LABOUR MARKET POLICIES AND EMPLOYMENT OUTCOMES

Student:

Lorenzo Magli
Code 199941

Supervisor

Giovanna Vallanti

INDEX

Introduction

The principal core of this dissertation is to understand effects of labour market policies and other variables towards labour performance indexes.

In order to do this thesis is divided in two different parts: the first part, after a general overview given about definitions and component of world of work, underlines principal models known thanks to bibliography.

The second part is an empirical experiment based on labour market panel data: nineteen countries across twenty-nine years.

In this latter chapters of dissertation models described in the first part will be used, so that we can reach a comparison between bibliography and real experiment.

The dissertation also aims to explain different type of unemployment and discern between frictional, physiological and long term one.

With particular reference to unemployment rate and participation rate in OECD countries, applied models will show relation between following economic variables, downloaded from OECD official statistics website:

- Expenditure in active, passive or total (active + passive) labour market policies. This amount is expressed in million dollar and it is not scaled as a percentage of G.D.P.
- Strictness, also labelled as protection rate, which is equal to the portion of workers with permanent job contract over the total amount of workers
- Collective bargaining, which shows the rates of wages and hours of labour, both of factory workers and of employees of contractors, are determined by collective bargaining.

Both regression models and panel data models will be taken into account in order to pursuit the goal of understanding significant factors.

Component and factors of labour market

This chapter aims to give an overview on labour market, its operation and its principal components and indices.

According with OECD and, more generally with principal statistics computed in several countries, the working age population refers to people aged 15 to 64, nevertheless it is not other hand assumed that over 15 years old people are either employed or unemployed: labour market is further more complicated than this.

For instance: students are not considered in labour market not even if they attend university, people who decide on purpose not to work are not considered unemployed, disabled don't account nor for labour force nor for unemployed.

However, in order to approach this topic, labour market can be split into three different parts:

- Employment: given by employed in working age and self-employed, where Employed people are those aged 15 or over who report that they have worked in gainful employment for at least one hour in the previous week or who had a job but were absent from work during the reference week
- Unemployment: so called is The state of being without any work yet looking for work; according to the Organisation for Economic Co-operation and Development (OECD), is persons above a specified age not being in paid employment or self-employment but currently available for work during the reference period.
- Other people available at work: difference between people aged 15 to 64 and the sum of before mentioned categories of employment and unemployment

Creating jobs and combating high unemployment has been a key priority for all countries in the world since the beginning of 19th century, so that politicians all around the world base their decisions in reducing the measure of unemployment rate, computed as ratio between unemployed and labour force.

1.1 Meaning and different kinds of unemployment

Unemployment can have many sources, such as the following:

- new technologies and inventions
- the status of the economy, which can be influenced by a recession
- competition caused by globalization and international trade
- policies of the government
- regulation and market

Unemployment and the status of the economy can be influenced by a country through, for example, fiscal policy.

Furthermore, the monetary authority of a country, such as the central bank, can influence the availability and cost for money through its monetary policy.

In addition to theories of unemployment, a few categorisations of unemployment are used for more precisely modelling the effects of unemployment within the economic system.

Globally, 172 million people globally or 5% of the reported workforce of the world were without a job in 2018, according to the International Labour Organization.

Economists distinguish between various overlapping types of and theories of unemployment, including

- Cyclical or Keynesian unemployment,
- Frictional unemployment,
- Structural unemployment
- Classical unemployment.

Some additional types of unemployment that are occasionally mentioned are seasonal unemployment, hardcore unemployment, and hidden unemployment.

Classical, or real-wage, unemployment, occurs when real wages for a job are set above the market-clearing level, causing the number of job-seekers to exceed the number of vacancies.

On the other hand, most economists argue that as wages fall below a liveable wage, many choose to drop out of the labour market and no longer seek employment.

That is especially true in countries in which low-income families are supported through public welfare systems. In such cases, wages would have to be high enough to motivate people to choose employment over what they receive through public welfare.

Wages below a liveable wage are likely to result in lower labour market participation in the above-stated scenario.

In addition, consumption of goods and services is the primary driver of increased demand for labor. Higher wages lead to workers having more income available to consume goods and services.

Therefore, higher wages increase general consumption and as a result demand for labour increases and unemployment decreases.

Many economists have argued that unemployment increases with increased governmental regulation. For example, minimum wage laws raise the cost of some low-skill labourers above market equilibrium, resulting in increased unemployment as people who wish to work at the going rate cannot (as the new and higher enforced wage is now greater than the value of their labour).

Laws restricting layoffs may make businesses less likely to hire in the first place, as hiring becomes more risky.

However, that argument overly simplifies the relationship between wage rates and unemployment by ignoring numerous factors that contribute to unemployment. Some, such as Murray Rothbard, suggest that even social taboos can prevent wages from falling to the market-clearing level.

In Out of Work: Unemployment and Government in the Twentieth-Century America, economists Richard Vedder and Lowell Galloway argue that the empirical record of wages rates, productivity, and unemployment in America validates classical unemployment theory.

Their data shows a strong correlation between adjusted real wage and unemployment in the United States from 1900 to 1990.

However, they maintain that their data does not take into account exogenous events.

Cyclical, deficient-demand, or Keynesian unemployment occurs when there is not enough aggregate demand in the economy to provide jobs for everyone who wants to work. Demand for most goods and services falls, less production is needed and consequently fewer

workers are needed, wages are sticky and do not fall to meet the equilibrium level, and unemployment results.

Its name is derived from the frequent ups and downs in the business cycle, but unemployment can also be persistent, such as during the Great Depression.

With cyclical unemployment, the number of unemployed workers exceeds the number of job vacancies and so even if all open jobs were filled, some workers would still remain unemployed. Some associate cyclical unemployment with frictional unemployment because the factors that cause the friction are partially caused by cyclical variables.

For example, a surprise decrease in the money supply may suddenly inhibit aggregate demand and thus inhibit labour demand. Keynesian economists, on the other hand, see the lack of supply of jobs as potentially resolvable by government intervention.

One suggested intervention involves deficit spending to boost employment and goods demand.

Another intervention involves an expansionary monetary policy to increase the supply of money, which should reduce interest rates, which, in turn, should lead to an increase in non-governmental spending.

Structural unemployment occurs when a labour market is unable to provide jobs for everyone who wants one because there is a mismatch between the skills of the unemployed workers and the skills needed for the available jobs. Structural unemployment is hard to separate empirically from frictional unemployment except that it lasts longer. As with frictional unemployment, simple demand-side stimulus will not work to abolish this type of unemployment easily.

Structural unemployment may also be encouraged to rise by persistent cyclical unemployment: if an economy suffers from long-lasting low aggregate demand, it means that many of the unemployed become disheartened, and their skills (including job-searching skills) become "rusty" and obsolete. Problems with debt may lead to homelessness and a fall into the vicious circle of poverty. That means that they may not fit the job vacancies that are created when the economy recovers.

The implication is that sustained high demand may lower structural unemployment. This theory of persistence in structural unemployment has been referred to as an example of path dependence or "hysteresis."

Much technological unemployment, caused by the replacement of workers by machines might be counted as structural unemployment.

Alternatively, technological unemployment might refer to the way in which steady increases in labour productivity mean that fewer workers are needed to produce the same level of output every year.

The fact that aggregate demand can be raised to deal with the problem suggests that the problem is instead one of cyclical unemployment. As indicated by Okun's law, the demand side must grow sufficiently quickly to absorb not only the growing labour force but also the workers who are made redundant by the increased labour productivity.

Seasonal unemployment may be seen as a kind of structural unemployment since it is linked to certain kinds of jobs (construction and migratory farm work). The most-cited official unemployment measures erase this kind of unemployment from the statistics using "seasonal adjustment" techniques. That results in substantial and permanent structural unemployment.

Frictional unemployment is the time period between jobs in which a worker searches for or transitions from one job to another. It is sometimes called search unemployment and can be voluntary, based on the circumstances of the unemployed individual.

Frictional unemployment exists because both jobs and workers are heterogeneous, and a mismatch can result between the characteristics of supply and demand.

Such a mismatch can be related to skills, payment, worktime, location, seasonal industries, attitude, taste, and a multitude of other factors. New entrants (such as graduating students) and re-entrants (such as former homemakers) can also suffer a spell of frictional unemployment. Workers and employers accept a certain level of imperfection, risk or compromise, but usually not right away.

They will invest some time and effort to find a better match. That is, in fact, beneficial to the economy since it results in a better allocation of resources. However, if the search takes too long and mismatches are too frequent, the economy suffers since some work will not get done.

Therefore, governments will seek ways to reduce unnecessary frictional unemployment by multiple means including providing education, advice, training, and assistance such as day-care locations.

The frictions in the labour market are sometimes illustrated graphically with a Beveridge curve, a downward-sloping, convex curve that shows a correlation between the unemployment rate on one axis and the vacancy rate on the other. Changes in the supply of or demand for labour cause movements along the curve. An increase or decrease in labour market frictions will shift the curve outwards or inwards.

Official statistics often underestimate unemployment rates because of hidden, or covered, unemployment.

