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THE GREAT RECESSION WAS NOT SO GREAT

By

Jan C. van Ours

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The Great Recession was not so Great*

Jan C. van Ours[†]

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Abstract

The Great Recession is characterized by a GDP-decline that was unprecedented in the past decades. This paper discusses the implications of the Great Recession analyzing labor market data from 20 OECD countries. Comparing the Great Recession with the 1980s recession it is concluded that there is a high cross-country correlation of the unemployment rates over the two recessions indicating that some labor markets are more vulnerable to fluctuations in economic growth than others. Young workers are the most affected by the Great Recession both in terms of unemployment rates as well as employment rates. For prime age workers employment rates were also affected but for older workers the Great Recession did not have a large impact. To analyze how economic growth and labor market institutions have affected unemployment two types of models are estimated. The main conclusion is rather straightforward and has a “one size fits all” character: to reduce unemployment and create jobs economic growth is needed.

Keywords: Great Recession, unemployment, employment

JEL-codes: J64

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[†]Department of Economics and CentER, Tilburg University, PO Box 90153, 5000 LE Tilburg, The Netherlands; E-mail: vanours@uvt.nl; Phone +31-13-466-2880. Also affiliated with Department of Economics, University of Melbourne, Parkville, Australia; CESifo (Munich); CEPR (London) and IZA (Bonn).

1 Introduction

For several decades economic growth in OECD countries has been fluctuating but it was rarely negative. The Great Recession is characterized by an unprecedented decline of GDP. In 2009, in almost every OECD country there was a negative growth of real GDP of a couple of percentage-points. The big negative economic shock led to a sharp increase of unemployment in many though not all countries. In terms of unemployment rates (unemployment as a percentage of the labor force) young workers are the most affected by the Great Recession. For young and prime age workers employment rates (employment as a percentage of the working age population) were also affected but for older workers the Great Recession did not have a large impact. This paper provides a description of the evolution of GDP growth, employment and unemployment over the past decades and relates the evolution of labor market outcomes to economic growth and cross-country differences in unemployment rates to labor market institutions.

The set-up of the paper is as follows. The next section provides details about the Great Recession mainly in terms of unemployment rates and economic growth. The Great Recession is compared with the 1980s recession in terms of who is hurt the most, distinguishing workers by gender, age and education. In terms of unemployment there are large cross-country differences in the effects of the Great Recession. Nevertheless, compared to earlier recession the impact of the Great Recession is not do different. In countries where unemployment was high after earlier recessions unemployment is also high after the Great Recession. In terms of unemployment rates, young workers and low educated workers are the most affected by the Great Recession. Nevertheless, within countries unemployment is highly correlated between age groups and according to educational attainment. Section 3 discusses labor market institutions where the focus is on three types: unemployment insurance benefits, unions and wage bargaining and employment protection legislation. Despite the fact that large fluctuations in economic growth are a recurrent phenomenon in the past decades labor market institutions did not change much over time. The effects of labor market institutions on the functioning of the labor market has been investigated but the effects for some institutions is clearer than for others. Reforms of labor market institutions are considered to be important but these reforms occur only every now and then and are rarely substantial. Section 4 is on how to make sense of all this. There are two basic types of empirical models of unemployment: Okun's relationship that relates unemployment change and economic growth and Nickell's relationship that relates unemployment rates to labor market institutions. Section 5 presents an exploratory analysis of both empirical models. The effects of labor market institutions and economic growth on unemployment rates are quantified by estimating extended versions of Okun's relationship and Nickell's relationship. In Okun's relationship labor market institutions are allowed to be determinants whereas in Nickell's relationship economic growth is allowed to affect unemployment rates. Okun's relationship is rather stable, and only few labor market institutions affect it. The same holds for Nickell's relationship. Both in Okun's relationship and Nickell's relationship economic growth is the dominant determinant of the evolution of unemployment rates. Changes in labor market institutions might also be important, but the effects are less related to booms and

busts. Therefore, the clearest remedy for unemployment seems to be economic growth. This is most relevant for young workers. The concluding section argues why the Great Recession was not so great and why the labor market consequences of the Great Recession are not over yet.

– Table 1 about here –

2 The Great Recession – what was it like?

2.1 Unemployment and growth

Because of data availability the focus of the analysis is on 20 OECD countries, which for descriptive purposes are often aggregated into four groups of countries: Euro-countries, other European countries, non-European countries and the United States.¹ Table 1 gives an overview of the evolution of unemployment rates and real GDP growth for these four country blocks where five calendar time periods are distinguished: Prologue (1970-80), 1980s Recession (1981-83), Great Moderation (1984-08), Great Recession (2009) and Post Great Recession (2010-13). In terms of unemployment rates the Great Recession does not stand out. In fact, the average unemployment rates in the Great Recession are identical for some country blocks to the Great Moderation. In terms of economic growth the Great Recession clearly stands out. Furthermore, the growth rates in the Post Great Recession Period are comparable to the growth rates in the 1980s recession period.

– Figure 1 about here –

Figure 1 provides annual information about unemployment rates and economic growth over the period 1970-2013 for the four country blocks. There is a strong correlation between the fluctuations in the unemployment rate in the four country blocks but there are also clear differences. In the US, unemployment rates are fluctuating a lot but over the whole of the calendar time interval there is no clear trend. For the other countries in the early 1970s the average unemployment rates are much lower than later on. The Euro-countries on average faced the biggest increase. Whereas in the early 1970s the average unemployment rate in the Euro-countries was substantially lower than in the US, not much different from the non-European countries and only slightly above the non-Euro European countries, there was a strong increase in unemployment rates in the course of the 1970s and early 1980s. From the early 1980s onwards the average unemployment rate in the Euro-countries is the highest. The immediate impact of the Great Recession in terms of unemployment rates is most severe in the US, but whereas in the US unemployment rates declined after the Great Recession it kept on growing in the Euro-countries. The lower part of Figure 1 shows that the fluctuations in GDP-growth are very similar in the four blocks of countries. The drop in GDP-growth over the Great Recession is unprecedented

¹The Euro came virtually into existence 1 January 1999 and from 2002 onwards Euro coins and notes began to circulate. The countries that adopted the Euro are grouped into Euro-countries from 1970 onwards.

over the period of analysis. The US experienced negative GDP-growth also in the early 1980s but by far not as big as in the Great Recession. Over recent years the Euro-countries are the outlier since there is again negative GDP-growth which is not the case in the other country blocks.

– Figure 2 about here –

Figure 2 provides for the 20 countries kernel density plots of country-specific unemployment rates and economic growth for the five time periods. This gives some information about the variation across the countries. The unemployment rates are clearly lowest in the 1970s when there was a bimodal distribution. Some countries had very low unemployment rates and other countries had substantially higher unemployment rates. The recession of the early 1980s not only caused a rightward shift in the distribution of unemployment rates but also a widening of the distribution. The distribution of the unemployment rates in the year of the Great Recession is not so wide, but it is striking that the distribution in the Post Great Recession period is very similar. The lower part of Figure 2 shows the cross-country distribution of GDP-growth for the different time periods. In the 1970s growth rates are highest. Here it is striking that the distribution of growth rates in the period 2010-13 is not so different from the distribution in the 1980s Recession. The distribution of GDP-growth rates in 2009 stands out with almost all countries having negative GDP-growth.

– Figure 3 about here –

2.2 Comparing the Great Recession and the 1980s Recession

The top part of Figure 3 compares the unemployment rates in the 20 countries in 1985 and 2013, a couple of years after the 1980s recession and the Great Recession respectively. Clearly, despite the difference of 28 years, the unemployment rates in the two years are highly correlated across the countries. Spain has the highest unemployment rate in both years whereas Austria, Japan, Norway and Switzerland have the lowest unemployment rates in both years. Portugal is somewhat of an outlier as the unemployment rate in 1985 was average while in 2013 it was higher than in the other countries except for Spain. For comparison, the lower part of Figure 3 shows unemployment rates in 2000 when unemployment rates were relatively low and unemployment rates in 2013. Again, the cross-country correlation in unemployment rates in both years is high.

Generally, to describe the performance of labor markets, three labor market indicators are used, the unemployment rate, the employment rate and the participation rate. These three indicators are related. If U is the number of unemployed, E is the number of employed and N is the population of working age, then the unemployment rate is $u = \frac{U}{U+E}$, the employment rate is $e = \frac{E}{N}$, and the participation rate is $p = \frac{E+U}{N}$. There is a simple relationship between the three indicators: $e = p(1 - u)$. This implies that a change in employment can be split up into a participation effect and an unemployment effect: $\Delta e \approx \Delta p(1 - u) - p\Delta u$. If the

employment rate goes down it is not necessarily the case that the unemployment rate goes up. It could also be that the participation rate goes down for example because employed workers retire early or because unemployed workers become discouraged and withdraw from the labor force.² However, if the participation rate is constant a decline in the employment rate causes an increase in the unemployment rate.

