model for 26 OECD countries for the years 2005-2012 and 2008-2012

Sample period	2005-2012		Sample period	2008-2012	
Number of countries	26		Number of countries	26	
Number of observations	185		Number of observations	116	
Explained variable	$\Delta \ln(Z)$		Explained variable	$\Delta \ln(Z)$	
Explanatory variables:	Param.	t statistic	Explanatory variables:	Param.	t statistic
$\Delta \ln(PKB)$	0,427***	14,912	$\Delta \ln(PKB)$	0,427***	11,482
$\Delta \ln(RWage(-2))$	-0,125***	-3,512	$\Delta \ln(RWage(-1))$	-0,068*	-1,758
$\Delta \ln(PKB)*EPL(-2)$	-0,005**	-2,372	$\Delta \ln(PKB)*EPL(-2)$	-0,012***	-2,949
$\Delta \ln(PKB)*EPL^2(-2)$	0,001**	2,152	$\Delta \ln(PKB)*EPL^2(-2)$	0,003***	3,413
$\Delta \ln(PKB)*Uo$	-0,020	-0,759	$\Delta \ln(PKB)*Uo$	-0,091***	-2,947
$\Delta \ln(PKB)*Uo^2$	0,077	1,270	$\Delta \ln(PKB)*Uo^2$	0,252***	3,276
R ²	0.547		R ²	0.578	
Adjusted R ²	0.534		Adjusted R ²	0.559	
DW	1.495		DW	1,646	

Rejection of the null hypothesis of significance of estimates at the level: *** p<0,01, ** p<0,05, * p<0,1.

Source: Own calculations.

Chart 7. Elasticity of employment to GDP in relation to the level of EPL (a), and the share of fixed-term employment in overall employment (b) for the years 2008-2012



Source: Own calculations.

Chart 7 shows the values of elasticity of employment to changes in GDP for different levels of observed EPL index (part (a)) and different shares of fixed-term contracts in the overall number of work contracts (part (b)). The results of the estimation of the proposed model show that in the case of EPL there is a minimum value of employment elasticity for the EPL index equal to 2, while in the case of the share of fixed term employment to overall employment a minimum employment elasticity value is reached when the share is about 18%.

Based on our conducted analysis it can be concluded that during times of crisis a greater elasticity of employment relative to GDP can be observed in countries with a relatively low, as well as countries with a relatively high EPL index (i.e. level of employment protection). The same phenomenon applies to the share of employees working on fixed-term contracts. Thus in these countries we can expect bigger decreases in employment during economic slumps.

6. Conclusions

Based on our conducted analysis it can be concluded that the global crisis affected the labour market situation in the OECD countries, causing declines in employment and increases in unemployment. Changes in the levels of employment were, however, differentiated in particular countries. The largest declines in employment were observed in Greece, Estonia, Ireland, Spain, Iceland, Portugal and Japan, and the lowest declines took place in Austria, Belgium, the Netherlands, Canada, Mexico, Norway, New Zealand, and Poland. Three countries did not experience any decline in employment: Israel, Chile, and Australia.

Economic theory indicates that in situations in which a negative economic shock occurs, one should expect the appearance of quantitative adjustments in the stricken economies, which are reflected in decreased production and employment. The scale of these adjustments depends, however, not only on the depth of the shock to demand and production, but also on the nature and scale of the adjustments in terms of wages, working hours, and work productivity. One may thus speak about an interchangeability between the types of adjustments described. The larger are the adjustments in terms of wages and hours, the lesser will be the quantitative adjustment. In addition to the adjustments described factors of an institutional nature also impinge on the scope of quantitative adjustments. These include the degree of stringency of employment protection legislation and the share of fixed-term contracts in use. Also not without significance in restricting the depth of the economic shock on production and employment are the macro-economic policies employed in reaction thereto.

