



# **DIPLOMARBEIT**

Titel der Diplomarbeit

„Institutions, Shocks and Labour Relations:  
Ways To Explain Past Unemployment Trends”

Verfasserin

**Saskia Bogner**

angestrebter akademischer Grad

**Magistra der Sozial- und  
Wirtschaftswissenschaften**

Wien, im November 2007

|                                   |                    |
|-----------------------------------|--------------------|
| Studienkennzahl lt. Studienblatt: | A140               |
| Studienrichtung lt. Studienblatt: | Volkswirtschaft    |
| Betreuer:                         | Ph.D., Julien Prat |

## Contents

|          |                                                                            |           |
|----------|----------------------------------------------------------------------------|-----------|
| <b>1</b> | <b>The Effects of Institutions and Shocks on Unemployment</b>              | <b>2</b>  |
| 1.1      | Institutions . . . . .                                                     | 3         |
| 1.1.1    | The Average Replacement Rate and Unemployment Benefit Duration . . . . .   | 3         |
| 1.1.2    | Union Density and Degree of Corporatism . . . . .                          | 4         |
| 1.1.3    | Employment Protection Legislation (EPL) . . . . .                          | 5         |
| 1.1.4    | Tax Wedge . . . . .                                                        | 6         |
| 1.1.5    | Econometric Findings . . . . .                                             | 6         |
| 1.2      | Shocks and their Interaction with Institutions . . . . .                   | 11        |
| 1.2.1    | Econometric Findings . . . . .                                             | 13        |
| <b>2</b> | <b>The Effects of Product and Labour Market Regulation on Unemployment</b> | <b>16</b> |
| 2.1      | The Model . . . . .                                                        | 16        |
| 2.1.1    | Workers . . . . .                                                          | 17        |
| 2.1.2    | Products and Firms . . . . .                                               | 18        |
| 2.1.3    | Bargaining . . . . .                                                       | 18        |
| 2.1.4    | Short and Long Run . . . . .                                               | 18        |
| 2.1.5    | Regulation . . . . .                                                       | 19        |
| 2.2      | Equilibrium . . . . .                                                      | 19        |
| 2.2.1    | Short Run Partial Equilibrium . . . . .                                    | 19        |
| 2.2.2    | Short Run General Equilibrium . . . . .                                    | 20        |
| 2.2.3    | Long Run General Equilibrium . . . . .                                     | 20        |
| 2.3      | Deregulation . . . . .                                                     | 22        |
| 2.3.1    | Product Market . . . . .                                                   | 22        |
| 2.3.2    | Labour Market . . . . .                                                    | 22        |
| 2.3.3    | Policy Options for Deregulation . . . . .                                  | 23        |
| 2.4      | Econometric Findings . . . . .                                             | 23        |
| 2.4.1    | Estimation with PMR and Output Gap . . . . .                               | 24        |
| <b>3</b> | <b>The Effects of Labour Relations on the Unemployment Rate</b>            | <b>26</b> |
| 3.1      | The Model . . . . .                                                        | 27        |
| 3.1.1    | Non-Cooperative and Cooperative Equilibrium . . . . .                      | 28        |
| 3.1.2    | Unemployment . . . . .                                                     | 30        |
| 3.1.3    | Equilibrium . . . . .                                                      | 31        |
| 3.1.4    | Sustainable Equilibria . . . . .                                           | 33        |
| 3.2      | Application . . . . .                                                      | 34        |
| 3.3      | Econometric Findings . . . . .                                             | 35        |
|          | <b>References</b>                                                          | <b>42</b> |
|          | <b>Appendices</b>                                                          | <b>43</b> |

## Introduction

Understanding the mechanisms behind the evolution of unemployment is important in order to react better and more accurately to changes in the macroeconomic environment. So far, many studies have been performed aiming at defining factors which are closely linked to unemployment. I therefore decided to give an overview of those economic influences affecting the course of unemployment. But the motivation of this paper is not only to focus on the theoretical approach but also to assess if the results of those theories and models are supported by economic data.

Econometric studies first focused on the impact of economic shock in order to explain the general increase in European unemployment, which started in the 60s. Three main shocks could be observed. The first was a decrease in the total factor productivity growth since the 60s, the growth rate dropped from about 6% to 2% in the 90s. After the post World War II years, European economies experienced an economic catch up with high TFP-growth rates, in order to gain competitiveness in the world market. In the 60s this catch-up effect went away and the economies slowed down. The second massive shock was a decline in the labour share starting at the end of the 70s. This evolution can be explained in part by an increase in real wages. The evolution of the interest rates is the last influencing shock. As a reaction to the oil shock, central banks decreased interest rates in the 70s. The following decades were characterized by a continuous increase in interest rates.

With shocks one can explain the general trend of unemployment but not the differences across countries. In order to answer the question why the same shocks affect countries in different ways, economists turned their attention to labour market institutions. Such institutions like employment protection legislation, unions or social benefits affect labour market performance and the impact of a shock. Later on we will see that some institutions may cause more labour market rigidity, which can hinder the labour market from adjusting to shocks. The first section of this paper will cover those issues and summarize the theories brought up in the paper "*The Role of Shocks and Institution in the Rise of European Unemployment: The Aggregate Evidence*" (2000), by Olivier Blanchard and Justin Wolfers as well as those in the OECD Paper "*Employment Patterns in OECD Countries: Reassessing the Role of Policies and Institutions*" (2006), by Andrea Bassani and Romain Duval. The regressions performed in this section show that institutions as well as shocks can account for a great part of the evolution of unemployment, supporting in part the findings of the papers mentioned above.

The next approach to better understand the evolution of unemployment is to look at the degree of product market regulation. In most European countries many sectors, such as the energy or transportation industries are still highly regulated. I will present the model and findings of Olivier Blanchard's and Francesco Giavazzi's paper "*Macroeconomic Effects of Regulation and Deregulation in Goods and Labour Markets*" (2003). Their model assumes that labour market deregulation can be done through a decrease in the bargaining power of workers. This can for example happen if the government reduces the strictness of the conditions for layoffs. Product markets can be deregulated by lowering the barriers to entry which allows more firms to start their businesses. The

idea behind their research is to show the short and long run effects of deregulation on the unemployment rate. In order to analyze and determine whether these mechanisms are supported by the data, I performed estimations including a variable measuring the degree of product market regulation.

The last section of this paper analyses the impact of labour relations on the level of unemployment. In order to study this issue, I used the model from the paper “*The Quality of Labour Relations and Unemployment*” (2006) by Olivier Blanchard and Thomas Philippon. It is basically a search matching model, where firms post vacancies and workers apply. An extension to this standard model is the assumption of asymmetric information and the fact that firms can have a good or a bad reputation, meaning that they can lie about their productivity in order to reap higher rents. The model introduces also another shock, namely the increase in firm level uncertainty, which could explain unemployment evolutions. The estimations I will present in this section find only little support for this theory.

## 1 The Effects of Institutions and Shocks on Unemployment

From the 60s to the 90s the overall unemployment rate in the OECD countries increased by about 9%, but not all countries were hit the same way: while for example Switzerland had an unemployment rate of only 4.1% in the 90s, Spain had more than 20%. One way to explain this rise is by shocks affecting the economies. The increase of the oil price and the decrease in total factor productivity growth are two shocks which have affected the evolution of the unemployment rate. The question is: why did those shocks not affect all countries in the same way? The answer is that countries have different labour market institutions. One may have a decentralized, another a centralized wage bargaining system. Some have high other low replacement rates. The consequence is that shocks can have more or less strong effects on the economy.

We now have two explanations for the evolution of unemployment: the first are shocks, which can explain the general increase in unemployment since the 60s, but not the differences across countries; the second are labour market institutions which can explain today's differences across countries.

In their paper from 2000 Olivier Blanchard and Justin Wolfers studied the evolution of unemployment since the 60s in European countries. They had a data set including variables describing institutions and shocks in 20 OECD countries. Their main finding was that the interaction between shocks and institutions can account for the evolution of European unemployment. This conclusion is based on estimations including labour market institutions and macroeconomic shocks.

This section of the paper is intended to explain the effects of the labour market institutions and shocks on the unemployment rate. In order to do so, I will in a first step concentrate on institutions, and explain the mechanisms behind those institutions. This is important for understanding how institutions can worsen or improve the performance of labour markets. In a second step I will introduce shocks in order to see if they bring further information into the regressions.

## 1.1 Institutions

Blanchard and Wolfers found institutions to play an important role in explaining the behavior of unemployment in European countries. In order to see if I can support their findings I first have estimated the unemployment rate with 6 institutions. However there is one problem which arises when using labour market institution for explaining unemployment. Most of those institutions have an endogeneity problem, which means that they are in part influenced by the unemployment rate. This is problematic, because our estimators risk to be biased. Let's take one simple example, namely the benefit system. Di Tella and MacCulloch<sup>1</sup> show in their paper that countries where unemployment increased the most after the oil shocks in the 70s were also countries where the benefit system became more generous afterwards. Furthermore they have shown that the largest increases were detected in countries having very low benefits. This implies that if an adverse shock happens to a country with low benefit rates, the government may be forced to increase those rates to keep demand at a certain level. If a larger part of the population lived at the subsistence level, consumption would drop dramatically and the economy would perform even worse. To address this problem, one could use instrumental variables, like lagged values, but since I did not have such instruments, this hitch remains untreated in my paper. Being aware of this issue, one should be cautious when interpreting the results of the following estimations.

I used the dataset from the paper by Andrea Bassani and Romain Duval published in June 2006. This dataset contains measures of political institutions and economic determinants<sup>2</sup> from 20 OECD countries, covering 21 years (from 1982 to 2003). As we will see later, Blanchard and Wolfers used fixed variables for describing institutions, while the variables used in this paper are time-variant. Why this assumption leads to a different outcome will be explained in the econometric part of this section. In this subsection I will define the variables I used for this first regression and explain their impacts on the evolution of unemployment. I also will present the findings of those estimations and check whether the results conform with the theory.

### 1.1.1 The Average Replacement Rate and Unemployment Benefit Duration

The benefit system was found to have a great impact on the evolution of unemployment. Unfortunately only variables measuring the average replacement rate and the duration index are available in form of time series. In order to analyze the benefit system it would also be of interest to look at the coverage and the strictness of the system. Especially the latter could explain why some countries, which have a generous benefit system have very low unemployment rates. By increasing the strictness through tightening the criteria for receiving benefits and enforcing those criteria through a system of sanctions the negative effects of generous benefits, which we will be explained subsequently, can

---

<sup>1</sup>"Unemployment Shocks and Labor Market Institutions" by R. Tella and R. MacCulloch", June 1999

<sup>2</sup>Institutions were chose according to the availability of data. Only variables for which there existed data over the whole periode from 1982 to 2003 were included in the regressions.

be avoided.

The replacement rate represents the percentage of the former income which the average unemployed receives. When creating this rate two different family and employment situation as well as three unemployment durations were averaged. The measure of benefit duration is created by dividing the average replacement rate by the initial replacement rate, which is given by the benefits received in the first year of unemployment. The form of this index implies that if it tends to 1, the benefits are distributed more equally between the five years where the unemployed receives them. If on the other hand the index tends to 0, it is likely that unemployed receive higher benefits at the beginning and in the following year much less. A generous unemployment insurance system has negative effects on unemployment<sup>3</sup>. It can increase the unemployment rate and duration. If unemployed individuals get a high replacement rate for a long time the incentive to search for a job, and therefore the search intensity might decrease. Another effect can be that they accept less job offers and ask for higher wages. If the employer does not accept the wage claim, the worker just looks out for another job. In other words, the number of separations increases: the inflow into the unemployment pool increases while the outflow decreases, which obviously leads to a rise in the unemployment rate. The cost, additional unemployed bring to the government could lead to a further increase in unemployment, since those payments have to be financed by higher taxes, which can also have a negative impact on unemployment. Unemployment benefits are necessary in order to assure certain living and social standards after the loss of a job. From this point of view, higher benefits can also have positive effects on unemployment, namely a lower separation rate. The explanation is that workers can take more time to find a match. An unemployed who is not under pressure may be able to find a job which complies to his abilities. If a person rushes into the job search and takes the first offer he gets, the probability of a separation is surely higher than if he can take his time and has more job interviews.

### **1.1.2 Union Density and Degree of Corporatism**

The degree of centralization is measured by a dummy variable, which can take the value 1, for very centralized or the value 0 for decentralized systems. A more centralized wage bargaining system can have positive effects on employment levels. This can be explained by the fact that if wages are determined by unions in a more centralized way, those are more aware of the macroeconomic effects excessive wage claims can have on employment. They therefore restrain those wage demands such employment levels do not drop. On the other hand if unions bargain decentralized in each firm, those negative externalities from high wage claims are not considered, since their horizon is restricted to the firm level.

The union density measures the percentage of workers being members of a trade union. The countries with the lowest union density, namely less than 20% are Spain, France, the USA and Japan. On the other hand countries with a traditionally high union density are the Scandinavian countries and Belgium. In some countries like

---

<sup>3</sup>A negative impact on the unemployment rate always refers to an increase in unemployment.

New Zealand, Portugal or Ireland the proportion of workers being members in a union decreased dramatically in the past decades. However the union density variable only shows the percentage of the workers who are affiliated to a union but doesn't tell us anything about the union coverage. In some countries only few worker participate in the unions, but most of the population is covered by a collective agreement. This is the case for example in Spain and France where the union coverage is high while only few workers are members of trade unions. In literature union density has no explicit influence on the unemployment rate. The crucial question is how unions act. Do they claim high wages? Do they bargain at the firm level or in a more centralized way? In countries where the union density is high but the bargaining takes place at the firm level (decentralized bargaining), the outcome may have negative effects on unemployment, as already explained above. While countries with centralized bargaining may profit from a high union density. Another influencing factor is the power of unions. Even if the union density in one country is high, the effects on unemployment may be insignificant if the unions don't have enough influence.

