



*Department of Economics and Business, Thesis in  
Macroeconomics*

***Output gap, institutions and policies in the labour  
market: how do they affect the unemployment rate?***

Candidate: Laura Ferrari

ID number: 181321

Supervisor: Professor Giovanna Vallanti

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**Abstract:**

This thesis focuses on the labour market, in particular on the institutions and policies that regulate it. Each country has different institutional characteristics which can either mitigate or strengthen the effect that a variation of the output gap(proxy for the business cycle condition) has on the unemployment rate. I reported a review of the literature on the direct effect of the institutions on the unemployment rate and I present a model based on 20 countries in the period 1983-2003 to test whether the institutions taken into consideration have a positive or a negative effect on the impact of the economic fluctuations (output gap) on unemployment. The results are consistent with the expectations, showing that policies as employment protection legislation mitigate, the effect, while others, as high unemployment benefit, strengthen it.

## **Introduction:**

The subject discussed in this thesis is on whether the different institutional characteristics of the labour market present in 20 OECD countries change the response of unemployment rate to a fluctuation in the output gap, which is a proxy for the business cycle condition.

In the first chapter I describe the situation in the OECD countries during the great recession and the response of the unemployment rate to this last crisis, that has been the hardest since World War II. According to the empirical studies unemployment rate increased in all OECD countries, but with different magnitude and duration. In this context the different classes of workers in the labour market did not reacted in the same way, indeed some of them (like temporary contracts, unskilled workers and young workers) were more influenced than others. OECD countries responded differently to this crisis, some of them implemented policy like labour hoarding in order to try to re-establish the equilibrium in the market. These heterogeneous responses questioned the role of policies and institutions and their impact on the margin of adjustments.

In the second section I describe the four types of shocks that can influence the business cycle and their impact on the labour market and on the unemployment rate. In this section I also outline the different type of institutions that I am taking into consideration for my analysis and I present a summary of the previous empirical studies that estimate the impact these institutions have on the unemployment rate. According to the International Monetary Fund (IMF) the response of the unemployment rate to a fluctuation in the output gap could also depend on the reform in policies, which during the years before the crisis were implemented in order improve social safety and reduce the impact of a shock on the unemployment rate.

In the third chapter I present an econometric model for 20 countries in the period 1982-2003 based on the dataset employed by Bassanini and Duval(*“The determinants of unemployment rate: reassessing the role of policies and institutions”*, *OECD Economic studies* 2006). This study aims at analyzing if the response of the unemployment rate to a variation in the business cycle changes according to the different institutional characteristics present in the country and how influent the impact of these institutions is in moderating on the increasing unemployment rate. To obtain these results I run a regression for each of the different institution I wanted to

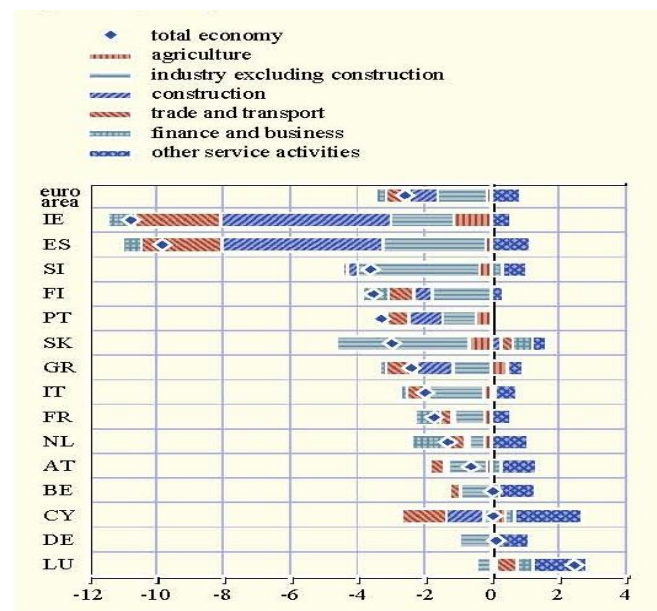
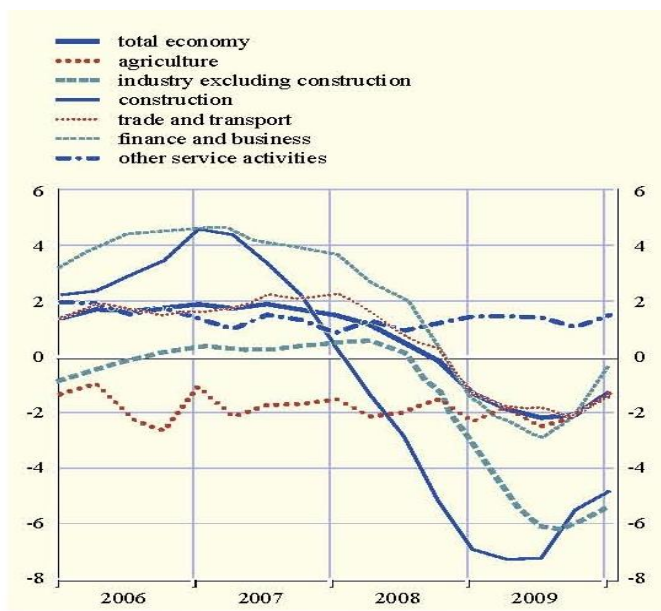
analyze and I interacted the variable of the output gap with the one of the institution to see whether their impact is statistically significant or not. The results I got are consistent with the empirical literature, revealing that depending on the duration and the stringency of the institution some of them strengthen the effect of the output gap while others mitigate it.

# 1.Unemployment during the great recession in OECD countries.

During the years labour market adjustments have been influenced and moderated by institutional arrangements and policy settings. The pace of labour market adjustments and the level of long-term unemployment are affected by policy decision and institutional mechanism of wage determination (Scarpetta 1996). The reaction of the labour market also depends on the harshness and duration of the crisis. (Erken, Grasba e Kempen 2015). As it is stated in the ECB bulletin, the last financial crisis was the hardest since World War II: the employment losses were substantial and concentrated mostly on few sectors, particularly in industry(8.5%) and construction(11.9%) , especially for those countries that have experienced big employment losses as it happened in Ireland and Spain .(ECB, July 2010). (See Figure 1.a and 1.b)

Figure1.a: Sectoral growth in euro area employment aggregate.

Figure1.b: Sectoral contributions to employment development, by countries.