The statistical analysis we conducted demonstrated that a decline in production occurred in the majority of OECD countries, which was particularly deep in the years 2008-2009. The largest declines occurred in Greece, Estonia, Iceland, Finland, Slovenia, Ireland, and Italy. During the time period considered in our research, a decline in real wages also occurred in many countries, which may indicate that wages and work hours were among the adjustment mechanisms employed, leading to the occurrence of the phenomenon of labour hoarding. These mechanisms were not sufficient however to avoid the application of quantitative adjustments.

In the years 2005-2012 relatively small changes took place with respect to the institutional factors. Both as regards the stringency of employment protection legislation as well as the use of fixed-term contracts no major changes in policies or practices occurred during the time of crisis.

Econometric verification of the hypotheses presented in the theoretical part of our study demonstrated that the level of GDP and real wages were essential factors in determining employment size during the entire analyzed period of 2005-2012. The decline in elasticity of employment to changes in real wages during the crisis suggests that to a certain extent wages and work hours were used as adjustment mechanisms during the crisis period. Our hypothesis about the existence of a non-linear (U-shaped) relationship between elasticity of employment to GDP and the stringency of EPL as well as the share of fixed-term contracts in overall employment also was confirmed by our econometric analyses. The results demonstrate that the lowest declines in employment can be expected in countries where the EPL index hovers around 2 and the share of fixed term employment contracts relative to the overall number of employment contracts is about 18%.

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Streszczenie

WPŁYW OCHRONY ZATRUDNIENIA I RODZAJU UMÓW O PRACĘ NA ELASTYCZNOŚĆ ZATRUDNIENIA WZGLĘDEM PKB W KRAJACH OECD

Przedmiotem artykułu są skutki globalnego kryzysu dla zatrudnienia w krajach OECD, a w szczególności próba objaśnienia przyczyn ich zróżnicowanych rozmiarów w poszczególnych krajach. Szczególną uwagę w tym objaśnieniu zwrócono na pytanie,

jaką rolę odgrywają tutaj instytucje rynku pracy, a w szczególności prawna ochrona zatrudnienia i umowy o pracę na czas określony.

Globalny kryzys gospodarczy przekładał się na sytuację panującą na rynkach pracy krajów OECD powodując spadki zatrudnienia i wzrosty bezrobocia. Zmiany rozmiarów zatrudnienia w poszczególnych krajach były zróżnicowane. W latach 2007-2012 w większości krajów OECD wystąpiły spadki rozmiarów produkcji. Obserwowano w nich również spadki rozmiarów płac realnych. Stosunkowo niewielkim zmianom w latach 2005-2012 podlegały natomiast czynniki o charakterze instytucjonalnym. Zarówno w przypadku restrykcyjności prawnej ochrony zatrudnienia, jak i w przypadku udziału zatrudnienia na czas określony nie wystąpiły wyraźne tendencje zmian tych wartości w okresie trwania kryzysu gospodarczego.

Weryfikacja ekonometryczna wysuniętych hipotez teoretycznych została przeprowadzona w oparciu o dane roczne z lat 2005-2012 dla 26 krajów OECD i wykazała, że PKB i płace realne były istotnymi czynnikami determinującymi rozmiary zatrudnienia w analizowanym okresie. Potwierdzono również hipotezę o istnieniu nieliniowej (U-kształtnej) zależności pomiędzy elastycznością zatrudnienia względem PKB a stopniem restrykcyjności prawnej ochrony zatrudnienia oraz udziałem zatrudnienia na czas określony. Uzyskane wyniki wskazują, iż najmniejszych spadków zatrudnienia w okresie kryzysu możemy się spodziewać w krajach, w których poziom EPL jest bliski 2, a udział umów o pracę na czas określony w liczbie umów ogółem jest bliski 18%.

Słowa kluczowe: *zatrudnienie, instytucje rynku pracy, elastyczność zatrudnienia, prawna ochrona zatrudnienia, zatrudnienie na czas określony*