### **1.1.3 Employment Protection Legislation (EPL)**

This variable measures the stringency of employment protection. The index goes from 0 (very flexible labour market legislation ) to 6 (very strict labour market legislation). One cannot clearly say if strict EPL increases or decreases unemployment. The theory assumes an intertemporal trade off of labour market deregulation. One means of deregulation is to reduce the bargaining power of workers. Since the rent of the firm is shared between workers and firm, a decrease in the bargaining power of workers leads to a lower share for workers, and therefore lower wages. In the short run, firms profit from labour market deregulation, they get higher rents, while workers lose. Employment effects though only occur in the long run: Firms are attracted by high rents they now can earn, but it takes some time to enter the market. Firms spot this possibility and enter the market in the long run. This increase in competition leads to a fall in prices and therefore an increase in real wages (leading back to the pre-deregulation wage level) while the employment levels increase, since new firms post vacancies. The long run effect therefore is a decrease in unemployment and wages return to the same level, after having temporary decreased. The model for labour market deregulation will be explained later on in Section 2 of this paper. Another way to look at the effects of EPL is to say that with strict EPL, it becomes more difficult or costly for firms to fire workers. Therefore firms will be more cautious when hiring, since they cannot easily "get rid" of workers if they don't fulfill their duties as expected and consequently less workers are dismissed. On the other hand the hiring rates also decrease, meaning that less unemployed find a job and it becomes more difficult to get out of the pool of unemployed. In order to know if strict EPL will increase or decrease unemployment one has to know which of those two effects will prevail. The econometric findings until now could neither find significant results in favor nor against strict EPL.

#### 1.1.4 Tax Wedge

The tax wedge measures how costly it is in terms of taxes for an employer to hire. That is, the wedge between the labour cost of the employer and the amount of disposable income a worker receives. In short, how much weight the income tax and all social security contributions have relative to the total labour cost. In most European countries the tax wedge ranges between 25% and 45%. The lowest levels can be attributed to the Anglo-Saxon countries and Switzerland which have numbers around 15%. Italy, Belgium, France, the Netherlands and the Scandinavian countries (with the exception of Norway) have the highest values at about 40%. The theory predicts that a higher tax wedge has a negative impact on unemployment in the short run. This reflects the fact that if labour becomes expensive for the employer, meaning that the amount of taxes he has to pay for each worker increases, he may hire less workers, consequently the number of vacancies falls and the labour market becomes tighter for unemployed. If however there are less vacancies per unemployed the wage levels are negatively affected. Because of inflows into the pool of unemployed competition between job-seekers increase and workers lose bargaining power. This decrease in wages can lead in turn to an increase in postings of vacancies and to higher employment rates in the long run. It is also argued in the literature<sup>4</sup> that in countries with a low degree of wage coordination the impact of the tax wedge on unemployment is stronger. When labour taxes increase, the cost of labour for firms increases. In order to keep the labour cost at the same level, the consumption wage of workers needs to decrease such that the tax-increase is compensated. Unions, which bargain at a centralized level will take potential negative employment effect more into account and push wages less, as already seen before. Consequently labour costs for firms increase less dramatically and the rise in unemployment will be softened. However in the theory the long run effects of tax wedges on the unemployment rate are unclear.

#### 1.1.5 Econometric Findings

- **Estimations Method and Data Issues:**

The institutional variables used by Blanchard and Wolfers were time-invariant. Their assumption was that changes in institutions on their own cannot explain the cross-country variation over time of unemployment changes. They argue that those institutions existed already before European unemployment began to increase and can therefore not explain this evolution. In the next two sub-sections we will use a set of time-variant institutions and shocks in order to show that contrary to the findings of Blanchard and Wolfers, institutions can account for a large part of those variations, supporting the findings of Bassani and Duval (2006).

Since there are unobserved effects in the data, the estimation model should control for them. In this case the two-way fixed effects method is appropriate, in order to control for the omitted variable problem. This estimation method allows to control for unknown time- and country-specific effects. The fixed effects model assumes that the

---

<sup>4</sup>As demonstrated in the paper "Unemployment, Growth and Taxation in Industrial Countries" (1997) by F. Daveri and G. Tabellini

unobserved effects are correlated with the explanatory variables<sup>5</sup>. We can imagine the general attitude of a country's government towards unions as such an effect. Another example of an omitted variable would be the political attitude in a country. The decisions the government takes, depend on the approach to social security or economics in general and clearly affect employment legislation, the tax wedge etc. Because of this correlation it is better to use the fixed rather than the random effects model. In order to confirm econometrically that the fixed effects model fits our data best we have to perform a Hausmann specification test. In our case we can reject the null-hypothesis, which says that the coefficients of the efficient random effects estimator are the same as the ones of the consistent fixed effects estimator, confirming that we should choose the fixed over the random effects model (results not reported).

The two-way fixed effect model creates dummy variables for each year and country, which allows for separate intercepts or constants for every group and time period. This means that we can take into account not only the individual effects but also the effect of each period inside the estimation. To prove that the time and country dummies are jointly significant and therefore should remain in the model, we perform an F-test (results not reported). The results confirm that both time and country dummies are jointly significant. The model calculates for each observation the deviation from the group mean. That way it is possible to see the average effect of each variable. The intuition behind this model is to have the unobserved effects in the coefficients and not in the error term, which would cause biased estimators.

In the following estimations I excluded the observations for the years 1990 and 1991 for Germany, Finland and Sweden, because of historical events, especially the collapse of the Soviet Union, which led to a sudden increase in unemployment in Germany. In Finland and Sweden the unemployment rate increased in the early 90s by about 8%. The countries encountered a severe economic and banking crisis with a harsh decline in GDP and an increase in unemployment. This important increase in unemployment cannot be explained by changes in institutions or economic shocks, therefore those three countries have to be split up in post and pre 90/91 in order to prevent an estimate bias.

#### • Estimation with Institutions:

For the first estimation (Table 1, column 1-4) I used the following model:

$$u_{it} = \sum_j \beta_j X_{it}^j + \alpha_i + \lambda_t + \varepsilon_{it}$$

This expression gives us the unemployment rate of country  $i$  in period  $t$ . It depends on the explanatory variables  $X^j$ , which are the different institutions mentioned in the previous section,  $\alpha_i$  and  $\lambda_t$  which are the country and time fixed effects and finally the error term  $\varepsilon_{it}$ .

---

<sup>5</sup>One restriction of this model is that the explanatory variables have to vary over time. If they were time-invariant, it would be impossible to distinguish between the effect of the observable and the unobservable variables

**Table 1**  
*Unemployment Estimations with Institutions (fixed effects)*

|                          | (1)                       | (2)                       | (3)                       | (4)                       |
|--------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
|                          | Coefficient (t-statistic) | Coefficient (t-statistic) | Coefficient (t-statistic) | Coefficient (t-statistic) |
| Replacement Rate         | 0.17 (7.59)               | 0.14 (5.34)               | 0.16 (7.47)               | -                         |
| Tax Wedge                | 0.33 (10.76)              | -                         | 0.34 (11.30)              | 0.29 (9.24)               |
| Union Density            | 0.03 (1.22)               | 0.04 (1.80)               | -                         | -0.01 (-0.66)             |
| High Corporatism         | -1.54 (-3.30)             | -                         | -                         | -0.72 (-1.50)             |
| EPL                      | 0.46 (1.13)               | 0.57 (1.21)               | 0.27 (0.69)               | -0.60 (-1.47)             |
| Benefit Duration         | -2.57 (-2.92)             | -3.28 (-2.93)             | -2.80 (-3.00)             | -0.84 (-0.86)             |
| Uniondens*highcorp       | -                         | -                         | -0.03 (-3.45)             | -                         |
| Tw*Lowcorp               | -                         | 0.05 (2.87)               | -                         | -                         |
| R <sup>2</sup> (within)  | 0.50                      |                           |                           |                           |
| R <sup>2</sup>           | 0.87                      | 0.82                      | 0.87                      | 0.85                      |
| Country and Time Dummies | yes                       | yes                       | yes                       | yes                       |
| Observations             | 434                       | 434                       | 434                       | 440                       |

The results of the first estimation are depicted in column (1) of Table 1. All coefficients are significant at a 5% level (critical value of the t-statistic is 1.96), except EPL and union density, which goes along with the theory. The signs of the coefficients are as expected: Replacement rate, tax wedge, EPL, and union density have positive signs, meaning that an increase of those variables induces an increase in unemployment, while the level of corporatism has a negative sign, implying that unemployment rate drops if this variable increases.

How can we explain the negative and significant coefficient of benefit duration? As we saw earlier a possible explanation for a positive effect on unemployment would be that people receiving benefits for a long period are not under time-pressure when searching for a job. This can lower separation rates and consequently lead to lower unemployment rates. In column (1) the negative effect of high replacement rates is captured by the coefficient of the average replacement rate, while the positive effect is captured by the coefficient of benefit duration. In column (4) I dropped the replacement rate, which led to an insignificant coefficient for the benefit duration and the measure for corporatism.

In order to analyze the effect of the tax wedge I constructed the variable Tw\*Lowcorp, which measures the effect of the tax wedge together with a low degree of corporatism. As we can see in column (2) of Table 1 the coefficient turns out to be positive and significant, suggesting a negative impact on the unemployment rate. The explanation behind this result is that unions in countries where bargaining takes place at firm level tend to claim higher wages. Firms begin to switch to less labour intensive productions and lower employment levels, which can lead to an increase unemployment.

As we can see from column (1) union density is statistically insignificant. Since union density is closely linked to the degree of corporatism I constructed an interaction variable, namely uniondens\*highcorp, measuring the cumulative effects of those two

variables. In column (3) we can see that the coefficient is negative and significant, implying that a high union density together with a centralized bargaining system has a positive impact on unemployment.

• **Estimation with Institutions and Output Gap:**

In the second estimation I introduced the output gap as a new variable. It represents the percentage difference between actual and long-run trend output of a country. Through the output gap we can control for the fluctuations in unemployment over business cycles. It's like assuming that countries are hit by the same unobservable shock. However the interpretation of the output gap is not straightforward because of the close link to unemployment. The output gap is likely to be influenced by the unemployment rate which causes an endogeneity problem. The unemployment rate in this estimation is given by

$$u_{it} = \sum_j \beta_j X_{it}^j + \chi G_{it} + \alpha_i + \lambda_t + \varepsilon_{it}$$

, where  $G_{it}$  is the output gap of country i in period j. The rest of the variables are the same as in the previous estimation.

**Table 2**  
*Unemployment Estimation with Institutions  
and Output Gap (fixed effects)*

|                          | Coefficient (t-statistic) |
|--------------------------|---------------------------|
| Replacement Rate         | 0.15 (8.46)               |
| Tax Wedge                | 0.28 (11.41)              |
| Union Density            | -0.02 (-1.45)             |
| High Corporatism         | -0.91 (-2.24)             |
| EPL                      | 0.40 (1.24)               |
| Benefit Duration         | -2.62 (-3.5)              |
| Output Gap               | -0.49 (-14.99)            |
| R <sup>2</sup> (within)  | 0.69                      |
| R <sup>2</sup>           | 0.92                      |
| Country and Time Dummies | yes                       |
| Observations             | 434                       |

Table 2 represents the results of estimation 5. The output gap is highly significant and its coefficient has a negative sign. This means that countries with a higher output gap tend to have lower unemployment rates. Since the output gap represents the deviation of actual from long-run trend output ( $y - y^*$ ) a positive output gap means that the economy is in a "boom period" while a negative output gap would imply a recession. Therefore the negative sign of the coefficient conforms with the theory. In other words, if  $y > y^*$  the output gap is positive and the economy is in a "good" period, implying

a lower unemployment rate. The  $R^2$  improves from 0.87 to 0.92, meaning that the output gap adds further information to the regression leading to a higher explanatory potential. Those results suggest that if for example a country reduces unemployment benefits by 10%, the unemployment rate decreases by 1.5%. A drop of 10% in the tax wedge would lead to a decrease in unemployment of 2.8%. In this regression 69% of the differences in changes in unemployment from 1982 to 2003 within countries can be explained by changes in institutions and the output gap, which is much better, than the result for the estimations without output gap. Since the output gap indicates if a country is in a cyclical up- or downturn this result would imply that many countries in this sample were in different economic periods, meaning that their business cycles were not synchronized.

**Figure 1**  
*Observed vs. Predicted Change in Unemployment from 1990 to 2003*  
*(Institutions and Output Gap)*  
 (Graph: Germany, Finland and Sweden: 1989 to 2003)

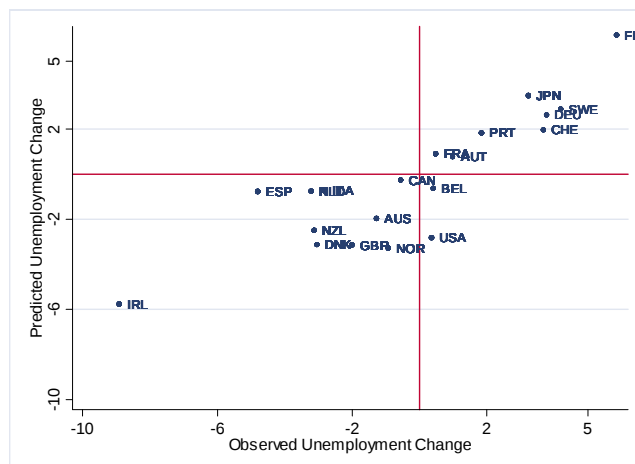


Figure 1 depicts the actual and predicted change in unemployment from 1990 to 2003. As one can see, the fit is quite well for most countries of the sample. However, there are some outliers, like for example Spain or Italy, where the decrease in unemployment was estimated much lower than it actually was. The graph shows that the estimation slightly underestimates the changes in unemployment.

We turn now to the robustness of those results. I first introduced each institution individually in order to see if they still are significant. The results are depicted in column (1) of Table 3. All variables, except EPL and union density turn out to be significant. The results (not reported) are also robust if dropping one institution at a time. In column (2) of Table 3 we can see that if we perform the estimation without country effects, that is we assume that all variations in unemployment can be explained by differences in institutions, the results remain generally significant. Without country

effects, the coefficient of union density becomes significant and negative. The coefficient of benefit duration becomes positive and EPL turns out to be significant. In a last step we look what happens to our results if we drop one country at a time. This test shows that in general the results are robust to such changes, the coefficients remain significant. The exceptions are Norway, where the coefficient for union density becomes significant, and New Zealand, where the coefficient of high corporatism turns out to be insignificant.