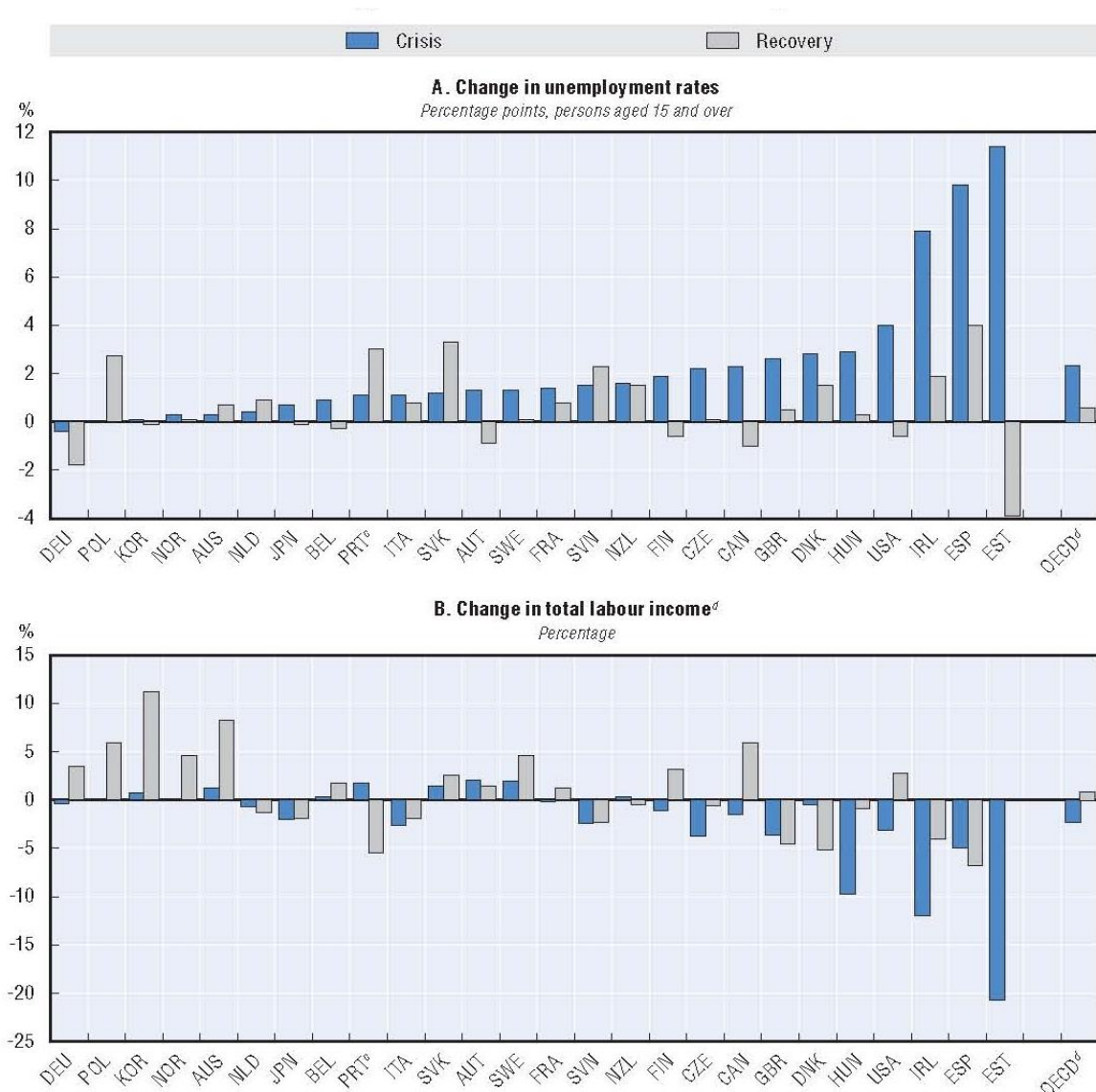


Source: Eurostat and ECB calculations

As a response to the crisis unemployment at first increased in all OECD countries with different duration and magnitude, with the largest rise in Estonia, Ireland and Spain. Even during the period of recovery the rate continued to increase reaching its peak. The change in labour income reflects the change in unemployment in most countries. To those countries with

the larger increase in unemployment correspond a decline in labour income by about 1% for each additional percentage point increase in the unemployment rate. (OECD 2012)

Figure 2: The change in unemployment rates and labour income by countries during the crisis and initial recovery.

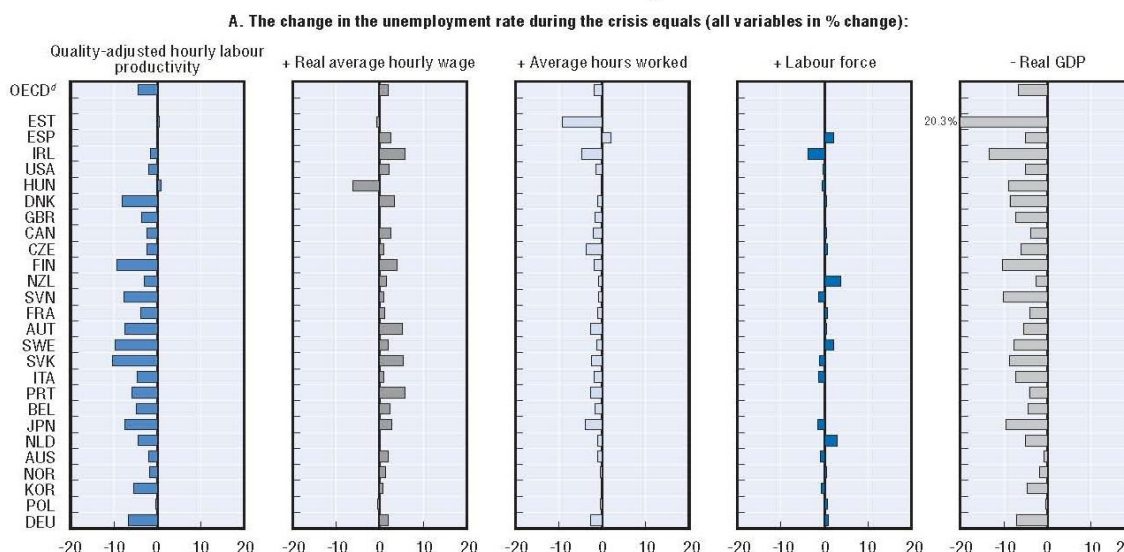


Source: OECD calculations based on OECD Main Economic Indicators Database and quarterly national accounts.

The OECD document also reports for each country the decomposition of the change in unemployment both during the crisis and the recovery period into five parts : 1) the change in the quality-adjusted labour productivity (simply measured as the ratio of output to the wage

bill); 2) the change in average hourly wages; 3) the change in average hours worked; 4) the change in labour force participation; and 5) the change in output. (See figure 3).

Figure 3: Decomposing the change in the unemployment rate by country during the crisis

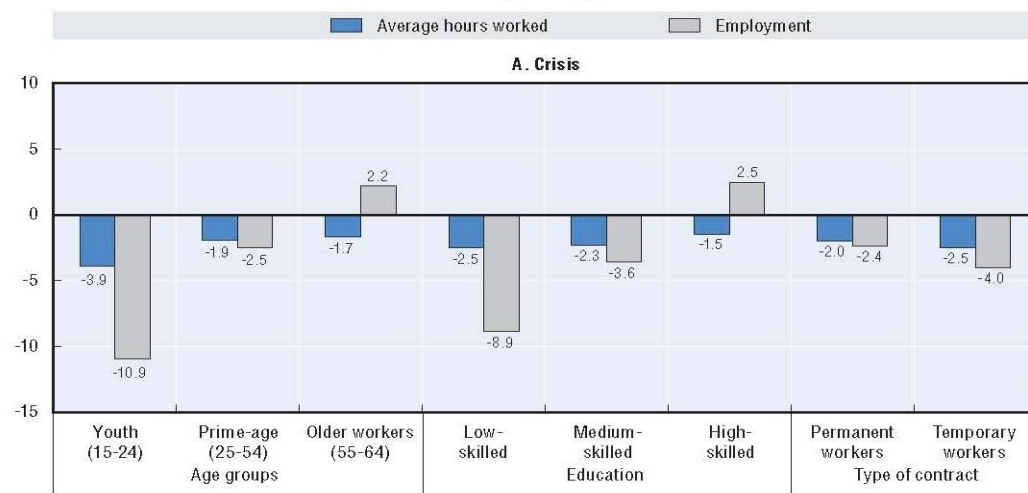


Source: OECD calculations based on OECD Main Economic Indicators Database and quarterly national accounts.

Another aspect to consider is that the employment losses have not been distributed equally across the labour force participants. Indeed even though the unemployment rates of different classes move together the intensity of their alteration differs. This happens because of two phenomena: the rise in unemployment can be caused either because more people try to find a job or because the number of job available increases. (Clark e Summers 1980) As it is reported on the ECB bulletin “how different segments of the labour market are affected by the recession is determined by the sectoral composition of employment and the sectoral exposure to the downturn”. Firms may decide to adjust labour inputs in different ways (either by reducing hours working per person or by reducing wages for employees with a higher income) to respond to economic shocks which lead to a different outcome in the distribution of earnings, that have implications on consumption and welfare. (OECD 2012) .



Figure 4: The change in employment and average hours worked by age, education and type of contract.



Source: OECD estimates on the European Union Labour Force Survey(EULFS).

Employment reduction is mainly concentrated on some groups of workers who usually have lower income. As figure 4 shows temporary contracts, low skilled workers and young workers faced the highest reduction in working hours. Temporary contracts are the ones that have been influenced the most, presenting the highest fall, while for workers with permanent contracts and part-time work the reaction was not so intense. Two other groups of workers were also largely affected by the crisis: young workers defined as those under the age of 25 and unskilled which are those holding just a basic school-leaving qualifications. (ECB July 2010).

Fig. 5.a: Euro area employment growth by contract type

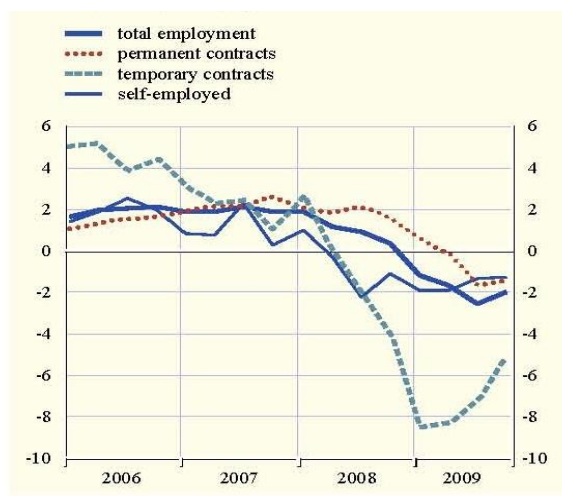
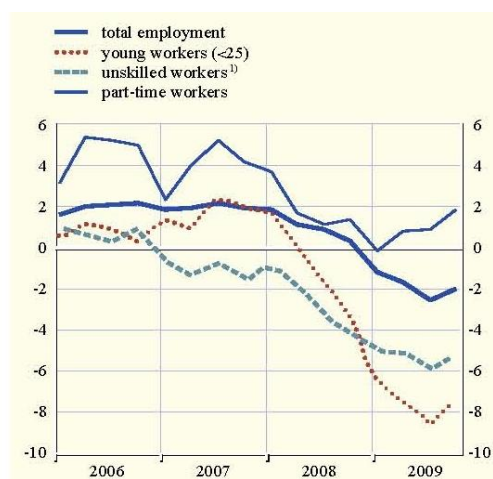