That is the unemployment of potential workers that are not reflected in official unemployment statistics because of how the statistics are collected. In many countries, only those who have no work but are actively looking for work and/or qualifying for social security benefits are counted as unemployed.

Those who have given up looking for work and sometimes those who are on government "retraining" programs are not officially counted among the unemployed even though they are not employed.

Hidden unemployment often is caused by the state's deliberate manipulations to make statistics about the country look better especially for international propaganda purposes, as was a common practice in the Soviet Union and its satellite states under the Warsaw Pact. Especially in those countries, it is often referred to as agrarian unemployment since it often occurred in agricultural sectors, mostly in rural areas.

It was commonly done in a form of early retirement because of lack of vacant jobs for those who had not reached the retirement age or often a situation in which increasing the number of employees did not increase the production (creating fake vacancies on paper for people with whom they did not know what to do, how to use their potential workforce but not admitting to that inability and paying out the diminutive wages for them to pretend to work and remain silent), thus rendering the overall productivity close to zero.

It was a very common problem and one of the main reasons for the economic crisis leading to the common people's strikes that later on led to governments responding with martial law state in places like Poland, and the eventual downfall of USSR and Soviet occupation over the rest of the subjugated states under the Warsaw Pact.

The statistic also does not count the "underemployed", those working fewer hours than they would prefer or in a job that fails to make good use of their capabilities. In addition, those

who are of working age but are currently in full-time education are usually not considered unemployed in government statistics.

Traditional unemployed native societies who survive by gathering, hunting, herding, and farming in wilderness areas may or may not be counted in unemployment statistics.

1.2 Economic and politics problems due to long term unemployment

Long-term unemployment is defined in European Union statistics as unemployment lasting for longer than one year (while unemployment lasting over two years is defined as very long-term unemployment). The United States Bureau of Labor Statistics (BLS), which reports current long-term unemployment rate at 1.9 percent, defines this as unemployment lasting 27 weeks or longer. Long-term unemployment is a component of structural unemployment, which results in long-term unemployment existing in every social group, industry, occupation, and all levels of education.

In 2015 the European Commission published recommendations on how to reduce long-term unemployment. These advised governments to:

- encourage long-term unemployed people to register with an employment service;
- provide each registered long-term unemployed person with an individual in-depth assessment to identify their needs and potential within 18 months;
- offer a tailor-made job integration agreement (JIA) to all registered long-term unemployed within 18 months. These might include measures such as mentoring, help with job search, further education and training, support for housing, transport, child and care services and rehabilitation. Each person would have a single point of contact to access this support, which would be implemented in partnership with employers.

  In 2017–2019 it implemented the Long-Term Unemployment project to research solutions implemented by EU member states and produce a toolkit to guide government action. Progress was evaluated in 2019.

  Though many people care about the number of unemployed individuals, economists typically focus on the unemployment rate, which corrects for the normal increase in the number of people employed caused by increases in population and increases in the labour force relative to the population. The unemployment rate is expressed as a percentage and calculated as the ratio between unemployed workers and the labour force.

There are also different ways national statistical agencies measure unemployment. The differences may limit the validity of international comparisons of unemployment data.

To some degree, the differences remain despite national statistical agencies increasingly adopting the definition of unemployment of the International Labour Organization.

To facilitate international comparisons, some organisations, such as the OECD, Eurostat, and International Labor Comparisons Program, adjust data on unemployment for comparability across countries.

As defined by the International Labour Organization, "unemployed workers" are those who are currently not working but are willing and able to work for pay, currently available to work, and have actively searched for work.

Individuals who are actively seeking job placement must make the effort to be in contact with an employer, have job interviews, contact job placement agencies, send out resumes, submit applications, respond to advertisements, or some other means of active job searching within the prior four weeks.

Simply looking at advertisements and not responding will not count as actively seeking job placement. Since not all unemployment may be "open" and counted by government agencies, official statistics on unemployment may not be accurate.

In the United States, for example, the unemployment rate does not take into consideration those individuals who are not actively looking for employment, such as those who are still attending college.

According to the OECD, Eurostat, and the US Bureau of Labor Statistics the unemployment rate is the number of unemployed people as a percentage of the labour force.

1.3 How to face and to detect unemployment

An unemployed person is defined by Eurostat, according to the guidelines of the International Labour Organization, as:

- someone aged 15 to 74 (in Italy, Spain, the United Kingdom, Iceland, Norway: 16 to 74 years);
- without work during the reference week;
- available to start work within the next two weeks (or has already found a job to start within the next three months);
- actively having sought employment at some time during the last four weeks.

The labour force, or workforce, includes both employed (employees and self-employed) and unemployed people but not the economically inactive, such as pre-school children, school children, students and pensioners.

The unemployment rate of an individual country is usually calculated and reported on a monthly, quarterly, and yearly basis by the National Agency of Statistics. Organisations like the OECD report statistics for all of its member states.

Certain countries provide unemployment compensation for a certain period of time for unemployed citizens who are registered as unemployed at the government employment agency. Furthermore, pension receivables or claims could depend on the registration at the government employment agency.

In many countries like in Germany, the unemployment rate is based on the number of people who are registered as unemployed.

Other countries like the United States use a labour force survey to calculate the unemployment rate.

Managing and reducing the unemployment rate is pivotal for all countries in the world because of the economic and social costs of unemployment. Such as Personal costs to unemployed (lost income, loss of sense of value, lower on-the-job training), Costs to government (lost tax revenue and higher benefit spending), Costs to society in general (social problems, alienation, lost GDP).

The former costs of unemployment count Loss of earnings to the unemployed, in-fact unemployment is one of the biggest causes of poverty in the country, especially when unemployment benefit and welfare state are not widespread across the country.

Prolonged periods of unemployment can push households into debt and increase rates of relative poverty.

Loss of income can leave people without sufficient income to meet housing costs and may cause homeless. Rises in unemployment often exacerbate the rates of homelessness.

Those who are unemployed will find it more difficult to get work in the future Lost human capital.

If people are out of work, they miss out on ‘on the job training’ This is a vital component of human capital and labour skills; high rates of unemployment can reduce labour productivity.

If someone is out of work for two years, they miss out on the latest working practices and trends.

Being unemployed can also affect the confidence of the unemployed and they become less employable in the future.

When it comes down to the relation between unemployment and depression or mental health Amongst studies of unemployed men, principally carried out in Anglo-Saxon countries, signs of depression, mental anxiety, and health problems are noticeably higher: “About one in five Americans who have been unemployed for a year or more say they currently have or are being treated for depression — almost double the rate among those who have been unemployed for five weeks or less.”

Other studies found that common outcomes of unemployment include depression, substance abuse, admissions to psychiatric hospitals, death by suicide, and violence

The last but not the least effect of unemployment concern govern and society: increased government borrowing, lower GDP for the economy, increase in social problems, political instability.

There are seven causes of unemployment. Four causes create frictional unemployment. This type of unemployment is when employees leave their job to find a better one. Two causes create structural unemployment.

That is when workers' skills or income requirements no longer match the jobs available. The seventh cause leads to cyclical unemployment. Frictional and structural unemployment occur even in a healthy economy. The natural rate of unemployment is between 3.5% and 4.5%, according to the Federal Reserve.

The Bureau of Labor Statistics defines unemployed people as those who are jobless and have actively looked for work in the past four weeks as well as those who have been temporarily laid off from a job. If they don't keep looking, the BLS doesn't count them in the labour force.

Previous mentioned causes of unemployment are reported below:

- One cause of unemployment is voluntarily leaving the workforce. Some of the unemployed have saved enough money so they can quit unfulfilling jobs. They have the luxury to search until they find just the right opportunity.
- The second cause is when workers relocate. They are unemployed until they find a position in the new town.
- The third cause is when new workers enter the workforce. This includes students who graduate from high school, college or any higher degree program. They look for a job that fits their new skills and qualifications. That is a primary cause of youth unemployment.
- The fourth cause is when job seekers re-enter the workforce. These are people who went through a period in their lives when they stopped looking for work. They could have stopped working to raise children, get married or care for elderly relatives.
- These four causes are an unavoidable part of the job search process. The good news is that frictional unemployment is usually voluntary and short-term. Moreover, another kind of unemployment does exist. It is the so called “structural

unemployment". Structural unemployment is neither voluntary nor short-term. Following two examples of unemployment are so called structural:

- First cause of structural unemployment is advances in technology. This is when computers or robots replace workers. Most of these workers need more training before they can find a new job in their field.
- The second cause is job outsourcing. That is when a company moves its manufacturing or call locations to another country. Labour costs are cheaper in countries with a lower cost of living. This situation occurred in many states after NAFTA was signed in 1994. Many manufacturing jobs moved to Mexico. It also occurred once workers in China and India gained the skills needed by American companies.

The last but not the least cause of unemployment is when there are fewer jobs than applicants. The technical term is demand-deficient unemployment. When it happens during the recession phase of the business cycle, it's called cyclical unemployment.

Low consumer demand creates cyclical unemployment. Companies lose too much profit when demand falls. If they don't expect sales to pick up anytime soon, they must lay off workers. The higher unemployment causes consumer demand to drop even more, which is why it's cyclical. It results in large-scale unemployment.