**Table 3**  
*Robustness Check*

|                          | (1) Entered Individually | (2) No Country Effects |
|--------------------------|--------------------------|------------------------|
| Replacement Rate         | 0.06 (2.95)              | 0.05 (3.01)            |
| Tax Wedge                | 0.31 (9.90)              | 0.20 (8.45)            |
| Union Density            | 0.006 (0.29)             | -0.05 (-6.14)          |
| High Corporatism         | -1.41 (-3.25)            | -2.37 (-6.74)          |
| EPL                      | -0.16 (-0.38)            | -0.44 (-2.38)          |
| Benefit Duration         | -2.69 (-2.78)            | 2.42 (3.23)            |
| Output Gap               | -0.55 (-14.21)           | -0.69 (-9.22)          |
| R <sup>2</sup>           | -                        | 0.47                   |
| Country and Time Dummies | Yes                      | No Country Dummies     |

## 1.2 Shocks and their Interaction with Institutions

Three major shocks happened since the 60s. The first one is the decline in total factor productivity growth. This shock affected all European countries quite equally. This decline should have affected the wage level negatively, but in the 60s and 70 workers increased their bargaining power and claimed higher wage. The result was an increase in the equilibrium unemployment rate and the expectations of unemployment. But this effect is not a permanent one, it can account for the increase in unemployment in the 70s, but not for the persistence of this phenomenon. After the decline in TFP growth unemployment increased, but after wages and expectations had adjusted those negative effects should have gone away. Unemployment continued to rise suggesting that something else must have happened.

This something were in a first instance the changes in the real interest rate. In most countries they turned negative or decreased in the mid 70s but increased afterwards. The sharp decrease can be interpreted as a reaction to the oil shock and the decrease in TFP growth in the 70s. In order to stimulate investment and consumption, interest rates were held low, sometimes they were even negative. This affects the behavior of firms, which will increase labour demand. In the 70s they invested more and labour demand increased, while it was the other way round in the 80s.

The last shock is the shift in labour demand. In the mid 70s the labour share went sharply down, after having increased in the previous years. This increase can be explained by the high labour costs, caused by high wage growth together with low TFP growth. The first consequence was that the share of labour in the production process

increased in the short run, while in the long run firms decreased labour demand. This second effect can be explained by the fact that the elasticity of substitution is less than one in the short run, and firms therefore react only in the long run to higher labour costs by reducing labour demand. This explains why labour share only decreased at the end of the 70s, while TFP growth had already begun to decrease in the 60s. This adverse labour demand shock led to a decrease in employment levels and to an increase in unemployment. Firms introduced new, more productive production technologies, using less labour, which could in time lead to higher profits and consequently more investment. In the long run firms hire new workers and unemployment decreases. This shock could explain the high unemployment rates in the 90s, but would also mean that unemployment should begin to decrease at the beginning of the 21st century, which has happened.

Another factor which had influenced the evolution of unemployment is inflation. In Europe, where the inflation is on average at a low or medium level, it increased in the 70s and decreased afterwards. This means that up to the 70s the actual unemployment was below the equilibrium rate, while since the 70s the actual unemployment has been above the equilibrium rate. The expansionary monetary policy in the 60s softened the negative effects of the decline in TFP growth and the oil shock. In the 70s the policy changed and inflation was kept low while interest rates were high leading to higher unemployment in the 80s. The labour demand shock can finally account for the increase in unemployment in the 90s.

Now that we have defined the major shocks, we should concentrate on their interaction with institutions. Shocks happen quite equally in all European countries, but their effects can be more or less important and persistent, depending on the labour market institutions of the countries. An adverse shock causing a productivity slowdown might have less severe effects in a country, where wages are bargained at the national level, as we saw before.

Some institutions can affect the persistence of unemployment. If an adverse labour demand shock happens, the unemployment rate increases, there are more workers searching for a job and wages should therefore decrease. This happens because the competition between unemployed increases and employers have more job applicants per vacancy. Lower wages will then lead to higher employment rates, because labour becomes cheaper for firms, and the unemployment rate decreases. If this mechanism is distorted by strict employment protections, affecting the wage determination, wages cannot decrease and unemployment remains high. Another reason for the persistence of unemployment is the increase in the duration of unemployment. If unemployment increases, the duration typically increases too. This means that there are more long term unemployed. The problem which arises now is that, the longer a person stays unemployed, the more skills he loses and the lower is his search intensity. Firms may not hire long term unemployed people because they might not have the same productivity as someone who only stayed one month unemployed. This causes the long term unemployed to search even less for a job. As a consequence they drop more or less out of the labour market, meaning that they don't search anymore for a job, and do no

longer compete with other job-seekers. But the competition between unemployed was the mechanism which caused this downward pressure on wages.

Since labour market institutions affect the unemployment duration, they also affect the persistence of unemployment. As we saw already, generous replacement rates for example, can lead to lower search intensities of unemployed leading to less matches and higher unemployment. When unemployment increases due to an adverse shock a high minimum wage will have effects on the unemployment rate of the less educated workers by reducing the downward pressure on the wages. Since recipients of the minimum wage are mostly workers with poor education, they will suffer most from an increase in unemployment. Normally their wages should decrease (because of the downward pressure due to more competition in job-search), but they cannot fall below the minimum wage. The consequence is that firms will first fire people with poor education, since they cannot adjust wages.

Another way of explaining persistent high unemployment even after the effects of adverse shocks have disappeared already is by looking at how people perceive unemployment. In countries with typically low unemployment, being unemployed may have a low reputation, and people may therefore have a higher incentive to find a job. If now unemployment increases and becomes persistent, this opinion might change and people may not be stigmatized any more because of being unemployed, which could lead to lower search intensities and higher long term unemployment.

### **1.2.1 Econometric Findings**

#### **• Estimation with Institutions and Shocks:**

Now that we have outlined the three important shocks which affected the economy since the 60s, we can introduce them in the regression. I replaced the output gap, used in the previous estimations by three shock variables: The first is measuring the deviation of the logarithm of TFP from its trend (in %). The second is the percentage difference between the 10-year nominal government bond yield (in %) and the annual change in the GDP deflator (in %) and is a measure for the real interest rate shock. The last one represents the logarithm of the labour share in business sector GDP purged from the short-run influences of factor prices. Since the variable was multiplied by -1 an increase refers to an adverse labour demand shock and a decrease in labour demand. The variable is set to 0 in 1970 (the first year of data availability).

**Table 4**  
*Unemployment Estimation with Shocks only*  
*(fixed effects)*

|                          | Coefficient (t-statistic) |
|--------------------------|---------------------------|
| TFP Shock                | -10.61 (-2.43)            |
| Real Interest Rate Shock | 0.29 (5.56)               |
| Labour Demand Shock      | 7.82 (2.38)               |
| R <sup>2</sup> (within)  | 0.35                      |
| R <sup>2</sup>           | 0.86                      |
| Country and Time Dummies | yes                       |
| Observations             | 394                       |

When estimating the shocks without institutions, all coefficients have the expected sign and are significant. The results are depicted in Table 4. A negative value for TFP-shock variable would mean that TFP growth lies under the long run trend, implying a lower economic growth. This would lead to an increase in unemployment, since the coefficient has a negative sign. If on the other hand TFP growth lies above the long run trend unemployment is lower.

An adverse real interest rate shock would mean that interest rates highly increase, leading to a fall of investment and to lower employment rates. Therefore the impact on the unemployment rate is negative.

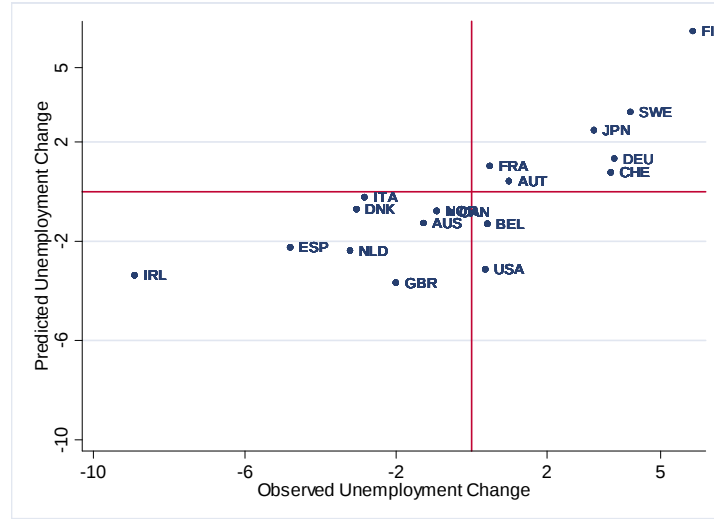
An increase in the measure of labour demand can be interpreted as an adverse shock. This follows from definition of the variable:  $-\left[\log(N/Y) + \log(W_{adjusted})\right]$ . The variable increases if the inside of the brackets becomes negative, which is only the case if the labour demand stock falls. We can interpret a 4% decrease in TFP growth as an increase of 0.4% in unemployment when all other shocks are held constant. A 15% decrease in labour demand would lead to a to an increase of 1.3% in unemployment. In Table 5 we find the results of the regression combining shocks and institutions:

**Table 5**  
*Unemployment Estimation with Institutions*  
*and Shocks (fixed effects)*

| Coefficient (t-statistic) |               | Coefficient (t-statistic) |               |
|---------------------------|---------------|---------------------------|---------------|
| Replacement Rate          | 0.14 (5.75)   | TFP Shock                 | -9.42 (-2.37) |
| Tax Wedge                 | 0.27 (7.76)   | Real Interest Rate Shock  | 0.20 (3.99)   |
| Union Density             | 0.05 (2.17)   | Labour Demand Shock       | 9.04 (2.82)   |
| Corporatism               | -1.20 (-2.58) |                           |               |
| EPL                       | 0.54 (1.27)   |                           |               |
| Benefit Duration          | -2.23 (-2.46) |                           |               |
| R <sup>2</sup> (within)   | 0.48          |                           |               |
| R <sup>2</sup>            | 0.89          |                           |               |
| Country and Time Dummies  | yes           |                           |               |
| Observations              | 394           |                           |               |

If we compare the results of Table 5 to those of Table 3, we can see that the coefficients of the replacement rate, the tax wedge and benefit duration are less significant than in this second estimation, while union density and high corporatism gains significance. Figure 2 plots the actual and the predicted change in unemployment for the countries in the sample.

**Figure 2**  
*Observed vs. Predicted Change in Unemployment*  
*from 1990 to 2003 (Institutions and Shocks)*  
 (Germany, Finland and Sweden: 1989 to 2003)<sup>6</sup>



The fit has worsened compared to the estimation without shocks. Especially for Ireland the prediction has become much weaker. In Ireland there happened a major turnaround beginning in 1993, where unemployment decreased dramatically from over 15% to less than 5% in 2000, making an accurate prediction difficult. The overall decrease from 1990 to 2003 was 8%, unfortunately largely underestimated by the model, which predicted a decrease of only about 3%. In the 90s Ireland had extraordinary growth rates of about 5%, which led to a massive increase in employment, especially in new sectors, like electronics. Additionally the Irish government reformed the tax and benefits systems, reducing the tax wedge by almost 25% and implementing stricter assessments for benefit receivers. Unemployment began to decrease to reach today one of the lowest in Europe. The result for Spain has improved a bit, however the change in unemployment is still underestimated.

<sup>6</sup>Due to missing values, the change in unemployment for some countries covers slightly different time periods: Belgium: 1990 to 2001, Denmark: 1990 to 1999, Ireland: 1990 to 1998, Japan: 1990 to 2000, Sweden, Finland and Germany: 1989 to 2003, New Zealand and Portugal do not appear because of too many missing variables.

Turning now to the robustness, the results of this estimation remain generally significant if we drop one country at the time. Exceptions are Italy, where the coefficient of unemployment benefit duration turns out to be insignificant and Portugal, where the same happens for union density. If we take out the time effects, EPL becomes significant and union density, which was already significant before, gains in importance, while the coefficient of unemployment benefit duration becomes insignificant. Overall we can say that the results are robust to most changes in the sample of countries.

## 2 The Effects of Product and Labour Market Regulation on Unemployment

This section aims at analyzing the effects of product and labour market regulation on the unemployment rate. The first question one should raise is what exactly is product market regulation? There are different kinds of regulations, aiming at protecting sectors of the economy. Public ownership is one way of controlling an industry. Another way is restricting the freedom of action of firms. This can be done by introducing for example high entry costs, making it less attractive for firms to enter the market or by intervening in the output or price setting decision of the firm. Some regulations were introduced aiming at maximizing social welfare or protecting the interests of society. Though as time goes by the design of such institutions may become obsolete: because of technological progress, new and more effective ways of dealing with this problem emerge. Another problem is that inefficiencies can appear, leading finally to "government failure". Politicians pursue their interests, in order to win elections, even if it may be costly. This can cause the institutions to become more costly than the inefficiencies emerging in the non-regulated environment. The findings in the literature support the view that product market deregulation has positive medium to long run effects on the unemployment rate.

The model in this section is taken from the paper "*Macroeconomic Effects of Regulation and Deregulation in Goods and Labor Markets*" (2003) by Olivier Blanchard and Francesco Giavazzi. The first subsection illustrates the main model, the bargaining procedure, differentiates between short and long run and explains what deregulation can look like. Then we focus on the equilibrium outcomes and bring up important differences in short and long run. The next subsection depicts the effects of deregulation on the labour and product market and sums up the main findings of Blanchard and Giavazzi. Finally we include a measure of product market regulation in the regression of unemployment and analyze the results.

### 2.1 The Model

Each firm utilizes labour to produce a differentiated good. In the goods market there rules monopolistic competition (which means that firms have a certain power over the prices they set). In the labour market wages are determined through bargaining.

In the short run the number of firms cannot change, whereas in the long run the number of firms is endogenous and firms can enter and exit the market. The fluctuation

of firms depends on the entry condition. It is assumed that the entry cost as well as the degree of competition in the goods market are determined by product market regulation and the bargaining power of the workers by the degree of labour market regulation.