Fig 5.b: Euro area employment growth of selected groups of workers



Source: Eurostat and ECD calculations

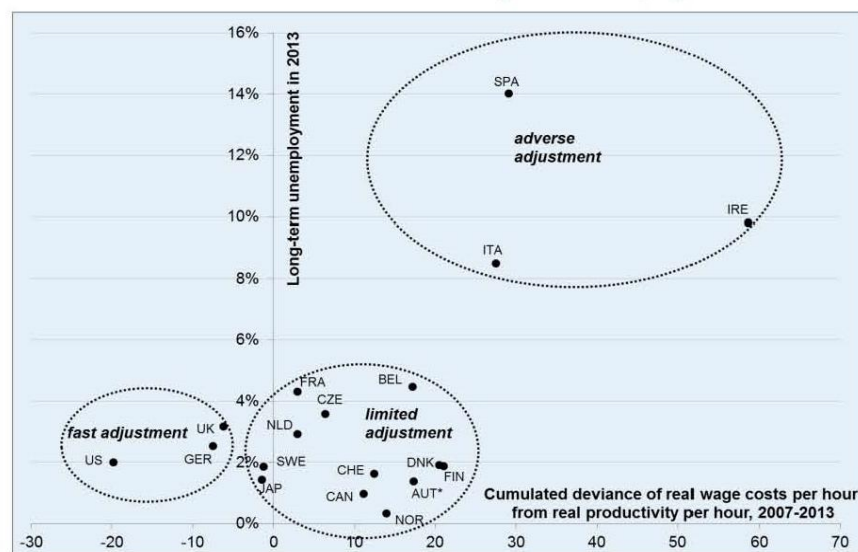
Since young workers are possibly the source of economic dynamism the increase in unemployment could discourage them permanently, causing a significant long-term macroeconomic effect (ECB July 2010). Across countries the increase in unemployment changes substantially due to the different responses to the output shock and in the margins of adjustments as labour productivity and earnings per workers. Some countries tried with *labour hoarding*, which means that firms do not fire workers proportionally given the fall in demand for product and services, to re-establish the equilibrium in the labour market. It helped at the beginning to mitigate the response of unemployment to GDP but then it was costly because employees that do not produce fully still have to be paid, leading to a decrease both in profits and in mixed income in the economy. (Erken, Grasba e Kempen 2015). Since the response of the unemployment rate to the change in aggregate demand was heterogeneous in OECD countries, it raised question on the role of policies and institutions both during the crisis and the period of recovery on the impact on the margin of adjustment (OECD 2012). Indeed when there is an increase in unemployment it can be reflected by a decrease in GDP with lower profits and real wages. How the shock will affect these components it depends on the flexibility of real wage, labour demand and labour supply; often the flexibility is connected to particular institutions (Erken, Grasba e Kempen 2015) .

As it is shown in figure 6 and observed by Erken, the distinction can be made between three

groups of countries according to their adjustment mechanism of flexible wages, calculated as the gap between real wage cost per hour and labour productivity per hour, on unemployment:

1. *Wage adjustment*(UK, USA, Germany): this group shows a relatively small rise in long-term unemployment compared to a relatively high decrease in real wages.
2. *Limited flexibility wage adjustments*(the Netherlands, France, Czech Republic, Belgium, Sweden, Switzerland, Denmark, Finland, Japan, Canada, Norway): these countries are characterized by moderate change in real wage and unemployment which is consistent with the level of productivity. This group did not show any change in real wages in response to the economic shock. This group can be classified into different segment distinguished between exposed and shelter economies. The former economies (the Netherlands, France, Belgium) shows a relatively higher long-term unemployment than the latter ( Japan, Sweden, Austria, Canada, Denmark, Finland, Norway).
3. *Adverse wage adjustments*(Spain, Italy, Ireland): this group is characterized by a substantial increase in the level of long-term unemployment combined with an equally large increase in real wage costs. (Erken, Grasba e Kempen 2015)

Figure 6: Cumulated deviation of real wage from real productivity over 2007-2013 vis-à-vis the long-term unemployment rate in 2013



## 2. The role of policies and institutions

In the existing literature many studies analyze the relation between the role of policies and institutions and unemployment to examine labour market responses. In most of these studies the coefficient of the output gap, which as stated by Bassanini and Duval, controls for the unemployment effects of aggregate demand fluctuations over the business cycle, is significant. This result highlights the importance of cyclical unemployment patterns that can be explained by macroeconomic variables. Four types of shocks are considered for the analysis: (Bassanini e Duval 2006).

1. *Total factor productivity shocks (TFP)*: TFP is defined by Comin as the “portion of output not explained by the amount of inputs used in production” which means that the amount of output is determined by how efficiently inputs are used. It is measured by the Solow residual. In business cycle TFP is associated with output and hours worked. (Comin 2006). When the rate of growth is lower productivity decreases generating a rise in long-term unemployment since firms’ revenue fall and forcing them to reduced labour. (Benigno, Ricci e Surico 2015). A number of empirical papers have shown time-series and cross-country evidence on the negative relationship between productivity and unemployment. Is this effect of such a slowdown on unemployment permanent? In his study Blanchard states that when there is a fall in TFP, the unemployment rate increase for some time until both firms and workers adjust their expectations to the new lower rate, when they adjust their expectations the effect on unemployment should go away according to theory. (Blanchard e Wolfers 2000). Also in Bassanini and Duval’s paper, where TFP is defined as the deviation of the logarithm of TFP from its trend, is declared that a positive increase in productivity has a negative decline on structural unemployment, which is temporary. (Bassanini e Duval 2006).
2. *Term of trade shocks*: explained by Bassanini and Duval as the ratio of imports to output multiplied by the logarithm of their prices. When the terms of trade is larger, the prices of imports increase which increases wage pressure and lastly unemployment.

3. *Real interest rate shocks*: which in the literature is found to have a positive correlation with the unemployment rate, like in the Bassanini and Duval's paper where the shock is given by the 10-year nominal government bond yield minus the annual GDP price inflation. When the real interest rate increases it has a negative effect on labour productivity and the accumulation of capital, this reaction has repercussion in lowering the demand of labour and so increasing unemployment. (Bassanini e Duval 2006). Also in the study of Feldmann is shown that real interest rate has a negative effect on labour market increasing unemployment rate smoothly in the short-run, but harshly in the long-run. He also found that the group of worker affected the most by this type of shock are young workers (Feldmann 2013). On the other hand, Blanchard judges that in the long-run the effect of real interest rate on unemployment will be small. (Blanchard e Wolfers 2000).

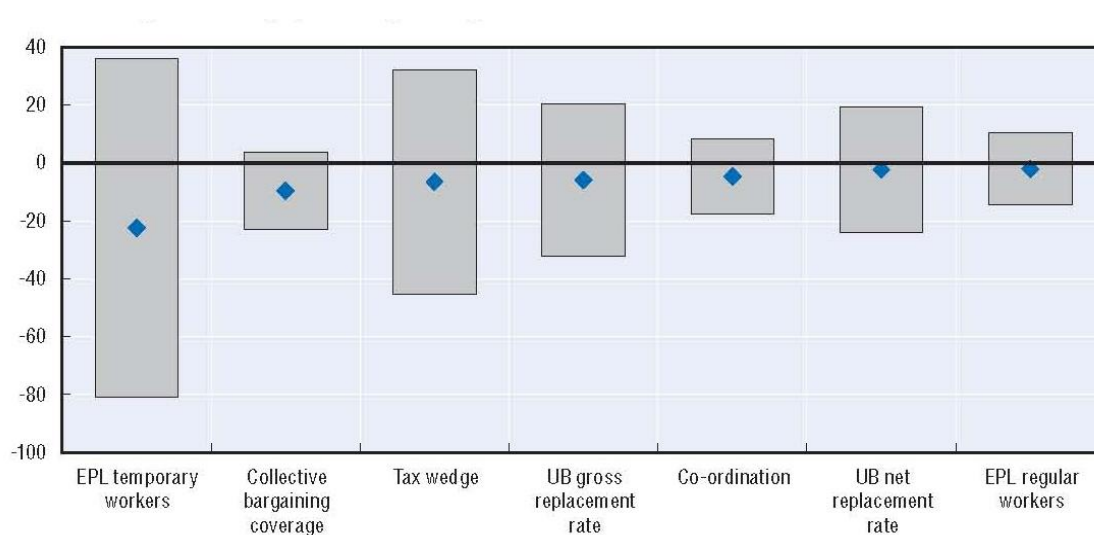
4. *Labour demand shocks*: it has been identified that a demand shock has more impact on labour market than a supply shock. There are two reasons for this variable to increase: either because of a decline in the gap between wage rate and marginal product of labour or because the technique of production moves towards capital and away from labour. Both cases can be seen as a negative labour demand shock which increases unemployment. (Bassanini e Duval 2006). As proposed by Blanchard, let's think of a shift coming from a reduction in labour hoarding by firms. When firms laid off superfluous workers they will reduce employment and so increase unemployment, but this action will also increase their profit which will lead, in sometime, to capital accumulation and higher employment. (Blanchard e Wolfers 2000).