If someone gives up looking for work, on the other hand, the BLS does not count them in the unemployment rate. If someone retires, goes back to school or leaves the workforce to take care of children or other family members, that is not unemployment because they no longer look for work. Even if they would prefer a job, the BLS doesn't count them as unemployed unless they looked in the past month.

People who have searched in the past year, but not the past month, are called marginally unemployed. The BLS calls this the "real unemployment rate." Some people say the government undercounts unemployment by reporting the official rate, rather than the "real" rate.

Given all reasons for unemployment and established that not all the lack of job creates unemployment this chapter would like to understand variables that shape unemployment rate.

This core will be prosecuted by following two different steps:

- First of all, mentioning bibliography, the dissertation approaches influences of active and passive politics of labour market on unemployment rate and, more generally, on labour market performances
- Secondly, approaching the problem by way of econometric models, an overview of effects of economic variables on unemployment rate is shown

2.1 Theoretical background about active and passive politics on labour market

There are innumerable detailed theories of unemployment in the long run. These may be divided into two broad groups, those based on flow models and those based on stock models. Pissarides (1990) and Mortensen and Pissarides (1999) provide good surveys of the former model type. Blanchard and Katz (1997) presents a general template for the latter models[1].

Fundamentally, all the models have the same broad implications. According to Nickell, Nunziata and others, unemployment in the short-run and in the long-run is determined by real demand.

Moreover, considering the long term, real demand and unemployment generally tend towards the level consistent with stable inflation.

This we term the equilibrium level. Various possible mechanisms may be at work here. For example, many OECD countries now set monetary policy on the basis of an inflation target which naturally moves real demand and unemployment towards the equilibrium defined above.

Finally, the equilibrium level of unemployment is affected first, by any variable which influences the ease with which unemployed individuals can be matched to available job vacancies, and second, by any variable which tends to raise wages in a direct fashion despite excess supply in the labour market.

[1] The Beveridge Curve, Unemployment and wages in the oecd from 1960s and 1990s, Stephen Nickell, Lucia Nunziata, Wolfgang Ochel and Glenda Quintini **[1]**

There may be variables common to both sets. Finally, both groups of variables will tend to impact on real wages in the same direction as they influence equilibrium unemployment, essentially because equilibrium labour demand, which is negatively related to wages, has to move in the opposite direction to equilibrium unemployment.

Before going on to consider these variables in more detail, it is worth noting that the first group of variables mentioned above will tend to impact on the position of the Beveridge

Curve (UV locus), whereas the second will not do so in any direct fashion. However, this division is not quite as clear cut as it might appear at first sight (see below). What we can say, nevertheless is that any variable which shifts the Beveridge Curve to the right will increase equilibrium unemployment. So a shift of the Beveridge Curve is a sufficient but not necessary sign that equilibrium unemployment has changed.

We turn now to consider a series of variables which we might expect to influence equilibrium unemployment either because of their impact on the effectiveness with which the unemployed are matched to available jobs or because of their direct effect on wages[2].

The unemployment benefit system directly affects the readiness of the unemployed to fill vacancies. Aspects of the system which are clearly important are the level of benefits, their coverage, the length of time for which they are available and the strictness with which the system is operated. Related to unemployment benefits is the availability of other resources to those without jobs. These include the returns on non-human wealth which may be increasing in the real interest rate.

Employment protection laws may tend to make firms more cautious about filling vacancies which slows the speed at which the unemployed move into work. This obviously reduces the efficiency of job matching.

However, the mechanism here is not clear-cut. For example, the introduction of employment laws often leads to an increased professionalisation of the personnel function within firms, as was the case in Britain in the 1970s (see Daniel and Stilgoe, 1978).

[2] The analysis reported has been theorised by Stephen Nickell, Lucia Nunciata, Wolfgang and Glenda Quintini in the previous mentioned paper, chapter 2 s.c. “theoretical background”

This can increase the efficiency of job matching. So, in terms of outflows from unemployment, the impact of employment protection laws can go either way. By contrast, it seems clear that such laws will tend to reduce involuntary separations and hence lower inflows into unemployment.

So the overall impact on the Beveridge Curve is an empirical question; furthermore, employment law may also have a direct impact on pay since it raises the job security of existing employees encouraging them to demand higher pay increases.

Anything which makes it easier to match the unemployed to the available vacancies will shift the Beveridge Curve to the left and reduce equilibrium unemployment. Factors which operate in this way include the reduction of barriers to mobility which may be geographical or occupational. Furthermore, numerous government policies are concerned to increase the ability and willingness of the unemployed to take jobs. These are grouped under the heading of active labour market policies.

Turning now to those factors which have a direct impact on wages, the obvious place to start is the institutional structure of wage determination. Within every country there is a variety of structures. In some sectors wages are determined more of less competitively but in others wages are bargained between employers and trade unions at the level of the establishment, firm or even industry. The overall outcome depends on union power in wage bargains, union coverage and the degree of co-ordination of wage bargains.

Generally, greater union power and coverage can be expected to exert upward pressure on wages, hence raising equilibrium unemployment, but this can be offset if union wage setting across the economy is co-ordinated.

Superficially it may be argued that wage setting institutions impact directly on wages without influencing the efficiency of job matching or the separation rate into unemployment.

That is, without influencing the position of the Beveridge Curve. However, if we use a model of the Beveridge Curve which endogenies the rate of separation into unemployment or the rate of job destruction (see Mortensen and Pissarides, 1994, for example), this no longer applies. For example, if union power raises the share of the matching surplus going to wages, this will tend to raise the rate of job destruction and shift the Beveridge Curve to the right.

A Beveridge curve, or UV curve, is a graphical representation of the relationship between unemployment and the job vacancy rate, the number of unfilled jobs expressed as a proportion of the labour force. It typically has vacancies on the vertical axis and unemployment on the horizontal.

The curve, named after William Beveridge, is hyperbolic-shaped and slopes downward, as a higher rate of unemployment normally occurs with a lower rate of vacancies. If it moves outward over time, a given level of vacancies would be associated with higher and higher levels of unemployment, which would imply decreasing efficiency in the labour market. Inefficient labour markets are caused by mismatches between available jobs and the unemployed and an immobile labour force.

The position on the curve can indicate the current state of the economy in the business cycle. For example, recessionary periods are indicated by high unemployment and low vacancies, corresponding to a position on the lower side of the 45° line, and high vacancies and low unemployment indicate the expansionary periods on the upper side of the 45° line.

The same thing will also happen if factors such as the coordination of wage bargaining reduce the extent to which wages at the firm level can fluctuate to offset idiosyncratic shocks and stabilise employment at the firm level.

For this reason, while co-ordination can reduce overall wage pressure, which tends to lower equilibrium unemployment, it may raise the rate of idiosyncratic job shifts which will tend to shift the Beveridge Curve to the right and have an offsetting effect.

According to theoretical studies it is shown that Beveridge Curve can move for the following reasons[3]:

- The matching process will determine how efficiently workers find new jobs. Improvements in the matching system would shift the curve towards the origin, because an efficient matching process will find jobs faster, filling vacancies and employing the unemployed. Improvements can be the introduction of agencies (‘job centres’), lower rates of unionisation, and increasing the mobility of labour.

3 Catherine Rampell (March 7, 2013). "An Odd Shift in an Unemployment Curve". NYT. Retrieved August 27, 2017. **[2]**

- Skills mismatches occur when changes in the skills employers want differ from the available skills in the labour pool. Greater mismatches would shift the Beveridge curve outward. If that were the driving factor behind the shift, one would expect to also see employers bid up wages for the few candidates who were desirable. Although the US Beveridge curve shifted outward in the 2010–2012 period, wages did not increase.
- Labour force participation rate: as the number looking for jobs increases relative to total population, the unemployment rate increases, shifting the curve outwards from the origin. Labour force participation can increase due to changes in education, gender roles, population age and immigration.
- Long-term unemployment will push the curve outward from the origin, which could be caused by deterioration of human capital or a negative perception of the unemployed by the potential employers.
- Frictional unemployment: a decrease in frictions would reduce the number of firms searching for employees and the number of unemployed searching for jobs. That would shift the curve towards the origin. Frictional unemployment is caused by job losses, resignations and job creation.
- Economic and policy uncertainty may cause employers to hold vacancies open longer in the search for the "perfect candidate", particularly when there is high unemployment with a large number of candidates from which to choose. More uncertainty would tend to shift the curve outward.

Skill shortages should not be confused with "labour shortages", which identify an objective lack of workers in the market, independently of their skills, and it may arise because of limited geographical mobility, ageing populations or a labour market approaching full employment during an economic boom.

Along with labour surpluses, labour shortages are one of the most traditional examples of labour market imbalances. What distinguishes an objective shortage of labour from a skill-related shortage (i.e. a special case of skill mismatch) is just the presence of a pool of unemployed individuals (non-discouraged job seekers) willing to take up jobs in the labour market considered at the ongoing rate.