– Table 2 about here –

Table 2 provides an overview of the decomposition in the change in employment rates over the 1980s Recession and over the Great Recession (including the post Great Recession years). In terms of change in employment rates the Great Recession has affected men more than women. This was also the case in the 1980s Recession. For young men (15-24 years) employment rates went down by 5.3 %-points in the 1980s recession and 7.4 %-points in the Great Recession. For young women these numbers are 2.9 and 4.4 %-points. The unemployment rates for young workers went up simultaneously. For prime age workers (25-54 years) there are clear differences between men and women. Whereas for women employment rates were hardly affected in the Great Recession and even increased in the 1980s recession, employment rates went down and unemployment rates went up for men. For old workers (55-64 years) there is a clear difference between the 1980s recession and the Great Recession. For old women the 1980s recession did not have a big impact but over the Great Recession both participation and employment went up substantially. For old men the main effect of the 1980s recession was a substantially drop of 4 %-points in the employment rate which was sort of evenly distributed between an increase in unemployment and a decrease in participation. The Great Recession hardly affected employment of old men while unemployment went up due to an increase in labor force participation.

– Table 3 about here –

2.3 Who is hurt the most?

There are large and persistent differences in the labor market position of workers according to their age and gender. Table 3 provides an overview of country-specific averages of the unemployment rates and employment rates by age and gender over the past 29 years, i.e. over the period 1985-2013. Clearly both within and between countries the differences are substantial. Youth unemployment rates are on average twice as high as unemployment rates among prime age workers whereas unemployment rates among old men and women are on average the lowest. There are differences between unemployment rates of young men and young women but the dominant difference is according to country. Whereas on average youth unemployment rates in Austria, Germany, Japan and Switzerland are below 10 percent, they are above 30 percent for young men in Italy and Spain. Also for prime age workers there are these differences but

²See for a 3-state analysis of labor market flows Dixon et al. (2015).

they are substantially smaller in absolute terms. The lowest unemployment rates over the time period for prime age men and women are in Norway and Japan (below 4 percent). The highest unemployment rates for old men are in Spain with 10.2 percent and for old women in Germany with almost 11 percent.

Table 3 also shows that employment rates of young men and young women are about the same; on average almost 46% for young women and 50% for young men. Prime age and old women have substantially lower employment rates than prime age and old men. The cross-country differences in employment rates are huge for old women. Whereas old women in Belgium have an average employment rate of 18% this is 64% in Sweden, a difference of 46%-points. Also for old men there are substantial differences ranging from 38% in Belgium to 80% in Japan, a 42%-point difference. Among prime age women there are cross-country differences ranging from 49% in Spain to 80% in Norway. Among prime age men the cross-country differences are smallest. The highest employment rate is 94% in Switzerland, the lowest 82% in Ireland and Spain.

– Figure 4 about here –

Figure 4 shows the evolution of employment rates and unemployment rates for 12 countries over the period 1976-2013 distinguished by age and gender.³ The employment rates shown in the top graph are very different depending on age and gender. The employment rates of prime age men are by far the highest; they fluctuate and there is a clear drop due to the Great Recession. For prime age women there has been a huge increase in employment rates over the past decades from an average of 50 percent in the mid 1970s to more than 70 percent recently. Here too the effect of the Great Recession is clear but the effect is different. Whereas for prime age men there is a continuing decline in the employment rate for prime age women the Great Recession brings the increase to a halt. The employment rate of old men initially goes down to reach its lowest level in the mid 1990s to increase later on. The effect of the Great Recession is visible but the employment rate of old men is again increasing in the past year. For old women there is an almost continuous increase in the employment rate from the mid 1990s onwards and there is no visible effect of the Great Recession. Finally, the employment rates of youngsters show substantial fluctuations over time and the Great Recession is no exception to this. The bottom graph of Figure 4 shows the development of unemployment rates by age and gender. The unemployment rates of prime age men and women and old men and women are not very different. All of these unemployment rates fluctuate and show an increase during the Great Recession. The unemployment rates of young men and young women show big fluctuations and the Great Recession is no exception.

– Figure 5 about here –

³These countries are: Australia, Canada, Finland, Germany, Italy, Japan, Netherlands, Norway, Portugal, Spain, Sweden, United States. For the other countries information is available only for a shorter period of time.

Figure 5 provides information about cross-country differences in unemployment rates of prime age men and young men in the year 2011, shortly after the Great Recession. Clearly, these are strongly correlated. In every country the unemployment rate of young men is substantially higher than the unemployment rate of prime age men. The unemployment rate is highest in Spain, Ireland and Portugal and this is the case for both prime age men as well as young men. The bottom graph of Figure 5 provides information about unemployment rates in the year 2011 of men according to educational attainment distinguishing between low educated and high educated workers. Clearly, the unemployment rate among low educated workers is substantially higher than among high educated workers. Nevertheless, as with age, if unemployment is high among low educated workers it is also high among high educated workers.

In short, a similar GDP-shock in one country can have different effects on unemployment than in another country. Nevertheless, conditional on shock to unemployment there is a high within-country correlation in unemployment rates according to education and age.

3 Labor market institutions

3.1 Effects on the functioning of the labor market

Labor market institutions affect the functioning of labor markets.⁴ For some institutions these effects are clearer than for others. Tatsiramos and van Ours (2014) provide a recent overview of studies on the effects of UI benefits on labor market behavior of unemployed workers. They conclude that there are substantial effects on unemployment duration if the replacement rate or the potential benefit duration change. The magnitude of the effects are not much different across countries and type of policy change. An extension of potential benefit duration leads to an increase in actual unemployment duration of about 20% of the benefit duration extension. The benefit elasticity ranges between 0.4 and 1. The job-finding behavior of unemployed workers is influenced both by the level and the duration of the UI benefits. For unions and wage bargaining the effects on the functioning of the labor market are less clear-cut. Boeri and van Ours (2013) suggest that the employment performance of an economy with both high bargaining coordination and high unionization is, *ceteris paribus*, superior to that of an economy with low coordination and unionization. At the same time, when coordination is lacking, better macroeconomic outcomes are observed under either centralized or decentralized regimes, with intermediate regimes offering the worst performance. Employment protection is found to reduce turnover in the labor market but it is not clear whether the level of unemployment and employment is affected.

– Table 4 about here –

⁴See Boeri and van Ours (2013) for a systematic overview. Holmlund (2014) provides a recent overview of research on labor market institutions focusing on minimum wage, unemployment insurance and employment protection legislation.

3.2 Aggregate measures

The structure of labor market institutions is more often than not too complex to capture in one or two numbers. Labor market institutions are not only complex but also very heterogeneous, i.e. within the same country they are different for different types of workers. For the purpose of analyzing the determinants of unemployment I will focus on three types of labor market institutions: unemployment insurance benefits, unions and wage bargaining and employment protection legislation (see Appendix A for details on the indicators for these institutions).

For the individual worker unemployment insurance benefits have three main characteristics: entitlement, level and duration. These depend for example on work experience and sometimes age, on previous earnings, and on family circumstances. Furthermore, the effect of UI benefits on the behavior of individual workers will also depend on other benefits such as welfare benefits, disability benefits and retirement benefits. To allow cross-country comparisons, the generosity of UI benefits is summarized in a simple indicator, the gross replacement rate. This takes into account that replacement rates depend on previous earnings, the duration of unemployment and family situation. It is defined as the average of the gross unemployment benefit replacement rates for two earnings levels, three family situations and three durations of unemployment.

Union power can be measured through union density which is the percentage of workers who are union member. An alternative measure is union coverage which is the percentage of workers covered in wage negotiations. The influence of unions is embedded in the system of wage bargaining. If separate unions coordinate their wage demands they are more powerful in wage negotiations. If bargaining takes place at a higher level, say country-wide, wage demands may be constrained because unions have to take the consequences of their demands into account in terms of potential job loss and as a consequence of that, unemployment. Wage bargaining can be characterized by the magnitude of coordination (scale 1 to 5) or the level of bargaining (scale 1 to 5).

Employment protection legislation is different for workers on regular jobs and workers on temporary jobs. The relevance of this on a countrywide level depends on the enforcement of the legislation but also on the share of each type of jobs. At a country level regular jobs might be well-protected but if only a small share of the workforce has a regular job the overall level of employment protection will be low. The indicators for employment protection legislation for regular jobs and temporary jobs both have a scale from 0 to 6.

Table A1 provides information about the cross-country differences in the indicators for labor market institutions, averaged over the period 1970-2013 (except for the indicators for Employment Protection Legislation which are averaged over the period 1985-2013). There is quite some variation. The highest gross replacement rate is 51.5 for Denmark, the lowest is 11.3 for Japan. Highest union density is in Sweden (76.8%), the lowest in France (12.6%). For all the other indicators the US scores the lowest, 19.3 for union coverage, 1.2 for wage coordination, 1.0 for level of wage bargaining, 0.3 for Employment Protection Legislation of both regular and temporary jobs. Austria scores the highest for union coverage (97.0%) and wage coordination (4.3). Norway scores the highest for the level of wage bargaining (4.0),

Portugal for the protection of regular jobs (4.5) and France and Italy for the indicator for the employment protection of temporary jobs (3.5).

