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„Youth Unemployment in Selected European Countries"

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List of Abbreviations

p	general productivity parameter in the Mortensen/Pissarides model, job finding rate in all other models
q	rate at which vacant jobs are filled
c	search cost
L	total labour force
v	rate of vacancies
u	rate of unemployed workers
$m(u, v)$	matching function
θ	labour market tightness
x	idiosyncratic productivity parameter
R	reservation productivity
λ	arrival rate of idiosyncratic shocks
r	interest rate
β	workers' bargaining power
U	value to the worker of being unemployed
V	value to the firm of a vacant job
J	value to the firm of a filled job
W	value to the worker of a job
ω	wage
$\bar{\omega}$	minimum wage
z	real return of the worker while searching
s	new productivity of a job after a shock arrived
η	elasticity of the labour market tightness
f	firing costs
δ	rate of flows into and out of the labour market
c_x	constant hiring costs
ρ_i	rate at which separation shocks, dependent on the experience of the worker, occur; i = e (experienced), n (inexperienced)
c_i	hiring costs dependent on the experience of the worker; i = e (experienced), n (inexperienced)
τ	tax
ϑ	rate at which workers gain experience
h	human capital of workers
C	costs of education
ε	firm-specific random productivity factor
$k(i)$	state variable denoting the skills of the worker; i = s (specific), g (general)
π	probability of a good match quality
α	revelation probability of the match quality
S	surplus of a match
ψ	empirical proportion of good matches in the labour market
ζ	share of workers entering the labour market as employed
c_e	costs for opening an employment position
c_v	costs for opening a vacancy

1. *Introduction*

At the time of writing, youth unemployment is a major concern in most European countries. The last global financial crisis and the following "Great Recession", starting in 2007/08, led to a major increase of youth unemployment rates, with some countries more affected than others: in 2013 Greece had a youth unemployment rate of 58.3% and Spain of 55.5%, while other countries like Germany and Austria observed low rates of 7.8% and 9.7% respectively. Overall, the youth unemployment rate in the EU 15 has risen from 17.3% in 2000 to 23.2% in 2013. Apart from effects of the crisis, some countries also have to worry about consistently high youth-to-adult unemployment ratios: in 2013 for example, youth unemployment in Italy was 3.9 times as high as adult unemployment, in the United Kingdom it was 3.8 times as high, in Germany, however, only 1.6 times as high. (Eurostat, 2015(a))

Youth unemployment is considered very detrimental for the development of an economy for several reasons. I want to highlight two of them: first, there are studies showing that especially long unemployment spells at first entry into the labour market lead to so-called "scarring" effects, meaning that those affected have to expect longer terms of unemployment and lower wages also later in life. Second, there are negative consequences for the economic performance of a country. High unemployment rates of youth lead to a depreciation of their human capital and increase incentives, especially for the highly educated, to migrate into other countries where employment prospects are better. (Banerji et. al., 2014: 7)

This thesis seeks to address the reasons for high youth unemployment in particular, the following questions:

– Why does youth unemployment react stronger to economic shocks in some countries than in others?

– Why are the levels of youth unemployment relative to adult unemployment higher in some countries?

– What can be done by policy makers to tackle the problem?

In order to show the range and structure of the above mentioned questions, I will provide an overview of the most important indicators of youth unemployment, labour market characteristics and educational attainments of youth. I have chosen to cover Austria, France, Germany, Greece, Italy, Spain and the United Kingdom. Firstly, because the countries with the highest unemployment rates in Europe (either absolute or relative to adult unemployment) are in this sample. Secondly, the variance in institutional characteristics allows one to investigate which factors promote youth unemployment. Finally, Germany is regularly offered as a positive ex-

ample concerning the management of youth unemployment and this thesis further investigates that claim.

I will organise the analysis of youth unemployment in Europe in terms of the search and matching literature. In contrast to the neoclassical theory, this approach allows one to study unemployment in equilibrium, which mainly comes from frictions inherent in the search and matching process of jobs. Furthermore, it is possible to inquire how institutions influence the matching process for different types of workers. There is a vast literature of search and matching models in the tradition of the seminal work of Mortensen and Pissarides (1994). I have selected the models presented in this paper according to what seem to be the most relevant labour market institutions, specifically for youth unemployment, using cross-sectional analysis as a starting point (see de Lange et. al., 2014). My focus is on theoretical models that investigate the effect of:

(i)   institutional factors, having different effects depending on the productivity of workers, in particular the employment protection legislation and minimum wages;

(ii)   educational decisions, influencing employment chances, depending on whether investment in specific or general skills prevails in an economy;

(iii)   uncertainty on the side of the firm about the real productivity of employment seekers, which is smaller or larger depending on the characteristics of the educational system in a country.

To investigate whether the predictions of these theoretical models also hold in reality, I will discuss country specific empirical studies or refer to cross country analysis where appropriate. In cases where neither type of study is available, I will argue on the basis of self-collected empirical data whether similar effects can also be expected in other countries.

In a further step, based on the synthesis of theory and empirical observations, I will provide recommendations for policy makers on a selective number of policy areas, specifically reforms concerning employment protection legislation and the vocational education system and, more generally, on improvement of the firm-based component in education.

This thesis is structured as follows: chapter 2 highlights empirical facts on youth unemployment and labour market institutions, chapter 3 presents the theoretical models, chapter 4 provides a synthesis of the obtained predictions in the theory part and empirical observations, chapter 5 discusses policy recommendations based on the insights derived from chapter 4 and chapter 6 summarises the findings and concludes.

2. Empirical Analysis

2.1. Key indicators

In order to grasp the employment situation of youth in the countries being discussed, it is not sufficient to look at unemployment rates only. The youth unemployment rate is the number of youth, i.e. young people between 15 and 24 years old, participating in the labour market but unable to find work, relative to the total youth labour force. Many people at age 15 to 24 are still in education and therefore, unless they are not working at the same time, they do not belong to the labour force or in any calculation of youth unemployment. As additional context, I will present data on the youth-to-adult unemployment ratio, as it allows me to inquire the relative position of youth compared to the adult population in the labour market. Furthermore, it is useful to look at participation rates in education, highlighting the share of youth not participating in the labour market due to education and at NEET-rates, covering all young people neither taking part in the labour market nor in some kind of educational program. For further explanations of statistical terms and concepts please see Appendix A.

Graph 1: Youth unemployment rates (age 15 to 24); 1995 to 2014
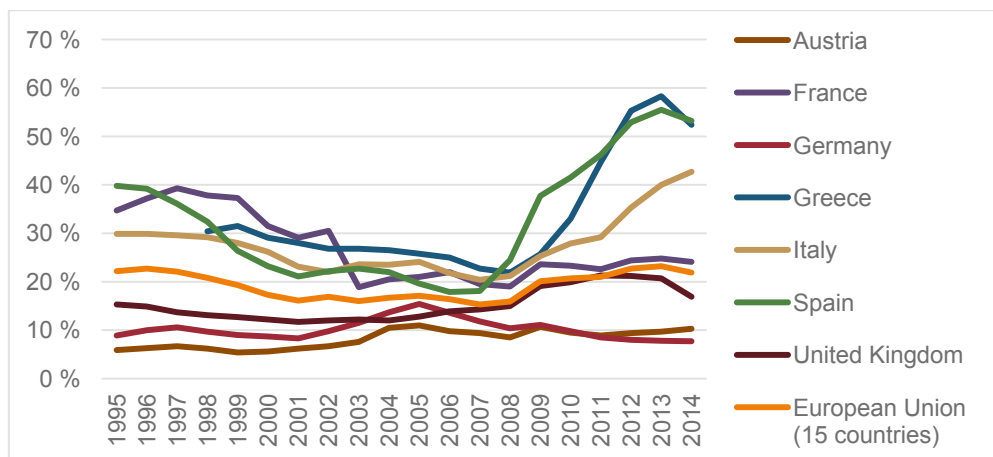
Data: Eurostat, (2015(a)).

Graph 1 shows unemployment rates for youth from 1995 to 2014, indicating the significant impact of the "Great Recession" starting in 2007. The strongest increases in youth unemployment rates were observed in Spain, Greece and Italy, culminating in rates close to 55% in Greece and Spain in 2013 and more than 40% in Italy in 2014. Youth unemployment also increased in the United Kingdom and France. In contrast, there was only a small and short-lived upward trend for Germany and Austria in 2008/09. In 2014 youth unemployment rates for these latter two countries stood at relatively low levels of 7.7% and 10.3% respectively. Interestingly, from 2003 until the start of the financial crisis a narrowing of the youth unem-

ployment rates can be observed, leading to the question of why youth unemployment rates diverged so markedly post-crisis. However, those countries experiencing an unemployment rate below the EU average (considering 15 countries) for the whole shown period (1995-present), are Austria, Germany and the United Kingdom, while France, Greece, Italy and Spain sit above the average, suggesting that high youth unemployment rates in these countries are not only a crisis phenomenon but that there are also long-standing institutional causes.

In order to further investigate the impact of the crisis and whether it particularly influenced youth, or whether increases in unemployment are due to an overall worsening of the labour market situation, it is useful to look at youth-to-adult unemployment ratios. Graph 2 shows how much stronger youth is affected by unemployment compared with those aged 25 to 74.

Graph 2: Youth-to-adult unemployment ratios; 1995 to 2014
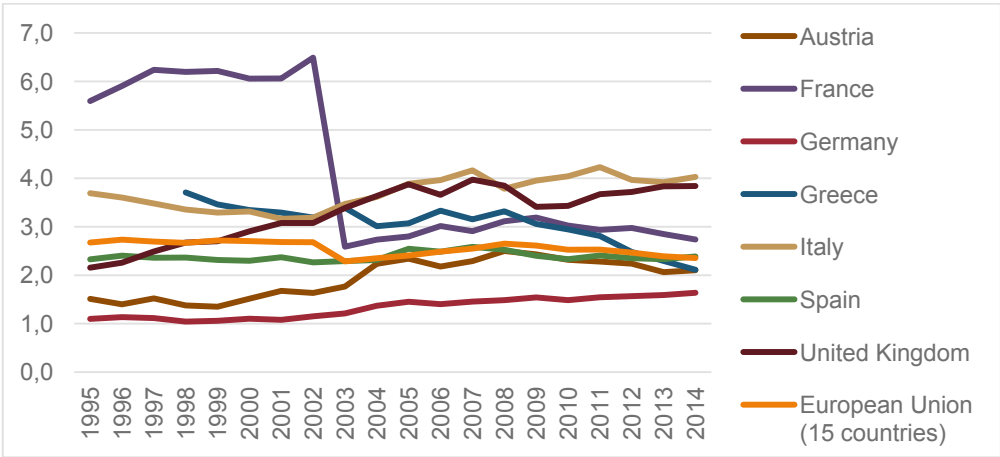
Data: Eurostat, (2015(a)). Own calculations: The youth-to-adult unemployment ratio is the youth unemployment rate (age 15 to 24) divided by the adult unemployment rate (age 25 to 74).