### 2.1.1 Workers

Each worker/consumer  $j$  of the labour force  $L$  has his utility function as follows:

$$V_j = \left[ m^{-1/\sigma} \sum_{i=1}^m C_{ij}^{(\sigma-1)/\sigma} \right]^{\sigma/(\sigma-1)}$$

He consumes all the goods equally, such that  $C_{ij} = C_j/m$ . This implies that an increase in the number of products  $m$  does not directly lead to an increase in utility. The elasticity of substitution increases with the number of products, but this means that also the elasticity of demand increases, which is exactly what happens if the product market is deregulated: the number of firms increases and therefore also the number of goods produced, leading to a reduction of the monopoly power of the firms. Worker  $j$  can decide each period if he works or not (he supplies 1 or 0 units of work). In this model there are no savings, all his income is spent on consumption. The budget constraint is as follows:

$$\sum_{i=1}^m P_i C_{ij} = W_j N_j + P f(u)(1 - N_j)$$

Here  $N_j$  is the labour supply of worker  $j$ . It can either take the value 0 in the case the worker decides not to work in that period, or the value 1 if he decides to work.  $P_i$  represents the price of good  $i$ .  $f(u)$  is the reservation wage, a decreasing function of the unemployment rate. The price index depends on the elasticity of demand and the number of goods and is given by:

$$P \equiv \left( \frac{1}{m} \sum_{i=1}^m P_i^{(1-\sigma)} \right)^{1/(1-\sigma)}$$

The worker spends all his labour income on consumption if he works and all his non labour income if he doesn't. We assume that higher unemployment causes the reservation wage to fall, and workers to have more incentive to find a job. This is the case since the reservation wage is a decreasing function of the unemployment rate. By using the budget constraint the utility of worker  $j$  in each period is as follows:

$$[W_j/P - f(u)] N_j + f(u)$$

This implies that the utility of the workers is decreasing with prices and increasing with the total number of workers. The more workers, the more products are produced (and since one firm only produces one good), the more firms are in the market. This leads to an increase in competition and to lower prices.

### 2.1.2 Products and Firms

Since each firm only produces one differentiate good,  $i$  is the common index for product and firm. The production function of firm  $i$  is as follows:

$$Y_i = N_i$$

The productivity of labour is in this case equal to one, and production does only depend on the amount of labour (no capital input). The nominal profit of firm  $i$  is given by:

$$(P_i - W_i)N_i$$

### 2.1.3 Bargaining

In each period workers can decide if they want to work or not. Each firm bargains with  $L/m$  workers, since the number of workers is equal in each firm. Firms and the workers determine through Nash-bargaining the optimal wage and employment level for the period.

$$\beta \log [(W_i - Pf(u)) N_i] + (1 - \beta) \log [(P_i - W_i)N_i]$$

This expression shows how the rents of the firm are shared between firm and workers.  $\beta$  represents the bargaining power of the workers. The expression weighted with  $\beta$  represents the share going to the workers or the surplus of worker from working in firm  $i$ . As we can see the expression depends on the reservation wage, meaning that if the reservation wage is low (implying a high unemployment rate) the surplus for workers increases. This is straightforward, since more unemployed mean higher competition for job seekers and therefore they appreciate more a job in a firm. The second term represents the share going to the firm.

Assuming "efficient bargaining" we can allow in the short run workers having higher wages without having negative effects on employment, since their bargaining power can increase and the number of firms is fixed.

### 2.1.4 Short and Long Run

We assume that in the short run the number of firms is exogenously given, while in the long run the number of firms is endogenous, depending on an entry cost  $c$  and the distribution of rents in the short run. If the rents for the firms in the short run are low, new firms have less incentives to enter the market or might even exit in the long run.

The entry cost  $c$  can be seen as a sort of product market regulation. It could be some kind of administrative barrier, governmental restriction, etc... So,  $c$  is assumed to be a shadow cost. Furthermore  $c$  is proportional to the output/employment in order to facilitate the determination of the long run equilibrium. The profit rate in the long run has to equal  $c$ . This implies that the economy converges to a competitive equilibrium when  $c$  goes to zero.

### 2.1.5 Regulation

Two parameters in this model can capture product market regulation, namely  $c$  and  $\bar{\sigma}$ . If the entry cost decreases, firms, that couldn't enter the market before, are now enabled to start business. An increase in  $\bar{\sigma}$ , which means an increase in substitutability, can be caused by the implementation of trade alliances, reducing tariff barriers or making foreign and domestic products more comparable.

The parameter, that captures labour market regulation is  $\beta$ . The bargaining power of the workers can be affected by the unemployment rate, meaning that if there are many unemployed, there are many potential candidates for a vacancy too, the competition between workers is higher and the bargaining power low. But  $\beta$  is also influenced by the existing regulations on the labour market, like for example restrictions on layoffs, high severance payments, etc.

Those three parameters are therefore essential for determining the distribution of rents between firms and workers, and furthermore for determining the macroeconomic equilibrium.

## 2.2 Equilibrium

### 2.2.1 Short Run Partial Equilibrium

The partial equilibrium can be seen for example as the equilibrium in a certain goods market, which is independent of the prices and wages of other markets. The demand for good  $i$  by workers and firms is as follows:

$$Y_i = (Y/m)(P_i/P)^{-\sigma}$$

If the relative price equals one, total demand for good  $i$  would be  $Y/m$ .  $-\sigma$  represents here the elasticity of demand with respect to the relative price. This means that if  $\sigma$  increases the demand of firm  $i$  would decrease. We now can proceed and define the relative prices, which are given by:

$$P_i/P = [1 + \mu(m)] f(u)$$

This expression shows that the relative prices depend not only on the firms markup but also on the unemployment rate.  $\mu(m)$  represents the markup of the relative price over the reservation wage and is given by:

$$\mu(m) = 1/[\bar{\sigma}g(m) - 1]$$

, where  $g'(m) > 0$ . This implies that the markup is a decreasing function of  $m$ . The more goods are produced in the market, the lower the markup for the firm. Which is straightforward, since if there are more products, there are also more firms and more competition. The real consumption wage is given by:

$$W_i/P = [1 + \beta\mu(m)] f(u)$$

The real wage is therefore an increasing function of  $\beta$  and  $\mu(m)$ . This implies that workers earn a higher real wage if their bargaining power and the markup of the firms is high. The high markup means that the share of the rents that workers can receive is also higher. We have come now to the crucial part of the partial equilibrium. What happens if only a small part of the economy is deregulated? Prices and also the rents of incumbent firms in this industry will decrease, while prices of all other goods (produced by firms in the regulated market) remain the same. Workers' shares of the rents in those firms will also be smaller. The result of such a partial deregulation will be that the purchasing power of individuals falls. On the one hand workers get less out of the bargaining, on the other hand prices for most of the goods remain at a high level and consumers only profit from the lower price in the deregulated part of the economy. In the general equilibrium the situation changes, as we will see shortly.

### 2.2.2 Short Run General Equilibrium

The difference to the short run partial equilibrium is now that the prices firms choose for their goods can no longer be chosen freely. We assume that  $P_i/P = 1$ . If we put this result in our relative price equation we find that:

$$1 = [1 + \mu(m)] f(u)$$

Since in the short run the number of firms is fixed, the level of competition  $\sigma$  is also fixed and equal to  $\bar{\sigma}g(m)$ . The same happens for  $\mu(m)$  since it depends only on  $\bar{\sigma}$  and the number of firms. If we replace  $f(u)$  in the real wage equation by  $1/[1 + \mu(m)]$  we find:

$$W_i/P = (1 + \beta\mu(m))/[1 + \mu(m)]$$

What are now the effects of our parameters in the short run general equilibrium? The real wage is still increasing with the bargaining power of workers, so here nothing has changed compared to the partial equilibrium. On the other hand, different to the previous case, the real wage is now decreasing with the markup of the firm,  $\mu(m)$ . In case of deregulation ( $\mu(m)$  decreases) individuals profit more as consumers (lower prices due to more competition) than they lose as workers (lower rents because of lower markup of firms). In other words, the general decline in the price level will outweigh the lower rents of the firms and therefore will lead to an increase in real wages.

### 2.2.3 Long Run General Equilibrium

The difference to the short run general equilibrium is that the number of firms is endogenous. It depends on the entry cost  $c$  and the markup  $\mu(m)$ . Profits per worker have to be equal to the entry cost, given by:

$$c = [\mu(m)(1 - \beta)] / [1 + \mu(m)]$$

The equilibrium number of firms is given by:

$$\begin{aligned}\bar{\sigma}g(m) &= (1 - \beta)/c \\ g(m) &= (1 - \beta)/c\bar{\sigma}\end{aligned}$$

We obtain this expression by replacing  $\mu(m)$  in the definition of the entry cost by  $1/(\sigma - 1)$ . From this term we can deduce that if the degree of competition is high, if  $\bar{\sigma}$  is high, the rents of firms are decreasing and firms are less attracted by entering the market. If the bargaining power of workers increase, the share of rents that goes to firms also decreases and firms are less likely to enter the market. And last but not least, an increasing entry cost means that firms have to produce higher rents in order to break even, which may not be possible for all firms. In short, the equilibrium number of products decreases with  $\beta$ ,  $c$  and  $\bar{\sigma}$ . Lets turn now to the unemployment rate, which is given by:

$$f(u) = 1 - c/(1 - \beta)$$

The form of this expression implies that it increases with the entry cost and the bargaining power of workers. In other words, if the entry cost is high less firms enter the market because they need higher rents to survive. If workers have more bargaining power, the share of rents going to firms decreases and less firms enter the market in the long run. This causes a drop in employment, an increase in unemployment and consequently a decrease in the reservation wage. The real wage is given by:

$$W_i/P = 1 - c$$

We find this result by replacing  $\mu(m)$  by  $c/(1 - \beta - c)$  in the real wage equation of the short run general equilibrium (Proof see Appendix 1). What is now the effect of  $\beta$ ,  $\mu(m)$  and  $c$ ? In the short run an increase in workers bargaining power implied an increase in the real wage, but this is no longer the case: If the share of rents going to firms decreases, the number of firms will decrease in the long run, the markup of the remaining firms increases and the result will be higher unemployment and lower real wages. On the whole, real wages in the long run are no longer affected by the bargaining power of workers. A decrease in the markup, which led in the short run to an increase in real wages has also no impact in the long run. A lower markup causes in the short run higher real wages, but would lead to less firms in the long run and consequently to lower employment rates and higher unemployment. With less firms in the market, the degree of competition decreases, while the markup and prices increase, leading to lower real wages. If the entry cost increases less firms enter the market in the long run, leading again to less competition, higher prices and lower real wages.

## 2.3 Deregulation

### 2.3.1 Product Market

How can we imagine a measure which leads to product market deregulation? As we already saw before, we could think of a policy applied by the government, which increases competition in product market, namely  $\bar{\sigma}$ . In the short run, more competition, given the same number of firms, leads to a more elastic demand, and firms tend to lower their markup. Prices decrease and real wage increase while unemployment decreases. In the short run more competition appears to have only positive influences on the labour market.

However in the long run negative effects appear. The number of firms will decrease, since they expect lower rents, leading to an increase in unemployment. Less firms mean a higher markup: Firms increase their prices, such that real wages adjust. In this case, the entry cost  $c$  didn't change. This means that if competition increases and entry cost is still high the number of firms in the long run will decrease and the favorable short run effects will disappear. Whereas if the entry cost decreased when competition increases, firms would have more incentives to enter the market, even with higher competition.

We now assume a decrease in  $c$ . As we already know, this will not have any effects in the short run, since the number of firms is fixed. In the long run however, firms have a greater incentive to enter the market and the number of firms increases. With more firms in the market competition among them increases, leading to lower prices and consequently higher real wages for workers. The second effect is an increase in employment caused by the entrance of new firms, leading to a decrease in the unemployment rate.

There is however a potential problem concerning incumbent firms: The overall employment level increases, but those firms who were already in the market now face higher competition and may decrease their employment. This will lead to the opposition of the workers in those incumbent firms.

In both cases there is no intertemporal trade off between unemployment and real wages. In our first case, in the short run real wages increase and unemployment decreases and in the long run we come back to the pre-deregulation level. In our second case, nothing changes in the short run, while in the long run unemployment falls and real wages increase. As we will see shortly, this is not the case for the deregulation of the labour market.

### 2.3.2 Labour Market

We can think of a deregulation in the labour market as a decrease in  $\beta$ . The short run effect will be that the share of rents, which goes to workers decreases, leading to an increase in the profit rate for firms. So, in the short run, workers lose, since they have lower real wages and there is no effect on employment. In the long run, the higher profit rate leads to a larger number of firms (firms enter the market until the profit rate equals again  $c$ ). As more firms enter, the markup decreases leading to lower prices, higher real wages and unemployment decreases. Actually, the real wages return to the pre-deregulation level and unemployment is lower than before. So, in this case there

is an intertemporal trade off: In the short run workers have to suffer from lower real wages, while in the long run, their real wages will go back to the initial level and the unemployment rate will decrease. Labour market deregulation is therefore fought by workers and difficult to implement by the government. People don't want their wages to decrease, even if later on they will adjust.

### 2.3.3 Policy Options for Deregulation

What would be the best way to deregulate? The answer is that one should combine labour market and product market deregulation. Since labour market deregulation will probably lead to opposition of the workers, the first step should be to deregulate product markets. As we saw already, this means more competition for firms and lower rents. Those rents are not only important for firms but also for workers, since they get a share, depending on  $\beta$ , of those rents. But as rents decrease, the share workers can appropriate falls and they have less incentive to fight for it. In short, one is more likely to accept a decrease in wages if those wages are lower (the loss is not that painful).

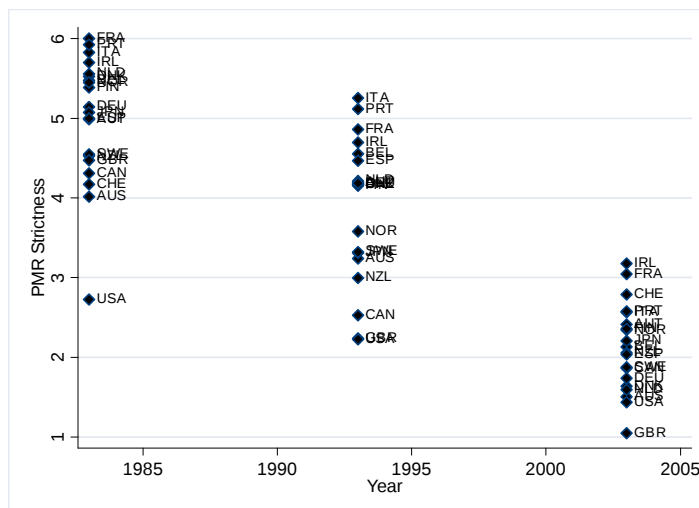
Another important aspect, that should not be neglected, is the dimension of deregulation: It is much more favorable to deregulate the whole market at once than to do it step by step. The explanation lies in the partial equilibrium we saw earlier. If only a part of the economy is deregulated the partial equilibrium effect will dominate the general equilibrium effect. We know that in the partial equilibrium the gain of consumers (namely lower prices) is outweighed by the loss of workers (namely lower rents). Overall, workers in a deregulated part of the economy would lose if the dimension of deregulation is too small. An example would be, the deregulation of the pen production. Workers in the pen industry would profit from lower prices of pens but suffer from a decrease in real wages, since all other prices remain the same but their share of rents decreases. In short, a government should start its deregulation program with the product market and then go on with the labour market.