3.3 Reforms of labor market institutions

Table 4 provides an overview of average changes in the main indicators for these labor market institutions over the period 1985-2013. As shown, the gross replacement on average increased from 28.4 to 31.8 percent. Clearly, on average the incentives for unemployed workers to leave unemployment have been reduced. Table 4 shows that union density as well as union coverage decreased substantially. Wage coordination and the level of bargaining decreased somewhat. Employment protection of regular jobs hardly changed while employment protection of temporary jobs reduced quite a bit.

Labor market institutions are reformed every now and then. However, not every labor market institution is subject to government influence (see Boeri and van Ours (2013)). Union density for example is the outcome of decisions of workers who compare expected benefits and costs of union membership and then decide whether or not they want to become a union member. The wage bargaining regime is to a large extent influenced by unions and employers' associations and also beyond government influence. Government can influence for example regulations on working hours, mandatory retirement age or the existence of early retirement programs. These measures reduce labor supply with the intention of new jobs being created for unemployed workers. For a mandatory reduction of working hours this is an illusion.⁵ The same is the case for early retirement programs which are being phased out as a consequence of which there has been a reversal of the declining trend in employment rates of old workers to a increasing trend. For temporary short-time work arrangements the verdict is less negative (see Boeri and van Ours (2013)). A reform of employment protection legislation that is suggested and may be worthwhile to pursue is the single contract in which employment protection gradually increases with tenure. With a single employment contract the distinction between temporary jobs and permanent jobs will disappear. Employment protection will gradually and steadily increase with tenure without any large discontinuity. In relation to Unemployment Insurance benefits there is a plea to have the generosity of the benefits increasing if unemployment goes up. For this, the main argument in favor is that moral hazard is less of an issue in recessions than in boom periods.

4 Modeling unemployment

4.1 Okun's relationship

Okun (1963) proposed a relationship between unemployment and economic growth that is re-

⁵Crépon and Kramarz (2008) discuss the employment effects of two working hours reductions in France. The first occurred in 1982 when the normal workweek was reduced from 40 to 39, the second occurred in the course of the 1990s when the normal workweek was further reduced to 35 hours. They conclude that work sharing per se did not have positive effects on employment but because the introduction of worksharing was accompanied by payroll tax subsidies there were short-run positive effects which disappeared when the subsidies ran out.

ferred to as “Okun’s law”. Using US data Okun (1963) related quarterly observations from 1947:2-1960:4 on changes in the unemployment rate (u) in percentage points to percentage changes in real GNP (y) finding: $\Delta u_t = 0.30 - 0.30 \Delta y_t$. This implies that the unemployment rate will increase with 0.3 of a percentage point if real GNP does not grow and will stay constant if real GNP quarterly growth rate is 1 percent.⁶ Okun’s study was not intended to explain the evolution of unemployment through economic growth but to indicate how much potential output is lost when the unemployment rate is above 4 percent, the unemployment rate when according to Okun “a reasonable target under existing labor market conditions” that would be in line with price stability.

The relationship between changes in unemployment rate and economic growth has been studied often. Sometimes with unemployment as the dependent variable and growth as explanatory variable, sometimes the other way around. The latter type of studies relate real output to a number of production factors including labor, capital and technology. Perman and Stephan (2013) presents a meta analysis of 269 estimates of Okun’s relationship as presented in 28 studies. According to this overview about 60 percent of all estimates have real output as left-hand-side variable, three-quarters use country level data and slightly more than half of the studies use a static model. Many studies find that the nature of the relationship has changed over time or find that the relationship is different in expansions than during recessions.⁷ Therefore, some studies refer to the relationship as “Okun’s rule of thumb”. Okun specified an empirical relationship from which it is not clear which way causality runs. From a labor economist’s point of view growth affecting unemployment makes sense. I will use the term “Okun’s relationship” focusing on studies where the unemployment rate is the left-hand-side variable.

Owyang and Sekhposyan (2012) using quarterly data over the period 1949-2011 estimate various specifications of the Okun relationship with the change of the unemployment rate or the unemployment rate as left-hand-side variables and the growth rate of real GDP or the log of real GDP as right-hand side variables. They find that during the three most recent U.S. recessions and the Great Recession the unemployment rate is more sensitive to output growth and output gap fluctuations. Cazes et al. (2013) analyze country-specific changes in unemployment in the Great Recession finding that Okun’s relationship varies across countries and time. In some countries unemployment was more responsive and in other countries less responsive to the negative economic growth shock. The authors relate these differences to differences in employment protection claiming that the responsiveness of unemployment through the Great

⁶As an alternative Okun estimated from 1953:1-1960:4 a relationship between the unemployment rate and the gap between the potential and actual output: $u = 3.72 - 0.36 \text{ gap}$. So, if there is no gap the unemployment rate equals 3.72 percent. With a 1 percent gap the unemployment rate is equal to 4.08 percent.

⁷Lee (2000) is one of the studies that estimate an Okun relationship with the change of unemployment as a right-hand-side variable. Using data from 16 OECD countries he finds that such relationships are sensitive to the choice of specification and time period. Freeman (2001) estimates Okun relationships with real GDP (in its deviation from a long run trend) as left-hand side variable and the unemployment rate (in its deviation from the natural rate of unemployment) as a right-hand side variable. He uses data from 10 OECD countries over the period 1968–95 and includes calendar year fixed effects in the analysis. One of his conclusions is that Okun’s original estimate of a three to one tradeoff between real GDP growth and the unemployment rate is now about two to one.

Recession was smaller in countries with more employment protection. Ball et al. (2013) study Okun’s relationship on short-run unemployment movements for the US from 1948 to 2011 and for 20 OECD countries from 1980 to 2011. They conclude that there is a strong and stable relationship “by the standards of macroeconomics” in most countries although the magnitude of the relationship between output and unemployment varies across countries. Pereira (2013) analyzing quarterly US data from 1948:1 to 2012:4 concludes that there are asymmetries in Okun’s relationship with a weaker relationship between economic growth and unemployment during periods of expansion. Nevertheless, the Great Recession does not differ from other recession periods.

4.2 Nickell’s relationship

A different strand of literature analyzes the relationship between unemployment and labor market institutions. The general relationship is specified as $u_{j\tau} = \gamma Z_{j\tau} + \delta \Delta^2 p_{j\tau}$, where $\Delta^2 p_{j\tau}$ is the change in inflation in country j in calendar year interval τ .⁸ Although this equation has been discussed in works of Layard and Nickell sometimes in combination with Jackman I refer to it as Nickell’s relationship as Nickell also has quite a few single authored papers on this relationship. Nickell (1998) for example analyzes 20 OECD countries taking averages over two time periods: 1983–1988 and 1989–1994. From this analysis, he concludes that financial incentives for the unemployed such as the replacement rate and benefit duration affect unemployment. Active labor market policies affect unemployment and the characteristics of the wage determination system also play a significant role. Union density and union coverage are pushing the unemployment rate upward whereas coordination between unions and employers improve labor market performance. Finally, labor taxes increase total unemployment, while none of the indicators of labor market rigidity (employment protection regulation, labor standards) have a significant effect. Nickell and Layard (1999) provide a general overview of the relationships between unemployment and labor market institutions. They conclude that the main institutions influencing unemployment are unions and social security systems. And they conclude that to reduce unemployment governments should encourage product market competition to reduce union power and eliminate the negative effect of unions and governments should link reforms of unemployment benefit systems to active labor market policies in order to move people from welfare to work.

Belot and van Ours (2001) argue that the role of each labor market institution depends on the rest of the institutional framework. They perform an empirical analysis using data from 18 OECD countries and seven 5-year periods in which they distinguish between interactions within the system of financial incentives – labor taxes and unemployment benefits – and interactions within the structure of union bargaining – union density, level of bargaining and employment protection legislation. Belot and van Ours (2001) show that if country fixed effects are included

⁸Time periods are used in stead of yearly information to remove the effect of cyclical fluctuations. The time intervals are often 6-years periods. One of the earliest studies relating unemployment rates to labor market institutions is presented in Layard et al. (1991). From an analysis based on 20 countries and one 6-year time periods it is concluded that the level and duration of unemployment benefits and union coverage have positive effects on unemployment while active labor market policies and wage coordination have a negative effect.

and the analysis is restricted to direct effects of labor market institutions only home ownership has a significant (positive) effect on unemployment rates. However, if in addition interactions between labor market institutions are allowed for there are significant effects on unemployment rates of centralized bargaining in combination with employment protection and union density. Furthermore, there is a significant effect of the UI replacement rate on unemployment while tax rates are not significant. Belot and van Ours (2004) present an empirical analysis of 17 OECD countries based on averages over eight 5-year periods 1960–99. They find that there is a direct negative effect on unemployment of the UI replacement rate, positive interaction effects between taxes and UI replacement rates and between union density and centralization. To investigate to what extent the voluntary part of unemployment matters, Belot and van Ours (2004) also consider the effects of labor market institutions on the non-employment rate, which is defined as 1 minus the employment rate, finding similar results as for the unemployment rate estimates.⁹

The discussion on whether unemployment is influenced by changes in labor market institutions in combination with economic shocks or just by changes in labor market institutions goes back to Blanchard and Wolfers (2000) and Nickell et al. (2005). According to Blanchard and Wolfers (2000) labor market institutions in Europe did not change a lot in the 1980s whereas unemployment rates went up substantially. Blanchard and Wolfers (2000) analyze the evolution of unemployment using data from 20 OECD countries and eight 5-year periods from 1960 to the mid nineties. They investigate in particular the interactions between labor market institutions and economic shocks finding that shocks have a larger positive effect on unemployment when the UI replacement rate is high, the benefit duration is long, employment protection is strict, union density is high and coordination in wage negotiations is low. Nickell et al. (2005) conclude that changing labor market institutions provide a reasonably satisfactory explanation of the broad pattern of longer-term unemployment shifts in the OECD countries. Changes in benefit systems, increases in labor taxes, changes in union variables and employment protection contribute to changes in unemployment. Interactions between average values of institutions and shocks make no significant additional contribution to the understanding of OECD unemployment changes.