Although the young are more affected by unemployment in general, the observed ratios also highlight substantial differences between countries. Italy and the United Kingdom observe the highest youth-to-adult unemployment ratios (apart from France prior to 2003): the unemployment risk of young workers in these countries is 4 and 3.8 times as high as of the adult population. Germany, Austria and Spain have the smallest ratios and are all below (or close to) the EU average with ratios of 1.6, 2.1 and 2.4 in 2014. An interesting case is Greece: the relative situation of youth has improved since the latest crisis and in 2014 the youth-to-adult unemployment ratio is 2.1, the same as in Austria. It should, however, be considered that adult unemployment rates in Greece are extraordinarily high, standing at 25.4% in 2013 and therefore, the significance of a ratio of 2.1 is very different compared to Austria, with an adult unemployment rate of 4.7% (Eurostat, 2015(a)). Although the relative unemployment risk of youth in Italy and the United Kingdom worsened over time, this development was already

evident before the crisis: an increase in the ratio can be observed in Italy since 2002 and in the United Kingdom since 1995. The EU average has not changed substantially in either direction during the crisis.

The question arising from these data is why levels of youth unemployment compared to adult unemployment differ so much between countries, which requires a further analysis of institutional characteristics. Considering changes in time and not differences between countries, the data indicate that most of the significant rise in youth unemployment rates after 2007 is due to an overall worsening of the economic situation and was not due to a specific impact on youth compared to the adult population.

As already noted, unemployment rates only have a limited descriptive power as a substantial share of young people might still be in education at the age of 15 to 24. In times where fewer vacancies exist it could be beneficial for youth unemployment rates if the inactivity rate increases, thereby reducing the labour force. However, there is the risk of young people not taking part in education too. Graph 3 depicts the rate of young people which are not in employment, education or training and thus allows one to infer on the share of youth discouraged from both, participation in the labour market and from taking part in education.

Graph 3: Youth not in employment, education or training in percent of youth population (NEET-rate); 2004 to 2014
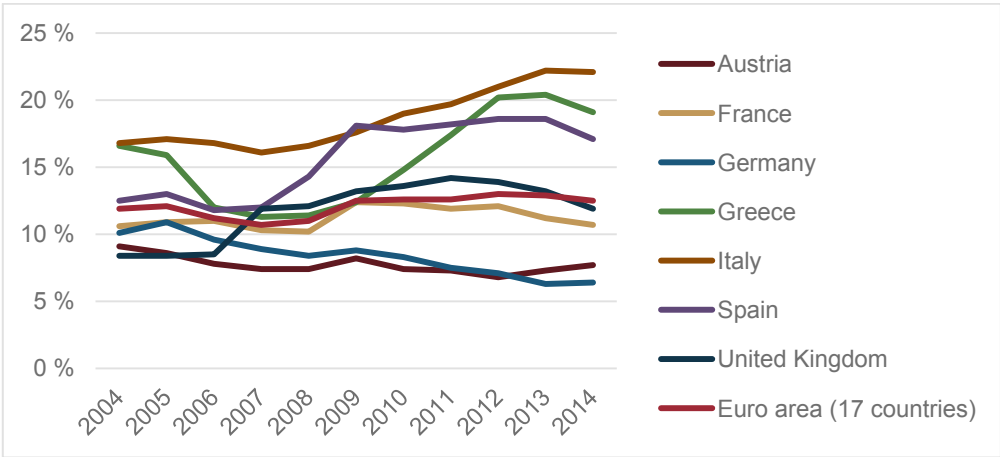
Data: Eurostat, (2015(b)).

Germany and Austria exhibit relatively low and decreasing NEET-rates, 6.4% and 7.7% respectively in 2014. While there was a slight increase in the NEET-rate since 2007/08 in the Euro Area (considering 17 countries) on average and also in France and the United Kingdom, very substantial increases were observed in Italy, Spain and Greece. In Italy the NEET-rate rose from 16.1% in 2007 to 22.1% in 2014, in Greece from 12% to 19.1%.

The data indicate that due to the severity of the crisis, many young people were discouraged not only from taking part in the labour market but also from acquiring skills in a schooling or training program. Thus, increases in inactivity rates (Eurostat, 2015(q)), most pronounced in Spain (since 2007), Greece and Italy (since 2004), cannot be fully traced back to an increase in young people enrolled in education. Although there might have been such effects, only Spain observed an obvious increase in the participation rate in education among youth: it increased from 52.9% in 2008 to 67.4% in 2014 (Eurostat, 2015(c)).

Summing up, increases in inactivity rates of youth in Italy and Greece appear to be mainly due to a discouragement of participation in education as well as in the labour market, while in Spain participation rates in education as well as NEET-rates increased since 2007/08.

The last figure in this section allows for a closer look at the kind of employment relationships young people are working in. Graph 4 shows the share of youth employees engaged in temporary employment. Relatively high levels of temporary employment for youth can be observed in Spain, France, Italy (after 2007) and Germany. In Spain 69.1% of youth had a temporary contract in 2014. France, Germany and Italy exhibited rates between 53% and 57%. The lowest rates of temporary employment among youth in 2014 were observed in the United Kingdom, with only 15.2%, and in Greece with 29.4%. There is no clear indication that these rates have changed in general since the last crisis. An increase since 2009 can be observed in Spain and in Italy an upward trend can be observed which, however, is already present since 2005, i.e. since data are available.

Graph 4: Youth in temporary employment as percentage of the total number of youth employees; 1995 - 2014
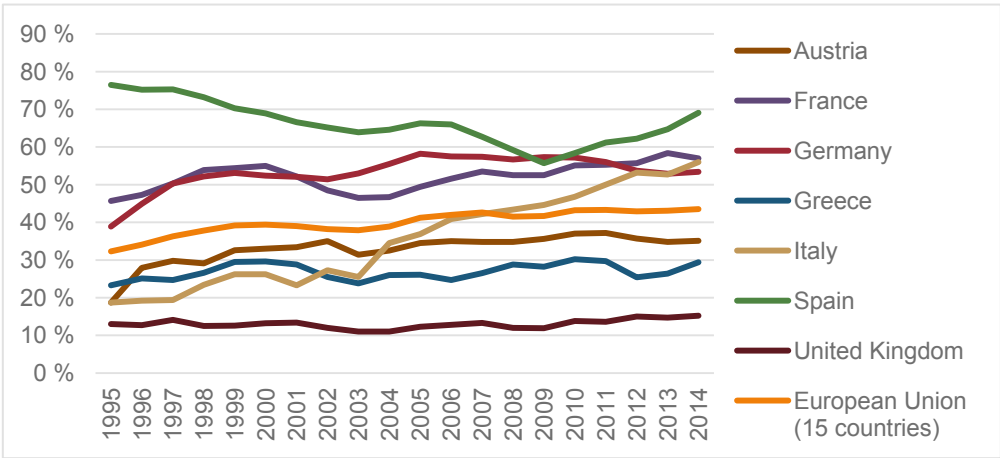
Data: Eurostat, (2015(d)).

Compared to the prime-age group of employees (age 25 to 54), youth is much more likely to be engaged in temporary employment. Graph 5 shows data on the incidence of temporary

employment among young and prime-age workers in 2007. While for example in Germany in 2007 only 9.1% of prime-age workers were in temporary employment, 57.4% of young workers had a temporary contract. Put differently, the probability of young workers getting a temporary contract was more than six times as high as for prime-age workers. For Austrian youth, this probability was more than eight times as high. In general, temporary employment among prime-age workers in the covered period was close to or below 11% (except from Spain), while for Spain, Germany, France and Italy temporary employment among youth was above 40%. Spain exhibits the largest rate of temporary employment among youth as well as among prime-age workers with 29.3% in the latter case, indicating a relatively strong use of temporary contracts for both age groups.

Graph 5: Incidence of temporary employment among young (age 15 to 24) and prime-age (age 25 to 54) workers; 2007
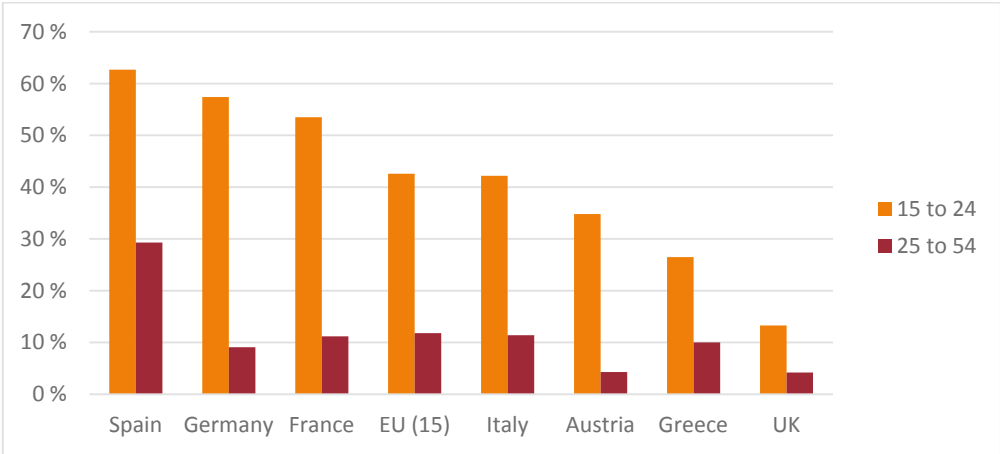
Data: Eurostat, (2015(d)).

2.2. Labour Market Characteristics

This section is devoted to comparing the discussed countries in terms of some of their labour market characteristics. The data are restricted to those institutions most relevant to youth (in accordance with the chosen theoretical models) although in principle others, such as collective bargaining coverage or union density, could also be relevant for youth labour market outcomes.