The effect of the shock can be temporary or permanent depending on whether the shock is stationary or not. According to the Okun's coefficient if GDP increases fast the unemployment rate will decrease, if it grows slowly or it decrease the unemployment rate will increase while unemployment will not change if potential output equals actual output (Higgins 2011). During the last recession this coefficient behave in a very different way depending on the countries. Over the years before the crisis in the United States it remained stable, while in other countries like Germany and the Netherlands it increased; in 2008 the situation changed because the coefficient in the United States increased as the economy shrank, on the other hand in

Germany and the Netherlands the coefficient decreased rapidly as growth declined but unemployment remained almost unchanged (Cazes, Verick e Hussami 2013). Numerous theoretical studies tried to analyze the divergent behaviour of the Okun's coefficient over the business cycle. One possible explanation is that because of the different policies and institutions that regulate labour market employers fire less workers and so during an economic downturn unemployment responds less to output changes then during a period of expansion; another explanation is that during an economic contraction employers are more pessimistic than during a period of expansion. A study of the International Monetary Fund (IMF) analyzed the responsiveness of the unemployment rate to output in OECD countries: the study found that the response of unemployment to output increases depending on the changes in policies like employment protection legislation and unemployment benefits. (Cazes, Verick e Hussami 2013)

During the years before the crisis many countries have changed their policies on job protection and economic growth in order to improve social safety, reinforce labour market flexibility and dampen the effect of an economic shock on labour market. The figure below shows the average direction over 15 years given to these reforms. We can see that the government is less involved in labour market and over the OECD countries the directions given to the reforms are variegated (OECD 2012).

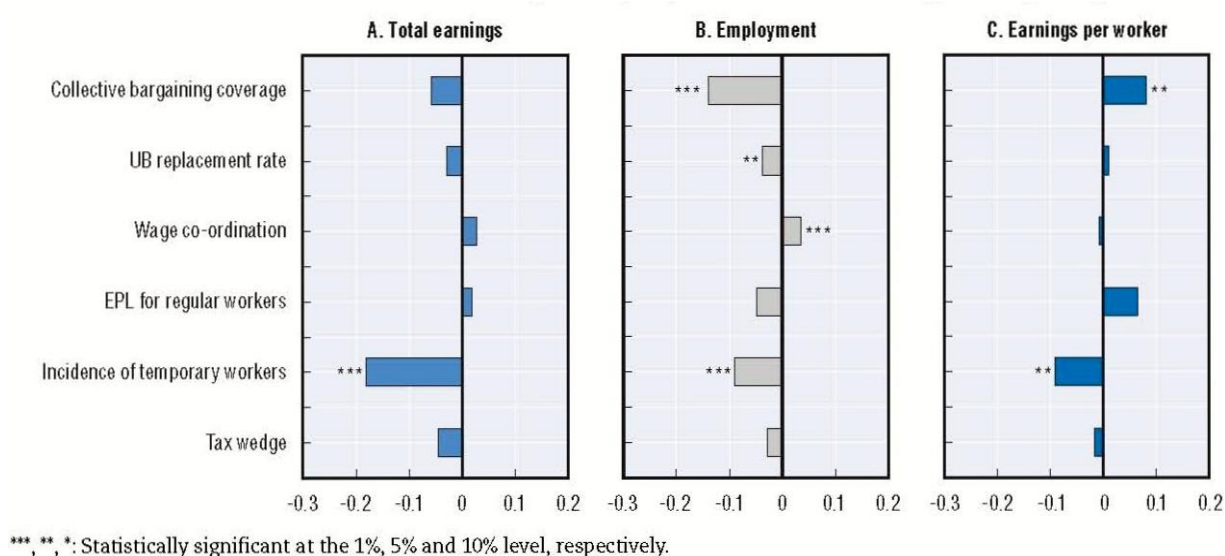
Figure 7: Change in selected labour market institution in OECD countries 1995-2007.



Source: OCED estimates.

Doing a more in depth analysis let's look at what are the effect of the different policies on total earning, employment and earnings per workers, since it is the combined effect of these three factors that has an impact on the labour market. (Erken, Grasba e Kempen 2015)(See figure 8).

Figure 8: The role of policies and institutions for trend total earnings, employment and earning per workers.

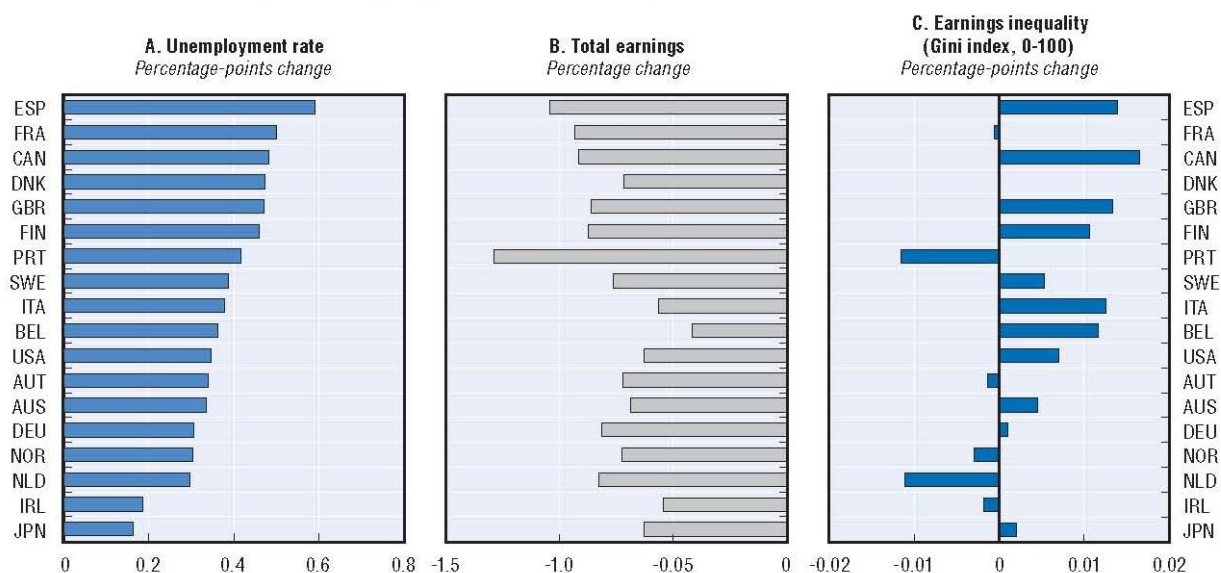


Source: OECD estimates.

This figure shows that some policies have different, sometimes opposite, effect on the variables as in the case of collective bargaining coverage and UB replacement, these two programs on the hand increase earnings per workers but on the other hand they decrease employment.

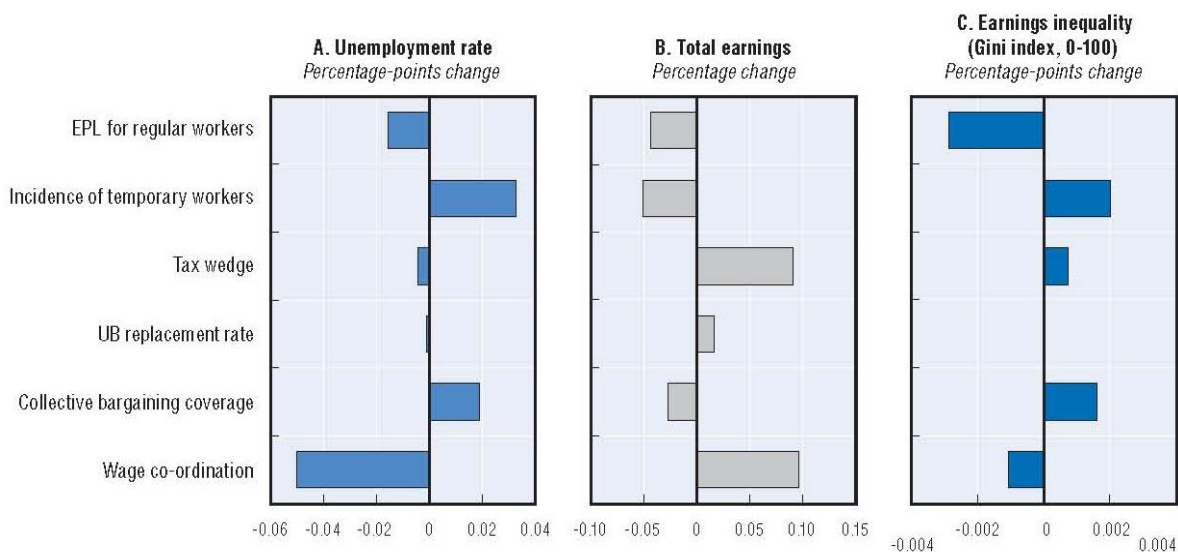
Some institutions may have a negative effect on productivity, output and welfare, but at the same time they may not influence the level of unemployment. Some policies can extent the duration and strengthen the hardness of the crisis, but they could also have a positive effect on economic resilience and mitigate economic shock. (Erken, Grasba e Kempen 2015). From the OECD Employment Outlook 2012 we can see that market resilience of different countries depends on the different kind of institutions and policies adopted by them. Figures 9 shows the different level of unemployment rate, total earning and earning inequality per each country.