5 Labor market institutions and economic growth revisited

To explore the relationship between unemployment, growth and labor market institutions, I estimate both Okun’s relationship and Nickell’s relationship using data from the 20 OECD countries. Okun’s relationship is specified as:

$$\Delta u_{j,t} = \alpha + \beta_1 \Delta y_{j,t} + \beta_2 \Delta y_{j,t-1} + \epsilon_{j,t} \quad (1)$$

where u is the unemployment rate in country j in year t , Δy is annual real GDP-growth, α , β_1 and β_2 may depend on labor market institutions Z_j and $\epsilon_{j,t}$ is the error term. Long-term equilibrium unemployment where $\Delta u_{j,t} = 0$ requires a GDP growth of $-\frac{\alpha}{\beta_1 + \beta_2}$.

⁹See for other studies on the effect of labor market institutions on labor market performance Elmeskov et al. (1998) and Daveri and Tabellini (2000).

Nickell’s equation is specified over time periods τ , so there is no need to specify a full dynamic equation:

$$u_{j,\tau} = \gamma_j + \gamma_\tau + \delta Z_{j,\tau} + \beta \Delta y_{j,\tau-1} + \varepsilon_{j,t} \quad (2)$$

where the γ_j are country fixed effects, the γ_τ are period fixed effects and $\varepsilon_{j,t}$ is the error term. Here the equilibrium unemployment depends on labor market institutions and GDP-growth. A higher equilibrium economic growth would lead to a lower equilibrium unemployment. As an alternative to this specification with a one-period lagged GDP-growth, I will also use one year lagged GDP-growth and the change of inflation ($\Delta^2 p$) as right-hand side variables.

In the remainder of this section of the paper I investigate possible effects of the labor market institutions discussed in section 3, i.e. gross replacement rates, union density, union coverage, wage coordination, level of wage bargaining and employment protection of regular jobs and temporary jobs.¹⁰

– Table 5 about here –

5.1 Okun’s relationship

The first column of panel *a* of Table 5 shows the parameter estimates for a simple version of Okun’s relationship that relates the change in unemployment to GDP-growth and lagged GDP growth. Both growth indicators have significant negative effects. In the second column the Great Recession is removed from the sample, i.e. data for the years 2009 and (because of the lag in GDP) 2010 are removed. This hardly affects the parameter estimates. In the third column country fixed effects are introduced but this does not affect the main parameter estimates either. Panel *b* presents the parameter estimates for three country blocks: Euro countries, non-Euro countries and non-European countries. The parameter estimates hardly differ between the country blocks. Panel *c* replicates the estimates of panel *a* but over a shorter time period, 1985-2013. The parameter estimates are not much affected by this. Nevertheless, it is worth noticing that the ratio between the intercept and the sum of the parameter related to GDP-growth and lagged GDP-growth is changing. Over the period 1970-1983, this ratio is 3.1 indicating that to keep unemployment constant an annual GDP-growth of 3.1% is needed. Over the period 1985-2013 this ratio went down to 2.3, indicating that less economic growth is needed to keep unemployment constant.

¹⁰I ignore Active Labor Market Policies because microeconomic research suggests that these are only effective in special circumstances. Kluve (2012) presents a meta-analysis of 137 ALMP evaluation studies in Europe finding that simple non-expensive programs with clear incentives for unemployed workers work best. Card et al. (2010) also present a meta-analysis of ALMP evaluations with similar findings but emphasizing that longer term evaluations generally tend to be more favorable than short-term evaluations. Using a randomized experiment in France Crépon et al. (2013) show that job placement assistance for young, educated job seekers in France was effective but there were also large displacement effect causing the program to have small net benefits in terms of the reduction in unemployment.

Finally, labor market institutions are introduced. It appears that union power as measured by union density and union coverage do not have significant effects on Okun’s relationship. Employment Protection Legislation both for regular jobs and temporary jobs have no effect either. The other labor market institutions do have effects are their parameter estimates are reported in panel *d* of Table 5. Wage coordination and level of bargaining affect both the intercept and interact with GDP-growth, and there is also a significant effect of the gross replacement rate interacted with GDP-growth. Wage coordination has a negative effect on the intercept of Okun’s relationship which suggests that with a higher level of wage coordination less economic growth is needed to keep unemployment constant. But, through the interaction term, wage coordination also has a dampening effect of GDP-growth on the change in unemployment. Similarly, if the level of wage bargaining is higher more economic growth is needed to keep unemployment constant but through the interaction term the effect of GDP-growth on the change in unemployment is amplified. A higher unemployment benefit replacement rate amplifies the effect of lagged GDP-growth on the change in unemployment. So, in a situation of a recession, conditional on the drop in GDP, countries with higher UI replacement rates will experience a bigger increase in unemployment.

– Table 6 about here –

5.2 Nickell’s relationship

From estimating Nickell’s relationship it is clear that unemployment is not affected by the gross replacement rate, union density, union coverage or the level of wage bargaining. Furthermore, interactions between the gross replacement rate and an indicator of entitlement to unemployment insurance benefits are not important, nor are interactions between union density and the level of bargaining or bargaining coordination important. Table 6 shows the mostly significant parameter estimates of Nickell’s relationship estimated over nine calendar time periods. In panel a a one-period lagged GDP-growth is among the right-hand side variables, in panel b this is one-year lagged GDP-growth while in panel c it is the change in inflation. In the first column country fixed effects are included but not calendar time fixed effects.

As show in Table 6, in all estimates the level of wage coordination has a significant negative effect on the unemployment rate. Furthermore, panel a shows that lagged GDP-growth has a significant negative effect on the unemployment rate. These results do not change if calendar year fixed effects and country-specific time trends are included. As shown in the fourth column estimated over a shorter calendar time period, with country fixed effects and time period fixed effects there is still a negative effect of wage coordination and GDP-growth but the effect of the change in inflation is not significantly different from zero.

Whereas in Okun’s relationship country fixed effects are not relevant, they are very important in Nickell’s equation. Spain for example has the highest fixed effect, while Sweden and Denmark have the lowest. Country fixed effects remove time-invariant country-specific characteristics and these could well reflect labor market institutions who have the tendency

not to change very often. In fact, for some countries some of the main labor market institutions like employment protection legislation have not changed at all over the period of analysis. So, whereas introducing country fixed effects is necessary to obtain unbiased estimates of how changing labor market institutions affect unemployment they may reflect the influence of the level in labor market institutions on the equilibrium level of unemployment.

– Table 7 about here –

5.3 Unemployment and employment by age and gender

Panel a of Table 7 provides parameter estimates of Okun’s relationship when a distinction is made by age and gender. The specification and the time period are the same as the one used in panel c of Table 5. Clearly, the estimates of the constant decrease with age and are larger for men than for women. The negative effects of GDP-growth and lagged GDP-growth also decrease with age and they are larger for men than for women. In all estimates the ratio of the constant and the sum of the two parameters for GDP-growth is about 2.4 indicating that an annual GDP-growth of 2.4 percent is needed to keep unemployment rates constant. The main difference according to age and gender is that the unemployment rates of young workers are affected the most by cyclical fluctuations while old workers are affected the least. Also unemployment rates of men are affected more than unemployment rates of women. Panel b of Table 7 shows parameter estimates of an Okun-type of relationship in which unemployment rates are replaced by employment rates. Here too the positive effects of GDP-growth decrease with age and they are larger for men than for women.

6 Conclusions

The Great Recession was characterized by a drop in GDP that was unprecedented in recent history. The big negative economic shock led to a sharp increase in unemployment in most of the affected countries. Nevertheless, the Great Recession caused an increase in unemployment that was not unprecedented. The much milder recession of the early 1980s caused a similar increase in unemployment rates. Within countries there is also a strong correlation in unemployment rates. If in a country unemployment rates are relatively high, they are relatively high for various types of workers along dimensions as gender, age and educational attainment.