It has been argued, that rigidities in the labour market can explain differences in unemployment rates, in particular between Europe and the United States (see Bernal-Verdugo et. al. 2012; Nickell, 1997). Many countries have tried to reduce rigidities by increasing numerical flexibility. This has mainly taken the form of "two-tier" regulations, meaning that temporary contracts were deregulated, while permanent contracts stayed highly protected, leading to a dual labour market. This development has considerably changed employment perspectives for

young people (Kahn, 2007). A widely used method to measure the strictness of employment protection is the Employment Protection Legislation Index (EPL), constructed and published by the Organisation for Economic Co-operation and Development (OECD). It provides distinct measures for regular and temporary contracts, involving actual payments connected to dismissals, as well as notification requirements and, in the case of temporary contracts, regulations concerning their duration, as well as payments and working conditions (OECD, 2004: 102 - 106).

In Table 1 an overview of the EPL Index for permanent and temporary employment contracts is shown for selected years. In many countries (except from Austria, France and the United Kingdom) the regulation of temporary contracts was lowered substantially between 1995 and 2013. In Germany, the EPL Index went down from 3.13 to 1.13, in Italy and Greece from 4.75 to a value close to 2. At the same time, the protection of permanent contracts was only weakly lowered and in some cases it even increased, as for example in Germany. Using the USA, considered as a country with a highly flexible labour market, as a reference point I will further refer to all other listed countries, except for the United Kingdom, as highly segmented labour markets.

Table 1: Employment Protection Legislation Index (OECD); 1995, 2001, 2007, 2013

	1995		2001		2007		2013	
	Regular	Temp.	Regular	Temp.	Regular	Temp.	Regular	Temp.
Austria	2,75	1,31	2,75	1,31	2,37	1,31	2,37	1,31
France	2,34	3,63	2,34	3,63	2,47	3,63	2,38	3,63
Germany	2,68	3,13	2,68	2,00	2,87	1,00	2,87	1,13
Greece	2,80	4,75	2,80	4,75	2,80	2,75	2,12	2,25
Italy	2,76	4,75	2,76	3,25	2,76	2,00	2,51	2,00
Spain	2,36	3,25	2,36	3,25	2,36	3,00	2,05	2,56
United Kingdom	1,03	0,25	1,20	0,25	1,20	0,38	1,03	0,38
USA	0,26	0,25	0,26	0,25	0,26	0,25	0,26	0,25

Data: OECD, (2015(a)) and OECD, (2015(b)). Own compilation. Short description: "Regular" and "Temp." refer to the regulation of regular and temporary employment relationships respectively. Higher values indicate a stronger protection.

A further aspect of labour market rigidities is wage flexibility, which can be restricted, among other measures or institutions, by minimum wages. Table 2 provides information on statutory as well as negotiated minimum wages. Italy and France observe the highest minimum wages compared to average wages with 71% and 62% respectively. It has to be noted that in Italy the minimum wage is not statutory but negotiated at the industry level and thus might vary sig-

nificantly between industries and that in France lower minimum wages apply for those below the age of 16 and 17. The United Kingdom and Spain in contrast, have very low minimum wages. Note that in the United Kingdom no minimum wage at all applies to workers below the age of 18.

Table 2: Minimum wage levels and other characteristics; 2000

	Ratio of minimum wage to average wage (2000)	Method for setting	Level	Youth subminimum
Italy	0.71	Negotiated	Industry	Some
France	0.62	Statute	National	80% for workers aged 16 90% for workers aged 17
Germany	0.58	Negotiated	Industry	Some
Greece	0.51	Negotiated	National	No
United Kingdom	0.42	Wage councils	Industry	85% for workers aged 18 to 21 No minimum wage for workers below 18
Spain	0.32	Statute	National	Only below 16

Source: Neumark and Wascher (2004: 228, 244 – 247). Average wages are either median or mean wages, dependent on the data source used by the authors. Own compilation. "Some" means that due to the minimum wage setting procedure, i.e. negotiations on industry level there are youth subminima in some industries but they might differ substantially. Data for Austria are missing.

2.3. Educational Attainments

To deepen the understanding of labour market chances of young people, also individual characteristics have to be considered. The two most important factors are gender and educational attainments. Gender differences in unemployment rates are not discussed in my thesis as search and matching models are not well-equipped to capture gender effects in the labour market. This section focuses on the educational attainments of youth.

Due to the upper limit of the age group covered, there is the risk of a biased picture of educational attainments as many young people have not reached their final level of education at the age of 24.

The average age at exit from the educational system in 2009 is below 24 in all of the covered countries: it ranges from 20.1 in the United Kingdom to 22.4 in Germany. The average age at exit from tertiary education in 2009 is, however, above 24 in Germany and Italy (25.8 and 25.6 respectively) and close to 24 in basically all other countries (e.g. 22.9 in France, 23.4 in Spain). (Eurostat, 2015(e)) However, although the share of tertiary graduates increases in all countries if people between 25 and 29 are also considered, magnitudes relative to the EU 15 average do not change, i.e. countries with a relatively low share of tertiary graduates among

15- to 24-year-olds also exhibit a relatively low share if the age group is enlarged (Eurostat, 2015(f)).

Table 3: Youth by educational attainment (in % of total youth population); 2004, 2007, 2010, 2014

	2004			**2007**			**2010**			**2014**		
	low	medium	high	low	medium	high	low	medium	high	low	medium	high
Austria	47,0	49,5	3,4	50,1	48,1	1,8	49,3	48,1	2,7	40,0	44,7	15,3
France	47,1	38,2	14,7	44,3	40,8	14,9	43,4	42,3	14,3	40,3	44,9	14,9
Germany	60,5	37,3	2,2	60,5	37,5	1,9	56,7	40,7	2,6	53,9	42,9	3,2
Greece	43,0	52,5	4,5	44,8	50,1	5,1	45,0	50,1	4,9	41,6	52,7	5,6
Italy	55,1	43,5	1,3	53,9	42,5	3,6	53,9	43,0	3,0	51,3	44,5	4,1
Spain	54,5	32,8	12,7	54,4	32,6	13,0	54,3	33,0	12,7	51,5	36,3	12,1
UK	33,3	55,3	11,5	29,0	57,7	13,3	25,3	59,3	15,4	21,1	61,3	17,6
EU 15	50,8	41,5	7,7	49,4	42,3	8,3	47,5	43,8	8,7	44,2	45,9	10,0

Data: Eurostat, (2015(f)). Short description: Educational level "low" refers to ISCED levels 0 – 2, i.e. primary education and lower secondary education, "medium" refers to ISCED levels 3-4, i.e. upper secondary and post-secondary non-tertiary education and "high" refers to ISCED levels 5-6, i.e. tertiary education.

Table 3 shows youth education levels for selected years and countries. The lowest rate of youth with a high educational level, i.e. with tertiary education, in 2014 can be observed in Germany, with only 3.2%, followed by Italy and Greece with 4.1% and 5.6% respectively. The highest rate can be observed in the United Kingdom with 17.6%. Increasing trends in the share of tertiary graduates between 2004 and 2014 can in particular be observed in Italy and the United Kingdom. While the share of youth with tertiary education in the United Kingdom is the highest, the share of youth with a low education level is also (by far) the lowest, with only 21.1% in 2014. Very high levels of youth with low educational attainments are observed in Germany, Italy and Spain. The share of youth with only primary education has decreased in all countries, but especially in the United Kingdom, where it dropped from 33.3% in 2004 to 21.1% in 2014.

Generally it can be expected that persons with a higher education level have better employment prospects. It has been argued that a stronger demand for highly skilled people is a reason for better employment opportunities. However, although the skills among youth are generally rising compared to older generations, the relative position of youth compared to adults has not improved. Therefore, there might be a second skill-bias at work: a decreasing substitutability of education and experience, leading to a penalty for young workers in terms of pay and employment. (Ryan, 2001:53-56) The last proposition will be further discussed later in this thesis.

Table 4 gives an overview of unemployment rates for youth by educational attainments, relative to the overall unemployment rate and shows that relative unemployment rates are lowest for those with the highest level of education. However, it is not true that those countries with the highest shares of tertiary graduates exhibit the lowest youth unemployment rates overall.

Table 4: Youth unemployment rates by educational attainment relative to the overall youth unemployment rate; 2004, 2007, 2010, 2014

	2004			2007			2010			2014		
	low	medium	high	low	medium	high	low	medium	high	low	medium	high
Austria	1,86	0,86		1,43	0,72		1,33	0,80		1,40	0,87	0,70
France	1,50	0,86	0,60	1,55	0,83	0,64	1,56	0,87	0,59	1,67	0,95	0,60
Germany	0,96	0,98	0,52	1,33	0,75	0,55	1,37	0,76	0,67	1,53	0,70	0,58
Greece	0,86	1,02	1,12	0,78	1,03	1,39	0,96	0,95	1,30	0,97	1,02	0,94
Italy	1,20	0,91	1,34	1,11	0,93	0,98	1,11	0,95	0,83	1,14	0,96	0,80
Spain	1,06	0,95	1,01	1,13	0,91	0,74	1,19	0,83	0,69	1,15	0,94	0,74
UK	1,66	0,64	0,35	1,85	0,78	0,52	1,74	0,86	0,61	1,92	0,91	0,58
EU 15	1,11	0,76	0,64	1,27	0,78	0,69	1,30	0,80	0,73	1,28	0,81	0,67

Data: Eurostat, (2015(g)) and Eurostat, (2015(a)). Own calculations: Youth unemployment rate by educational attainment divided by the total youth unemployment rate. Data for Austria in the years 2004/07/10 are missing.

Payoffs to education in terms of lower unemployment rates are particularly high in the United Kingdom, Germany and France, where in 2014 the unemployment rate of highly skilled youth is 58%, 58% and 60% respectively of the overall unemployment rate for youth. The worst employment chances for low skilled youth can be observed in the United Kingdom - where the unemployment rate is 1.92 times the overall unemployment rate - in France and Germany. An interesting case is Greece, where in 2004, 2007 and 2010 the risk of unemployment for high skilled youth was higher than for the average. In Spain and Italy a similar particularity can be observed in 2004, it vanishes however in the following years. Finally, employment prospects have worsened for low skilled youth in most countries (except from Austria and Italy) between 2004 and 2014.