## 2.4 Econometric Findings

In order to analyze the effect of product market regulation on the unemployment rate, I used the same data set as in the first section of this paper. I added a variable measuring the degree of product market regulation coming from the OECD database. The variable covers the level of regulation in seven energy and service industries. Its values range from 0 to 6, where 0 indicates a very low degree of regulation and 6 a very high degree. As we can see in Figure 3, PMR has decreased since the 80s in all countries of the sample. The most heavily regulated sectors in OECD countries are the energy, transport and communication sectors. This is the case because firms in those market segments have to fulfill social goals, which is for example the case for public transportations. In order to assure the provision of those goods, public ownership or legal restrictions are seen as a way to do so. But with increasing international competition, those protected market segments have to become more competitive. Some measures, which are taken in order to make these markets more open are to reduce the entry cost and state ownership. Since the 80s many regulations have been eliminated or eased. The overall trend of

OECD countries in this dataset is the reduction in PMR. While in the 80s the highest PMR value was about 6 it dropped to about 3 in 2003. The differences across countries also diminished: in 1983 the difference between the most and the less regulated country was 3 points, while it decreased to 2 points in 2003.

**Figure 3**  
*Change in PMR since 1983*



Regarding EPL, OECD countries with strict legislations tend to ease regulations. But there is also the inverse trend, meaning that some countries where EPL is low tend to increase the strictness. Most reforms intended to increase labour market flexibility, by facilitating fixed-term contracts or part time work. In Austria and New Zealand there were also reforms on the regulations of permanent employment such as reducing the barriers for dismissals. In a nutshell, EPL strictness varies still a lot across countries. Although the main pattern in the 80s and 90s was to ease EPL strictness, some countries like Spain tightened it for fixed contracts, but loosened it for temporary agency work. On the other hand we have France, where overall strictness increased during the past decades. Generally EPL is stricter in the southern countries as well as in France. Germany had important reforms, causing a decrease in strictness, but has in 2003 still one of the highest EPL levels across OECD countries. The countries with the lowest regulation-levels are the USA, New Zealand and Great Britain.

### 2.4.1 Estimation with PMR and Output Gap

The results, depicted in Table 6, are quite satisfying. The coefficient of product market regulation is significant and positive, which means that a higher level of regulation has a negative effect on unemployment. This result suggests that the positive long run effects dominate. We saw already that in the long run product market deregulation leads to an increase in real wages, because of more competition and lower markups, and to a decrease in unemployment, because of the entry of new firms. On the other hand

in the short run there can appear adjustment problems. In an environment with low competition, firms tend to be less efficient or productive and wages to be higher (since the rents of the firms are also higher and wages are determined in part by rents). If the government introduces a new law causing an increase in competition, firms will have to increase their competitiveness. One reaction could be to reduce wages or even lay off workers. The consequence is a period of high unemployment. If this unemployment will be absorbed quickly or be more permanent depends in part on labour market institutions like the unemployment benefits. Benefits depending on the former wage, which was high because of the high rents firms earned, can lead to a lower search intensity of the unemployed and to a longer period of high unemployment. Unemployed may not accept jobs with lower wages, since they receive high unemployment benefits.

As we can see an increase in competition can lead in the short run to additional unemployment, whose amplitude depends in part on labour market institutions, while the long run effects have a positive impact on labour market performance.

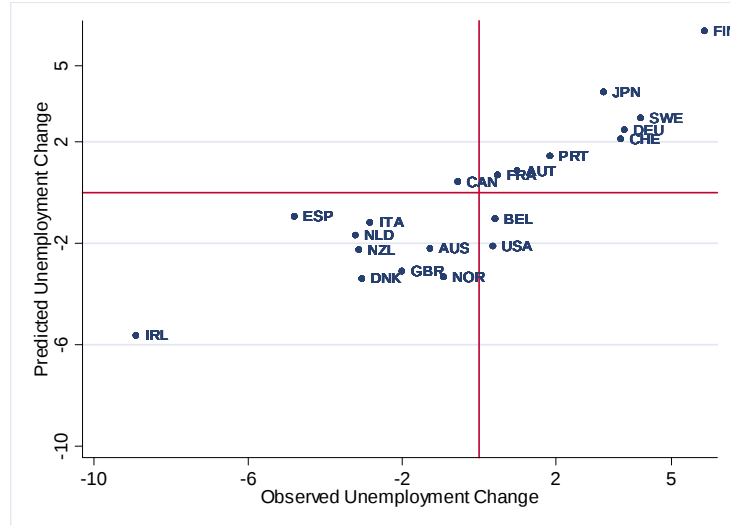
**Table 6**  
*Unemployment Estimation with PMR (fixed effects)*

|                          | Coefficient (t-statistic) | Deviations from cross-country mean |       | Impact of shock on u |       |
|--------------------------|---------------------------|------------------------------------|-------|----------------------|-------|
|                          | (1)                       | (2)                                |       | (3)                  |       |
| Replacement Rate         | 0.13 (7.52)               | -29.33                             | 35.26 | -2.81                | 5.58  |
| Tax Wedge                | 0.27 (10.99)              | -22.23                             | 16.86 | -5.00                | 5.55  |
| PMR                      | 0.62 (3.05)               | -2.76                              | 2.19  | -0.71                | 2.36  |
| Union Density            | -0.03 (1.92)              | -31.38                             | 44.28 | 1.94                 | -0.33 |
| High Corporatism         | -0.99 (-2.67)             | -0.55                              | 0.45  | 1.54                 | 0.55  |
| EPL                      | -0.08 (-0.23)             | -1.87                              | 2.12  | 1.15                 | 0.83  |
| Benefit Duration         | -2.73 (-3.67)             | -0.33                              | 0.99  | 1.90                 | -1.70 |
| Output Gap               | -0.49 (-15.12)            | -11.27                             | 7.24  | 6.52                 | -2.55 |
| R <sup>2</sup> (within)  | 0.69                      |                                    |       |                      |       |
| R <sup>2</sup>           | 0.92                      |                                    |       |                      |       |
| Country and Time Dummies | yes                       |                                    |       |                      |       |
| Observations             | 434                       |                                    |       |                      |       |

In column (2) the deviations of the independent variables from the cross-country mean are depicted. Those deviations are important in order to calculate the impact of an adverse shock on unemployment. The way to read column (3) is as follows: We assume that the shock will increase unemployment by 1% in the "mean country", namely the country where all institutions have the mean value. The left number in (3) shows by how much unemployment would increase in a country, where all institutions have the mean values except one, which has the lowest value for a given institution. Lets take PMR as an example: While a shock in the "mean country" would increase unemployment by 1%, it would lead to a decrease of 0.71% in the country having the lowest regulations on product markets. On the other hand the country with the highest

PMR level (all other institutions at mean value) would have to suffer from an increase of 2.36% in unemployment. Figure 4 depicts the results of the previous regression.

**Figure 4**  
*Observed vs. Predicted Change in Unemployment from 1990 to 2003*  
 (Germany, Finland and Sweden: 1989 to 2003)



### 3 The Effects of Labour Relations on the Unemployment Rate

Only recently economists became aware of the potential importance of relations between employer and employee in the attempt to explain the evolution of unemployment. The paper "*The Quality of Labour Relations and Unemployment*", where the model in this section comes from, was written in 2006 by Olivier Blanchard and Thomas Philippon. They show that in countries where labour relations are usually bad, the unemployment rate tends to be higher. A first approach was to connect the past behavior of governments towards unions with today's labour relations in order to show that a hostile environment in the past leads to more conflictual labour relations today. The reason why bad labour relations can turn into high unemployment lies in arising bargaining failures and inefficiencies, as will be shown subsequently.

The first subsection presents the main model by depicting the bargaining game. Then will be discussed the non-cooperative and cooperative equilibrium which depend on the reputation of the firm. Subsection 3 defines the unemployment rate, while Subsections 4 and 5 illustrate the equilibrium outcome and the sustainable equilibria. After having presented the model, we will perform an application, clarifying the impact of bad labour relations on the unemployment rate. In a last step we analyze the influence of labour relations in a set of European and non-European countries, in order to see if we can find significant results, confirming empirically the rationals behind the model of Blanchard and Philippon.

### 3.1 The Model

It is basically a standard search/matching model with asymmetric information. The bargaining game begins with the match of firm and worker. Only the firm knows the initial productivity  $y$ , and has the option to lie about productivity<sup>7</sup>. Two kinds of productivities exist namely high or low productivity:  $y^h$  occurs with probability  $p$ ,  $y^l$  occurs with probability  $1 - p$ . The average productivity  $\bar{y}$  is defined by:

$$\bar{y} = py^h + (1 - p)y^l$$

With probability  $\lambda$  a new productivity is drawn. This means that the firm either remains in the current state of productivity or the productivity changes. The reputation of the firm is given by  $\rho$  and can be either good ( $\rho \equiv g$ ) or bad ( $\rho \equiv b$ ). Firms only have an incentive to lie if their real productivity is high. The match surpluses for the different productivities are:  $S(y^h, \rho)$  and  $S(y^l, \rho)$  and the average surplus is given by:

$$\bar{S}(\rho) \equiv E^y [S(y, \rho)]$$

The match surplus is then defined as follows:

$$S(y, \rho) = J(y, \rho) - V + W(y, \rho) - U$$

It is divided in the surplus of workers  $W(y, \rho) - U$  and firms  $J(y, \rho) - V$ . When workers get a job their surplus consists of the wage they earn minus the opportunity cost of working (namely the value of being unemployed). For firms this surplus is defined by the value to the firm of having an employee minus the value of having a vacancy.

- **The bargaining game works as follows:**

Through the bargaining process the wage of the worker and consequently the share of the surplus going to the firm will be determined. This bargaining game is a version of Rubinstein's model (1982)<sup>8</sup> with imperfect information. The first step is an initial wage offer  $W$  of the firm to the worker. In this stage of the bargaining game firms have an incentive to lie, namely to announce a low productivity and to offer a low wage to the worker. The worker then can either reject this initial offer with probability  $s$ , or accept it, with probability  $1 - s$ . Since the worker doesn't know the real productivity of the firm when he starts the bargaining process, he also doesn't know if the firm lies, meaning if the productivity is really low and he therefore should get the lower wage. But workers can see ex-post whether the firm has told the truth or not. Actually, with a certain probability  $\lambda$ , as already seen before, a new productivity is drawn. When this happens, again, firms know their new productivity but workers don't. Workers only

---

<sup>7</sup>Only if the productivity is high, firms have an incentive to lie and to offer a low wage.

<sup>8</sup>Rubinstein describes this bargaining procedure in his paper "Perfect Equilibrium In A Bargaining Model" (1982) as follows: "Two players have to reach an agreement on the partition of a pie of size 1. Each has to make in turn, a proposal as to how it should be divided. After one player has made an offer, the other must decide either to accept it, or to reject it and continue the bargaining."

know the real productivity of the past period. If the firm lied in the period before and said that productivity was low, but it actually was high, workers won't believe the firm in the second period (after the new draw of productivity) if she again announces low productivity. What happens is that once a firm lied, the reputation of the firm goes to "bad" in the next period and workers will always decline the low wage offer of the firm, even when the firm claims that there was no change in productivity.

Let's come back to the bargaining process: If the worker accepts the initial wage offer the firm makes, the match takes place. If he rejects, a share  $\gamma$  of the surplus is destroyed. The worker makes a counter offer  $W^c$ , which the firm has to accept, if she wants the match to take place. If she doesn't accept the match ends. This counter offer is given by:

$$W^c(y, \rho) = U + (1 - \gamma)S(y, \rho)$$

The worker will offer a wage equal to the value of being unemployed plus a share  $1 - \gamma$  of the total match surplus. The worker will only accept an initial wage  $W(y, \rho)$  of at least  $W^c(y, \rho)$ . The value of the firm from being in a match is the value of having a vacancy plus the share  $\gamma$  of the surplus, which goes to the firm: (Proof see Appendix 1)

$$J(y, \rho) = V + \gamma S(y, \rho)$$

In other words, we can see  $\gamma$  as the bargaining power of the firm. Now that we have defined the bargaining game, we should focus on the truth telling incentives of the firms. In order to analyze those we consider two cases: the non-cooperative equilibrium, played by firms with a bad reputation and the cooperative equilibrium, played by firms with a good reputation.

### 3.1.1 Non-Cooperative and Cooperative Equilibrium

#### • Non-Cooperative Equilibrium

Firms with a bad reputation play the non-cooperative equilibrium. Since workers don't know the productivity, firms can choose to lie or to tell the truth. Which way they go depends on the surpluses they get. If the surplus obtained by lying is higher than the one from telling the truth, firms will lie. Actually, this must only be examined for the case of high productivity, since the firm doesn't have any incentive to lie if its productivity is already low. Short, the value for the firm with  $y^h$  if telling the truth has to be at least equal to the value of lying in order to prevent the firm from lying:

$$S(y^h, b) - W(y^h, b) \succeq (1 - s) [S(y^h, b) - W(y^l, b)] + s [(1 - \gamma)S(y^h, b) - W^c(y^l, b)]$$

On the left hand side we can see the value to the firm with bad reputation if telling the truth about productivity. The firm gets the surplus of  $y^h$  and has to pay the

wages  $W(y^h, b)$ . Workers will always accept this high wage offer, even if the firm has a bad reputation. On the right hand side we see the value to the firm if lying about productivity. The first term, weighted with  $(1 - s)$ , represents what the firm gets if the worker accepts the wage offer  $W(y^l, b)$ . The second term represents the other alternative, namely the worker rejects and makes a counter offer  $W^c(y^l, b)$ . In this case a part of the surplus, namely  $\gamma S(y^h, b)$ , is destroyed. If we assume that the values of lying and telling the truth are equal we can derive the probability  $s(b)$ , that the worker rejects the initial offer of the firm (Proof see Appendix 1).

$$s(b) = \frac{1 - \gamma}{\gamma} * \frac{S(y^h, b) - S(y^l, b)}{S(y^h, b)}$$

The higher the difference between the surplus of high and low productivity, the higher the gains for the firm if announcing low productivity, when the actual productivity is high. In other words, the larger the difference between high and low productivity, the higher must be the rejection rate  $s(b)$  in order to prevent the firm from lying. This means that if the workers reject more often, it is more probable that a share  $\gamma$  of the surplus will be destroyed and firms will not risk to offer a lower wage. What is new in this model is that the behavior of the firm affects the separation rate and therefore also the unemployment rate. Firms with bad behavior cause wages to be more often renegotiated, since workers do not trust firms anymore. If the renegotiation fails, the worker may leave the firm and unemployment increases. The crucial question is how to prevent firms from lying about productivity? The way to make the truth more attractive for firms is to increase their surplus if they are honest and to punish them with a lower surplus if they aren't. If firms for example expect the rejection rate of workers to be very high, meaning that during bargaining workers reject more often the initial wage offer of the firm, it becomes more costly for firms to negotiate and they will try to avoid additional bargaining. Another way of increasing the cost of lying is a high deadweight loss, which is the loss that appears if the worker rejects the offer of the firm. Since firms only have an incentive to lie if productivity is high, a very low degree of uncertainty in the economy (meaning no difference between high and low productivity) will also motivate firms to tell the truth. If the match does not take place, firms have a deadweight loss given by:

$$\bar{D}(b) = (1 - p)s(b)\gamma S(y^l, b)$$

This deadweight loss only occurs if workers reject the initial wage offer and the firm announces a low productivity. The average deadweight loss is therefore the share of the surplus which is destroyed.