The overall picture of unemployment after the Great Recession is mixed. Some countries still have relatively low unemployment rates while others have very high unemployment rates. For the latter countries there is no easy way out. Reintroducing early retirement programs, shorter working hours or throwing a lot of money at expensive active labor market policies are not the way to go. Shorter working hours and early retirement reduce labor supply with the intention of jobs being created for unemployed workers. With shorter working hours the idea is that firms will hire more workers to balance shorter working hours per worker. With lower retirement ages, the idea is that firms will hire more workers to compensate for workers retiring.

This is unlikely to happen. Active labor market policies are often found not to be effective but still a lot of money is spent on them. Possibly because politicians measure the effectiveness of their actions by the amount of money they spend not by the effectiveness of that spending.

Fluctuations in unemployment are to a large extent determined by fluctuations in economic growth. Okun's relationship is quite stable over time and even the Great Recession did not disrupt the relationship. A simple model with economic growth and one-year lagged economic growth goes a long way in explaining cross-country differences in unemployment growth. From the parameter estimates of the Okun relationship it became clear that currently less economic growth is needed to reduce unemployment than in the 1970s. Allowing for labor market institutions to influence Okun's relationship either through the intercept or through the growth effect improves the statistical fit. Nevertheless, labor market institutions do not seem to matter a lot. Or, more precisely, it does not seem to be the case that indicators of labor market institutions matter. It could well be and to me it seems very likely that labor market institutions matter, but at a country level the indicators are insufficiently rich to unravel their effects. The same line of reasoning holds for Nickell's relationship in which the unemployment rate is linked to indicators of labor market institutions. A simple model with unemployment rates and economic growth goes a long way in explaining country-specific annual levels of unemployment. Nevertheless, country fixed effects are an important contributor as well. And, by nature these country fixed effects are difficult to explain. Differences in country fixed effects are likely to be related to labor market institutions which are persistent in nature. Some countries have large fixed effects in unemployment regressions and probably therefore unemployment rates are highly correlated across recessions and within countries for different groups of workers. Therefore, it is an illusion to think that unemployment rates for some groups of workers can be reduced without reducing unemployment across the board.

As Freeman (1998) stressed a long time ago, countries cannot just borrow some institutional features from other countries and expect the unemployment rate to decline. Particular labor market institutions may perform differently in one country than they do in another country depending on the overall institutional framework. There is no magical combination of labor market institutions. If there was one, countries would have implemented such a system long ago. If anything, the role model of good labor market institutions is changing faster than the institutions themselves. Germany made the transition from the 'sick man' of Europe to the role model for the rest of Europe within a decade and is praised for reforming its labor market institutions in an efficient way as an important reason for its low unemployment rates. However, there is a debate on the nature of the German "miracle".¹¹

Reforms of labor market institutions are needed but not necessarily due to the Great Recession. For example, the need for workers to retire later is related to the demographics of an aging population and unrelated to the current high unemployment rates. The generosity of UI benefits can be made dependent on the economic cycle as is already the case in some countries. In terms of Employment Protection Legislation, the dual system could be abolished.

¹¹See Dustmann et al. (2014) who claim that wage flexibility at the low end of the wage distribution which increased competitiveness lies at the heart of the German success.

A single contract avoids discontinuities that occur if the firm would have to decide on whether temporary contracts reach a legal end and need to be transferred into a permanent one or the worker has to be dismissed. As a solution to high youth unemployment dual training systems are proposed. However, relevant as they may be, dual training systems are complex and not easy to implement. They may contribute to a better functioning labor market for young workers because the transition from school to work is smoother. Nevertheless, it is unlikely that the introduction of a dual training system is a quick solution to the current high youth unemployment rates. Youth unemployment rates have always fluctuated much more than unemployment rates of prime age workers. This is a natural phenomenon. If an economy slows down and firms need fewer workers they cut on hiring and if the economic conditions worsen they start firing workers. It is the young workers who suffer most because they are the ones who are not hired and if they had a job they are the most likely to be fired.

The Great Recession was great from an economic growth perspective as there was a huge and cross-country highly correlated decline in GDP. The Great Recession was not great compared to earlier recessions in terms the impact on unemployment rates. Earlier much milder recessions have shown similar increases in unemployment rates. The Great Recession is over as economic growth is recovering but the consequences of the Great Recession are still present. First and foremost, to reduce unemployment rates there is a great need for economic growth. Economic growth affects above all the position of young workers. Economic growth causes youth unemployment rates to go down quickly and youth employment rates go up fast. Economic growth benefits mostly those who need it the most. Thus, economic growth has an attractive “one size fits all” character.

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Appendix A: Details on data

1. Unemployment and employment data: Unemployment national averages for 20 countries. Sources : (1) 1970-2003: Bassanini and Duval (2006), (2) 2004-2013: OECD labor force statistics. Unemployment rates and employment rates by age, gender and education. Educational attainment: Low = Below upper secondary education; Intermediate = Upper secondary and post-secondary non-tertiary education; High = Tertiary education. Source: OECD labor force statistics
2. Labor market institutions
 - (a) Unemployment insurance benefits: Gross replacement rates: Unemployment insurance and unemployment assistance benefits as a percentage of the Average Production Worker wage; this an OECD summary measure is defined as the average of the gross unemployment benefit replacement rates for two earnings levels, three family situations and three durations of unemployment. Series 1970-2005 available for odd years – even years are calculated as average of adjacent odd years; from 2006 onwards unemployment insurance and unemployment assistance benefits as a percentage of the Average Worker wage; the jump in series from 2005 to 2006 has been accounted for by the author. Source: OECD statistics. Eligibility criteria for unemployment benefits; Source: Venn (2012)
 - (b) Unions and wage bargaining: Visser (2011) published a data base for the period 1960 to 2010 on institutional characteristics of trade unions, wage setting, state intervention and social pacts. In case of missing observations in recent years numbers are assumed to be constant from the last available year onwards. From this database the following series are used: 1. Union density: union membership as a percentage of wage and salary earners in employment. 2. Union coverage: employees in workplaces covered by unions or works councils as a percentage of all wage and salary earners in employment; adjusted for the possibility that some sectors or occupations are excluded from the right to bargain. 3. Coordination of wage bargaining: discrete values ranging from 5 (economy-wide bargaining) to 1 (fragmented bargaining, mostly at company level). 4. Level of wage bargaining: discrete values ranging from 5 (national or central level) to 1 (local or company bargaining)
 - (c) Employment protection legislation: Two indicators for Employment Protection Legislation: legislation on permanent jobs and legislation of temporary jobs. Series available from 1985. Source: OECD (2013).
3. GDP-growth: World Bank.

Table A1 provides an overview of the means of the variables over the period of analysis.

– Table A1 about here –

TABLE 1: UNEMPLOYMENT RATES AND REAL GDP GROWTH; DESCRIPTIVE STATISTICS BY GROUPS OF COUNTRIES AND TIME PERIODS

	Europe			US	Total
	Euro	non-Euro	non-Europe		
Unemployment rate (%)					
1970-80 Prologue	4.3	2.5	3.3	6.4	3.8
1981-83 1980s Recession	9.0	5.3	6.1	9.1	7.5
1984-08 Great Moderation	9.0	5.3	6.4	5.8	7.4
2009 Great Recession	9.0	6.0	6.4	9.4	7.8
<u>2010-13 Post GR</u>	<u>10.4</u>	<u>6.3</u>	<u>6.1</u>	<u>8.7</u>	<u>8.4</u>
1970-13	8.0	4.8	5.6	6.5	6.6
Annual growth real GDP (%)					
1970-80 Prologue	4.0	2.5	3.5	3.2	3.5
1981-83 1980s Recession	1.1	1.3	2.3	1.8	1.4
1984-08 Great Moderation	2.8	2.5	2.8	3.2	2.7
2009 Great Recession	-4.6	-3.9	-1.7	-2.8	-3.7
<u>2010-13 Post GR</u>	<u>0.5</u>	<u>1.6</u>	<u>2.3</u>	<u>2.3</u>	<u>1.2</u>
1970-13	2.6	2.2	2.8	2.9	2.5

TABLE 2: CHARACTERIZING TWO RECESSIONS; SPLITTING-UP THE EMPLOYMENT CHANGE (Δe) INTO THE CHANGE IN PARTICIPATION ($\Delta p(1 - u)$) AND A CHANGE IN UNEMPLOYMENT ($p\Delta u$)

	15 to 24		25 to 54		55 to 64	
	79-83	07-11	79-83	07-11	79-83	07-11
Women						
Change in employment	-2.9	-4.4	4.0	-0.6	0.8	3.6
Change in participation	0.3	-1.7	5.4	1.0	1.4	4.2
Change in unemployment	3.1	2.8	1.3	1.6	0.5	0.6
Men						
Change in employment	-5.3	-7.4	-3.0	-3.9	-4.0	-0.3
Change in participation	-0.9	-3.1	0.1	-0.7	-1.9	1.5
Change in unemployment	4.4	4.6	3.1	3.2	2.2	1.7

Note that this composition is based on data from Australia, Canada, Finland, Germany, Ireland, Italy, Japan, Netherlands, Norway, Portugal, Spain, Sweden, United States