Not only the level of education but also the specificity and especially firm-based training might be of relevance for chances of youth getting into employment (this proposition will be covered in sections 3.4 and 3.5). Graph 6 shows the percentage of students in upper secondary education enrolled in a program that is vocationally specific, i.e. preparing for a certain occupation or field of work. The graph shows that especially Austria and Italy have high levels of vocational education, above 50%. Greece and the United Kingdom, on the other hand, exhibit very large levels of general education. It has to be noted that systems of vocational education differ very strongly and thus such numbers have to be interpreted with great care. One impor-

tant difference is the degree of combined school-and-work based training, also known as dual system. Especially the German-speaking countries exhibit high levels of this type of vocational education and training (VET).

Graph 6: Upper secondary enrolment rates by program orientation (general, vocational, vocational combined school-and-work based only); 2012
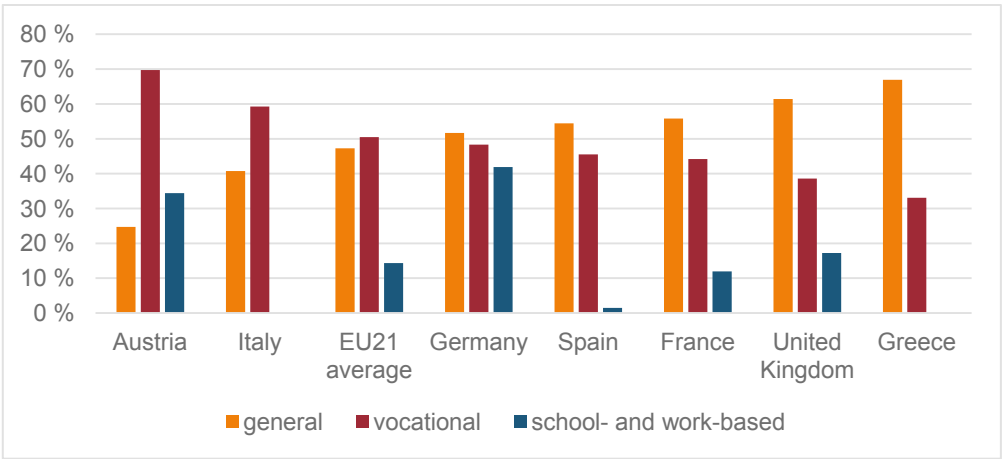
Data: OECD, (2014(a): 314).

One last question to address in this section is the degree of (qualification) mismatch, i.e. to which extent years of education of workers correspond to the requirements at their job. This is to be marked-off from the concept of a skills shortage, referring to a misalignment in the demand and supply of particular skills in the economy. Estimations of mismatch depend crucially on the concept of mismatch and the method used. The further-discussed numbers were obtained by a normative approach: the actual level of educational skills of workers was compared to a level of education assigned to the occupation they are working in. Those with higher educational attainments than the occupation requires were considered as overeducated and those with a lower educational level as undereducated. (ILO, 2013: 23 - 29) For the full data see Table 8 in Appendix E.

A decrease in undereducation of young compared to mature workers can be observed in all countries except from Germany. There, not only undereducation among young people is substantially higher than for the mature group (in 2010 more than twice as high) but also in total numbers a substantial increase between 2002 and 2010 can be observed. In 2004 the highest levels of undereducation were found in Austria, Spain, Italy and the United Kingdom. Overeducation is in general a much smaller problem, although a strong increase can be observed in the United Kingdom and in France. Moreover, in Greece, Spain and the United Kingdom shares of overeducation among young people are much higher than among the mature group.

3. *Theoretical Analysis*

3.1. A Standard Search and Matching Model

As a first step, a standard search and matching model with endogenous job destruction as developed by Mortensen and Pissarides (1994) and discussed again in Pissarides (2000) is presented. This model will serve as a reference point and will be modified in the following sections in order to capture more aspects of the labour market.

Pissarides (2000) describes the labour market as a place of trade characterised by incomplete information, frictions and heterogeneities, making the searching process for firms and workers costly and time-consuming. These features are captured by a matching function that defines the number of jobs that are created at any moment in time and depends on the tightness of the labour market, i.e. the number of vacancies for given unemployment. (Pissarides, 2000: 3 − 5) Firms only can create jobs after they have opened a vacancy and they incur search costs (*pc*), depending on the general productivity parameter (*p*) of the worker. Each firm can only open one vacancy and workers only search for a job if they are unemployed, i.e. there is no on-the-job search. (Pissarides, 2000: 10)

Workers and firms that are matched, are randomly drawn from the total set of unemployed and vacancies, leading to a positive probability at any point in time for a searching worker that he is not matched with a firm (and vice versa for firms). This externality cannot be solved by price adjustments, but the risk of not getting matched is lower for workers if labour market tightness is high (and vice versa for firms). A Poisson process defines the rate at which vacant jobs are filled by $\frac{m(uL,vL)}{vL}$ with L denoting the total labour force, v the rate of vacancies, u the rate of unemployed workers and $m(uL,vL)$ the matching function. The matching function is homogenous of degree one, concave and increasing in both its arguments. The rate at which vacant jobs are filled (q) can be formulated as a decreasing function of labour market tightness ($\frac{v}{u} = \theta$) only: $q(\theta) \equiv m(\frac{u}{v}, 1)$. Workers find a job at rate $\theta q(\theta)$. It is assumed that firms and workers are maximizing their objective function according to their full knowledge of the matching and separation process. This leads to a rational expectations equilibrium with a unique unemployment rate at which flows in and out of unemployment are equal. (Pissarides, 2000: 6/7)

Total productivity of a job consists of a general parameter (*p*) and an idiosyncratic one (*x*). Job separation might take place when a job is hit by an idiosyncratic productivity shock which arrives at Poisson rate λ. Initial productivities of all newly created jobs are assumed to be

maximal ($x = 1$) and if a productivity shock arrives, new productivities are drawn from a distribution *G(x)*, with $0 \leq x \leq 1$. Firms choose a reservation productivity *(x = R)*, such that the value of a job (*J*) with this productivity level satisfies *J(R) = 0,* implicating that production will take place as long as the value of a filled job is non-negative and firms will close down all jobs for which productivity falls below this level. The flow into unemployment is thus determined by the probability that an idiosyncratic shock arrives and by the probability that the shock lowers productivity below the reservation value. (Pissarides, 2000: 37-39)

A match between a worker and a firm yields a pure economic rent in comparison with the state of search, as each pair is equally productive and search is costly. It is assumed that this rent is divided according to the Nash bargaining solution. This implies that wages are set, such that they maximise the product of the net return from workers and firms, weighted by the parameter β, which can be interpreted as the relative bargaining strength of the worker. Net returns are defined as the returns (i.e. expected returns of filled positions for workers (*W*) and firms (*J*) respectively) minus the outside options (i.e. the value of being unemployed (*U*) and the expected return to an unfilled vacancy (*V*) for workers and firms respectively). The first order condition of the maximisation problem satisfies: $W - U = \beta(J + W - V - U)$. (Pissarides, 2000: 15/16) The full set of equations to determine the steady state is given in Appendix B. The three main equations of the model that allow one to determine equilibrium unemployment are:

I.   The *job creation condition* (Pissarides, 2000: 43)

$$(1 - \beta)\frac{1-R}{r+\lambda} = \frac{c}{q(\theta)} \tag{1}$$

The variable *r* denotes the interest rate (Pissarides, 2000: 12).

The equation states that the expected gain from a newly created job has to be equal to the expected hiring costs. The implied job creation curve is downward-sloping in θ/R-space, as a higher reservation value leads, for given market tightness, to a higher probability that the job is destroyed and therefore, firms open less vacancies. Job creation (i) increases with a decrease in the workers' share of the surplus, as opening new vacancies becomes more profitable for firms, (ii) decreases with an increase in the interest rate (because returns are discounted stronger) or with the probability that the job is hit by a shock (because future returns are connected to a higher uncertainty) and (iii) increases with a higher rate at which workers

arrive at vacancies, i.e. a lower mismatch[1], as expected hiring costs are reduced. (Pissarides, 2000: 43/44)

II.   The *job destruction condition* (Pissarides, 2000: 44)

$$R = \frac{z}{p} + \frac{\beta c}{1-\beta}\theta - \frac{\lambda}{r+\lambda}\int_R^1 (s-R)dG(s) \qquad (2)$$

The variable *z* denotes the real return the worker receives while he is searching, which is independent of wages or other returns (Pissarides, 2000: 13). The variable *s* denotes the new productivity after an idiosyncratic shock has arrived (Pissarides, 2000: 40).

The implied curve is upward sloping in θ/R-space because at a higher labour market tightness (at given reservation value) also wages are higher, due to an improvement of the outside option of workers (i.e. it is easier to find a job). Job destruction increases when unemployment income, the workers' share of profits or hiring costs are higher as these factors increase the reservation wages of workers, i.e. the wage at which the worker is willing to work. Moreover, job destruction increases if the probability of shocks increases or general productivity decreases. It can be shown, that the reservation productivity is less than the reservation wage of workers. This implies that there is some labour hoarding of firms, due to a positive option value. Some jobs that are currently unprofitable are kept, due to the possibility that the productivity might change and in this case, the repayment of costs related to hiring can be avoided. (Pissarides, 2000: 44/45)

III.   The *Beveridge curve* (Pissarides, 2000: 40)

$$u = \frac{\lambda G(R)}{\lambda G(R) + \theta q(\theta)} \qquad (3)$$

Equation (3) is the steady-state condition for unemployment and can be derived from the fact that rates into $(\lambda G(R))$ and out of $(\theta q(\theta))$ unemployment must be equal in equilibrium and it can be drawn as a downward-sloping curve in v/u-space (Pissarides, 2000: 40).

Equilibrium unemployment can be determined by the simultaneous solution of equations (1) to (3). Graphically, unemployment is determined by the point where the job creation line is equal to the Beveridge curve (see Figure 1 in Appendix C for illustration). In turn, the job creation line is determined by the intersection points of the job creation curve and the job destruction curve (defined by equations (1) and (2)) in θ/R-space. (Pissarides, 2000: 46/47)

Changes in equilibrium unemployment arise from the following parameter changes (Pissarides, 2000: 48 – 56):

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[1] Please note the different meaning of mismatch compared to the discussion in the empirical analysis in chapter 2. Here mismatch refers to a higher risk for workers and firms of not being matched with each other, regardless of the skills of workers as they are assumed to be homogenous concerning their productivity.