Nevertheless, even in presence of unemployment and assuming that there is an adequate demand for labour in the market, it could still be difficult to point to a skill shortage for at least two reasons: if whether the unemployment we observe is frictional (just a short-term

consequence of costly "search"), cyclical (caused by the business cycle) or structural cannot be established or if whether the position offered is accessible and/or attractive (such as whether or not the wage posted is competitive or at least rising with respect to other segments of the market that are not reporting unmet labour demands) cannot be established.

In addition, skill shortages may be caused by both "horizontal" skill mismatch, when workers have qualifications/skills which are different than the one required by the firms, or by "vertical" skill mismatch, when workers' skills and qualifications are lower level than what firms require. In the literature, scholars have also referred to skill mismatch and sometimes even to skill shortages to define a situation of the skills of the employed workers and those required by being jobs were different.

To avoid any possible confusion, that form of mismatch affecting only employed individuals will be referred as "on-the-job" mismatch, in the more general case of workers being both over and under skilled for their jobs (vertical on-the-job mismatch) or have different skills/qualifications (horizontal on-the-job mismatch) and as skill gap to refer to employed workers whose skills are lower than those required by their jobs.

It follows that skill mismatch, as it is defined here, can result in the occurrence of both skill shortages and on-the-job mismatches (both vertical and horizontal).

Economists generally believe that labour markets adjust to such imbalances, especially over time, but it is also possible for such mismatches to persist for many years or decades. In such instances, adverse equilibria, characterised by more structural unemployment, long-term unfilled vacancies and/or lower labour force participation may arise, and employers may eventually be forced to hire workers who possess lower or just different skills, giving place to the mismatch "on the job". Public policy interventions to change or improve the match of workers to employers might be appropriate in such cases.[4]

The final group of variables which directly impacts on wages falls under the heading of real wage resistance. The idea here is that workers attempt to sustain recent rates of real wage growth when the rate consistent with stable employment shifts unexpectedly.

For example, if there is an adverse shift in the terms of trade, real consumption wages must fall if employment is not to decline. If workers persist in attempting to bargain for rates of

[4] Barro, Robert J.; Grilli, Vittorio (1994). "Unemployment". *European Macroeconomics*. London: Palgrave Macmillan **[3]**

real wage growth which take no account of the movement in the terms of trade, this will tend to raise unemployment. Exactly the same argument applies if there is an unexpected fall in trend productivity growth or an increase in labour taxes. For example, if labour taxes (payroll tax rates plus income tax rates plus consumption tax rates) go up, the real post-tax consumption wage must fall if real labour costs per employee facing firms are not to rise.

Any resistance to this fall will lead to a rise in unemployment. This argument suggests that increases in real import prices, falls in trend productivity growth or rises in the labour tax rate may lead to a temporary increase in unemployment.

However, some argue that these effects can be permanent. For example, Mortensenand Pissarides (1999) use their standard flow model of equilibrium unemployment to analyse various economic policies including changes in payroll taxes. And they find enormous effects.

For example, in one simulation, with a benefit replacement ratio of 0.4, a rise in the payroll tax rate from 15 to 25 percent is enough to raise equilibrium unemployment permanently by over 6 percentage points.

The reason why labour taxes have a big impact in this case is because Mortensen and Pissarides introduce into their model a value of leisure which is independent of the consumption wage. This fixing of an important element of the individual reservation wage implies that labour supply and willingness to work will increase permanently if the real consumption wage goes up.

This will induce permanent reductions in equilibrium unemployment if labour taxes fall or productivity rises.

Ultimately this is an empirical question, but it may be argued that in a satisfactory model, the value of leisure, and the individual reservation wage more generally, should, in the long run, move proportionally to the consumption wage and the general level of productivity.

If this adjustment is made in the Mortensen and Pissarides model, the impact of payroll taxes on equilibrium unemployment disappears.

To summarise, the variables which we might expect to influence equilibrium unemployment include the unemployment benefit system, the real interest rate, employment protection

laws, barriers to labour mobility, active labour market policies, union structures and the extent of co-ordination in wage bargaining, labour taxes, terms of trade changes and shifts in trend productivity growth.

Given the inverse relationship between the equilibrium unemployment and equilibrium employment, the impact of any of the above variables on unemployment should be reflected by a ceteris paribus impact in the same direction on real wages which are, of course, inversely related to employment.

Moreover, bibliography established that high unemployment can be caused by rigid labour market institutions such as generous unemployment insurance schemes, high unemployment protection, severe tax distortions and non-competitive wage-setting mechanisms (e.g., Nickell et al. 2003; IMF 2003).

The observation that unemployment is extremely high in some of the new member states of European Union with a history as centrally planned economies, especially in Poland and Slovakia, may easily lead one to conclude that it is inflexible labour market institutions that are to blame in these countries.

Above mentioned conclusions drive Sjef Ederveen and Laura Thissen[5] to take into account not only the role played by unemployment rate but also considering replacement rate in order to determinate the long term employees' behaviour.

It almost goes without saying that higher unemployment benefits may increase unemployment, but in a wider consideration we reach a more detailed conclusion:

- Tax wage may influence unemployment. In addition to the social security benefits system, taxes also play a role in the-redistribution of income. Intuitively, a higher tax wedge raises the relative attractiveness of working in the informal sector
- Collective wage bargaining: union density, coverage, and coordination. An important determinant of the outcome of the wage bargaining process is the relative bargaining power of the employee or trade union relative to the employer (association).

[5] Can labour market institutions explain high unemployment rates in the new European Union member states? Published online 5 June 2007; Springer Science + Business Media B.V. 2007; S.Ederveen and Laura Thissen **[4]**

The bargaining position depends primarily on the number of people that unions represent. The higher union density is, the better is the relative bargaining position of the trade unions

- Employment protection legislation. Strict dismissal protection rigidifies the labour market in the sense that it becomes more difficult and more expensive for businesses to lay off staff. Dismissal protection is therefore attractive for those who have a job, but unfavourable for job seekers. This will tend to reduce short term unemployment and raise long term unemployment. The ultimate effect on total unemployment is however ambiguous[6]

2.2 How to quantify effects of labour market institutions on unemployment

Quantifying the relationship between unemployment and labour market institutions has been the topic of several studies[7].

Two broad lessons can be drawn from the existing body of empirical work:

- institutions matter and a substantial part of the fluctuation in unemployment can be explained by changes in the institutional structure;
- theoretical predictions about the way institutions influence unemployment are confirmed by the econometric results

  Econometric analyses of the impact of institutions can be divided in two different types (see e.g., the overview of Nickell et al. 2005). First, there are studies that focus on 'shocks' and their interaction with institutions that are assumed to be constant over time (see e.g., Blanchard and Wolfers 2000).

A second type of econometric studies relies on changing institutions to explain unemployment patterns.

Here, a subdivision can be made of studies that use averages over institutions for different periods to explain the long-term unemployment trends and studies that use annual data to explain actual unemployment.

An example of the latter is provided by Nickell et al. (2003). The other type of studies that relates changing institutions to unemployment is static in the sense that it does not aim at explaining the exact annual level of unemployment, but rather the underlying structural trend.

[6] According with Ederven and Thissen this conclusion is taken by Mortensen and Pissaredes, 1999

This kind of studies therefore does not rely on the measurement of shocks. Belot and Van Ours (2004) provide a notable example of this line of reasoning.

This study of Belot and Van Ours (2004) is a convenient starting point for our analysis for at least two reasons.

First, it assesses the structural impact of the institutional framework on unemployment, rather than the interaction of shocks and institutions or the explanation of actual unemployment.

This fits nicely with the objective of this study: it seeks to explore whether unemployment in the new member states can be explained by the way labour market institutions are built.

Second, it uses data for the period 1960–1999, whereas most other empirical studies use a sample till 1995. Using these recent years in the empirical analysis is essential for the purpose of this study, as unemployment in the new member states only stabilised at around 1995.

At that time, markets had adapted somewhat to the new circumstances. The impact of the labour market institutions on unemployment can be estimated in standard panel data techniques

The most used model to describe relationship between independent variables (mostly described in section 2.1 of this dissertation) and unemployment rate is regression model.

In statistics, linear regression is a linear approach to modelling the relationship between a scalar response (or dependent variable) and one or more explanatory variables (or independent variables). The case of one explanatory variable is called simple linear regression. For more than one explanatory variable, the process is called multiple linear regression. This term is distinct from multivariate linear regression, where multiple correlated dependent variables are predicted, rather than a single scalar variable.

In linear regression, the relationships are modelled using linear predictor functions whose unknown model parameters are estimated from the data. Such models are called linear models.

Most commonly, the conditional mean of the response given the values of the explanatory variables (or predictors) is assumed to be an affine function of those values; less commonly, the conditional median or some other quantile is used. Like all forms of regression analysis, linear regression focuses on the conditional probability distribution of the response given the values of the predictors, rather than on the joint probability distribution of all of these variables, which is the domain of multivariate analysis.

Linear regression was the first type of regression analysis to be studied rigorously, and to be used extensively in practical applications.

This is because models which depend linearly on their unknown parameters are easier to fit than models which are non-linearly related to their parameters and because the statistical properties of the resulting estimators are easier to determine.