TABLE 3: COUNTRY-SPECIFIC UNEMPLOYMENT RATES AND EMPLOYMENT RATES BY AGE AND GENDER; AVERAGE 1985-2013 (%)

	Unempl. women			Unemployment men			Employment women			Employment men		
	15-24	25-54	55-64	15-24	25-54	55-64	15-24	25-54	55-64	15-24	25-54	55-64
Australia	12.7	5.5	3.4	14.0	5.3	6.3	59.4	66.0	35.1	62.2	86.5	60.1
Austria	7.6	4.1	3.1	7.3	3.5	4.2	50.2	75.6	23.8	58.2	90.1	44.8
Belgium	21.7	9.6	5.0	17.5	5.9	4.1	25.5	63.7	17.6	30.8	86.6	38.0
Canada	12.3	7.1	6.5	15.6	7.3	7.1	56.7	72.4	40.6	56.8	85.0	59.6
Denmark	10.4	6.5	6.0	9.9	5.1	5.2	61.8	79.4	46.7	65.6	87.8	63.5
Finland	18.6	7.0	8.6	18.7	7.5	9.2	41.0	79.3	44.5	44.9	84.3	46.8
France	24.6	10.2	6.7	21.0	7.3	6.7	27.5	69.9	29.9	33.8	87.8	38.5
Germany	8.5	7.8	10.8	9.3	6.7	9.5	46.5	68.3	32.8	51.7	86.8	53.6
Ireland	16.5	9.2	5.7	20.5	10.5	6.9	39.0	54.4	28.2	42.4	81.8	61.8
Italy	34.9	11.0	3.3	25.9	5.7	3.6	21.4	51.7	18.7	31.5	86.3	46.6
Japan	6.5	3.6	2.6	7.7	3.1	5.1	42.2	64.5	48.4	41.5	93.7	79.6
Netherlands	10.4	6.2	3.8	9.6	4.3	3.6	58.5	65.2	26.4	60.1	89.0	51.0
New Zealand	13.0	4.9	3.1	13.8	4.8	3.9	53.5	69.7	48.0	59.1	87.9	68.7
Norway	9.7	2.9	1.3	10.4	3.3	1.9	53.3	79.5	59.5	55.7	88.5	73.0
Portugal	19.3	7.6	4.1	14.2	5.4	5.5	34.7	69.8	37.9	43.4	87.9	60.1
Spain	39.2	19.5	10.0	29.7	12.2	10.2	27.1	49.0	23.3	39.3	81.7	55.4
Sweden	15.2	4.8	4.1	16.5	5.3	5.3	48.3	83.4	64.1	47.9	87.7	71.1
Switzerland	6.5	4.0	2.7	6.7	2.7	3.0	62.6	76.3	53.3	64.7	93.9	78.7
UK	12.4	5.5	3.8	16.6	6.5	7.2	57.6	71.0	42.1	61.7	86.6	62.0
US	11.7	5.1	3.7	13.6	5.1	4.3	53.3	71.0	49.9	57.4	86.8	65.3
Average	15.8	7.2	5.0	15.1	5.9	5.7	45.8	68.8	38.6	50.1	87.2	58.9

Note that the data for Austria refer to the period from 1994 onwards, for New Zealand from 1986 onwards and for Switzerland from 1991 onwards.

TABLE 4: CHANGES IN LABOR MARKET INSTITUTIONS 1985-2013

Indicator	1989	2013	Range
Gross replacement rate (%)	28.4	31.8	0-100
Union density (%)	43.2	30.8	0-100
Union coverage (%)	70.3	60.8	0-100
Wage coordination (%)	3.2	2.9	1-4
Level of bargaining	2.5	2.1	1-5
EPL – regular jobs	2.2	1.9	0-6
EPL – temporary jobs	2.3	1.4	0-6

TABLE 5: OKUN'S RELATIONSHIP (ΔU) – 1970-2013

a. 1970-2013 – 20 countries						
Constant	0.89	(14.7)**	0.87	(13.1)**	0.96	(11.0)**
GDP growth	-0.21	(11.2)**	-0.20	(10.5)**	-0.23	(7.3)**
GDP growth _{t-1}	-0.08	(5.4)**	-0.09	(4.9)**	-0.09	(5.8)**
Years 2009 & 2010		yes		no		yes
Country F.E.		no		no		yes
N		852		812		852

b. 1970-2013	Euro countries		non-Euro Europe		non-Europe	
Constant	0.96	(10.3)**	0.84	(8.7)**	0.83	(7.1)**
GDP growth	-0.21	(7.4)**	-0.22	(7.5)**	-0.23	(6.6)**
GDP growth _{t-1}	-0.09	(4.0)**	-0.11	(3.8)**	-0.04	(1.9)*
N		428		210		214

c. 1985-2013 – 20 countries						
Constant	0.82	(11.0)**	0.79	(9.7)**	0.91	(9.5)**
GDP growth	-0.26	(10.5)**	-0.23	(9.7)**	-0.28	(8.3)**
GDP growth _{t-1}	-0.10	(5.1)**	-0.11	(4.0)**	-0.12	(4.6)**
Years 2009 & 2010		yes		no		yes
Country F.E.		no		no		yes
N		580		540		580

d. Including institutions	1970-2013		1985-2013	
Constant	0.88	(6.9)**	0.90	12.3)**
GDP growth	-0.26	(12.8)**	-0.28	(11.4)**
GDP growth _{t-1}	-0.10	(6.9)**	-0.11	(6.2)**
Wage coordination	-0.26	(4.6)**	-0.29	(4.4)**
Level of bargaining	0.28	(4.0)**	0.28	(3.4)**
Replacement rate * GDP growth	-0.61	(4.5)**	-0.53	(5.6)**
Wage coordination * GDP growth	0.08	(5.6)**	0.11	(5.5)**
Level of bargaining * GDP growth	-0.04	(2.4)**	-0.07	(2.7)**
N		839		580

Note: Interactions terms are differences from their means; absolute t statistics in parentheses; ** (*) indicates significance at a 5% (10%) level.

TABLE 6: NICKELL'S RELATIONSHIP; TIME PERIODS 1970-2013

a. Baseline	1970-2013		1970-2013		1970-2013		1985-2013	
GDP growth $_{t-1}$	-0.93	(5.6)**	-0.84	(5.6)**	-0.94	(5.5)**	-1.15	(6.8)**
Wage coordination	-0.83	(3.0)**	-0.79	(3.3)**	-0.63	(1.9)*	-0.92	(2.5)**
Time period fixed effects	no		yes		yes		yes	
Country-specific trends	no		no		yes		no	
N	160		160		160		120	
b. Alternative 1	1970-2013		1970-2013		1970-2013		1985-2013	
GDP growth $_{t-1}$	-0.47	(3.8)**	-0.65	(4.3)**	-0.81	(5.0)**	-0.64	(3.0)**
Wage coordination	-1.14	(3.8)**	-0.85	(3.6)**	-0.52	(1.5)	-1.29	(3.2)**
Time period fixed effects	no		yes		yes		yes	
Country-specific trends	no		no		yes		no	
N	160		160		160		120	
c. Alternative 2	1970-2013		1970-2013		1970-2013		1985-2013	
$\Delta^2 p$	-0.60	(1.9)*	-0.68	(2.0)**	-0.68	(1.9)*	-0.60	(1.4)
Wage coordination	-1.27	(4.0)**	-0.82	(2.8)**	-0.84	(2.5)**	-1.48	(2.5)**
Time period fixed effects	no		yes		yes		yes	
Country-specific trends	no		no		yes		no	
N	160		160		160		120	

Note: based on data from 20 countries and 9 time periods: 1970-74, 1975-79, 1980-84, 1985-88, 1989-93, 1994-98, 1999-2003, 2004-08, 2009-13; all estimates contain country fixed effects; absolute t statistics in parentheses; ** (*) indicates significance at a 5% (10%) level.

TABLE 7: OKUN'S RELATIONSHIP; CHANGES IN UNEMPLOYMENT RATES AND CHANGES IN EMPLOYMENT RATES BY AGE AND GENDER; 1985-2013

	Women 15-24	Women 25-54	Women 55-64	Men 15-24	Men 25-54	Men 55-64
a. Unemployment rates						
Constant	1.33 (9.3)**	0.62 (10.2)**	0.47 (6.7)**	1.87 (10.5)**	0.89 (10.9)**	0.72 (9.1)**
GDP growth	-0.41 (9.2)**	-0.15 (7.6)**	-0.08 (3.7)**	-0.66 (11.1)**	-0.28 (10.2)**	-0.16 (6.3)**
GDP growth _{t-1}	-0.15 (4.2)**	-0.11 (5.6)**	-0.10 (4.6)**	-0.08 (1.9)*	-0.08 (4.6)**	-0.14 (5.7)**
R ²	0.33	0.28	0.13	0.42	0.47	0.28
b. Employment rates						
Constant	-1.41 (10.8)**	-0.21 (3.5)**	0.56 (7.1)**	-1.98 (11.6)**	-1.05 (12.5)**	-0.37 (3.4)**
GDP growth	0.28 (7.3)**	0.16 (7.8)**	0.04 (1.7)*	0.55 (9.3)**	0.29 (10.3)**	0.10 (2.9)**
GDP growth _{t-1}	0.25 (6.6)**	0.17 (8.4)**	0.05 (1.9)*	0.14 (2.6)**	0.10 (5.5)**	0.11 (3.4)**
R ²	0.30	0.37	0.02	0.37	0.45	0.07

Note: based on 561 observations from 20 countries; absolute *t* statistics in parentheses; ** (*) indicates significance at a 5% (10%) level.