(i) A positive productivity shock, i.e. an increase in p, leads to a decrease in unemployment. Job creation is not affected by p but job destruction decreases and thus the reservation productivity; labour market tightness increases due to lower job destruction. As job destruction decreases, unemployment has to follow, in order to assure equality between flows in and out of unemployment, leading to a reduction in equilibrium unemployment.

(ii) The effects of a change in the idiosyncratic parameter, i.e. changes in its probability distribution, depend on how they are modelled: if the probability distribution is shifted to the right, this leads to a decrease in unemployment; the effect of a mean-preserving increase in the variance has ambiguous effects on unemployment.

(iii) An increase in the arrival rate of idiosyncratic shocks λ leads to a decrease in job creation due to higher uncertainty but at the same time influences the reservation productivity, which is now lower, as the option value of the job has increased. Market tightness also falls. The job destruction rate increases directly, due to an increase in λ, but decreases, due to a decrease in R. It is assumed that the direct effect dominates, and thus equilibrium unemployment increases.

(iv) A higher mismatch leads to a fall in job creation and job destruction, first, due to the increase in mismatch and second, due to a lower labour market tightness, which in turn reduces the reservation productivity. Generally, it is not clear which rate falls more heavily but the direct effect of an increase in mismatch is assumed to dominate (leading to a stronger fall of job creation) and thus unemployment rises.

(v) A higher workers' share implies that job destruction rises and job creation falls at the same time. Effects on unemployment are ambiguous, however, under the restriction that $\beta = \eta(\theta)$, with $\eta(\theta)$ being the elasticity of θ, an increase in β leads to an increase in equilibrium unemployment.

In order to reach consistency, I will furthermore use the variable names introduced by Pissarides (2000) for all already known variables.[2]

3.2. Employment Protection Legislation

In this section I will follow the approach of Blanchard and Landier (2002) to model the effects of employment protection legislation. For the analysis of youth unemployment it is par-

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[2] None of the papers I will further discuss follow the distinction between general and idiosyncratic productivity but only consider the latter type. Thus, from now on, I will define $p = \theta q(\theta)$ as job finding rate of workers instead of general productivity. Otherwise, variable names of models are only changed if they are double. Please see the list of abbreviations for a consistent definition of the variable names.

ticularly interesting to see the effects of lowering employment protection of entry-level jobs (in reality these are often temporary jobs) while keeping the protection of permanent contracts unchanged.

Blanchard and Landier (2002), in contrast to Pissarides (2000), assume that firms are able to fill positions immediately, implying a very low level of market tightness. Moreover, it is not assumed that initial productivity of a job equals one, but that it is equal to some value x_0. If the job is hit by a productivity shock, the new productivity (x) is drawn form a cumulative distribution function $G(x)$ with expected value Ex. The initial value is assumed to be lower than the expected value. The idea behind these assumptions is that new workers, occupying entry-level jobs, are less productive and workers only increase their productivity over time, leading to regular jobs, if they are not laid off due to the arrival of a productivity shock. If workers are laid-off, they have to look for another entry-level job. Thus the model implies a work life cycle, where a regular job is often preceded by a number of entry-level jobs. The assumption that productivity only changes once and is constant afterwards, captures the idea that regular jobs are more secure compared to entry-level jobs. The central characteristic of the model is the introduction of firing costs that are assumed to be pure waste. Firing costs are different for entry-level (f_0) and regular (f) jobs. Entry into the labour market as unemployed and outflows from the labour market, by going into pension, evolve at an equal rate δ. (Blanchard and Landier, 2002: F 215/216)

The equilibrium is characterised by two equations, determining the reservation productivity (R) and the present value of being unemployed (U), which can also be interpreted as the expected lifetime utility of entrants and thus is an indicator for welfare and labour market conditions. (Blanchard and Landier, 2002: F 218/219)

Equation (4) determines the choice of the reservation productivity:

$$[J(R) - J_0 + k_0] + \{W[\omega(R)] - U\} = f - f_0 \tag{4}$$

$J(R)$ is the discounted value of a job with productivity R, J_0 denotes the value of an entry-level job, W denotes the value to workers of being employed and U the value of being unemployed. The left-hand side gives the surplus for the firm and the worker of a match with productivity R. If the choice of R were efficient, this expression would be equal to zero. However, this is not generally the case: If lay-off costs for regular jobs are higher, this gives bargaining power to the workers, allowing them to ask for higher wages. Firms in turn react by asking for a higher minimum productivity, i.e. they raise the reservation productivity. Note that also the Nash bargaining condition does not yield a privately efficient solution, as in equi-

librium, the surplus is equal to k_0, which is generally not equal to zero. (Blanchard and Landier, 2002: F 219/220)

From equation (4) the so-called *lay-off relation* can be derived:

$$\frac{R+\delta c_x}{r+\delta} - U - f = -f_0 + (f - f_0) \tag{5}$$

The variable c_x denotes constant hiring costs. The equation replicates the result that the total surplus of a match with productivity R is not drawn down to zero anymore but that there are distortions due to firing costs. The higher the difference between firing costs for entry-level and regular jobs, the larger the distortion and the higher the reservation productivity. (Blanchard and Landier, 2002: F 219/220)

The *hiring relation* is given by equation (6):

$$x_0 + \delta c_x + \lambda \int_R^\infty \frac{x+\delta c_x}{r+\delta} dG(x) - \{r + \delta + \lambda[1 - G(R)]\}(U + c_x)$$

$$= \lambda G(R)f_0 + (r + \delta + \lambda)f_0 \tag{6}$$

This equation is similar to the job creation condition in the standard model and says that total gross surplus (left-hand side) from a newly created position should be equal to the hiring costs. Again, there are distortions due to the firing costs f_0 as without them, total surplus would be drawn down until it is equal to the expected firing costs, i.e. equal to the first term on the right-hand side. (Blanchard and Landier, 2002: F220/221)

The *lay-off relation* is upward sloping in *U/R*-space, because an increased value of being unemployed is equivalent to an improvement of the outside option of workers which allows them to ask for higher wages and is thereby connected to a higher reservation value. (Blanchard and Landier, 2002: F 220)

The reservation productivity has ambiguous effects on the value of being unemployed in the *hiring relation*. On the one hand it leads to a higher productivity of continuing jobs, on the other hand the probability that workers have to be laid off increases. It can be shown that at least in equilibrium, the effect on job destruction is stronger and thus welfare decreases. The curve can be either drawn flat or downward sloping in *U/R*-space and the equilibrium is given by the intersection point of equations (5) and (6). A decrease in the lay-off costs for entry-level jobs, while keeping the lay-off costs for regular jobs constant, has in principle an ambiguous effect on welfare.[3] However, if the difference between lay-off costs is positive and/or

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[3] It leads to an increase in the difference between the lay-off costs, which shifts the lay-off relation downwards, implying a lower level of welfare for given reservation productivity. At the same time the distortion of the hiring relation is decreased (by decreasing the bargaining power of entry-level workers) and thus the curve shifts upwards, implying a higher level of welfare for given R. (Blanchard and Landier, 2002: F222/223)

the change in the lay-off rate is sufficiently high, welfare is increased. (Blanchard and Landier, 2002: F221 – F224)

Blanchard and Landier (2002: F 224/225) show that if lay-off costs on entry-level jobs are reduced (given that $f - f_0 > 0$),

(i)   the lay-off rate, $\lambda G(R)$, increases (due to an increase in R),

(ii)   the hiring rate $q(\theta) = \frac{(r+\delta)}{f_0} U$ increases *if* the reform leads to an increase in welfare and thus the duration of unemployment decreases,

(iii)   the effect on the unemployment rate $u = \{q(\theta) + \delta - [\lambda G(R)q(\theta)]/(\lambda + \delta)\}$ is ambiguous, as the increase in labour turnover ($G(R)$) at least partly offsets the increase in the hiring rate (if there is an increase at all).

The model of Blanchard and Landier (2002) is restrictive in the sense that only entry-level jobs can be created and only later on transformed into permanent ones. An extensions of the model can be found in Cahuc and Postel-Vinay (2002). They allow for the creation of both types of jobs and entry-level jobs can either be terminated at no cost or firms can transform a certain share (which is determined by the government) of them into permanent jobs. Lay-off costs only apply to regular contracts and they take the form of a tax, which is redistributed via a lump-sum transfer. There are no assumptions on the initial productivity which is only revealed after a match is formed and not known at first contact. Despite these differences to Blanchard and Landier (2002), they also come to the conclusion that an increase in the share of entry-level jobs that can be created, which is equivalent to a decrease in the firing costs for these jobs, has ambiguous effects on unemployment, as job creation and job destruction increase at the same time. Bentolila et. al. (2012(a)) extend the model even further by assuming that wages are only renegotiated for permanent jobs. Furthermore, the costs for permanent jobs not only contain lay-off costs but it is assumed that the lay-off process takes time, for example because legal disputes have to be settled. During this span of time the productivity of the worker is assumed to be on its minimum level. In general, the ambiguous effect of an increase in the number of temporary jobs that can be created on unemployment holds. However, they come to the conclusion that if the gap in the protection of temporary and permanent jobs is very large and the protection of permanent jobs is further increased or the share of temporary jobs that can be used is increased, unemployment rises.

3.3. Minimum Wages

The model presented in this section extends the standard model in two respects. Firstly, minimum wages are taken into account and are introduced to the model. Secondly, there are

now two types of workers, experienced and unexperienced ones. I have chosen to follow Gorry (2013) by implementing these two modifications at the same time, because thereby the effects of minimum wages specifically on youth unemployment can be discussed.