Linear regression has many practical uses. Most applications fall into one of the following two broad categories:

- If the goal is prediction, forecasting, or error reduction linear regression can be used to fit a predictive model to an observed data set of values of the response and explanatory variables. After developing such a model, if additional values of the explanatory variables are collected without an accompanying response value, the fitted model can be used to make a prediction of the response.
- If the goal is to explain variation in the response variable that can be attributed to variation in the explanatory variables, linear regression analysis can be applied to quantify the strength of the relationship between the response and the explanatory variables, and in particular to determine whether some explanatory variables may have no linear relationship with the response at all, or to identify which subsets of explanatory variables may contain redundant information about the response.

  Linear regression models are often fitted using ordinary least squares approach, nevertheless this approach bases on assumptions concerning residual terms, predictive variables and dependent variable; most common of whose are reported below:
- Weak exogeneity. This essentially means that the predictor variables x can be treated as fixed values, rather than random variables.

  This means, for example, that the predictor variables are assumed to be error-free—that is, not contaminated with measurement errors.

  Although this assumption is not realistic in many settings, dropping it leads to significantly more difficult errors-in-variables models.
- Linearity. This means that the mean of the response variable is a linear combination of the parameters (regression coefficients) and the predictor variables.

  Note that this assumption is much less restrictive than it may at first seem. Because the predictor variables are treated as fixed values (see above), linearity is really only a restriction on the parameters.

The predictor variables themselves can be arbitrarily transformed, and in fact multiple copies of the same underlying predictor variable can be added, each one transformed differently.

This technique is used, for example, in polynomial regression, which uses linear regression to fit the response variable as an arbitrary polynomial function (up to a given rank) of a predictor variable. This makes linear regression an extremely powerful inference method. In fact, models such as polynomial regression are often "too powerful", in that they tend to overfit the data.

As a result, some kind of regularization must typically be used to prevent unreasonable solutions coming out of the estimation process. Common examples are ridge regression and lasso regression.

Bayesian linear regression can also be used, which by its nature is more or less immune to the problem of overfitting. (In fact, ridge regression and lasso regression can both be viewed as special cases of Bayesian linear regression, with particular types of prior distributions placed on the regression coefficients.)

- Constant variance (a.k.a. homoscedasticity). This means that different values of the response variable have the same variance in their errors, regardless of the values of the predictor variables. In practice this assumption is invalid (i.e. the errors are heteroscedastic) if the response variable can vary over a wide scale.

  In order to check for heterogeneous error variance, or when a pattern of residuals violates model assumptions of homoscedasticity (error is equally variable around the 'best-fitting line' for all points of x), it is prudent to look for a "fanning effect" between residual error and predicted values. This is to say there will be a systematic change in the absolute or squared residuals when plotted against the predictive variables.

  Errors will not be evenly distributed across the regression line. Heteroscedasticity will result in the averaging over of distinguishable variances around the points to get a single variance that is inaccurately representing all the variances of the line. In effect, residuals appear clustered and spread apart on their predicted plots for larger and smaller values for points along the linear regression line, and the mean squared error for the model will be wrong. Independence of errors. This assumes that the errors of the response variables are uncorrelated with each other. (Actual statistical independence is a stronger condition than mere lack of correlation and is often not needed, although it can be exploited if it is known to hold.) Some methods (e.g. generalized least squares) are capable of handling correlated errors, although they

typically require significantly more data unless some sort of regularization is used to bias the model towards assuming uncorrelated errors. Bayesian linear regression is a general way of handling this issue.

- Lack of perfect multicollinearity in the predictors. For standard least squares estimation methods, the design matrix X must have full column rank p; otherwise, we have a condition known as perfect multicollinearity in the predictor variables.
  This can be triggered by having two or more perfectly correlated predictor variables (e.g. if the same predictor variable is mistakenly given twice, either without transforming one of the copies or by transforming one of the copies linearly).
  It can also happen if there is too little data available compared to the number of parameters to be estimated (e.g. fewer data points than regression coefficients).
  In the case of perfect multicollinearity, the parameter vector β will be non-identifiable—it has no unique solution. At most we will be able to identify some of the parameters, i.e. narrow down its value to some linear subspace of Rp.
  Methods for fitting linear models with multicollinearity have been developed; some require additional assumptions such as "effect sparsity"—that a large fraction of the effects are exactly zero

These assumptions are not always observed. Foer this reason, numerous extensions of linear regression have been developed.
Among these models mixed models are widely used to analyse linear regression relationships involving dependent data when the dependencies have a known structure. Common applications of mixed models include analysis of data involving repeated measurements, such as longitudinal data, or data obtained from cluster sampling. They are generally fit as parametric models, using maximum likelihood or Bayesian estimation. In the case where the errors are modelled as normal random variables, there is a close connection between mixed models and generalised least squares.
Fixed effects estimation is an alternative approach to analysing this type of data.
Since it is not at all sure that the explanatory power of labour market institutions for unemployment is the same for different countries fixed effects estimation is a much better way to determinate effect on unemployment of labour market institution.

A fixed effects model is a statistical model in which the model parameters are fixed or non-random quantities. This is in contrast to random effects models and mixed

models in which all or some of the model parameters are considered as random variables.

In many applications including econometrics and biostatistics a fixed effects model refers to a regression model in which the group means are fixed (non-random) as opposed to a random effects model in which the group means are a random sample from a population.

Generally, data can be grouped according to several observed factors. The group means could be modelled as fixed or random effects for each grouping. In a fixed effects model each group mean is a group-specific fixed quantity.

In panel data where longitudinal observations exist for the same subject, fixed effects represent the subject-specific means. In panel data analysis the term fixed effects estimator (also known as the within estimator) is used to refer to an estimator for the coefficients in the regression model including those fixed effects (one time-invariant intercept for each subject).

Such models assist in controlling for omitted variable bias due to unobserved heterogeneity when this heterogeneity is constant over time. This heterogeneity can be removed from the data through differencing, for example by subtracting the group-level average over time, or by taking a first difference which will remove any time invariant components of the model.

There are two common assumptions made about the individual specific effect: the random effects assumption and the fixed effects assumption.

- The random effects assumption is that the individual-specific effects are uncorrelated with the independent variables.
- The fixed effect assumption is that the individual-specific effects are correlated with the independent variables. If the random effects assumption holds, the random effects estimator is more efficient than the fixed effects estimator.

  However, if this assumption does not hold, the random effects estimator is not consistent. The Durbin–Wu–Hausman test is often used to discriminate between the fixed and the random effects models.

  Fixed model approach leads to a specific relationship between a single predicting variable and the response variable y.

Specifically, the interpretation of βj is the expected change in y for a one-unit change in xj when the other covariates are held fixed—that is, the expected value of the partial derivative of y with respect to xj. This is sometimes called the unique effect of xj on y. In contrast, the marginal effect of xj on y can be assessed using a correlation coefficient or simple linear regression model relating only xj to y; this effect is the total derivative of y with respect to xj.

A punctual and straightforward application of regression models to labour market analysis takes into account as dependent variables either participation rate or unemployment rate.

These variables might be influenced by either economic or social variables:

- Principal social variables are countries (or type of country) and period of time
- Collective bargaining, Expenditure in active or passive policies and strictness of employees are, otherwise, economic variables

Bibliography also shows that economic variables might affect not only labour market coefficients at given time but also at following instant of time.

Chapter 3 will create a model in which relations of each variables towards unemployment will be tested in real context.

The main core of this third and final chapter, differently than previous two sections, is to estimate, by way of econometric models, effects of institutional policies, both active and passive participation on labour market.

In order to do that a data base composed by official data concerning OECD countries is taken into account. This data base derived from organisation for economic co-operation and development online data base, which includes the largest amount of data about labour, economics, expenditure for different reasons of 37 different countries involved into the organisation and 20 more countries not included.

As underlined by figure 1 data base is composed by 21 countries observed across 29 consecutive years: from 1990 to 2018. Thus, data can be considered as panel.

According with bibliography and empirical researches every statistical unit is observed through six variables, divided into three kind:

- Total expenditure in policies for labour market: passive policies, active policies and total expenditure
- Strictness of employment protection, from Oecd official data
- Trade union density

Time series from 1990 to 2018 is long enough to delete the marginal effect of endogenous and external shocks; in the same way countries taken into account are different one each other, so they can be split into four different groups:

- Anglo-Saxon countries such as Australia, Canada, Ireland, New Zealand, United Kingdom, United States of America
- Central European countries such as Austria, Belgium, France, Germany, Netherlands. Switzerland has been deleted and not taken into account due to its particular policy of being a not European Union country in the middle of Europe
- South European countries, for example Spain, Portugal, Italy and Greece. These country have been hit by an even stronger economic crisis during the considered period

- North European countries, such as Denmark, Finland, Sweden, Norway

  These four group of country have a largely different point of view for labour market; so they unemployment rate and participation rate are assumed to be very different one each other.