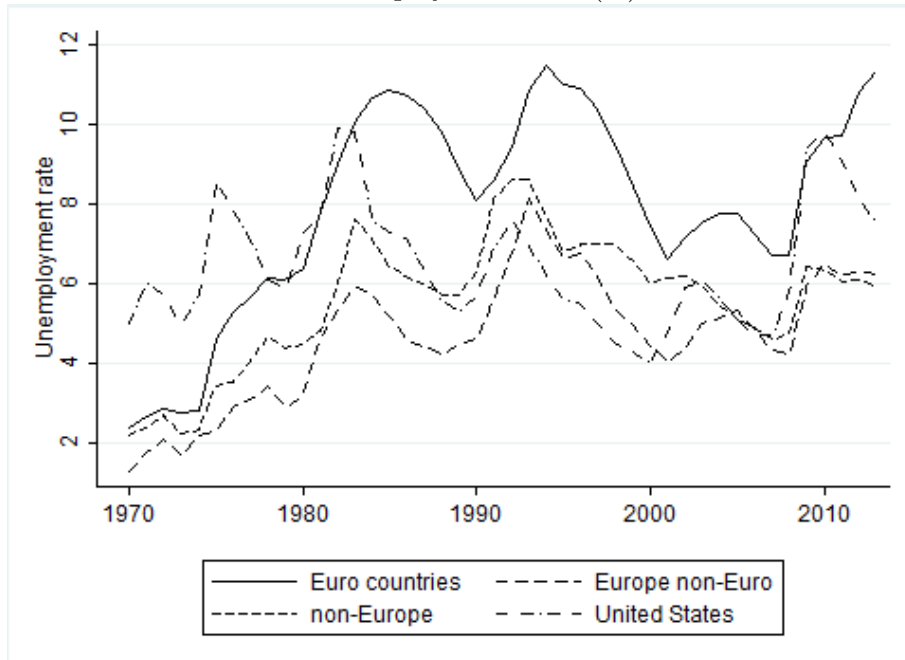
TABLE A1: MEANS OF VARIABLES

	u	Δ GDP	GRR	UD	UC	WC	WL	EPL-r	EPL-t
Australia	6.2	3.3	23.0	35.4	68.0	2.6	2.7	1.3	0.9
Austria	3.4	2.5	29.0	44.9	97.0	4.3	3.1	2.6	1.3
Belgium	7.6	2.2	42.2	50.1	94.8	4.2	3.5	1.8	3.4
Canada	8.2	2.9	16.6	31.7	35.2	1.3	1.2	0.9	0.3
Denmark	6.0	1.8	51.5	72.4	82.0	3.8	2.8	2.2	2.0
Finland	7.3	2.6	31.3	70.6	83.3	3.7	3.9	2.4	1.4
France	8.2	2.3	34.3	12.6	86.7	2.1	2.0	2.4	3.5
Germany	6.3	2.0	27.4	28.8	71.2	4.0	2.9	2.7	2.2
Ireland	10.4	4.3	28.4	44.6	56.6	3.5	3.1	1.4	0.4
Italy	9.1	1.9	14.9	39.8	82.8	3.2	2.7	2.8	3.5
Japan	3.2	2.6	11.3	25.8	23.0	3.7	1.0	1.6	1.3
Netherlands	6.2	2.4	47.6	26.9	84.3	4.0	3.3	2.9	1.1
New Zealand	4.7	2.4	28.5	40.9	46.0	2.8	2.2	1.4	0.7
Norway	3.3	3.0	37.7	55.6	70.5	4.2	4.0	2.3	3.0
Portugal	6.9	2.8	26.0	30.8	67.9	3.0	2.6	4.5	2.8
Spain	14.1	2.6	30.0	14.2	82.1	3.6	3.3	2.7	3.3
Sweden	5.0	2.2	28.4	76.8	88.7	3.8	3.7	2.7	2.1
Switzerland	2.4	1.6	22.7	22.7	48.8	3.6	2.3	1.6	1.1
United Kingdom	6.8	2.3	19.5	37.2	42.1	1.6	1.5	1.1	0.3
United States	6.5	2.9	13.0	17.0	19.3	1.2	1.0	0.3	0.3
Average	6.6	2.5	28.2	39.3	66.9	3.2	2.6	2.1	1.8

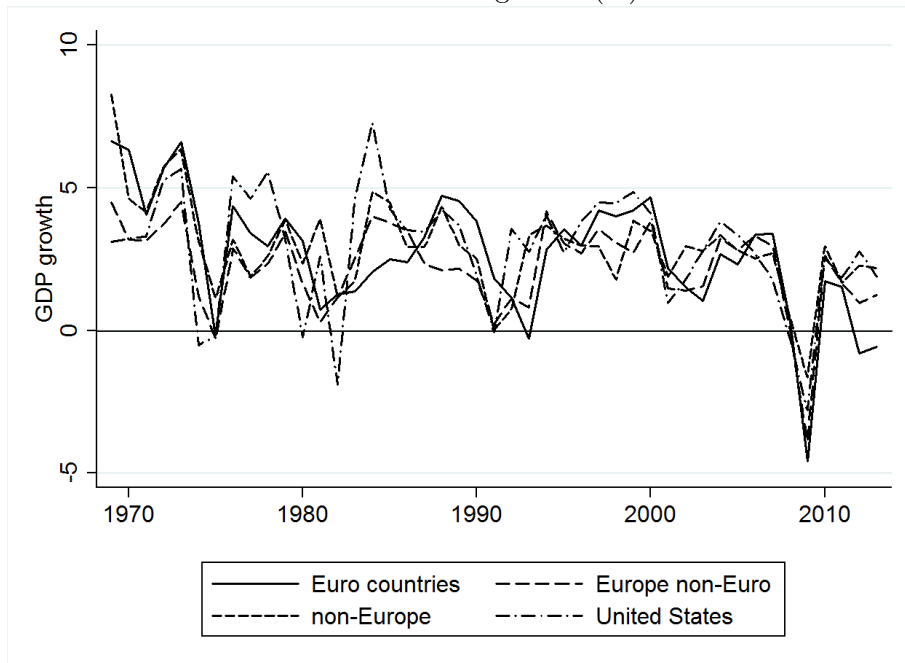
Note: u = unemployment rate (%); ΔGDP = annual GDP growth (%); GRR = gross replacement rate (%); UD = union density (%); UC = union coverage (%) WC = wage coordination; WL = level of wage bargaining; EPL-r = Employment protection regular jobs (average 1985-2013); EPL-t = Employment protection temporary jobs (average 1985-2013); see Appendix for details on the data.

FIGURE 1: UNEMPLOYMENT RATES AND GDP GROWTH 1970-2013; COUNTRY BLOCKS

a. Unemployment rates (%)



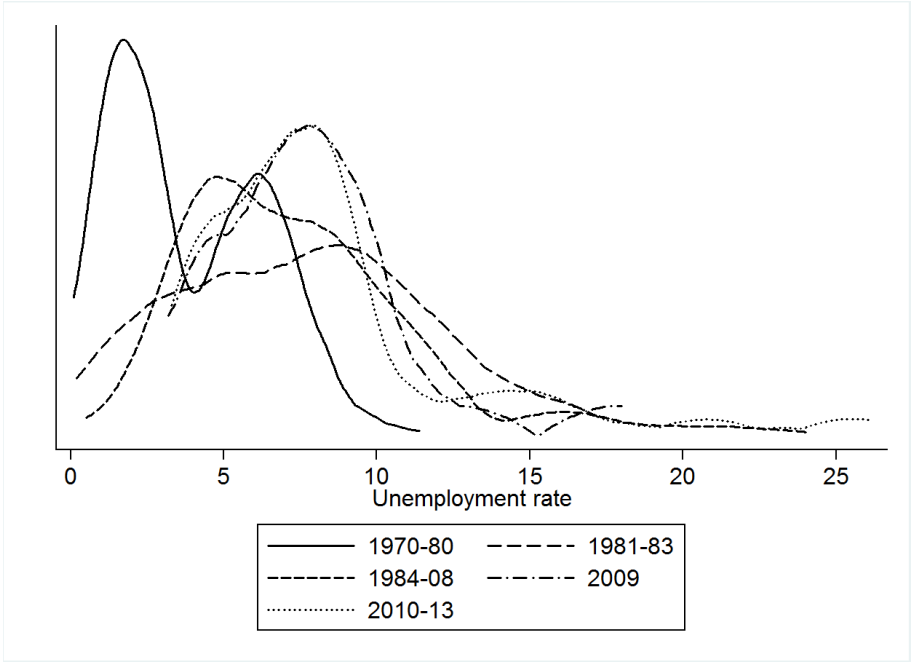
b. Annual GDP growth (%)