As in Blanchard and Landier (2002), Gorry (2013) assumes that labour market participants enter and exit at an equal rate (δ). There are two types of workers, experienced (e) and inexperienced (n) ones, which can be hired at flow cost c, which differs depending on the worker type. For inexperienced workers the productivity (x_n) is drawn from distribution $G(x)$, while the productivity of experienced workers is set constant at x_e. Wages are generally paid according to the productivity level and as before, they are determined by the Nash solution to the bargaining problem. Wages are subject to a tax τ. Workers are hit by separation shocks which occur at different rates, depending on whether a worker is experienced or not (ρ_i $with$ $i \in \{e, n\}$). As before, there also exists an idiosyncratic productivity shock (λ) which now, however, only affects inexperienced workers. Inexperienced workers gain experience at rate ϑ and thereby end their previous, inexperienced, match. (Gorry, 2013: 59/60)

Minimum wages ($\bar{\omega}$) are assumed to be binding for workers without experience, such that $\bar{\omega} > \omega_n(R)$, indicating that there are some inexperienced workers which want to work at minimum wage but are not employed, because their productivity is not sufficiently high. The productivity threshold at which firms start to employ inexperienced workers is defined by x_n^{MW} (which is an increasing function of $\bar{\omega}$) such that the value of a filled employment position is $J_n(x_n^{MW}) = 0$ (replicating the free entry condition). $\bar{x}_n^{MW}$ is the productivity threshold where wages start to rise above the minimum wage, such that $\omega_n(\bar{x}_n^{MW}) = \bar{\omega}$ and is also an increasing function of the minimum wage. For productivities between these two thresholds, workers receive the minimum wage and workers with higher productivities receive the wage given by the wage equation as in the standard model. (Gorry, 2013: 62)

This leads to a new expression for the zero profit condition (equivalent to the hiring relation) for the firm, given by equation (7).

$$\frac{c_n}{q(\theta_n)} = \frac{1}{r+s+\vartheta+\rho_n+\lambda}\left(\int_{x_n^{MW}}^{\bar{x}_n^{MW}}(x - x_n^{MW})dG(x) + \frac{1-\beta}{1+\beta^\tau}\int_{\bar{x}_n^{MW}}^{\infty}(x - \bar{x}_n^{MW})dG(x) + \right.$$
$$\left.(1 - G(\bar{x}_n^{MW}))(\bar{x}_n^{MW} - x_n^{MW})\right) \tag{7}$$

It is straightforward to show that all terms on the right-hand side (giving the expected surplus of the firm) decrease with an increase of the minimum wage and thus, hiring is reduced.

An increase in the minimum wage will have two effects: first, a direct effect by making fewer jobs available for workers and second, an indirect effect resulting from the lower probability of a successful match and the decrease in the expected return to vacancies, leading to a reduc-

tion of vacancies posted. Moreover, the reservation productivity, which also gives the productivity level at which a worker is willing to work, is changed. The minimum wage implies that fewer jobs are available, thus decreasing the expected value of presently unemployed people and thereby R. This is further enhanced by firms posting fewer vacancies, as described above. On the other hand, some workers will receive the minimum wage (due to a stronger bargaining position), although their actual productivity would imply a lower wage, which increases the reservation productivity. The effects on unemployment are thus ambiguous. If it is assumed that the decrease in R is stronger than the increase, the job finding rate of young, inexperienced workers decreases and thus unemployment will increase. (Gory, 2013: 63)

3.4.   Aggregate Effects of Individual Educational Decisions

There is a vast literature on educational decisions focusing on different aspects. In the following section, I present a model by Wasmer (2006), who focuses on explaining investments in specific and general skills and shows that they strongly depend on job finding rates within an economy. Investment decisions in skills can lead to very different types of labour markets, which in turn can lead to different employment prospects of youth, discussed later in chapter 4. Under the assumption that general skills correlate with a higher level of education, as it enables workers to perform a higher range of tasks (see Charlot et.al., 2005: 1008), Wasmer (2006) also covers (although not explicitly referring to it) ideas of Moen (1999), who has shown that there might be an incentive to overeducate in the presence of unemployment, and Burdett and Smith (2002), arguing that undereducation might occurs, if individuals cannot hope to recover their investments in education through higher wages.

Wasmer (2006: 812/813) assumes that workers decide on whether to acquire general or specific skills instantaneously after they enter a job and that they have to carry the costs for it themselves. Specific and general human capital of workers is denoted by h^s and h^g respectively, with $h^g < h^s$, as specific skills are related to a higher level of productivity. By the participation constraint $W^{k(i)} - C^i \geq U^0$ it is assured that workers are not held back from investing into skills by education costs. It says that the net asset value expected from the chosen skills (asset value of a job (W) minus costs (C)) has to be larger or equal to the expected asset value for someone unemployed (U), who has not made a skill decision already (with $i = s, g$ and $k(i)$ being a state variable of the employed worker, denoting his/her skills). If the worker changes to another firm, specific skills are lost (as they cannot be used as productively in a new firm) but general skills stay productive.

The productivity of a worker in a firm depends not only on the acquired human capital, but also on a firm-specific random factor ε. The timing is as follows: workers enter the firm and decide on their human capital investment, correctly anticipating future wages and the job duration. After this, firm and worker bargain a wage and re-bargain after every new draw of the firm-specific factor. After job creation, firms have to pay a firing tax f if they want to lay off the worker, in cases where the random factor ε, which is newly drawn at random time, does not allow for a positive surplus. (Wasmer, 2006: 813)

It is assumed that if workers prefer specific skills over general skills on their first decision, they will never invest in general skills. If the worker prefers general skills, he will never invest in specific ones, as his acquired skills stay productive after separation from a firm. If a worker is indifferent between general and specific skills, he will always choose general skills if he has chosen general skills at the first decision after randomising and will always randomise if he has chosen specific skills at his first decision. Bargaining on wages evolves as in the standard model, according to the Nash bargaining rule, with outside options U^k and V for workers and firms respectively. Note that after the initial wage is negotiated, the outside option for firms changes to $V - f$, as they have to pay a firing tax. (Wasmer, 2006: 813/814)

In partial equilibrium it holds that (i) unemployed workers are better off if they have general skills (as they don't have to invest in acquiring skills again, which is equivalent to an improvement of the outside option), (ii) jobs last longer if workers have specific skills as the limit productivity (i.e. the reservation productivity) is lower, and (iii) the ultimate choice depends on which of these two effects is stronger. To further illustrate point (ii), note that due to the higher outside option of workers with general skills, the expected surplus by firms is reduced and thus, these kind of jobs are more often destroyed. The fact that general skills are connected to a lower productivity makes this effect even stronger, but is not a necessary assumption.[4] (Wasmer, 2006: 815/816)

Essential for the educational decision are the variables p, i.e. the job-finding rate, and V, i.e. the threat point of firms, which in turn also depends on the job-finding rate. For a given value of V, workers will invest in specific skills if the job-finding rate is low and vice versa for general skills. If the job-finding rate is low, people try to get jobs of longer duration. Moreover, they are not expecting to lose their jobs very frequently and thus, the risk of losing the in-

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[4] The reservation wage is determined by the equation:

$$R^k + h^k + \frac{\lambda}{r + \lambda + \delta} \int_{R^k}^{\varepsilon_0} \big(1 - F(\varepsilon')\big) d\varepsilon' = (r + \delta)\big(U^{k\prime} - f\big) + rV$$

The reservation wage is higher the lower human capital, the lower the intensity of the Poisson process of ε, the higher the entry and exit rate into the labour market and the higher the discount rate. It is also higher if $U^{k\prime}$ and V increase or f decreases. (Wasmer, 2006: 814)

vestment in skills is small. Moreover, there is a value of p for which workers are indifferent towards investment in the two types of skills. For a given value of p, there are values of V for which workers do not invest in skills at all, as the expected surplus decreases, and these values decrease with an increasing job-finding rate. (Wasmer, 2006: 816/817) For a graphical illustration of the supply decision of skills see Figure 2, Appendix C.

In principle, three different "regimes" can occur in the labour market. Two pure regimes, where all workers either acquire general (G) or specific skills (S) and one mixed (M) regime. Job-finding rates depend on which regime occurs and both (finding rates and regimes) are determined by the free-entry condition, i.e. that the expected value of a vacancy has to be zero in equilibrium. (Wasmer, 2006: 818)

If the bargaining power of workers is close to zero, workers will not invest at all in skills, as they cannot expect to receive an adequate share of the surplus. If the bargaining power is small this implies that labour market tightness is large and in equilibrium, i.e. if $V = 0$, regime "G" will occur. If the bargaining power is close to one, regime "S" will occur. The effects of the layoff tax are similar: high taxes will reduce labour market tightness and the firms' share of the surplus and thus make regime "S" more likely. Sufficiently high levels of the tax might even discourage any investment in skills at all. A similar effect can be created by an increase in search frictions or of unemployment benefits. (Wasmer, 2006: 819/820)

3.5. Education as a Signal – Learning on Match Quality

In order to investigate the effects of the education system in a country on the chances of young people getting into employment, uncertainty on the actual productivity of the job seeker is introduced into the standard model. I follow Pries and Rogerson (2005), who have developed a matching model where real productivity is not fully revealed at first worker-firm contact but only after the match has already started.

It is assumed that the match quality is an inspection good, as firms and workers receive a signal π on match quality at their first contact, as also an experience good. The value of the signal gives the probability that the productivity of the match turns out to be high and is drawn from a cumulative distribution function $H(\pi)$. If a firm and a worker are matched, the observed output after one period is given by $x_t = \bar{x} + \varepsilon_p$. Thus, the observed productivity at the end of any period is the sum of the actual productivity ($\bar{x}$) and an i.i.d. random variable (ε_p). The actual productivity can take two values, high ($\bar{x} = x^g$) or low ($\bar{x} = x^b$), leading to either good or bad matches. Under the assumption that ε_p is uniformly distributed on $[-\gamma, \gamma]$, it is not possible to distinguish a good from a bad match if the observed productivity is be-

tween $(x^g - \gamma)$ and $(x^b + \gamma)$ and thus the actual productivity remains unknown. A match will be revealed to be good with probability $\alpha\pi$, where $\alpha = (x^g - x^b)/2\gamma$ is the probability that the match is revealed at the end of the first period. A match might become unproductive at the end of each period with probability λ. In this model both posting a vacancy and creating employment positions are costly.[5] The assumptions on timing are that search takes place in period t, matches become productive in period $t + 1$, productivity of a prior unknown match-type is revealed at the end of period t and matches are dissolved at the beginning of period $t + 1$. (Pries and Rogerson, 2005: 816-818)

Pries and Rogerson (2005: 820/821) characterise the equilibrium (just as in the standard model) by labour market tightness (θ) and the reservation value ($\bar{\pi}$) (which is a probability in this case). They do so with the help of the surplus function, defined as $S(\pi) = J(\pi) + W(\pi) - U - V$ (the meaning of the variables is as before). Substituting the explicit expressions for $J(\pi), W(\pi), U$ and V (which will not be repeated here) and performing some reformulation (by using the bargaining rules) yields the *surplus function*:

$$S(\pi) = max\{\pi x^g + (1 - \pi)x^b - a + r(1 - \lambda)[\alpha\pi S(1) + (1 - \alpha)S(\pi)] -$$
$$\frac{v\theta}{u(1-\theta)}[(1 - r)c_e + c_v] - [1 - r(1 - \lambda)]c_e, 0\} \qquad (8)$$

The disutility of working is denoted by a, r is the common discount factor, $S(1)$ is the surplus of a good match, c_e is the cost for opening an employment position and c_v the cost of opening a vacancy (Pries and Rogerson, 2005: 816/817).