### • Cooperative Equilibrium

Firms with good reputation sustain the equilibrium by a trigger strategy. If they ever lie, their reputation switches to bad. In this case the dynamic truth telling constrain is given by:

$$S(y^h, g) - W(y^h, g) + \frac{\lambda}{r + \delta + \lambda} \bar{J}^\lambda(g) \succ S(y^h, g) - W(y^l, g) + \frac{\lambda}{r + \delta + \lambda} \bar{J}^\lambda(b)$$

This expression implies that the value for the firm with good reputation if telling the truth and announcing high productivity must be strictly higher than the value for lying. If the firm lies, its surplus today is higher than if telling the truth, but because we assume a trigger strategy, in the future the firm will have a bad reputation and the surpluses of  $\rho = b$ . Firms with good reputation don't have a deadweight loss, since workers never reject their offers. On the left hand side we can see the value to the firm if always telling the truth. In the first period they get the surplus of high productivity and also have to pay the wages of high productivity. The second term represents the future surpluses given the firm has a good reputation. The right hand side shows the value to the firm if lying. In the first period the profit is higher, since she only has to pay the wages of low productivity, but the future profits will be lower, since the firm will have deadweight losses<sup>9</sup>. If firms are shortsighted, they weight more today's than future profits and would prefer to lie in the first period and to have afterwards a bad reputation.

In this model firms can choose either to lie about their productivity and therefore have a bad reputation in the long run or to tell the truth. But how does the firm decide on whether lying or telling the truth? As we will see later, it depends on the degree of uncertainty in the economy but also on the deadweight loss, the probability of rejection,  $s(b)$ , and  $\gamma$ , the share of the surplus going to the firm. Until here we only have defined the truth-telling constraints for both equilibriums.

### 3.1.2 Unemployment

The unemployment rate is determined like in the standard search/match model. A share  $u$  of the worker is unemployed and a share  $1 - u$  of the workers is employed. The job vacancies are given by the rate  $v$ . The matches are determined by the matching function  $m(u, v)$ . The labour market tightness is measured by  $\theta \equiv \frac{v}{u}$ . A high  $\theta$  means more vacancies per unemployed, and it is therefore difficult for firms to fill a vacancy, meaning that the labour market is tight. If  $\theta$  is low, on the contrary, the number of unemployed is high relatively to the number of vacancies, and firms can easily find an employee.  $q(\theta) \equiv \frac{m}{v}$  represents the matching rate for vacancies and is decreasing with  $\theta$ .  $\theta q(\theta)$  is the matching rate for the unemployed and is increasing in  $\theta$ . In other words, the tighter the labour market (high  $\theta$ ), the more vacancies are available and the easier it is for unemployed to find a job. The unemployment rate evolves as follows:

$$\dot{u} = \delta(1 - u) - \theta q(\theta)u$$

---

<sup>9</sup>  $\bar{J}^\lambda(\rho)$  defines the average pre-bargaining match value to a firm. This value is lower for firms with bad reputation, since they have to pay a deadweight loss.

$$\bar{J}^\lambda(g) = V + \gamma \bar{S}(\rho)$$

$$\bar{J}^\lambda(b) = V + \gamma \bar{S}(\rho) - \bar{D}(b)$$

, where  $\delta$  represents the job destruction rate:  $\delta$  of the jobs find an end, meaning that a proportion of  $\delta(1 - u)$  of the employed gets fired. At the same time  $\theta q(\theta)u$  (a proportion of the unemployed workers) find a job. If more workers find than lose a job the unemployment rate falls, and vice versa. If we assume, that we are in a steady state, the equilibrium unemployment rate is given by:

$$u = \frac{\delta}{\delta + \theta q(\theta)}$$

### 3.1.3 Equilibrium

This subsection is dedicated to defining the macroeconomic equilibrium of this model. We want to determine the equilibrium value of  $\mu$ , the share of the firms with good behavior. In order to do this, we first need to calculate the surplus in the equilibrium and the deadweight loss of firms. We assume free entry of the firms. The surplus with productivity  $y$  and reputation  $\rho$  is given by:

$$rS(y, \rho) = y - r(U + V) - \delta S(y, \rho) + \lambda [\bar{S}(\rho) - \bar{D}(\rho) - S(y, \rho)]$$

$y - r(U + V)$  is the flow revenue of a match (taking into account the opportunity cost for workers and firms, namely  $U$  and  $V$ ).  $\delta S(y, \rho)$  is the loss if the match ends, which happens with probability  $\delta$ .  $\lambda [\bar{S}(\rho) - \bar{D}(\rho) - S(y, \rho)]$  is the gain or loss if a new productivity is drawn, which happens with probability  $\lambda$ . Let  $\Delta$  be the difference between high and low productivity, such that  $y^h = \bar{y} + (1 - p)\Delta$  and  $y^l = \bar{y} - p\Delta$ . The difference between high and low surplus is then given by<sup>10</sup>:

$$S(y^h, \rho) - S(y^l, \rho) = \frac{\Delta}{r + \delta + \lambda}$$

The worker matches with probability  $\mu$  with a firm with good reputation, the average matching value for the worker is therefore:

$$E^\rho [\bar{W}^e(\rho)] \equiv \mu \bar{W}^e(g) + (1 - \mu) \bar{W}^e(b)$$

The flow utility of being unemployed is given by  $\underline{u}$ . The value of being unemployed,  $rU$ , is given by  $\underline{u} + \theta q(\theta) [E^\rho(\bar{W}^e(\rho)) - U]$ . As long as the worker is unemployed he gets  $\underline{u}$ , and with probability  $\theta q(\theta)$  he finds a job and from then on gets the value of being employed. By replacing  $E^\rho(\bar{W}^e(\rho))$  by  $U + (1 - \gamma)\bar{S}(\rho)$ , the lowest initial offer the worker would accept, we find:

$$\begin{aligned} rU &= \underline{u} + \theta q(\theta) [E^\rho(U + (1 - \gamma)\bar{S}(\rho)) - U] \\ rU &= \underline{u} + \theta q(\theta)(1 - \gamma)E^\rho(\bar{S}(\rho)) \end{aligned}$$

The expectations of the average surplus with respect to reputation  $\rho$  are:

---

<sup>10</sup>We define  $S(y^h, \rho) = \bar{S}(\rho) + \frac{(1-p)\Delta}{r+\delta+\lambda}$  as the surplus of high productivity and  $S(y^l, \rho) = \bar{S}(\rho) - \frac{p\Delta}{r+\delta+\lambda}$  as the surplus of low productivity

$$E^\rho [\bar{S}(\rho)] = \frac{\bar{y} - rU - (1 - \mu)\lambda\bar{D}(b)}{r + \delta}$$

If we replace now  $rU$  by  $\underline{u} + \theta q(\theta)(1 - \gamma)E^\rho(\bar{S}(\rho))$  we find: (Proof see Appendix 1)

$$E^\rho [\bar{S}(\rho)] = \frac{\bar{y} - \underline{u} - (1 - \mu)\lambda\bar{D}(b)}{r + \delta + \theta q(\theta)(1 - \gamma)}$$

This expression gives us the expected average surplus. It's the discounted value of productivity, considering the flow utility of being unemployed,  $\underline{u}$ .  $(1 - \mu)\lambda\bar{D}(b)$  represents the loss due to a new draw of productivity, which happens with probability  $\lambda$  and only occurs if the firm has a bad reputation (probability is  $1 - \mu$ ). By using the value of having a vacancy  $rV = -c + q(\theta)[E^\rho[J^e(\rho)] - V]$ , which should be equal to zero because of the free entry condition we find an expression characterizing the market tightness: (Proof see Appendix 1)

$$\frac{c}{q(\theta)} = \gamma E^\rho [\bar{S}(\rho)] - (1 - \mu)\bar{D}(b)$$

As we can deduce from this equation, a higher deadweight loss, meaning a higher share of the surplus which is destroyed if the match doesn't take place, means that it becomes more difficult to find a job for workers. In other words, If  $\bar{D}(b)$  increases, the RHS of this expression decreases and consequently the matching rate for firms, namely  $q(\theta)$ , has to increase. As we saw earlier,  $q(\theta)$  is a decreasing function of  $\theta$ . This means that if  $q(\theta)$  increases  $\theta$  decreases and the labour market becomes less tight and it's easier for a firm to fill a job vacancy. Since there are more unemployed relative to vacancies, firms have less difficulties to find workers, but on the other hand workers are confronted with a lower matching rate.

If we replace now  $E^\rho [\bar{S}(\rho)]$  by  $\frac{\bar{y} - \underline{u} - (1 - \mu)\lambda\bar{D}(b)}{r + \delta + \theta q(\theta)(1 - \gamma)}$  we define the equilibrium of this search model:

$$\frac{c}{q(\theta)} = \gamma \frac{\bar{y} - \underline{u} - (1 - \mu)\lambda\bar{D}(b)}{r + \delta + \theta q(\theta)(1 - \gamma)} - (1 - \mu)\bar{D}(b)$$

If we assume that all firms have a good reputation and therefore the deadweight loss equals zero, we have the outcome of the general search matching model. In order to solve this problem, we have to define the deadweight loss as a function of  $\theta$ . As we saw earlier the probability that a worker rejects the initial offer of the firm was  $s(b) = \frac{1 - \gamma}{\gamma} \frac{S(y^h, b) - S(y^l, b)}{S(y^h, b)}$ . We also know that the difference between the high and low productivity surpluses is given by  $S(y^h, \rho) - S(y^l, \rho) = \frac{\Delta}{r + \delta + \lambda}$ . By replacing  $S(y^h, \rho) - S(y^l, \rho)$  by  $\frac{\Delta}{r + \delta + \lambda}$  in the first expression we obtain:

$$s(b) = \frac{1 - \gamma}{\gamma} \frac{\Delta}{r + \delta + \lambda} \frac{1}{S(y^h, b)}$$

As we saw already, the average deadweight loss  $\bar{D}(b)$  is equal to  $(1-p)s(b)\gamma S(y^l, b)$ . In order to rewrite the expression of the deadweight loss as a function of  $\theta$ , we use in a first step the definition of  $s(b)$ , we have derived before, and then we replace  $S(y^h, b)$  by  $\bar{S}(b) + \frac{(1-p)\Delta}{r+\delta+\lambda}$ , and  $S(y^l, b)$  by  $\bar{S}(b) - \frac{p\Delta}{r+\delta+\lambda}$ :

$$\begin{aligned}\bar{D}(b) &= (1-p)(1-\gamma) \frac{\Delta}{r+\delta+\lambda} \frac{S(y^l, b)}{S(y^h, b)} \\ \bar{D}(b) &= (1-p)(1-\gamma) \frac{\Delta}{r+\delta+\lambda} \frac{\bar{S}(b) - \frac{p\Delta}{r+\delta+\lambda}}{\bar{S}(b) + \frac{(1-p)\Delta}{r+\delta+\lambda}}\end{aligned}$$

The average surplus of a firm with bad reputation is then given by:

$$\bar{S}(b) = E^\rho [\bar{S}(\rho)] - \frac{\mu\lambda\bar{D}(b)}{r+\delta}$$

**From the derived equations we can say that:**

\*)  $\theta$  is increasing with  $\mu$  and decreasing with  $\Delta$ .

In other words, if there are many firms with good reputation the number of inefficient separations will decrease, meaning that the matching rate of the workers  $\theta q(\theta)$  increases, since the labour market becomes tighter for firms ( $\theta$  increases). As a consequence there are more vacancies per unemployed and unemployment rate decreases. If, on the other hand, the degree of uncertainty in the economy increases, meaning that  $y^h - y^l$  increases, firms have more incentive to lie about their productivity, since they get more surplus out of it. The probability of rejection,  $s(b)$ , also increases, meaning that workers will decline more often the initial wage offer of the firm. This implies that the labour market becomes laxer for firms (decreasing  $\theta$  and  $\theta q(\theta)$ ), there are more unemployed relatively to vacancies and consequently the unemployment rate increases.

\*)  $\bar{D}(b)$  is decreasing with  $\mu$  and increasing with  $\Delta$ .

This means the average deadweight loss is lower if there are more firms with good reputation, which is straightforward, since only firms with bad reputation have a deadweight loss. Furthermore if the degree of uncertainty increases the gains from lying increase and firms have a higher incentive to lie. There will be more firms with a bad reputation. Therefore the probability of rejection of the workers,  $s(b)$ , has to be higher, which means that workers will reject more often the wage offers of the firms, leading to a higher separation rate and to a less tight labour market for firms (low  $\theta$ ). This implies that  $\theta q(\theta)$  is also decreasing and the unemployment rate increases.