Figure 9: Aspect of labour market resilience



Source: OECD estimates.

Figure 10: The role of policies and institutions for labour market resilience.



Sources: OECD estimates.

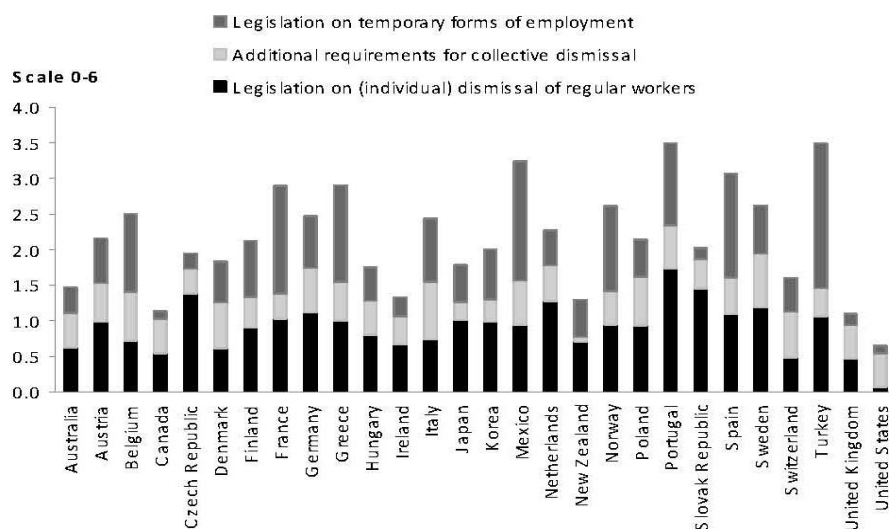
We analyze more in depth the different policies and their effect on unemployment:

- *Employment protection legislation(EPL)*: EPL usually refers to the rules governing hiring and firing employees. It defines the condition for the termination of employment. Usually on regular contract the length of the employment is not



specified. The rules provide specification on whether it is possible or not to fire a worker ( fair and unfair dismissal) and which procedures should be followed in case, as provision for notice periods. Also EPL sets the rules on the salary that employees should get and if they can challenge their dismissal. (Bassanini, Nunziata e Venn 2008). These regulations depending on their degree of stringency in the different countries can have two effects. They can decrease arbitrary firing of workers and reduce contracting costs, encouraging human capital formation. On the other hand since firms are subject to costs when they lay-off workers they might be more cautious in assuming them, which is particularly adverse for some categories of workers such as low-skilled, long-term unemployed and youth. The structure of employment is affected by EPL, because workers are more willing to accept atypical contracts (part-time and temporary), that give firms the flexibility they could not have in other way. Also, because of the cost incurred by the firms when firing workers, they may decide to lower wages to counterbalance these costs. (Scarpetta 1996) (Bassanini e Duval 2006). Across countries the stringency of EPL differs on the use of temporary contract, on the collective dismissal and on dismissal of regular workers. (Bassanini, Nunziata e Venn 2008). The graph below shows the differentiation of EPL across countries and the strictness of its components.

Figure 11: summary index of EPL strictness and its components, including special provisions for collective dismissal, 2003.

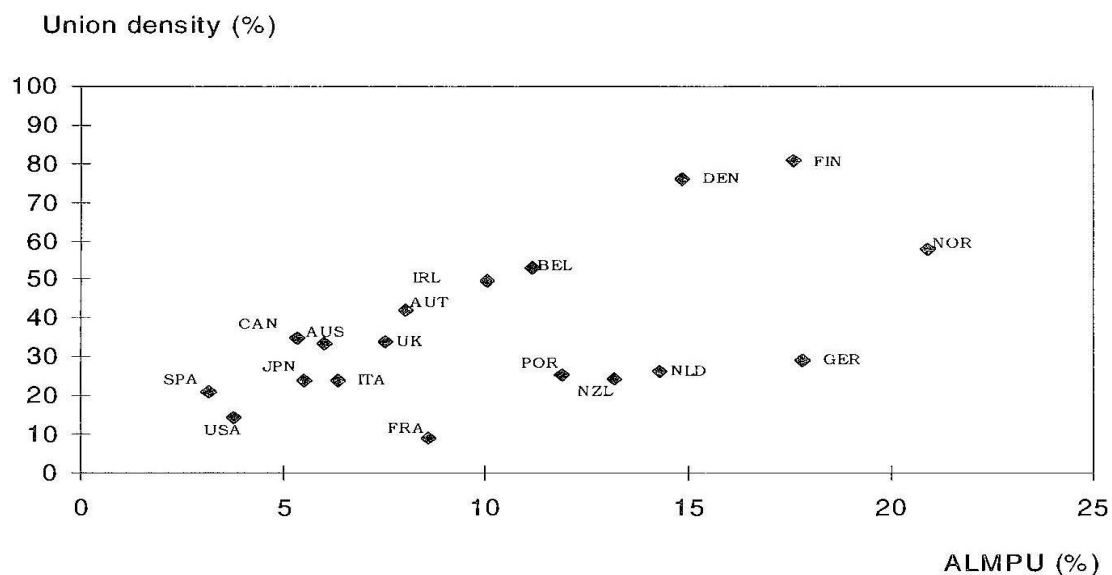


According to Scarpetta's study it appears that in those countries with a stricter EPL the unemployment rate increases with a strong effect on young workers and long-term unemployment. (Scarpetta 1996). While Blanchard states that unemployment is affected ambiguously by EPL because these regulation both decrease the number of workers in the labour market and increase the length of unemployment which result in more long-term unemployed. (Blanchard e Wolfers 2000).

- *Unemployment benefit scheme*: high unemployment benefits have a negative effect on employment. They employed two effects on labour market, first when they are high over a long period job-seekers are less incentivized at finding a job and their willingness to accept jobs decline. Secondly, they put more weight on workers' wage pressure. On the opposite, unemployment benefits increases the quality of job-matches because it gives more time to the unemployed to find the right job for themselves, so that there is less incentive for further separation, which intensify productivity. They help to overcome an asymmetric-information externality and act as a subsidy for job search. For social reasons an adequate income support is necessary for those losing their job in order not lower their living standards. In the empirical world there is substantial evidence that the intensity and the length of unemployment benefits have a positive impact on unemployment. (Bassanini e Duval 2006). The literature shows that the duration of these benefits has a larger impact on unemployment than the their level. Tatsiramos and Van Ours show that a longer length of the benefits increases by 20% the duration of unemployment. While Blanchard argues that a more generous level of unemployment benefit will increase unemployment because of the lower search intensity. (Erken, Grasba e Kempen 2015) (Blanchard e Wolfers 2000). As stated by Elmeskov, Martin and Scarpetta "there is a strong evidence that more generous unemployment benefit lead to higher structural unemployment". (Elmerskov, Martin e Scarpetta 1998).
- *Active labour market policies*: consist in a broad range of programmes such as training, hiring subsidies, job search assistance, unemployment insurance and others. They are studied as indicators of countries' efforts to spend on active programmes. These

policies have usually a negative effect on unemployment since they increase the quality of job-matching and improve the skills of workers. Although its effectiveness varies across the different programmes and some of them could discourage workers from finding a job if they do are not designed well. To finance these programmes the cost of taxes is very high, so their beneficial outcome is not efficient if they are not able to cover these costs. Empirical studies generally agree that ALMP has a negative effect on unemployment but they do not agree on its magnitude (Bassanini e Duval 2006) . Elmeskov, Martin and Scarpetta argue that high ALMP make workers from outside the labour market more competitive to the insiders and it is not a coincidence that the level of union density and level of spending on these programmes are correlated. (Elmerskov, Martin e Scarpetta 1998).