The first two terms of equation (8) denote the expected output from a current period match of unknown quality. The third term denotes the disutility of working and the fourth term denotes the future expected discounted profits, with $(1 - \lambda)$ being the probability that the match remains productive. (Pries and Rogerson 2005: 819)

It can be shown that the fifth term is equal to the discounted utility of being unemployed for the worker rU. The interpretation of the last term is less intuitive but comes from the equality $V = c_e$ (replicating the job creation condition in the standard model) that has to hold in equilibrium. The equilibrium is determined by the condition that the surplus for a match with a productivity equal to the reservation value has to be zero. Graphically it is determined by the intersection of an optimal match formation condition and the free entry condition. (Pries and

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[5] This assumption enables the authors to distinguish between worker turnover and job turnover, i.e. it is possible to say whether, after a separation, the job is terminated or filled by another worker. This was the ultimate aim of the paper by Pries and Rogerson (2005), but it is less relevant for the context of this thesis.

Rogerson 2005: 820 – 822) For further information on equilibrium determination please see Appendix C.

Finally, by discussing the effects of labour market policies in their model, the authors find negative effects of minimum wages, layoff costs and unemployment insurance on job finding rates, making the opening of vacancies less attractive. (Pries and Rogerson, 2005: 822-829)

Bucher (2011) explicitly inquires the effects of match specific learning on the differences in unemployment rates of youth compared with other workers in the setting of Pries and Rogerson (2005).[6] It is assumed that in each period δ denotes the fraction of young workers that enter and exit the labour force. Not all of them enter as unemployed but a fraction ζ starts as employed. The probability for a worker of entering employment is thus $(1 - \delta)p(\theta)$ and firms fill their vacancy with probability $(1 - \delta)q(\theta)$. Moreover, it is not assumed that opening an unfilled employment position creates any costs. (Bucher, 2011: 5/6)

Workers employed in a good match have a smaller probability of becoming unemployed than those employed in a match of unknown quality. While the unemployment risk for those in a good match is given by $(1 - \delta)\lambda$, for matches of unknown quality the risk increases to $(1 - \delta)[\lambda + (1 - \lambda)\alpha(1 - \psi)]$. The variable ψ denotes the probability that the match is of good quality and is the empirical proportion of good matches in the labour market. A different variable is used here compared to the Pries/Rogerson model, as the probability is now not drawn from a probability distribution, but common knowledge to workers and firms. The different lay-off probabilities imply that it takes some time to enter stable employment and this might require a sequence of more risky employment relationships. (Bucher, 2011: 6 – 9)

Bucher (2011: 12/13) further divides the labour force into age cohorts, indexed by their age A. Initial unemployment is given by $u_0 = (1 - \zeta)$. In the standard model it is assumed that all young workers enter the labour market as unemployed, thus young workers have the highest unemployment rates but they decrease towards the steady state level. The transition is faster the higher p, i.e. the probability of finding a job. The cohort specific unemployment rate evolves according to:

$$u_{A+1} = (1 - \delta)(1 - p)u_A + (1 - \delta)\lambda(1 - u_A) \tag{9}$$

The equation says that the unemployment rate of the current period is the sum of those unemployed in the previous period that were not able to find a job and of those who were in employment in the previous period but lost their jobs.

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[6] In the following, the variable names of Pries and Rogerson (2005) are used.

Bucher (2011:13) points out that, given data on the French labour market, levels of youth unemployment do not evolve according to this equation. In reality, the gap between youth and adult unemployment is much larger. This can be accounted for if those employed in a match of unknown quality are considered. This number is given by $e_{n,0} = \zeta$, saying that young people either enter the labour market unemployed or in a match of unknown quality. The unemployment rate now evolves according to:

$$u_{A+1} = (1 - \delta)(1 - p)u_A + (1 - \delta)\lambda(1 - u_A) + (1 - \delta)(1 - \lambda)\alpha(1 - \psi)e_{n,A} \quad (10)$$

$$\text{with } e_{n,A+1} = (1 - \delta)pu_A + (1 - \delta)(1 - \lambda)(1 - \alpha)e_{n,A} \quad (11)$$

Equation (10) is similar to equation (9) but extended by the number of those who lost their job in the previous period and were prior employed in a match of unknown quality. This slows down the convergence to the adult unemployment rate.

According to the above stated equations the most important factors influencing the level and the speed of adjustment of youth unemployment to its steady state level (and thereby the gap between youth and adult unemployment) are:

- the share of young people immediately in employment after entering the labour market ζ ,
- the job finding rate p[7], as it influences the adjustment speed,
- the probability that the match quality will be revealed in the current period α, leading to a smaller share of those employed in a match of unknown quality in the next period[8],
- the probability that the match is of good quality ψ, because it increases the adjustment speed of youth unemployment to its steady state level.

I will now go into further detail on the observable empirical equivalences to these variables. It is necessary to say at least whether the values of these variables are high or low in the discussed countries, in order to assess their impact on youth unemployment. For the explicit assignment of values (high, low or medium) to the variables see Appendix D.

The job finding rate p depends, per definition, on the matching function and on the labour market tightness. I will not go into further detail on these determinants as job finding rates are calculated[9] for the overall population and data are available for the period from 2008 to 2012 (European Commission, 2013: 15/16, 25).

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[7] The job finding rate also plays an important role in the standard model. Note that in the model by Bucher (2011) it enters equation (10) in two ways: while it positively affects the transition out of unemployment this effect is partly offset by an increase in the number of those in a match of unknown quality.
[8] This effect is partly offset as for those with low productivity employed in a match of unknown quality the risk of being laid off is also affected.
[9] For notes on the methodology please see Appendix A.

The variable ψ is defined as the probability that the match will be of good quality. In Bucher (2011) it is the empirical share of good matches, in Pries and Rogerson (2005) the equivalent π is drawn from a probability distribution. In the first case, the values for ψ correspond to the overall mismatch. In the second case it is more difficult to find an empirical equivalent. Although qualification requirements of jobs differ, I assume that for people with more years of schooling the probability of a good match is higher, because basic skills, such as literacy, are necessary and useful for any job. It has been shown that higher levels of literacy do correlate with higher education levels (OECD, 2014(a): 35). Therefore I propose to assume higher expected values of π for those with primary, secondary and tertiary education. Moreover, the distribution might differ with educational systems. I will further on concentrate on secondary graduates, because it is the first group receiving specific preparation for the entrance into the labour market. I assume that the expected value of π for this group increases if:

a) education is more specific, as skills are more firm-specific,

b) there is a large share of school-and-work based programs, as this increases the probability that skills are in line with firm demands,

c) a higher amount of money is spent per student, assuming some correlation with the priority given to the education system by the governments, and

d) students score well in standardised tests, assessing essential skills, e.g. in mathematics and reading, relevant for all jobs.

Using these characteristics provides a less than perfect indicator for the performance of the education system. There are certainly many flaws to standardised tests (see Hopmann et. al., 2007, for criticism on PISA) and money spent on education per student does not allow one to infer directly on the quality or effectiveness of the education system. However, if all these factors are considered simultaneously, they can give an idea of the quality of the education system.

The variable ζ is defined as the share of those young people, entering the labour market directly after leaving school. It is higher the higher the share of those that combine school and work. Finally, the variable α denotes the probability that the match quality is revealed after one period. One possibility is to see α as an empirical probability, more or less equal over all countries. On-the-job training and other factors, allowing firms to learn about their workers, could increase this probability, however, I will not go into further detail mainly due to a lack of available data.

4. Synthesis

To begin the assessment of the theoretical predictions, I want to make the hypotheses resulting from the theoretical models explicit again:

H1:   The higher the minimum wage (relative to productivity) the more difficult it is for young people to obtain a job.

H2:   In the presence of a highly segmented labour market, a further lowering of the protection of temporary contracts leads to a higher labour turnover and possibly (theoretically the effect is ambiguous) to higher unemployment.

H3a: A highly specialised workforce is connected to low job finding rates and high job tenures in the labour market.

H3b: If general education prevails in the workforce, this is connected to high job finding rates, low job tenures and high private investments in education.

H3c: Under-investment in education occurs if workers cannot hope to recover their investment in education through higher wages.

H4:   Low job finding rates, a low probability of a good match quality, a low revelation probability of the match quality and a low share of youth getting into employment directly after school slow down the adjustment of youth to adult unemployment rates.

To organise the further analysis Table 5 gives an overview of the labour market characteristics relevant to evaluate the above stated hypotheses. I have highlighted some common factors among countries and the resulting pattern leads me to arrange the countries in three groups:

1) The German-speaking countries Austria and Germany are characterised by low youth unemployment, low minimum wages, a high segmentation of the labour market, long job tenures, a high share of youth entering the labour market as employed and a high probability that matches will be of good quality.

2) The low job turnover countries Greece and Italy are characterised by high youth unemployment, high minimum wages, high levels of labour market segmentation, long job tenures, low levels of tertiary graduates among youth and a problematic school-to-work transition.

3) The high job turnover countries Spain and the United Kingdom are characterised by high youth unemployment (either total or in relation to adult unemployment), low minimum wages, short job tenures and high levels of tertiary graduates among youth.

The only country that hardly fits into any of these categories is France. In order to simplify the discussion, I will not consider this country in the further analysis.