Figure 1 Unemployment and participation rate by time and by country

Partecipation Rate	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Australia	73,51	72,98	72,82	72,59	73,19	73,96	74,03	73,59	73,52	73,34	73,79	74,06	74,15	74,49	74,37	75,40	75,80	76,19	76,50	76,39	76,44	76,64	76,43	76,41	76,31	76,94	76,95	77,45	78,03
Austria	.	.	.	.	70,98	71,38	70,79	70,81	70,76	71,05	70,79	70,74	71,67	72,04	70,39	71,44	72,39	73,50	73,89	74,34	74,43	74,55	75,11	75,51	75,38	75,50	76,20	76,43	76,79
Belgium	58,72	60,11	60,61	60,90	61,71	62,08	62,18	62,60	63,23	64,56	65,12	64,21	64,78	64,93	65,89	66,75	66,50	67,08	67,11	66,93	67,66	66,72	66,94	67,53	67,72	67,58	67,62	67,99	68,59
Canada	76,64	76,18	75,31	75,06	74,88	74,66	74,57	74,87	75,22	75,80	76,15	76,33	77,39	78,16	78,13	77,73	77,71	78,26	78,39	77,96	77,81	77,75	77,80	78,03	77,76	77,97	78,11	78,46	78,43
Denmark	82,39	82,20	81,99	81,19	78,80	79,52	79,46	79,77	79,34	80,63	79,96	79,88	79,57	79,49	80,14	79,81	80,55	80,08	80,67	80,24	79,36	79,26	78,64	78,12	78,08	78,46	79,95	78,84	79,38
Finland	77,12	75,65	74,17	73,39	72,69	73,16	73,41	72,74	73,18	74,19	74,86	75,19	75,04	74,68	74,37	74,84	75,39	75,69	76,12	75,18	74,63	75,13	75,39	75,32	75,48	75,95	76,04	76,86	78,04
France	66,03	66,00	66,34	66,55	66,62	66,85	67,40	67,18	67,42	67,82	67,98	68,03	68,27	69,72	69,78	69,71	69,61	69,71	69,87	70,26	70,25	70,11	70,72	71,14	71,38	71,51	71,70	71,81	72,25
Germany	67,44	71,04	70,89	70,75	70,51	70,41	70,57	70,85	71,37	71,19	71,14	71,47	71,50	71,29	72,58	73,84	74,99	75,63	75,94	76,37	76,64	77,32	77,22	77,62	77,74	77,63	77,94	78,24	78,65
Greece	59,08	57,58	58,33	58,94	59,49	60,11	60,98	60,84	62,47	62,94	63,84	63,30	64,15	64,96	66,18	66,36	66,67	66,54	66,66	67,43	67,84	67,26	67,47	67,47	67,43	67,81	68,22	68,27	68,18
Ireland	60,06	60,23	60,00	60,66	61,11	61,79	62,54	62,87	68,45	70,53	71,51	71,46	71,34	71,50	72,12	73,83	74,79	75,63	74,99	73,60	72,07	71,56	71,34	72,19	71,71	72,19	73,12	72,54	73,05
Italy	59,48	59,16	59,27	58,36	57,97	57,91	58,23	58,46	59,21	59,76	60,29	60,75	61,19	61,58	62,63	62,37	62,64	62,40	62,92	62,26	62,01	62,05	63,50	63,35	63,94	64,04	64,94	65,43	65,64
Netherlands	66,73	67,59	67,49	67,99	68,61	70,11	70,55	71,81	72,65	73,43	74,34	74,45	75,34	74,38	74,62	75,19	75,53	76,81	77,95	78,23	77,90	78,06	79,00	79,38	79,02	79,62	79,67	79,73	80,25
New Zealand	72,98	73,13	72,79	72,84	73,73	74,54	75,43	75,36	74,93	74,88	75,00	75,55	76,18	75,82	76,29	77,21	77,82	78,06	77,91	77,70	77,44	77,75	77,57	77,92	78,97	79,03	79,85	80,87	81,11
Norway	77,15	76,34	76,21	75,89	76,37	77,36	79,16	80,21	80,90	80,64	80,69	80,26	80,30	79,34	79,11	78,88	78,19	78,92	80,19	79,01	78,25	77,95	78,38	78,30	78,13	78,40	78,18	77,42	77,97
Portugal	68,84	70,09	68,21	67,55	67,33	66,91	67,18	68,25	70,40	70,64	71,22	71,95	72,58	72,74	72,69	73,20	73,62	73,87	73,94	73,43	73,67	73,63	73,41	73,04	73,24	73,40	73,73	74,66	75,14
Spain	61,73	61,86	61,72	61,98	62,40	62,56	63,24	63,91	64,49	65,27	66,70	65,77	67,68	69,09	69,97	71,08	72,13	72,81	73,79	74,13	74,55	74,92	75,28	75,31	75,26	75,45	75,36	75,07	74,90
Sweden	84,67	83,77	82,00	80,21	79,18	79,52	79,54	78,70	78,12	78,49	78,97	79,41	79,32	79,02	78,87	80,25	80,31	79,12	79,34	78,89	79,05	79,94	80,30	81,09	81,51	81,73	82,05	82,48	82,90
United Kingdom	77,80	77,34	76,49	76,14	76,02	75,78	75,94	76,31	75,82	76,27	76,44	76,27	76,38	76,42	76,32	76,30	76,83	76,51	76,78	76,60	76,25	76,38	76,63	77,10	77,18	77,63	77,71	78,21	78,32
United States	76,53	76,25	76,64	76,59	76,73	76,87	77,06	77,37	77,36	77,23	77,20	76,81	76,40	75,82	75,45	75,41	75,54	75,30	75,29	74,62	73,91	73,29	73,11	72,81	72,70	72,61	72,95	73,34	73,63

Unemployment Rate	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Australia	6,99	9,67	10,84	10,98	9,82	8,56	8,60	8,46	7,77	6,96	6,36	6,83	6,46	6,01	5,47	5,11	4,85	4,45	4,31	5,67	5,32	5,20	5,34	5,80	6,22	6,22	5,87	5,76	5,46
Austria	.	.	.	.	3,58	3,70	4,16	4,24	4,25	3,75	3,53	3,60	4,02	4,31	5,52	5,67	5,29	4,92	4,19	5,39	4,90	4,63	4,94	5,42	5,71	5,82	6,11	5,58	4,92
Belgium	7,28	7,01	6,73	8,11	9,69	9,38	9,52	8,99	9,35	8,71	7,05	6,64	7,55	8,22	8,44	8,50	8,30	7,50	7,02	7,96	8,35	7,19	7,60	8,50	8,60	8,56	7,89	7,15	6,00
Canada	8,22	10,41	11,29	11,46	10,47	9,56	9,70	9,19	8,36	7,65	6,89	7,27	7,73	7,64	7,25	6,82	6,36	6,09	6,22	8,44	8,15	7,59	7,38	7,17	7,02	7,00	7,10	6,39	5,90
Denmark	8,46	9,20	9,17	10,87	8,08	7,03	6,86	5,44	5,06	5,16	4,63	4,65	4,64	5,47	5,58	4,90	3,95	3,83	3,48	6,10	7,58	7,71	7,69	7,15	6,75	6,31	6,34	5,88	4,95
Finland	3,09	6,55	11,67	16,31	16,53	15,36	14,47	12,64	11,48	10,18	9,79	9,12	9,04	9,03	8,86	8,44	7,72	6,91	6,39	8,33	8,52	7,86	7,76	8,29	8,73	9,51	8,95	8,78	7,47
France	9,24	9,08	10,08	11,16	12,40	11,62	12,13	12,32	11,85	11,78	10,07	8,81	8,94	8,16	8,51	8,53	8,47	7,69	7,09	8,76	8,91	8,86	9,47	9,97	10,00	10,12	9,84	9,16	8,82
Germany	4,88	5,60	6,67	7,93	8,46	8,19	8,93	9,89	9,29	8,48	7,82	7,91	8,65	9,36	10,39	11,28	10,42	8,75	7,61	7,83	7,16	5,91	5,46	5,33	5,08	4,72	4,21	3,83	3,46
Greece	7,20	7,84	8,06	9,21	9,12	9,32	9,94	9,85	11,01	11,98	11,56	10,97	10,53	9,97	10,75	10,14	9,15	8,53	7,88	9,77	12,91	18,11	24,69	27,70	26,70	25,12	23,70	21,65	19,45
Ireland	13,32	15,07	15,51	16,12	15,10	12,39	12,12	10,51	8,38	6,42	4,96	4,19	4,83	4,99	4,88	5,09	4,98	5,21	6,22	13,09	14,87	15,60	16,14	14,91	12,71	10,58	9,27	7,03	6,18
Italy	11,54	11,08	11,70	10,06	11,08	11,66	11,68	11,77	11,89	11,47	10,63	9,59	9,08	8,74	8,09	7,83	6,86	6,16	6,81	7,85	8,48	8,48	10,81	12,33	12,90	12,10	11,89	11,43	10,82
Netherlands	7,42	6,95	5,48	6,13	6,81	7,09	6,43	5,47	4,33	3,55	3,07	2,51	3,09	4,85	5,68	5,90	5,03	4,20	3,67	4,39	5,03	5,01	5,87	7,31	7,47	6,92	6,06	4,86	3,83
New Zealand	8,06	10,73	10,78	9,90	8,45	6,53	6,37	6,94	7,81	7,12	6,21	5,52	5,36	4,83	4,09	3,87	3,91	3,75	4,27	6,30	6,74	6,71	7,20	6,51	5,99	6,01	5,35	4,94	4,48
Norway	5,39	5,51	6,01	6,06	5,43	4,97	4,87	3,96	3,24	3,22	3,46	3,49	3,98	4,51	4,45	4,67	3,46	2,56	2,65	3,21	3,69	3,34	3,30	3,59	3,61	4,51	4,89	4,33	3,97
Portugal	4,77	4,23	4,20	5,65	7,02	7,42	7,55	7,05	5,20	4,62	4,15	4,25	5,31	6,65	7,02	8,05	8,13	8,46	8,02	10,00	11,41	13,34	16,33	17,00	14,50	12,94	11,50	9,18	7,26
Spain	16,12	16,21	18,25	22,59	24,04	22,83	22,11	20,68	18,68	15,73	13,94	10,53	11,51	11,54	11,01	9,19	8,50	8,28	11,31	17,96	19,98	21,52	24,93	26,22	24,56	22,18	19,75	17,33	15,35
Sweden	1,84	3,30	5,82	9,47	9,74	9,20	10,01	10,15	8,42	7,17	5,88	5,07	5,25	5,84	6,61	7,77	7,06	6,23	6,31	8,46	8,75	7,94	8,13	8,22	8,12	7,57	7,11	6,81	6,46
United Kingdom	6,85	8,43	9,74	10,37	9,67	8,69	8,17	7,19	6,26	6,02	5,44	4,94	5,06	4,85	4,73	4,70	5,44	5,32	5,34	7,80	7,92	8,03	8,04	7,68	6,38	5,39	4,98	4,47	4,25
United States	5,67	6,93	7,61	7,02	6,16	5,64	5,46	4,99	4,55	4,25	4,02	4,79	5,85	6,06	5,60	5,14	4,69	4,67	5,85	9,38	9,77	9,07	8,16	7,49	6,25	5,37	4,93	4,41	3,94