Figure 12: Union density and active labour market programmes.



- *Trade unions and wage bargaining:* an important effect of wage bargaining is for employees to work in better conditions, even if this could mean to lower employment. When trade unions are strong, they can influence wages by setting them above market-clearing conditions, lowering employment especially for some class of workers such as young workers, low-skilled and women. It has been shown that union density's influence on wages depends on the structure of collective bargaining: they

are considered employment friendly when they are not centralized since they can prevent excessive wage claims, while on the other hand when they are centralized they will conduct to wage moderation. (Bassanini e Duval 2006).

- *Minimum wages*: imposes a boundary on wage adjustment. At firm level can with sagaciousness set wages knowing that employees cannot find jobs easily. In this case an increase in minimum wage would, until it reaches a certain point, reduce unemployment and after increase it. So minimum wage has to be set at the level that minimize its potential negative impact on unemployment. According to Bassanini and Duval the impact of minimum wage on unemployment is not significant, but when there is a high tax wedge, it has more impact on unemployment if minimum wage is high. (Bassanini e Duval 2006).
- *Tax wedge*: defined as the difference between the employer's labour costs and the net salary taken home by an employee. It is not clear whether tax wedge has permanent effect on labour market outcome, but in many studies it has been showed that when there is an increase in tax wedge also unemployment rises because companies face higher costs which indirectly influence unemployment. In other empirical studies it is found that the impact of tax wedge on unemployment in all countries is correlated with the intensity of trade unions and the centralisation of wage bargaining. (Bassanini e Duval 2006).

### **3. The empirical model.**

In this section I present an econometric model for 20 countries in the period 1982-2003. This study aims to analyze whether the response of unemployment to a change in the output gap depends on the institutional characteristics of the labour market in each country. To this aim I interact the output gap (proxy for the business cycle condition) with the institutions in different countries. The dataset used is the one employed by Bassanini and Duval (*"The determinants of unemployment rate: reassessing the role of policies and institutions"*, *OECD Economic studies* 2006). The institutions analyzed are first considered in their overall structure and then when it is possible divided in the categories (like EPL that is divided into EPLR and EPLT) to see whether the effect of one or all categories has a stronger and more

significant effect on the unemployment rate that the overall institution. The variables utilize in this model are:

- Output gap: defined as the OECD measure of the ratio between actual and potential output as a percentage of potential output. When the output gap is close to 1 the economy is in expansion, while it is in recession when the output gap is below 1.
- Unemployment rate: defined as the ratio of the labour force of unemployed workers. Considering the age of workers between 15-64. Expressed in %.
- Average unemployment benefit replacement rate: defined as the average rate between two different amount of income, three type of family conditions and three diverse unemployment periods. Expressed in %.
- Unemployment benefit duration(years): defined as the ratio of average to initial unemployment replacement rate, which is the average rate occurring in the first year of unemployment over two different amount of income and three type of family situations.
- Tax wedge: derived from *Taxing Wage*, it is defined as the tax wedge between the cost of labour to the employer and the net income an employee single-earner with two children takes home. All the personal income tax and social security contributions are stated by the tax wedge as percentage of total labour cost. Expressed in %.
- Labour tax wedge: which is one of the component of the tax wedge derived from National Accounts, expressed in %.
- Employment protection legislation (EPL): defined as the level of stringency of EPL in the OECD summary indicator. EPL is then specified in two according to the type of contract:
  - Employment protection legislation on regular/temporary contracts: defined as the level of stringency of EPL in the OECD summary indicator on regular/temporary contracts.
- Union density: defined as the number of workers associate with trade union. Expressed in %.
- High union coverage: which is defined as the portion of employees protect by a collective agreement. Expressed in %.

- ALMPs: which is the ratio of spending on public expenditure on active labour market programmes per unemployed to GDP per capita, expressed in %. These programmes are divided into five main categories:

- ALMP per public employment service(PES): which is defined as the ratio of PES spending per unemployed to GDP per capita. These services include job-search courses, administration of unemployment benefits, vocational guidance and all other administration costs of labour market agencies. Expressed in %.
- ALMP for training: which is defined as the ratio of training spending per unemployed to GDP per capita. Expressed in %. Training programmes for youth and disabled are not included, the programmes included are for unemployed adults and employed adults.
- ALMP for youth: defined as the ratio of spending on youth measures per unemployed to GDP per capita. Expressed in %. These programmes include training for youth and some form of measures for disabled youth.
- ALMP for subsidised employment: defined as the ratio of spending in subsidies employment per unemployed to GDP per capita. Expressed in %. These are measures to supply and encourage employment for the unemployed. Youth and disabled are not included in this group.
- ALMP for disabled: defined as the ratio of spending in measures for disabled per unemployed to GDP per capita. Expressed in %. These programmes consist of rehabilitation and finding jobs for the disabled.

In Table 1 and 2 below, I reported the descriptive statistics of the mean of the institutions analyzed in my study for each of the 20 countries taken into consideration over the period 1982-2003. It is interesting to see how in the different countries the level and stringency of the institution vary. The country with the highest level of stringency of EPL is Portugal with a mean of 3.9 while the one with the lowest level are the United States with a mean of just 0.2. While from table 2 we can observe that the Nordic countries (Denmark, Sweden, Norway and Finland) present the highest level of union density and active labour market policies per unemployed (ALMP), with the strongest level in Sweden where union density and ALMP reach respectively a mean of 80,97 and 97,40. These values are significantly greater than those of the others countries especially France and Spain.

Table 1: Descriptive statistics

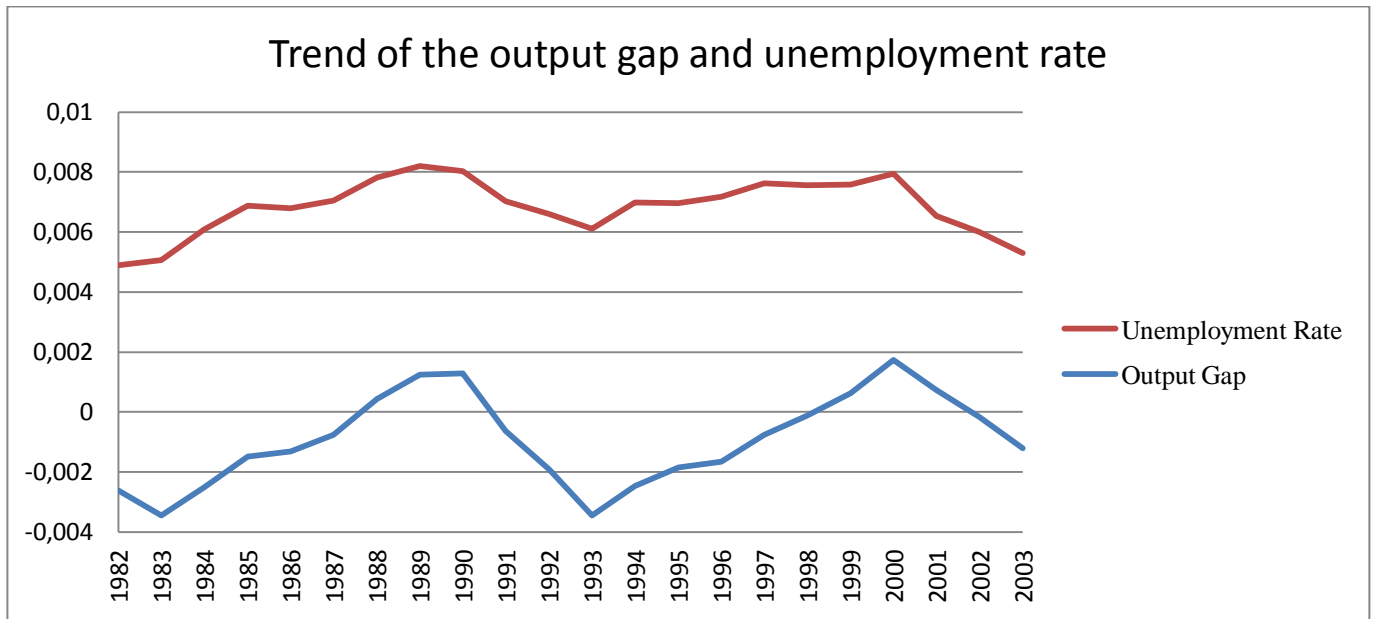
Country	Mean				
	EPL	EPLR	EPLT	Average unemployment replacement rate	Unemployment benefit duration
AUS	1,01	1,18	0,88	24,89	1,01
AUT	2,19	2,89	1,50	30,03	0,82
BEL	2,88	1,69	3,99	41,08	0,86
CAN	0,80	1,32	0,25	17,83	0,33
CHE	1,10	1,16	1,13	26,89	0,40
DEU	2,95	2,63	3,22	27,56	0,73
DNK	1,93	1,50	2,41	54,86	0,77
ESP	3,45	3,35	3,56	34,53	0,50
FIN	2,18	2,52	1,88	34,32	0,65
FRA	2,91	2,39	3,42	36,97	0,62
GBR	0,62	0,98	0,26	18,41	0,83
IRL	0,91	1,60	0,27	30,29	0,74
ITA	3,25	1,77	4,69	14,05	0,64
JPN	2,11	2,43	1,81	9,95	0,33
NLD	2,56	3,08	2,11	52,64	0,76
NOR	2,80	2,25	3,33	38,49	0,64
NZL	1,01	1,42	0,53	29,78	1,02
PRT	3,91	4,57	3,24	31,77	0,51
SWE	2,90	2,88	2,94	27,13	0,33
USA	0,20	0,17	0,25	12,81	0,46



Table 2: Descriptive statistics.