### 3.1.4 Sustainable Equilibria

Now that we have defined the equilibrium, we should determine for which values of  $\mu$  the equilibrium is sustainable. We know that the difference between the average surplus if having a good reputation,  $\bar{S}(g)$ , and the average surplus if having a bad reputation,  $\bar{S}(b)$ , is given by  $\frac{\bar{y}-r(U-V)}{r+\delta} - \frac{\bar{y}-r(U-V)-\lambda\bar{D}(b)}{r+\delta}$ . If we replace  $\bar{S}(g) - \bar{S}(b)$  in the truth telling constraint of the cooperative equilibrium by this expression, we find the dynamic truth-telling constraint given by (Proof see Appendix 1):

$$\lambda \bar{D}(b) \left[ 1 + \frac{\gamma \lambda}{r + \delta} \right] \succeq (1 - \gamma) \Delta$$

If  $r + \delta$  increases, firms weight less the long run gains from telling the truth. As already explained before, they would prefer in this case to have in the first period higher profits from lying and in the next periods a bad reputation. If in the next period a new productivity is drawn, the firm, having now a bad reputation, will have to face wage renegotiations, since workers will not believe what the firm is telling them. Even if productivity hasn't changed, workers will renegotiate their wages, since they suspect that the firm lies. As we can see, if firms are not forward looking, they don't take into account future losses due to the bad reputation, and do only look at the gains they can earn by lying in the first period, which makes trust more difficult to sustain.

How can we now interpret the influence of  $\mu$ ? As we know  $\mu$  is the share of firms with good reputation. How will firms react if  $\bar{\mu}$  changes? We assume that the maximum degree of trust is given by  $\bar{\mu}$ , that  $0 \leq \mu \leq \bar{\mu}$  and that  $\mu = 0$  is always an equilibrium.

- $\bar{\mu} = 1$  if the dynamic truth-telling constraint holds for this value of  $\bar{\mu}$ .
- $0 \prec \bar{\mu} \prec 1$  if the dynamic truth-telling constraint holds for  $\bar{\mu} = 0$ , but not for  $\bar{\mu} = 1$ .

Equilibria with higher values for  $\mu$ , but always lower than  $\bar{\mu}$ , pareto-dominate equilibria with lower values for  $\mu$ . The quality of labour relations is characterized by economic, but also by non-economic factors. Economic factors are for example the degree of trust. We assume that European countries have roughly the same economic situation, therefore changes in  $\mu$  are assumed to come from shocks, which affect  $\bar{\mu}$ , the maximum degree of trust.

### 3.2 Application

In order to understand the implications of this model, we can assume the following example: One country is characterized by a very high and the other by a very low degree of trust, namely  $\mu = 1$  and  $\mu = 0$ . In both countries the level of uncertainty,  $\Delta$ , is low. The tightness of the labour market in the country with low degree of trust is given by:

$$\frac{c}{q(\theta)} = \gamma \frac{\bar{y} - \underline{u} - \lambda \bar{D}(b)}{r + \delta + (1 - \gamma)\theta q(\theta)} - \bar{D}(b)$$

Whereas the expression for the country with high degree of trust is:

$$\frac{c}{q(\theta)} = \gamma \frac{\bar{y} - \underline{u}}{r + \delta + (1 - \gamma)\theta q(\theta)}$$

, since there are no firms with bad reputation and therefore no deadweight loss. What are now the effects of a shock affecting the level of uncertainty,  $\Delta$ ? Such a shock

would only affect the country with low degree of trust, since  $\Delta$  affects the deadweight loss:

$$\bar{D}(b) \approx (1-p)(1-\gamma) \frac{\Delta}{r+\delta+\lambda}$$

This means that an increase in  $\Delta$  increases also the deadweight loss. If the difference between the high and the low productivity level is big, firms can gain more by lying, but, if the match does not take place they also lose a greater share of the match surplus. As mentioned before, only the country with a low degree of trust is affected by the deadweight loss. In this country a higher  $\Delta$  leads to a higher  $\bar{D}(b)$  and to the decrease in the matching rate of the worker,  $\theta q(\theta)$ , implying an increase in unemployment. In this case, the same shock has different effects on countries. The lower the degree of trust, the larger is the effect of a shock in the level of uncertainty.

The outcome of this model suggests differences in  $\mu$  can explain the different levels of unemployment across countries. The maximal difference in unemployment between countries with good and bad labour relations is 1,4%. This means that countries where the level of trust is very low can have unemployment rates up to 1,4% higher than countries with good labour relations. Even higher differences are found if assuming that inefficient bargaining does not lead to a lower surplus, but to separation. In this case differences around 8% in the unemployment rate across countries can be explained.

Strikes and unemployment before the 1980s increased more in countries with bad labour relations, supporting the results of this model. But the evolution since 1980s is not well explained: unemployment increased steadily while strikes went back. In order to explain this evolution, technology should be assumed as endogenous: If firms are affected by strikes and bargaining failures, they may switch to more capital intensive technologies. In the 70s workers increased their bargaining power, which could have encouraged firms to reduce the role of labour in their production. This would explain the decline in labour share and the increase in unemployment in the 80s and 90s. Alternatively, firms can choose to produce goods with a stable demand, where the uncertainty is lower. With this approach the evolution of strikes and unemployment since the 80s can be explained: The level of uncertainty,  $\Delta$ , increased in the 70s, for example because of new technologies. As we saw earlier, this affects only countries with bad labour relations. In those countries unemployment and strikes increased. Firms choose, as a reaction, to switch to a more certain technology, which led to a decrease in strikes, while unemployment remained high.

### 3.3 Econometric Findings

In order to analyze the effect of labour relations, I introduced an index measuring the quality of labour relations. This index comes from the Global Competitiveness Report and ranges from 0 to 7, where 0 implies very bad employer/employee relations while 7 means that labour relations are generally cooperative. The index exists for three years, namely 1993, 1999 and 2003.

**Figure 5**  
*Labour Relations in 1999 vs. Unemployment Rate in 2000*



As we can see in Figure 5, there exists a clear negative relation between labour relations and the unemployment rate. Countries with lower unemployment rates tend to have better labour relations. However, this is only a descriptive statistic, which can't tell us anything about the causality. That is, we don't know yet why this relation exists, if labour relations and not some other omitted variable is affecting unemployment. Good labour relations may be correlated with a good state of the economy, which in turn affects unemployment. In other words, if the country currently is in a cyclical upturn the unemployment rate will be lower and on the other hand, also labour relation may improve. Therefore the effect of this cyclical upturn is measured through good labour relations. To analyze this issue more in detail, we have to describe the unemployment rate by not only labour relations but also by including other institutions which affect unemployment.

The following estimations will show if the theory of Blanchard and Philippon, saying that bad labour relations can lead to higher unemployment rates, is supported by the data. In a first approach, depicted in Table 7, I estimated the unemployment rate in 2000 and 2003 in all 20 OECD countries of the sample by the labour relation in 1999 and institutional variables. The reason for estimating the unemployment rate both in 2000 and 2003 is that the effect of bad labour relations may affect unemployment only in the future and therefore bad labour relations in 1999 could eventually have an impact on the unemployment rate in the following years. Labour relations turn out to be significant in explaining unemployment if entered individually (A) and (B), and remain significant if introducing other institutional variables estimation (B) and (C). While the coefficient of labour relations is significant and negative, coefficients of all other variables are for both years insignificant. The results of those estimations are in line with the findings of Blanchard and Philippon. They also indicate that the degree

of labour relations in 1999 has a greater impact on the unemployment rate in 2000 than on the one in 2003.

**Table 7**  
*Unemployment in all OECD countries in 2000 and 2003*  
*Estimated by Institutions and Labour Relations (OLS)*

|                        | A) DV: Unemployment 2000  | B) DV: Unemployment 2003  | C) DV: Unemployment 2000  | D) DV: Unemployment 2003  |
|------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
|                        | Coefficient (t-Statistic) | Coefficient (t-Statistic) | Coefficient (t-Statistic) | Coefficient (t-Statistic) |
| Labour Relations 1999  | -2.35 (-3.51)             | -1.81 (-3.74)             | -2.09 (-2.60)             | -1.35 (-2.23)             |
| Aver. Replacement rate | -                         | -                         | -0.07 (-1.13)             | -0.047 (-1.29)            |
| PMR                    | -                         | -                         | -0.58 (-0.59)             | 0.16 (0.22)               |
| EPL                    | -                         | -                         | 0.58 (0.57)               | 0.56 (0.84)               |
| Union Density          | -                         | -                         | 0.04 (1.26)               | -0.004 (-0.17)            |
| Tax Wedge              | -                         | -                         | -0.03 (-0.37)             | 0.103 (1.72)              |
| Output Gap             | -                         | -                         | 0.20 (-0.37)              | 0.097 (2.91)              |
| Constant               | 18.49 (5.622)             | 15.97 (6.25)              | 18.99 (4.10)              | 11.17 (2.91)              |
| R <sup>2</sup>         | 0.40                      | 0.43                      | 0.53                      | 0.68                      |
| Observations           | 20                        | 20                        | 20                        | 20                        |

*(The average replacement rate, tax wedge, PMR, EPL output gap in regressions C are the measures for the year 2000 and in D for the year 2003.)*

In order to check how robust those findings are regarding to changes in the sample size, I performed in Table 7a (see Appendix 1) estimations including only European countries. The results for the two first estimations with only labour relations as independent variable are mostly similar to the ones in Table 7. The only difference is that when estimating the unemployment rate in 2003 labour relations are insignificant, suggesting that the results of this estimation are not robust to a change in the sample size.

**Table 8**  
*Labour Relations in European Countries*  
*Instrumented by Average Strike Days in the 60s (OLS)*

|                          | Coefficient (t-Statistic) |
|--------------------------|---------------------------|
| IV Labour Relations 1999 | -2.69 (-2.95)             |
| Constant                 | 20.71 (4.44)              |
| R <sup>2</sup>           | 0.40                      |
| Observations             | 13                        |

*(Not included in estimation are Norway and Switzerland)*

Another problem which arises in this estimation is endogeneity. Labour relations can influence future unemployment in the sense that separation rates increase caused by the lack of trust towards firms, as we already saw in the model. On the other

hand, if the unemployment rate is high, which suggests that the economic situation may not be the best, labour relations tend to worsen. In other words, labour relations can be influenced by the unemployment rate which creates an endogeneity problem. In order to correct for this, I instrumented the labour relations in 1999 by the average strike days in the 60s. Like Blanchard and Philippon, I have chosen the strikes in the 60s because those strikes took place before unemployment began to increase and therefore could not have been affected by this rise in unemployment. The strikes in the 60s are negatively correlated with labour relations today, which means that countries with more strikes in the 60s have worse labour relations today. Blanchard used in his paper an index measuring the days lost because of strikes and the number of workers involved, allowing a more accurate measurement. In my regression, I use as instrument the average strike days in the 60s, defined as "days lost by strikes". Because no data for the 60s was available for Austria, Spain, Portugal and Finland I had to take the average strike days in the 1970s. Norway and Switzerland had to be dropped, since no data existed for this time period, which reduced the number of observations to 13 compared to 18 observations included in the regression of Blanchard. As we can see in Table 8, if we instrument labour relations by the strike days, the coefficient is negative and significant. It is also consistent with the results of column (A) in Table 7. The F-test shows that the coefficient of the instrumented variable is significantly different from zero (results not reported). The negative sign is as expected by the results of the model, meaning that a higher degree of labour relations has positive effects on the unemployment rate.

**Table 9**  
*Unemployment Estimation including  
Labour Relations (fixed effects)*

|                         | Coefficient (t-Statistic) |
|-------------------------|---------------------------|
| Labour Relations        | -1.08 (-2.42)             |
| Replacement Rate        | 0.14 (8.20)               |
| Tax Wedge               | 0.26 (10.95)              |
| Ben. Duration           | -2.64 (-3.56)             |
| EPL                     | 0.14 (-0.41)              |
| PMR                     | 0.68 (3.30)               |
| High Corporatism        | -1.31 (-3.85)             |
| Output Gap              | -0.47 (-14.84)            |
| R <sup>2</sup> (within) | 0.68                      |
| R <sup>2</sup>          | 0.92                      |
| Observations            | 434                       |

In a last step I created a time series for labour relations. I had the labour relation index for 3 years, namely 1993, 1999 and 2003. I used three time periods, the first 1983 to 1993, the second 1994 to 1999 and the last 2000 to 2003. The value of the index is fixed in each period and equal to the index of 1993, 1999 and 2003. The other

institutional variables are the same as in the previous regression. The results in Table 9 show that except for EPL all variables including labour relations are significant. Because I couldn't get data on strikes in non-European countries, I could not instrument labour relations in this regression. This said, one cannot say much about the causality. There seems to be a significant and negative relation between the unemployment rate and the degree of labour relations, but it's not clear whether bad labour relations cause higher unemployment. The average value of labour relations is 5.1, which is approximately the level of Germany or Ireland. The results of this estimation suggest that an increase in labour relations by 1.3 deviation points, namely from 5.1 to 6.4, all other institutions at the mean value, would lead to a decrease in unemployment by 1.18%.

## Conclusion

We saw in the previous sections a few explanations for the evolution of unemployment. In a first instance we analyzed the influence of institutions and shocks on unemployment in the long run. The three main shocks, namely a decline in TFP growth, the changes in interest rates and the decline in labour share turn out to be significant in the estimations. In order to explain the differences in unemployment rates across countries we saw that institutions play an important role in the sense that they can affect the impact of a shock on the labour market, which can for example lead to more permanent unemployment. The outcomes however are sometimes ambiguous. In the case of EPL, the long run effects on the unemployment rate are not clear, what is reflected by an insignificant coefficient throughout all estimations. The same holds for the union density, which has no clear effect on its own but together with a high degree of corporatism (or centralization) becomes significant.

We then turned in Section 2 to another source of explanation, namely product market regulation. The model presented in this section concludes that deregulation of the goods market leads in the long run to higher real wages and less unemployment. We also learn that the way this deregulation is performed plays an important role regarding the impact on labour markets. We deduce from the model that a quick and combined deregulation of labour and product markets, in order to prevent oppositions of workers, would lead to the best outcome. If we look at the empirical side, the results of the model can be supported. The coefficient of product market regulation is in all estimations positive and significant.

In the last section we had a look on the labour relations between employers and employees. This is the last approach in this paper to explain unemployment. We learned that from the theoretical point of view, bad labour relations lead to higher separation rates and therefore also to higher unemployment rates. In a country with many firms having a bad reputation, the wages will be re-negotiated more often and the probability of having the match ended increases. Another important conclusion was also that if the economic environment is less predictable, more firms are attracted by having a bad behavior. In a country with only firms having a good reputation, an increase in uncertainty has nearly no effect on the labour market since firms will always tell the truth about their productivity.