Figure 2 – Average unemployment rate per country across time

	Mean	Std. Dev.
Australia	6,7362862	1,8492336
Austria	4,7263168	0,80407383
Belgium	7,9924404	0,94189093
Canada	7,9562965	1,5384255
Denmark	6,3084849	1,7870185
Finland	9,577816	3,0470807
France	9,7188807	1,4427318
Germany	7,362259	2,1354903
Greece	13,545207	6,5299398
Ireland	10,023362	4,3852531
Italy	10,165836	1,9071683
Netherlands	53,249481	1,4215957
New Zeland	6,3707656	1,9079813
Norway	4,1498216	0,95591814
Portugal	8,3189193	3,6735993
Spain	17,338128	5,410907
Sweden	7,1966326	1,909203
United King	6,6253924	1,7777363
United States	5,9902653	1,5962822
Total	8,2056827	4,136566

Figure 2 shows how largest rates of unemployment refer to south European countries: Spain (almost 17% of average unemployment rate across time), Greece, Italy and Ireland.

The highest standard deviation refers to Spain. High standard deviation meaning this: the higher the standard deviation the worst economic crisis during the analysed period.

In the other hand, countries which show smaller unemployment rates are north European ones.

However, south European countries are also characterised by a lower participation rate than other kind of countries.

Figure 3 shows that Italy has a participation rate twenty percentage point lower than Sweden – 80% against 60% approximately – and it reasonable to estimate this different being generalised and statistically significant.

Figure 3 – Average participation rate per country across time

	Mean	Std. Dev.
Australia	75,043673	1,6080121
Austria	73,07438	2,176372
Belgium	64,978119	2,7906955
Canada	76,94935	1,3577246
Denmark	79,854851	1,0964411
Finland	74,961631	1,2863538
France	69,035028	1,9474704
Germany	73,750447	3,2672547
Greece	64,371405	3,5374183
Ireland	69,269576	5,3059043
Italy	61,438989	2,3261144
Netherlands	74,704748	4,2903884
New Zeland	76,505549	2,3266998
Norway	78,554488	1,4124297
Portugal	71,673933	2,5453808
Spain	69,256178	5,402209
Sweden	80,302083	1,6798665
United King	76,695147	0,68903786
United States	75,338551	1,6561965
Total	72,933616	5,8737951

In order to estimate whether unemployment rate and participation rate are different between groups of country analysis of variance is run:

- Figure 4 tests differences unemployment rates across type of country. The null hypothesis is rejected at a significance level of 0.01, so a significant difference across country do exist.
- Summary statistics of unemployment rate reveals that unemployment rate in south European countries is 12.3%, meanwhile in north of Europe is almost 50% less, stating around 6.8%
- Summary statistics of unemployment rate also suggest that Anglo - Saxon, north European and central European are approximately at the same level, whereas south of Europe seems to describe a less developed part of the world

- Figure 5 tests differences participation rates across type of country. The null hypothesis is rejected at a significance level of 0.01, so a significant difference across country do exist
- Summary statistics of participation rates shows that almost one third of labour force in south of Europe do not participate at labour work, whereas North of Europe participation rate is close to 80%

Figure 4 – Different levels of unemployment across type of country

Type of country	Mean	Std.Dev	Freq
Anglosaxon	7,2837279	2,727478	174
Central European	7,090179	2,297704	141
North European	6,8081888	2,822344	116
South European	12,342023	5,798039	116
Total	8,2056827	4,136566	547

	SS	df	MS
Between groups	2434,57	3	811,523333
Within groups	6808,12	543	12,5379742
F test	**64,73**	**(***)**	

Figure 5 – Different levels of participation rate across type of country

Type of country	Mean	Std.Dev	Freq
Anglosaxon	74,966974	3,700269	174
Central European	71,052776	4,736213	141
North European	78,418263	2,510274	116
South European	66,685126	5,411159	116
Total	72,933616	5,873795	547

	SS	df	MS
Between groups	9.236,79	3	3.078,93
Within groups	9.601,10	543	17,68
F test	**174,13**	**(***)**	

Given differences between south European countries and others assumed we now try to explain, referring to bibliography, unemployment rate by:

- Its relationship with active policy expenditure, passive policy expenditure in labour market and total expenditure in labour market policy
- Its link with strictness of employment protection, either strictness of employment protection 1 or strictness of employment protection 3 from OECD
- Collective Bargaining as a percentage
- Dummy variable which explains the kind of country

First three variables derived from literature, the last one is a straightforward consequence of previous analysis, and it is considered just to show whether differences between countries might be significant.

The first model – figure 6 – explains unemployment by using active expenditure, passive expenditure, strictness of employment protection and collective bargaining: please take into account that total expenditure in labour market policy is not included into the model due to collinearity.

Regression model results are shown in figure 6 and explained below:

- For a single unit increasing of active policy labour market expenditure the unemployment rate is expected to decrease by 2.63 percentage points on average and given all other variables fixed
- For a single unit increasing of passive policy labour market expenditure the unemployment rate is expected to increase by 4.24 percentage points on average and given all other variables fixed
- For a single unit increasing of strictness of employment protection the unemployment rate is expected to increase by 0.44 percentage points on average and given all other variables fixed. However, this coefficient is not significant at a level of 0.10
- For a single unit increasing of strictness of employment protection the unemployment rate is expected to decrease by 0.02 percentage points on average and given all other variables fixed.

Since the lower the unemployment rate the better the obtained result, we can argue that active expenditure has a positive effect on economy, meanwhile passive policies in labour market expenditure has a negative one.

Figure 6 – Unemployment explained with linear regression model (1)

	UnemploymentRate
AcriveLMP_expenditure	-2.626
	(3.13)**
PassiveLMP	4.241
	(10.59)**
EmploymentProtectionRate	0.449
	(1.46)
CollectiveBargainingRate	-0.025
	(1.76)
_cons	5.210
	(10.31)**
R2	0.47
N	171

* p<0.05; ** p<0.01

In order to improve the model another step is taken. Figure 7 shows a model in which strictness of employment protection – not significant in previous model – is deleted.

Generally, figure 7 regression model is not improving referring to adjusted R squared value, which decrease from 0.45 to 0.43, and it is not even better performing considering parameters:

- According to model (2) shown in figure 7 for a single unit increasing of active policy labour market expenditure the unemployment rate is expected to decrease by 3.29 percentage points on average and given all other variables fixed
- According to model (2) shown in figure 7 for a single unit increasing of passive policy labour market expenditure the unemployment rate is expected to increase by 4.54 percentage points on average and given all other variables fixed
- For a single unit increasing of strictness of employment protection the unemployment rate is expected to decrease by 0.008 percentage points on average and given all other variables fixed. This coefficient is not significant at a level of 0.10

This second regression model leads to a conclusion: although a large number of variables are included the most influencing are direct expenditure either in active expenditure policy or in passive expenditure policy.