Source: OECD Statistics

FIGURE 2: KERNEL DENSITIES GDP GROWTH AND UNEMPLOYMENT RATES; VARIOUS TIME PERIODS

a. Unemployment (%)



b. Annual GDP growth (%)

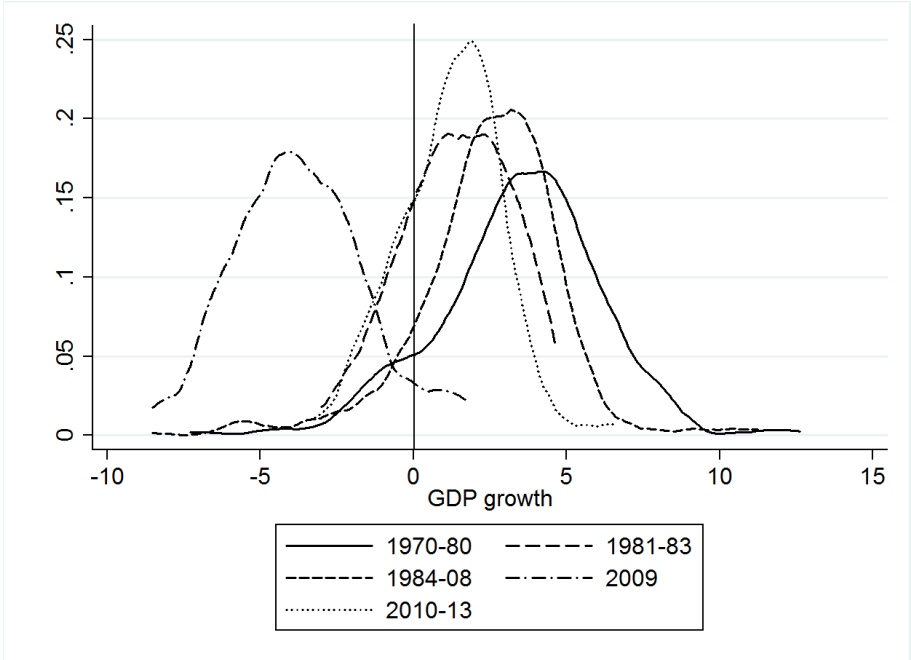
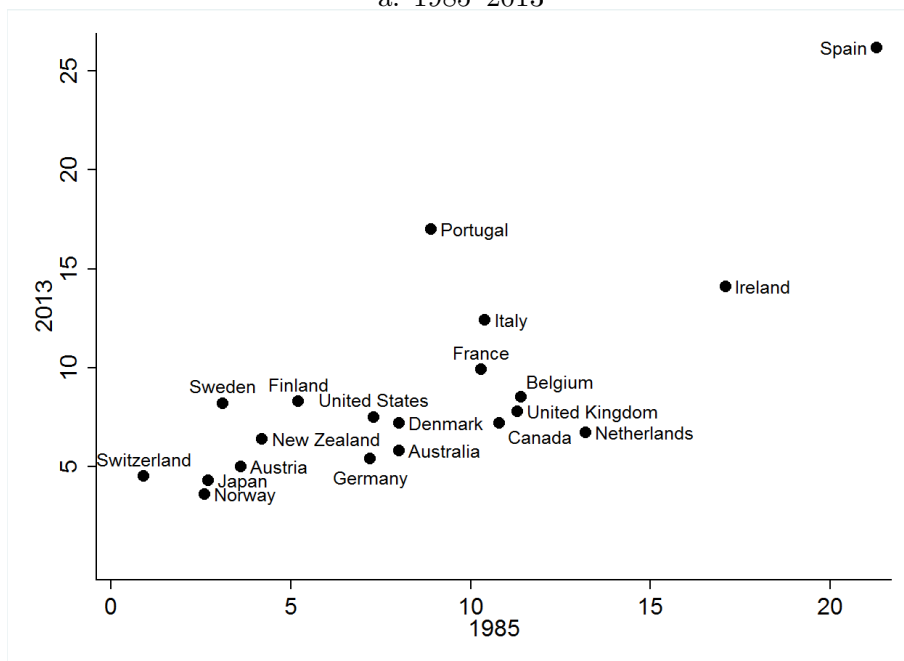


FIGURE 3: UNEMPLOYMENT RATES IN 1985, 2000 AND 2013

a. 1985–2013



b. 2000–2013

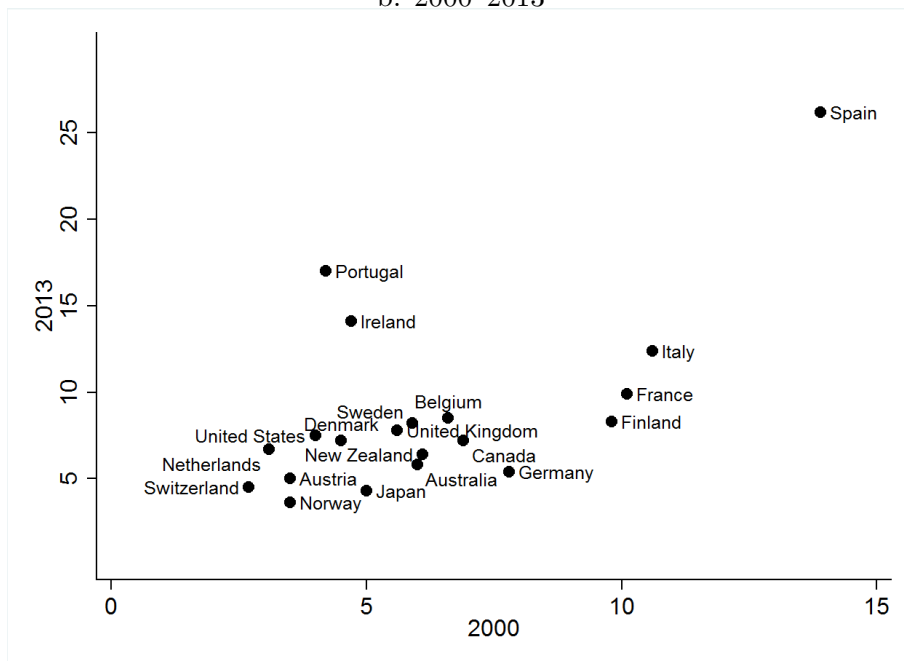


FIGURE 4: EMPLOYMENT RATES AND UNEMPLOYMENT RATES BY AGE AND GENDER;
1976-2013 (%)

a. Employment rates



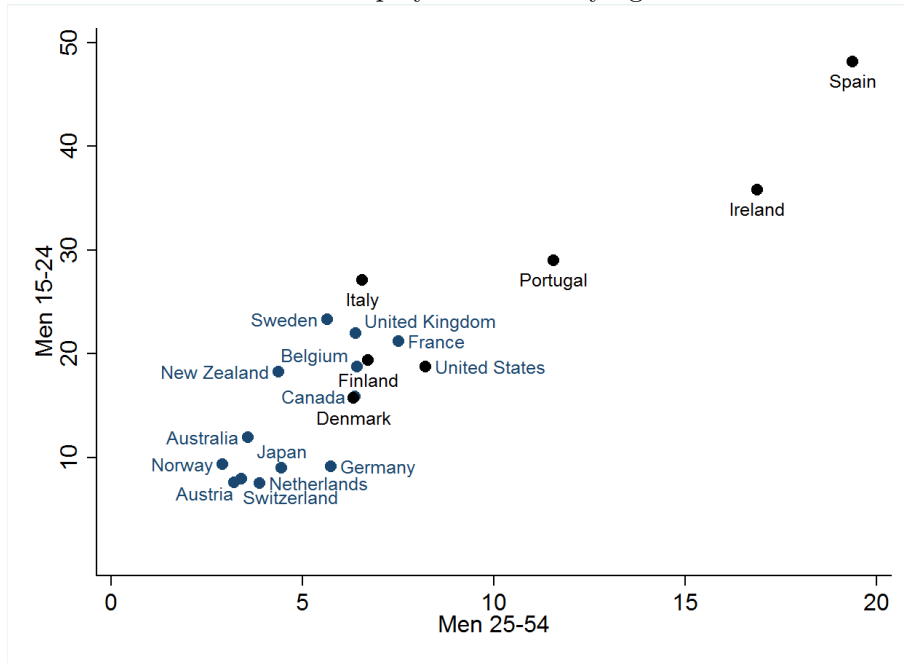
b. Unemployment rates



Note that this graph is based on data from 12 countries: Australia, Canada, Finland, Germany, Italy, Japan, Netherlands, Norway, Portugal, Spain, Sweden, United States

FIGURE 5: UNEMPLOYMENT RATES OF MEN BY AGE AND EDUCATIONAL ATTAINMENT; 2011 (%)

a. Unemployment rates by age



b. Unemployment rates by educational attainment