These results can only be supported in part by the empirical estimations in this paper. Good labour relations turn out to have a positive and significant effect on unemployment in the 20 OECD countries of the sample. If however we take into account only the European countries, the model does not a good job in explaining the unemployment rate in 2003, suggesting that the results are not robust to changes in the sample size. Furthermore labour relations are highly endogenous, since they can be influenced by the unemployment rate. This causality problem cannot be solved for the estimation with all countries of the sample because of a lack of data. If estimating the unemployment rate by fixed effects, using a time variable for labour relations, the results are significant but, as already said, the causality problem remains. The results of this section are not as supportive as those in the previous ones, especially because

of the causality problem it is difficult to conclude on the effect of labour relations.

## References

- [1] Bassanini, Andrea and Duval, Romain, "*Employment Patterns in OECD Countries: Reassessing The Role Of Policies And Institutions*". OECD Economic Department Working Paper No. 486, June 2006.
- [2] Blanchard, Olivier, "*European Unemployment: The Evolution of Facts and Ideas*". MIT, Department Of Economics, October 2005.
- [3] Blanchard, Olivier and Giavazzi, Francesco, "*Macroeconomic Effects Of Regulation And Deregulation In Goods And Labour Markets*". The Quarterly Journal of Economics, August 2003.
- [4] Blanchard, Olivier and Wolfers, Justin, "*The Role Of Shocks And Institutions In The Rise Of European Unemployment: The Aggregate Evidence*". The Economic Journal, Vol 110, No. 462, March 2000.
- [5] Blanchard, Olivier and Philippon, Thomas (November 2006), "*The Quality Of Labour Relations and Unemployment*".
- [6] Nicoletti, Giuseppe and Scarpetta, Stefano, "*Product Market Reforms And Employment In OECD Countries*". Economic Department Working Papers No. 472, December 2005.
- [7] Nickell, Stephen, Nunziata, Luca and Ochel, Wolfgang, "*Unemployment in the OECD since the 1960s. What Do We Know?*". The Economic Journal, 115, January 2005
- [8] "*OECD Employment Outlook 2004*", Chapter 2: Employment Protection Regulations and Labour Market Performance.

## Appendix 1

**2.2.3 Proof:** Replace  $\mu$  by  $c/(1 - \beta - c)$  in the real wage equation of the short run general equilibrium:

$$\begin{aligned} W_i/P &= \frac{1 + \beta \left[ \frac{c}{1 - \beta - c} \right]}{1 + \left[ \frac{c}{1 - \beta - c} \right]} \\ W_i/P &= \frac{1 - \beta - c + \beta c}{1 - \beta - c} * \frac{1 - \beta - c}{1 - \beta} \\ W_i/P &= \frac{1 - \beta - c + \beta c}{1 - \beta} = \frac{(1 - \beta) - c(1 - \beta)}{1 - \beta} \\ W_i/P &= 1 - c \end{aligned}$$

**3.1: Proof:** Replace  $W(y, \rho)$  by the expression of the counter offer  $W^c$ , namely  $U + (1 - \gamma)S(y, \rho)$ , in the definition of the surplus  $S(y, \rho)$ :

$$\begin{aligned} J(y, \rho) - V + U + (1 - \gamma)S(y, \rho) - U &= S(y, \rho) \\ J(y, \rho) - V + (1 - \gamma)S(y, \rho) &= S(y, \rho) \\ J(y, \rho) &= V + \gamma S(y, \rho) \end{aligned}$$

**3.1.1: Proof:** Assume the truth-telling constraint of the non-cooperative equilibrium holds as an equality:

$$\begin{aligned} S(y^h, b) - W^h(y^h, b) &= (1 - s) [S(y^h, b) - W(y^l, b)] + s [(1 - \gamma)S(y^h, b) - W(y^l, b)] \\ S(y^h, b) - W^h(y^h, b) &= (1 - s) [S(y^h, b) - W(y^l, b)] + s(1 - \gamma)S(y^h, b) - sW(y^l, b) \\ S(y^h, b) - W^h(y^h, b) &= S(y^h, b) - W(y^l, b) - sS(y^h, b) + sW(y^l, b) + s(1 - \gamma)S(y^h, b) - sW(y^l, b) \\ W(y^l, b) - W^h(y^h, b) &= s [(1 - \gamma)S(y^h, b) - W(y^l, b) - S(y^h, b) + W(y^l, b)] \\ W(y^l, b) - W^h(y^h, b) &= s [(1 - \gamma)S(y^h, b) - S(y^h, b)] \\ W(y^l, b) - W^h(y^h, b) &= s [S(y^h, b)(1 - \gamma - 1)] \\ s(b) &= \frac{W(y^l, b) - W^h(y^h, b)}{\gamma S(y^h, b)} \\ s(b) &= \frac{U + (1 - \gamma)S(y^h, b) - U - (1 - \gamma)S(y^l, b)}{\gamma S(y^h, b)} \\ s(b) &= \frac{(1 - \gamma)}{\gamma} * \frac{S(y^h, b) - S(y^l, b)}{S(y^h, b)} \end{aligned}$$

**3.1.3 Proof:** Replace  $rU$  by  $\underline{u} + \theta q(\theta)(1 - \gamma)E^\rho(\bar{S}(\rho))$

$$\begin{aligned}
E^\rho [\bar{S}(\rho)] &= \frac{\bar{y} - rU - (1 - \mu)\lambda\bar{D}(b)}{r + \delta} \\
E^\rho [\bar{S}(\rho)] &= \frac{\bar{y} - \underline{u} - \theta q(\theta)(1 - \gamma)E^\rho [\bar{S}(\rho)] - (1 - \mu)\lambda\bar{D}(b)}{r + \delta} \\
(r + \delta)E^\rho [\bar{S}(\rho)] + \theta q(\theta)(1 - \gamma)E^\rho [\bar{S}(\rho)] &= \bar{y} - \underline{u} - (1 - \mu)\lambda\bar{D}(b) \\
E^\rho [\bar{S}(\rho)] &= \frac{\bar{y} - \underline{u} - (1 - \mu)\lambda\bar{D}(b)}{r + \delta + \theta q(\theta)(1 - \gamma)}
\end{aligned}$$

**3.1.3. Proof:** Use  $rV = -c + q(\theta) [E^\rho [J^e(\rho)] - V] = 0$  and replace  $E^\rho [J^e(\rho)]$  by  $J^\lambda(\rho) = V + \gamma\bar{S}(\rho) - \bar{D}(\rho)$

$$\begin{aligned}
0 &= -c + q(\theta) [E^\rho [V + \gamma\bar{S}(\rho) - \bar{D}(\rho)] - V] \\
c &= q(\theta) [E^\rho [\gamma\bar{S}(\rho) - \bar{D}(\rho)]] \\
\frac{c}{q(\theta)} &= \gamma E^\rho [\bar{S}(\rho)] - (1 - \mu)\bar{D}(b)
\end{aligned}$$

**3.1.4. Proof:** Replace  $\bar{S}(g) - \bar{S}(b)$  in the truth telling constraint of the cooperative equilibrium by  $\frac{\bar{y} - r(U - V)}{r + \delta} - \frac{\bar{y} - r(U - V) - \lambda\bar{D}(b)}{r + \delta}$ :

$$\begin{aligned}
(1 - \gamma) [S(y^h, g) - S(y^l, g)] &\leq \frac{\lambda}{r + \delta + \lambda} \left[ \bar{D}(b) + \gamma \left( \frac{\bar{y} - r(U - V)}{r + \delta} - \frac{\bar{y} - r(U - V) - \lambda\bar{D}(b)}{r + \delta} \right) \right] \\
(1 - \gamma) [S(y^h, g) - S(y^l, g)] &\leq \frac{\lambda}{r + \delta + \lambda} \bar{D}(b) \left[ 1 + \frac{\gamma\lambda}{r + \delta} \right] \\
\lambda\bar{D}(b) \left[ 1 + \frac{\gamma\lambda}{r + \delta} \right] &\succeq (1 - \gamma) [S(y^h, g) - S(y^l, g)] (r + \delta + \lambda) \\
\lambda\bar{D}(b) \left[ 1 + \frac{\gamma\lambda}{r + \delta} \right] &\succeq (1 - \gamma)(r + \delta + \lambda) \left[ S + \frac{(1 - p)\Delta}{r + \delta + \lambda} - S + \frac{p\Delta}{r + \delta + \lambda} \right] \\
\lambda\bar{D}(b) \left[ 1 + \frac{\gamma\lambda}{r + \delta} \right] &\succeq (1 - \gamma)\Delta
\end{aligned}$$

### 3.3.

**Table 7a**  
*Unemployment in European countries in 2000 and 2003*  
*Estimated by Institutions and Labour Relations (OLS)*

|                        | A) DV: Unemployment 2000  | B) DV: Unemployment 2003  | C) DV: Unemployment 2000  | D) DV: Unemployment 2003  |
|------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
|                        | Coefficient (t-Statistic) | Coefficient (t-Statistic) | Coefficient (t-Statistic) | Coefficient (t-Statistic) |
| Labour Relations 1999  | -2.75 (-3.5)              | -2.04 (-3.62)             | -2.55 (-2.38)             | -0.12 (-0.97)             |
| Aver. Replacement rate |                           |                           | -0.06 (-0.67)             | -0.01 (-.028)             |
| PMR                    |                           |                           | -0.78 (-0.37)             | -.019 (-.055)             |
| EPL                    |                           |                           | 0.63 (0.37)               | -0.21 (-0.55)             |
| Union Density          |                           |                           | 0.04 (0.99)               | 0.02 (1.53)               |
| Tax Wedge              |                           |                           | -0.09 (-.072)             | -0.02 (-0.74)             |
| Output Gap             |                           |                           | -0.10 (-0.09)             | -0.37 (-1.35)             |
| Constant               | 20.83 (5.00)              | 17.40                     | 24.09 (3.72)              | 6.72 (5.65)               |
| R <sup>2</sup>         | 0.48                      | 0.50                      | 0.63                      | 0.69                      |
| Observations           | 15                        | 15                        | 15                        | 15                        |

*(The average replacement rate, tax wedge, PMR, EPL output gap in regressions  
C are the measures for the year 2000 and in D for the year 2003.)*

## Appendix 2

### Abstract (German):

Diese Arbeit zielt darauf ab, den Verlauf der Arbeitslosenrate besser zu verstehen. In der Vergangenheit haben sich schon viele Forscher mit diesem Thema auseinander gesetzt und sind teilweise zu unterschiedlichen Erkenntnissen gekommen. Um einen klaren Überblick über den Stand der Ergebnisse in diesem Bereich zu geben, werden in der Arbeit einige Forschungspapiere vorgestellt und deren Ergebnisse diskutiert. Um zu überprüfen, ob sich die Ergebnisse dieser theoretischen Ansätze in den Daten widerspiegeln, werden zu jedem Erklärungsansatz Regressionsanalysen präsentiert, welche die Arbeitslosenrate anhand von ausgewählten Variablen schätzen.

Erstmals intensiv mit diesem Thema beschäftigt haben sich Wissenschaftler in den 60er Jahren, als die Arbeitslosenraten in den Europäischen Ländern zu steigen begannen. Der erste Ansatz, um diese Entwicklung zu erklären, war Veränderungen in der Wirtschaft heranzuziehen. Diese Schocks betrafen zwar alle Länder, konnten aber nicht die heterogene Entwicklung der Arbeitslosenraten erklären. Hier kommen die Arbeitsmarktinstitutionen ins Spiel: Jede Volkswirtschaft reagiert anders auf einen Schock. Länder mit starren Lohnsetzungssystemen werden zum Beispiel mehr Schwierigkeiten haben, sich an eine schlechtere Wirtschaftslage anzupassen, da es dort länger braucht, um eine Änderung im Lohnniveau zu erreichen. Die Ergebnisse von Olivier Blanchard und Justin Wolfers aus ihrem Papier „*The Role of Shocks and Institutions in the Rise of European Unemployment: The Aggregate Evidence*“ (2000) werden im ersten Teil der Arbeit vorgestellt und diskutiert.

Veränderungen in Institutionen sowie Schocks liefern zwar gute Ergebnisse bei der Schätzung der Arbeitslosenrate, was aber nicht bedeutet, dass diese nicht auch noch von anderen Faktoren beeinflusst wird. Im zweiten Teil der Arbeit wird genauer auf die Rolle der Marktregulierung eingegangen. Das Modell, das in diesem Teil vorgestellt wird, kommt aus dem Papier „*Macroeconomic Effects of Regulation and Deregulation in Goods and Labour Markets*“ (2003), von Olivier Blanchard und Francesco Giavazzi. Die Autoren kommen zu dem Schluss, dass die Deregulierung des Gütermarktes die spätere Deregulierung der Arbeitsmarktes erleichtert. Weiters schließen sie, dass eine Deregulierung langfristig gesehen einen positiven Einfluss auf die Arbeitslosenrate hat.

Der letzte Teil dieser Arbeit ist dem Verhältnis zwischen Arbeitgebern und Arbeitnehmern gewidmet. Olivier Blanchard und Thomas Philippon argumentieren in ihrem Papier „*The Quality of Labour Relations and Unemployment*“ (2006), dass Länder mit schlechten Arbeitsverhältnissen dazu tendieren, höhere Arbeitslosenraten zu haben. Im Modell der Autoren wird davon ausgegangen, dass Firmen ein "schlechtes" Verhalten an den Tag legen können, was dazu führt, dass diese bei den Lohnverhandlungen über ihre wahre Produktivität lügen, um einen niedrigeren Lohn für die Arbeiter rechtfertigen zu können. Im Modell führt das zum Misstrauen der Arbeiter, einer höheren Trennungsrate und schlussendlich zu einer höheren Arbeitslosenrate.

## **Curriculum Vitae**

### Persönlich Daten

**Name:** Saskia Bogner  
**Adresse:** Lerchenfelderstraße 148/9  
1080 Wien  
**Handynummer:** 0664 38 28 413  
**E-mail Adresse:** saskia\_bogner@yahoo.com  
**Geburtsdatum, Ort:** 04.03.1983, Wien  
**Staatsbürgerschaft:** Österreichisch

### Schulbildung und Studium

Voraussichtlicher Abschluss des Studiums im Dezember 2007

Abschluss des ersten Abschnitts am 30.06.2004

Seit dem Sommer Semester 2002: Studium der Volkswirtschaftslehre an der Universität Wien

Winter Semester 2001: Internationale Betriebswirtschaft am BWZ in Wien

Erfolgreicher Abschluss der Matura im Juni 2001

Besuch des Lycée Français de Vienne von 1989 bis 2001