Figure 7 – Unemployment explained with linear regression model (2)

	UnemploymentRate
AcriveLMP_expenditure	-3.294
	(4.16)**
PassiveLMP	4.529
	(11.55)**
CollectiveBargainingRate	-0.009
	(0.80)
_cons	5.074
	(10.13)**
R2	0.44
N	211

* p<0.05; ** p<0.01

Despite literature do not suggest this kind of approach statistical evidence shown in figure 4 and 5 leads to try a dummy variable approach to explain regional effect:

- A dummy variable called Anglo-Saxon takes value 1 when the panel data refers to Anglo-Saxon group of country as previously defined and 0 otherwise
- A dummy variable called North Europe takes value 1 when the panel data refers to north European group of country as previously defined and 0 otherwise
- A dummy variable called Central Europe takes value 1 when the panel data refers to central Europeans group of country as previously defined and 0 otherwise
- A dummy variable called South Europe takes value 1 when the panel data refers to south European group of country as previously defined and 0 otherwise

According to literature three out of four variables can be included, by using the so-called corner code method and to avoid perfect collinearity.

Figure 8 – Unemployment explained with linear regression model (3)

	UnemploymentRate
AcriveLMP_expenditure	-1.792
	(2.42)*
PassiveLMP	5.081
	(15.11)**
CollectiveBargainingRate	-0.022
	(1.63)
EmploymentProtectionRate	-0.720
	(2.69)**
DummyAnglosaxon	-3.743
	(4.16)**
DummyCentralEuropean	-5.670
	(10.96)**
DummyNorthEuropean	-2.254
	(3.52)**
_cons	8.563
	(7.09)**
R2	0.71
N	171

* p<0.05; ** p<0.01

Latter multiple regression model – shown in figure 8 – has the following interpretation:

- In a south European country, with no expenditure in active policies nor in passive policies the expected unemployment rate is approximately 8%. This value derives from constant term
- Given all other variable fixed being a Anglo-Saxon country instead south European one account, on average for a 3.02% decrease in unemployment rate
- Given all other variable fixed being a north European country instead south European one account, on average for a 5.41% decrease in unemployment rate
- Given all other variable fixed being a central European country instead south European one account, on average for a 5.70% decrease in unemployment rate
- For a single unit increasing of active policy labour market expenditure the unemployment rate is expected to decrease by 0.58 percentage points on average and

given all other variables fixed. However, this variation is not statistically significant at a level of 0.15

- For a single unit increasing of passive policy labour market expenditure the unemployment rate is expected to increase by 2.95 percentage points on average and given all other variables fixed

This latter multiple linear regression model is the most suitable to describe unemployment rate variation at least for two reasons: first for the R squared value, which is higher than other models with same amount of variables and secondly for the number of observation taken into account.

Looking at regressions, such as figure 6 and figure 7 ones, which included variables such as collective bargaining and strictness of employment, the number of observations is 200 lower. The main reason for this lack of statistical evidence is the large number of missing value registered on previously mentioned variables.

At last, this last regression model suggests introducing country as selecting variable.

So that, we do introduce a more effective model described in previous chapter: the fixed effect model with time as variable and country as fixed effect.

In order to understand the occurring relationship between unemployment rate – so called dependent variable – and some independent variables, such as expenditure in active politics in labour market, expenditure in passive politics in labour market, strictness employment protection, collective bargaining across time and country we run a GLS model.

Figure 9 – Model for Panel Data

	UnemploymentRate
AcriveLMP_expenditure	-0.298
	(0.67)
PassiveLMP	3.097
	(19.21)**
EmploymentProtectionRate	-1.335
	(6.90)**
_cons	5.919
	(13.59)**
R2	0.53
N	414

* p<0.05; ** p<0.01

Results show that:

- A very high percentage of variance is due to u_i, which means that value of unemployment is 80% due to differences within every single country
- We reject the null hypnotises for every u_i equal to zero at a level of significance of 0.05
- General model shows that for a single increase of expenditure either in active politics in labour market or passive politics in labour market unemployment rate is expected to increase. When it comes down to expenditure in active politics this variable doesn't affect in a significant way the unemployment rate
- Time has a positive effect towards unemployment and this effect is positive. It means that every year unemployment rate is expected to increase given all other variables fixed
- Within groups residual term is negatively related with coefficients
- R-Squared within is higher than overall one: the first one is more than 55%, the latter one is lower than 20%

It is reasonable that time have to be taken into account in a different way than by panelling values. For this figure 10 shows the last and more complete fixed model: active policies in labour market, passive policies in labour market and employment protection rate are included as explanatory variables, country is used as panel data so as results being shown in nineteen different groups and time is insert like a dummy variables.

Due to multicollinearity effect, among twenty-nine different time dummy variables we do include into the model only twenty-eight of them.

Figura 10 - Fixed model for panel data; time as a dummy

	UnemploymentRate	
ActiveLMP_expenditure	-0.240	(0.56)
PassiveLMP	2.757	(15.55)**
EmploymentProtectionRate	-1.266	(6.51)**
Time=1991	0.229	(0.41)
Time=1992	0.371	(0.66)
Time=1993	1.222	(2.16)*
Time=1994	1.269	(2.29)*
Time=1995	1.134	(2.06)*
Time=1996	1.311	(2.39)*
Time=1997	1.056	(1.93)
Time=1998	0.555	(0.97)
Time=1999	0.090	(0.16)
Time=2000	-0.336	(0.58)
Time=2001	-0.684	(1.19)
Time=2002	-0.397	(0.69)
Time=2003	-0.358	(0.63)
Time=2004	-0.160	(0.29)
Time=2005	-0.001	(0.00)
Time=2006	-0.069	(0.12)
Time=2007	-0.190	(0.33)
Time=2008	-0.274	(0.48)
Time=2009	0.847	(1.51)
Time=2010	1.354	(2.42)*
Time=2011	1.599	(2.84)**
Time=2012	2.070	(3.62)**
Time=2013	2.257	(3.95)**
Time=2014	0.000	
Time=2015	0.000	
Time=2016	0.000	
Time=2017	0.000	
Time=2018	0.000	
Constant term	5.697	(8.19)**
R2	0.64	
N	414	
* p<0.05; **	p<0.01	

The figure 10 model shows following results:

- On average, given all other variables fixed, in a given country and during a giving time, every million dollar spent in active labour market policies generates around 0.24 percentage point decreasing in unemployment rate
- For every million euro spent in passive labour market policies, given all other variables fixed, unemployment rate is estimate to increase by 2.75 percentage points
- Employment protection rate has a positive effect in labour market, in fact for every single percentage point increasing of strictness of employment it is estimated that unemployment rate decrease by 1,26 percentage points
- Among all dummy variables period of time between 1993 and 1996 and period of time between 2011 and 2014 is estimated to be significantly different than the average. This is probably due to financial crisis, thus unemployment rate values are estimated to be higher in mentioned years

Conclusion

Labour market is principally composed by three main group of people:

- Employment: given by employed in working age and sel employed, where Employed people are those aged 15 or over who report that they have worked in gainful employment for at least one hour in the previous week or who had a job but were absent from work during the reference week
- Unemployment: so called is The state of being without any work yet looking for work; according to the Organisation for Economic Co-operation and Development (OECD), is persons above a specified age not being in paid employment or self-employment but currently available for work during the reference period.
- Other people available at work: difference between people aged 15 to 64 and the sum of before mentioned categories of employment and unemployment

Unemployment might be seen as an imperfection of labour market, but it is not always true that unemployment is given to lack of work; in fact different kind of unemployment do exist: cyclical or Keynesian unemployment, frictional unemployment, structural unemployment classical unemployment.

Due to complexity of phenomenon indices such as unemployment rate or participation rate have to be studied by using an econometric approach.

Literature suggests econometric models such as linear regression model, linear mixed model and mixed effect linear model for panel data.

According with bibliography my dissertation explained unemployment rate previously by using a linear regression model and further with a linear mixed model for panel data with fixed effect.

Obtained results suggest that:

- Participation rate and unemployment rate are largely different among different kind of country. South European countries register a low level of participation rate and a rather higher level of unemployment, in the other hand Scandinavian and central European countries are almost fully employed
- Spending money in active policies of labour market make unemployment decrease although not significantly in certain circumstances

- Expenditure in passive labour market policies generate an increase of unemployment, so that we consider these expenditure negatively
- Strictness of employment and collective bargaining have a positive influence in labour market but at the same time show higher results in countries, especially south European one, where unemployment rate is higher

At the end of this dissertation it is possible to assert that labour market indices are basically influenced both by social effect and economic effect and different countries have a slightly different impact on unemployment and participation rate of their econometric models.

BIBLIOGRAPHY

[1] *Unemployment and wages in the oecd from 1960s and 1990s, Stephen Nickell, Lucia Nunziata, Wolfgang Ochel and Glenda Quintini*

[2] *Catherine Rampell (March 7, 2013). "An Odd Shift in an Unemployment Curve". NYT. Retrieved August 27, 2017.*

[3] *Barro, Robert J.; Grilli, Vittorio (1994). "Unemployment". European Macroeconomics. London: Palgrave Macmillan*

[4] *Can labour market institutions explain high unemployment rates in the new European Union member states? Pubblished online 5 june 2007; Springer Science + Business Media B.V. 2007; S.Ederveen and Laura Thissen*