Country	Mean			
	Union Density	ALMP per unemployed	Tax wedge	Labour tax
AUS	35,98	12,23	15,28	18,98
AUT	43,95	21,63	25,66	31,15
BEL	54,03	28,14	38,74	34,91
CAN	32,10	11,61	19,05	23,26
CHE	23,88	39,12	18,36	21,53
DEU	30,28	33,57	33,97	30,20
DNK	76,44	40,29	32,86	30,37
ESP	12,85	9,63	32,42	26,82
FIN	74,69	31,23	37,35	33,29
FRA	11,07	23,18	38,08	32,72
GBR	37,88	13,67	24,14	20,24
IRL	47,63	29,89	24,66	20,60
ITA	38,86	7,40	41,23	30,85
JPN	24,90	17,23	16,84	22,33
NLD	25,79	59,07	37,35	31,23
NOR	56,60	41,36	26,69	27,53
NZL	39,46	26,16	19,17	22,29
PRT	35,09	25,29	26,91	19,39
SWE	80,97	97,40	42,33	39,08
USA	15,29	7,02	23,83	21,85

I also included a graph constructed by taking the average of the unemployment rate and the one of the output gap in the 20 countries over the period included in the dataset. The graph shows the trend of the output gap and the unemployment rate over the years. When the economy is facing an expansion unemployment rate decreases while when the economy is facing a recession unemployment rate increases.



### 3.1. Empirical specification.

The unemployment rate regression is specified as follows:

$$u_{it} = \beta_0 + \beta_1 \text{gap}_{it} + \beta_2 \text{inst}_{it} + \beta_3 \text{gap} * \text{inst}_{it} + \lambda_t + c_i + \varepsilon_{it}$$

where  $i = 1, \dots, 20$  and  $t = 1, \dots, 21$ . The regression model includes countries ( $c_i$ ) and time dummies ( $\lambda_t$ ). The error  $\varepsilon_{it}$  is assumed to be uncorrelated with the dependent variables. The variable *gap* refers to the output gap, the variable *inst* has a different meaning according to the

institution that is taken into consideration in the regression. In this model I want to show how much of the unemployment rate responds to a variation of the output gap and what happens if this effect of the output gap depends on the institutional characteristics of each country and how this result differs according to the different type of institution taken into consideration.

$$\frac{du}{dgap} = \beta_1 + \beta_3 inst.$$

where we expect  $\beta_1$  less than 1. If  $\beta_3 > 0$  means that the institution taken into consideration in the regression reduces the effect of the output gap, while if  $\beta_3 < 0$  means that the institutional qualities of a country amplifies the effect of the output gap on the unemployment rate.

### 3.2. Empirical results:

The model presented seem to be good enough with an  $R^2$  on average of 0.8, reaching 0.9 in some cases, which suggest a good fitting of data in the model. The findings are consistent with the empirical literature. The coefficient of the output gap has always a negative effect on unemployment with a significance level of 1% which is congruous with the expectations. I will present and discuss the model according to the different institutions analyzed.

#### *I. Employment protection legislation.*

In this model the variable *inst* refers to the employment protection legislation, in the first column of table 1 I reported the impact of the output gap, EPLR and EPLT on the unemployment rate. The coefficient of EPLT is negative and significant at 1% level, while on the other hand EPLR is positive but not significant. In column 2 I reported also the interaction of EPLR and EPLT with the output gap, the coefficient of the output gap is still negative significant at 1%, with an effect that is slightly stronger, while the interaction between gap and EPLR is not significant. On the other hand the interaction between the output gap and EPLT is positive and significant at 5% level with a coefficient of 0.081 which implies that the legislation on temporary contracts lessen the impact that the shock has on the unemployment rate. In column 3 and 4 I reported the impact of the output gap and the total EPL which is negative and significant at 5%, while the interaction of EPL with the output gap is positive and significant at 1% level. During a shock protections are

stricter, so on the one hand unemployment rate increases because firms are going to be more cautious in assuming workers, but on the other hand with a stringent EPL, since firing costs are higher, firms lay-off less workers and may decide to recover costs by reducing wages or changing the working hours of their employees. As a result EPL reduces the effect of the shock on the unemployment rate, which can be seen by the result on column 4 of table 1 where the coefficient  $\beta_3 > 0$ .

Table 3: Results on EPL.

Variables	Unemployment rate (1)	Unemployment rate (2)	Unemployment rate (3)	Unemployment rate (4)
Output Gap (%)	-0.626*** (0.041)	-0.879*** (0.086)	-0.625*** (0.041)	-0.882*** (0.081)
EPL			-0.908** (0.339)	-0.647** (0.341)
EPLR	0.228 (0.500)	0.555 (0.507)		
EPLT	-0.545*** (0.184)	-0.402** (0.189)		
Gap * EPL				0.110*** (0.030)
Gap * EPLR		0.032 (0.038)		
Gap * EPLT		0.081** (0.033)		
R <sup>2</sup>	0.84	0.84	0.84	0.84
Observations	440	440	440	440
Countries dummies	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes
Period	1982-2003	1982-2003	1982-2003	1982-2003
Number of countries	20	20	20	20

\*Denotes significance at 10% level

\*\*Denotes significance at 5% level

\*\*\*Denotes significance at 1% level

Values in parenthesis are robust standard error.

## II. *Passive labour market policies.*

In this model the variable *inst* is for passive labour market policies. The two types of institutions taken into consideration in the regression are unemployment benefit duration and average unemployment replacement rate. In table 2 it is shown that whenever analyzed, the unemployment benefit duration is very high negative and significant at 1% level. In column 2 of the table the coefficient  $\beta_3$ , which is significant at 1% level, has a value of -0.646, which means that during a shock a high unemployment benefit duration amplifies the impact of the crisis on the unemployment rate. This result is consistent with the literature, indeed unemployment benefit has a negative impact on unemployment since workers are less motivated in finding a job and they are also more inclined in turning jobs down if the benefits are too high. In column 3 I reported the effect of the average unemployment replacement rate which is positive and significant at 10%, while in column 4 the coefficient  $\beta_3$  is negative and significant at 1% level which is consistent with my expectation. Column 6 of the table below shows the effect when all the variables are included in the regression, the coefficient of the output gap is the only one that is still negative, but it is not significant anymore. The results on all the coefficients of the other variables do not show particular difference when they are run together in the same regression than when they are run separately. In conclusion when passive labour market are too high their effect is to increase unemployment rate because workers prefer to remain unemployed with all the benefits than try to find a new job.

Table 4: Results on unemployment benefit and average unemployment replacement rate.

Variable	Unemployment rate (1)	Unemployment rate (2)	Unemployment rate (3)	Unemployment rate (4)	Unemployment rate (5)	Unemployment rate (6)
Output Gap (%)	-0.620*** (0.041)	-0.221** (0.108)	-0.636*** (0.041)	-0.212** (0.105)	-0.620*** (0.040)	-0.058 (0.122)
Unemp Benefit Duration	-3.101*** (0.867)	-4.465*** (0.917)			-4.344*** (0.926)	-4.997*** (0.967)
Average Unemp Replac Rate			0.034* (0.019)	0.013 (0.020)	0.071*** (0.020)	0.050** (0.021)
Gap * UBD		-0.646***				-0.404**

		(0.162)			(0.171)	
Gap* AURR				-0.014*** (0.003)		-0.010*** (0.003)
R <sup>2</sup>	0.84	0.84	0.83	0.84	0.84	0.85
Observations	440	440	440	440	440	440
Countries dummies	yes	yes	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes	yes	yes
Period	1982-2003	1982-2003	1982-2003	1982-2003	1982-2003	1982-2003
Number of countries	20	20	20	20	20	20

\*Denotes significance at 10% level

\*\*Denotes significance at 5% level

\*\*\*Denotes significance at 1% level

Values in parenthesis are robust standard error.

### III. *Active labour market policies.*

In this model the variable *inst* refers to the active labour market policies. The results of the effect of active labour policies are consistent with the literature, indeed the coefficient of ALMP spending per unemployed, as it shown in column 1 of table 3, is negative as expected. In column 2 when this variable is interacted with the output gap the coefficient  $\beta_3$  is positive and equal to 0.003, although this result is not statistically significant. In column 3, I run the regression for the five different categories of ALMP and in column 4 I also added the interacted variables of the single components with the output gap. These findings show that, some of the categories have a negative impact on the unemployment rate (like ALMP of training, ALMP in subsidised employment per unemployed and ALMP of PES), while ALMP for youth and ALMP for disabled have a positive effect on the unemployment rate which although it is not significant. When combining the effect of the institutions with the output gap, the only coefficient significant at 1% level is the one of GAP\*ALMP per public employment service (PES) spending per unemployed. This coefficient is positive which means that when the economy is in recession this category of ALMP reduces the effect of shock on the unemployment rate. This result can be explained because PES spending includes programmes entailing job-search courses and vocational guidance which improve the level of

job-matching and the skills of workers; this combination reduces the bent to fire workers since both the employers and employees are more satisfied with the job.

Table 5: Results on ALMP.

Variables	Unemployment rate (1)	Unemployment rate (2)	Unemployment rate (3)	Unemployment rate (4)
Output Gap (%)	-0.471*** (0.041)	-0.541*** (0.059)	-0.441*** (0.043)	-0.633*** (0.075)
ALMP per unemployed	-0.049*** (0.005)	-0.053*** (0.006)		
ALMP of training			-0.074*** (0.019)	-0.054*** (0.019)
ALMP per youth			0.040 (0.047)	0.070 (0.049)
ALMP in subsidised Employment per unempl			-0.100*** (0.020)	-0.112*** (0.020)
ALMP of PES			-0.185*** (0.041)	-0.308*** (0.046)
ALMP for disabled			0.020 (0.017)	0.013 (0.021)
Gap*ALMPu		0.003 (0.002)		
Gap*ALMPtr				0.000 (0.007)
Gap*ALMPyouth				0.006 (0.012)
Gap*ALMPsub				-0.005 (0.005)
Gap*ALMPPEs				0.060*** (0.013)
Gap*ALMPdisabled				-0.003 (0.007)
R <sup>2</sup>	0.9	0.9	0.91	0.92
Observations	338	338	330	330
Countries dummies	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes
Period	1982-2003	1982-2003	1982-2003	1982-2003

Number of countries	20	20	20	20
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\*Denotes significance at 10% level

\*\*Denotes significance at 5% level

\*\*\*Denotes significance at 1% level

Values in parenthesis are robust standard error.

#### IV. Union density.

The findings on union density seem to be in line with the empirical studies. In the table below, the coefficient of union density in column 1 and 2 is small in magnitude, positive, but not significant. When in column 2 the union density variable is interacted with the output gap the coefficient is equal to 0, which means that union density has no impact on the effect the shock has on the unemployment rate. This effect can be explained because the role of union density is to better the condition of workers and they have an impact on unemployment when they are strong. This is shown in column 3, where the coefficient of high union coverage, which indicates a high percentage of collective bargaining coverage, has a negative effect on unemployment with a significance level of 5%. Even if not significant it is interesting to see that the result of the interaction between high union coverage and the gap has a positive coefficient (Column 4).

Table 6: Results on union density.

Variables	Unemployment rate (1)	Unemployment rate (2)	Unemployment rate (3)	Unemployment rate (4)
Output Gap (%)	-0.628*** (0.043)	-0.606*** (0.093)	-0.564*** (0.039)	-0.584*** (0.073)
Union Density (%)	0.007 (0.018)	0.007 (0.018)		
High Union Coverage			-1.597** (0.710)	-1.601** (0.711)
Gap*Union Density		-0.000 (0.002)		
Gap*High Union Coverage				0.025 (0.077)



R <sup>2</sup>	0.83	0.83	0.83	0.83
Observations	440	440	440	440
Countries dummies	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes
Period	1982-2003	1982-2003	1982-2003	1982-2003
Number of countries	20	20	20	20

\*Denotes significance at 10% level

\*\*Denotes significance at 5% level

\*\*\*Denotes significance at 1% level

Values in parenthesis are robust standard error.

## V. *Labour tax and tax wedge.*

The institutions analyzed here are tax wedge and labour tax. Table 4 reports the results on labour tax, in column 1 the coefficient on the labour tax is significant at 1% level and has a positive effect on unemployment. The same impact has the coefficient when the institution taken into consideration is tax wedge, as it is shown in table 5 on the first column. When there is an increase in tax wedge the unemployment rate also increases because employers have higher cost to face which, even if not directly, influences unemployment. In column 2 of both tables I included the variable of the output gap interacted with the institution, in both cases the coefficient  $\beta_3$  is not significant, specifically in table 4 the coefficient is equal to 0 which means that labour tax does not change the effect a shock has on the unemployment rate. On the other hand on table 5 the coefficient is negative and equal to -0.005, which denotes that tax wedge amplifies the effect a shock has on the unemployment rate.

Table 7: Results on labour tax.

Variables	Unemployment rate (1)	Unemployment rate (2)
Output Gap (%)	-0.627*** (0.045)	-0.638*** (0.155)
Labour Tax	0.283*** (0.050)	0.283*** (0.051)
Gap*Labour Tax		0.000 (0.005)
R <sup>2</sup>	0.86	0.86

Observations	404	404
Countries dummies	yes	yes
Year dummies	yes	yes
Period	1982-2003	1982-2003
Number of countries	20	20

\*Denotes significance at 10% level

\*\*Denotes significance at 5% level

\*\*\*Denotes significance at 1% level

Values in parenthesis are robust standard error.

Table 8: Results on tax wedge.

Variables	Unemployment rate (1)	Unemployment rate (2)
Output Gap (%)	-0.551*** (0.038)	-0.398*** (0.112)
Tax Wedge(%)	0.284*** (0.028)	0.281*** (0.028)
Gap * Tax Wedge		-0.005 (0.004)
R <sup>2</sup>	0.87	0.87
Observations	440	440
Countries dummies	yes	Yes
Year dummies	yes	Yes
Period	1982-2003	1982-2003
Number of countries	20	20

\*Denotes significance at 10% level

\*\*Denotes significance at 5% level

\*\*\*Denotes significance at 1% level

Values in parenthesis are robust standard error.

## **Conclusion:**

Over the years labour market adjustments have been influenced by policy decisions and institutional mechanism of wage determination. In the last decade the world economy has experienced the hardest financial crisis since World War II. Unemployment rate at first increased in all OECD countries reflecting the change in output, with the largest rise in Estonia, Ireland and Spain. Employment losses were significant and concentrated especially in some sectors like construction and industry. In this situation it is also important to consider that unemployment rate did not raise with the same intensity and magnitude across the different groups of workers present in the labour market. Temporary workers, unskilled and young workers are the categories that show the highest fall in employment and rise in long-term unemployment. Across OECD countries the impact of the crisis on the unemployment rate changes according to the different response to the shock and the adjustment made in terms of labour productivity and earnings per workers. According to their different adjustments of wage flexibility OECD countries can be distinct into three main groups: wage adjustments including US, UK, and Germany, limited wage adjustments including The Netherlands, France, Switzerland, Sweden and others, and lastly adverse wage adjustment which include Spain, Ireland and Italy. During this crisis the coefficient of the Okun's law behave in different ways according to the country, many empirical studies have analyzed this behaviour and came up with two possible explanations. The first one is that since there are different policies and institutions regulating the labour market during a crisis unemployment responds less to an output change than during a period of expansion, the other reason can be that during an economic downturn employers are more pessimistic than in a period of expansion, which imply that they will be less willing to hire employees. As reviewed in the second chapter, institutions have different effects on the unemployment rate according to their characteristics and to their level of stringency; indeed some policies can strengthen the effect of a crisis while others mitigate it, on the other hand some may not influence the level of unemployment but they can influence the level of productivity and the change in output. According to the model based on 20 countries in the period 1983-2003 the coefficient of the output gap is always negative and significant which is consistent with the expectation, indeed when the economy is shrinking unemployment rate will increase. From my estimation the

policies that mitigate the effect of the crisis on the unemployment rate are employment protection legislation(EPL) and active labour market policies on public employment service (ALMP on PES). On the other hand when there are too high passive labour market policies like unemployment benefits the effect of the output gap on the unemployment rate is strengthened, indeed if benefits are too high people prefer to remain unemployed and turn down more jobs. In the model I also analyzed the effect of union density, labour tax and tax wedge, these institutions do not provide any significant impact on the effect the crisis has on the unemployment rate. In conclusion most of the institutions analyzed do not have an influential impact on the effect a change in the output gap has on the unemployment rate, and we also have to consider that we cannot exactly predict the long-run effect of EPL and ALMP on PES on the unemployment rate during a shock.

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