Table 5: Main labour market characteristics

	MW	LMS	TE	ES	JT[3]	JFR[4]	EH	ER(W)[5]	EL	ψ[6]	E(π)[7]	ζ[7]	YU	YAU
	(2000)	(2007)	(2007)	(2009)	pre-crisis	(2008)	(2010)		(2010)	(2012)	(2011/12)	(2010/12)		
	(H1)	(H2)	(H2)	(H3a)	(H3a/H3b)	(H3b/H4)	(H3b)	(H3c)	(H3c)	(H4)	*(H4)*	*(H4)*		
Austria	L[1]	H	L	H	H	H	L	H	H	H	H	H	L	L
Germany	L	H	H	M	H	L	L	H	H	H	H	H	L	L
Greece	H[2]	H	L	L	H	?	L	?	L	?	L	L	H	M
Italy	H	H	L	H	H	L	L	L	H	L	L	L	H	H
Spain	L	H	H	L	L	H	H	L	H	L	L	L	H	L
UK	L	L	L	M	L	H	H	L	L	L	M	H	L	H
France	H	L	H	M	L	L	H	L	L	L	M	L	L	M

Own compilation either based on the data in the empirical part or on data sources that are explicitly given in the footnotes. Years in brackets denote which year the asserted values refer to. MW: minimum wages; LMS: labour market segmentation; TE: temporary employment among youth; ES: share of youth in upper secondary education receiving vocational education; JT: job tenure for both, adults as well as youth (for France only job tenures of youth are considered); JFR: job finding rates; EH: share of youth with tertiary education; ER(W): relative earnings of workers with a high education level; EL: share of youth with primary education; ψ: empirical probability that a match will be of good quality; E(π): expected value of the signal of match quality (specifically for secondary graduates); ζ: share of youth entering the labour market as employed; YU: youth unemployment rate; YAU: youth-to-adult unemployment ratio; H: high; L: low; M: medium; ?: data are missing.

[1] See Schulten, (2014: 9).

[2] I would classify Greece as "medium" concerning the minimum wage level but in contrast to many other countries there is no youth subminimum.

[3] Source: OECD, (2015(d)). Illustrations are given in Appendix E, Graph 7 and Graph 8.

[4] Source: European Commission (2012: 25). Note that data are only available from 2008 onwards. Job finding rates have dropped in most countries due to the crisis.

[5] Source: OECD, (2014(a)). Data are shown in Appendix E, Table 9.

[6] Source: OECD, (2014(b): 215). Qualification mismatch is considered as well as skills mismatch and field of study mismatch. Therefore data differ from numbers shown in section 2.3. For further details on the methodology see OECD, (2014(b): 230/231).

[7] For sources, construction and evaluation of the parameters see Appendix D, Table 6 and Table 7.

Concerning prediction H1, Neumark and Wascher (2004) have found in a cross-section analysis covering 17 OECD countries (including all discussed countries except for Austria) over the period from 1975 to 2000 that minimum wages lead to a decrease in youth employment. They furthermore come to the conclusion that countries with a youth subminimum have higher youth employment rates and that in general, the effects of minimum wages depend strongly on other labour market characteristics. In particular the negative effects of minimum wages increase with a decrease of the OECD EPL Index, indicating strong effects for Italy and Greece.

There is numerous empirical evidence on the negative consequences of two-tier labour market reforms, as indicated in H2. Boeri and Garibaldi (2007) for example find for Italy that labour market reforms only had a "honeymoon" effect on employment, indicating that only the first impact was positive but vanished in the long run. Although firms are exploiting flexibility in economic upturns, they are constrained in doing so by those protected by high firing costs in downturns, leading to negative effects on productivity. Bentolila et. al. (2012(a)) have shown in a simulation that the increase in unemployment rates in Spain due to the "Great Recession" would have been less strong (4.16% instead of 7.57%) if Spain would have had adopted the French employment protection legislation, characterised by a lower protection of permanent contracts and a higher protection of temporary ones compared to Spain.

This result appears reasonable given that a large share of the increase in unemployment comes from youth unemployment. Youth, mainly employed in temporary contracts, have a higher risk of becoming unemployed, compared to the average, if a productivity shock hits the economy, as they are not protected by high layoff-costs and they are less valuable to firms due to less work experience (Scarpetta et. al., 2010). Adopting the French legislation in Spain would have had prevented firms from firing workers in temporary contracts and would have dampened the negative effect of the bargaining power of permanent workers on job creation.

Labour market segmentation could serve as an explanation for the drastic increase in youth unemployment figures for Italy and Spain (and to a more limited extent for Greece, as the share of temporary employment is relatively small there). However, although Germany in principle should be more prone to the negative effects of labour market segmentation (given the EPL index and the high share of youth in temporary employment), the country exhibits lower youth as well as youth-to-adult unemployment ratios. How is this possible?

First, the economic downturn was less severe and the recovery much faster in Germany than in Spain, Italy or Greece (Eurostat, 2015(n); see Graph 9, Appendix E for illustration). This can explain why youth unemployment rates reacted less markedly in Germany[10].

Second, the use of temporary contracts differs strongly among countries: in Germany in 2012 the main reason for 84.3% of youth being in temporary employment was to receive training. In Spain this share only amounts to 10.3%, while 81.3% of youth reported to be in temporary employment because they were not able to find a permanent position. The latter share only amounts to 6.7% in Germany. For Italy the picture is mixed: 42.3% of youth reported training as main reason for temporary employment, while 44.9% were not able to find a permanent job. (Matsaganis et. al., 2014: 12) If temporary contracts are used as an investment opportunity in firm specific human capital via training relationships, ties between workers and firms become stronger, often leading firms to take on apprentices after the training period[11]. Thus, the risk of being laid off is lower than in the case where temporary contracts are only used to increase flexibility. The view that labour market flexibility is not decisive for the reaction of youth unemployment to the recession, but that the depth of the recession and the education system are very important, is empirically supported by O'Higgins (2012).[12]

The influence of the education system on youth unemployment in general is described by hypothesis H4. As I have already argued, the revelation probability might be of less importance and job finding rates will be discussed later in this section.

Following the hypothesis, good youth employment outcomes in the German-speaking countries can be really seen as a merit of their educational system. In both countries a relatively high share of youth attend combined school-and-work based (dual) programs and in general, many young people are employed while still in education, positively affecting the school-to-work transition. Moreover, education is relatively specific, a large amount of money is spent on education per student and the performance on standardised tests is good, indicating a good quality of the schooling system. Empirical support for the proposition that dual education systems improve the school-to-work transition can for example be found in Gangl (2003).[13] Moreover, the empirical data in Table 5 show that the degree of overall mismatch is low for Austria and Germany. Quite the opposite characteristics as in the German-speaking countries

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[10] Also the distribution of youth employment among sectors and which sectors where hit most hardly by the recession might have played a role (see e.g. Dolado et. al., 2013: 34 – 39).

[11] The share of apprentices taken on by their firms in Germany in 2010 was 61% (Bundesinstitut für Berufsbildung, 2012: 199).

[12] Note that O'Higgins only considers the effect of labour market flexibility in general and not of labour market segmentation.

[13] For a discussion of several empirical papers concerning the effects of vocational schooling and apprenticeships see Eichhorst (2015).

can be observed in Greece and Italy. In these countries, few combine school and work, low amounts of money are spent on education per student and the performance in standardised tests is rather low, especially in Greece. Moreover, mismatch is reported to be very high in Italy. Thus, I want to argue that the structure as well as the performance of the education systems in these countries contributes to poor employment chances for youth. Spain and the United Kingdom show a mixed picture concerning the above mentioned factors, also indicating a rather problematic school-to-work transition in Spain, which is in this respect closer to Greece and Italy. However, Spain as well as the United Kingdom observe a high degree of overall mismatch.

Apart from the education system, also individual investments in education need to be considered. According to Wasmer (2006) I want to argue that Italy exhibits an "S" regime, with a high specificity of skills and low job finding rates, while only the latter might also be true for Greece[14]. In 2009, the average time until the first job was found after leaving school was 10.5 months in Italy, second among the discussed countries after Greece with 13.5 months (Eurostat, 2015(o)). The job tenure of adults in Italy is very long (again second after Greece) at 11.4 years in 2007, further increasing to 11.8 years by 2013 (OECD, 2015(c)). These indicators in support of an "S" regime are complemented by low job finding rates in the whole period from 2008 to 2012 (European Commission, 2013: 25). According to Wasmer (2006), these characteristics provide incentives for youth to acquire specific education in order to increase the probability of obtaining a job and higher job security. Indeed this seems to be an individually rational decision for Italian youth: in 2012 the unemployment rate for adults with upper secondary vocational education was 7.4% compared to 8.9% for those with general education (OECD, 2014(a)).

Coming back to H4, at first glance, the high share of specific education appears to be an advantage for youth in Italy, while the low job finding rates are problematic for the school-to-work transition. However, while the high investment in specific education in Italy should foster school-to-work transitions, few Italian students combine school and work. Thus, both, low job finding rates and a weak connection between education and firms, lead to relatively high youth unemployment compared to adult unemployment.[15]

According to H3b the United Kingdom and Spain can be considered as representatives of a "G" regime, i.e. the workforce is characterised by a high degree of general education and the labour market exhibits high job finding rates. The average job tenure is very low (OECD,

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[14] Data on job finding rates in Greece are missing, however, long job tenures and a high long-term unemployment rate for youth (Eurostat, 2015(r)) implicate low job finding rates for Greek youth.
[15] Support for this proposition can be found in Pastore (2012).

2015(d)) and job finding rates have been high, although they decreased due to the "Great Recession" (European Commission, 2013: 25). The average time before finding a first job in 2009 was only 3.5 months in the United Kingdom, the lowest value among the discussed countries (Eurostat, 2015(o)). The high job turnover in these labour markets provides incentives to invest in higher education and thus in general skills as this allows job seekers to apply for a larger number of jobs. While high job finding rates should work in favour of youth employment, the generality of skills leads to a problematic school-to-work transition, which is especially true for Spain. The educational system in the United Kingdom facilitates the school-to-work transition to a certain extent, compared to Greece, Italy and Spain the share of youth that combines school and work, either part-time or full-time, is rather high (see Appendix D).

I want to make a note on mismatch at this stage. The standard Mortensen/Pissarides model predicts that unemployment increases if the degree of mismatch increases, i.e. if the matching function becomes "less productive". However, there are two possible sources of inefficiencies in matching: they might arise in the labour market (due to a misalignment of demand and supply of skills e.g. due to sectoral shifts, technological change, etc.) or in the interaction between the education system and the labour market (ILO, 2013:23/24). In this thesis I am concentrating on the second aspect, which was discussed in more detail in section 3.5. There, variables affecting the school-to-work transition are considered separate from the matching function. It is not possible to draw conclusions on the source of the mismatch on the basis of the data presented, but in either case theory predicts that unemployment increases[16].

In Italy, a high specificity of skills is connected with underinvestment in the level of skills: the shown data by the ILO (2013: 30) indicate that under-education is substantial and the share of youth with low educational attainments and of those not in employment, education or training are among the highest in the discussed countries, supporting hypothesis H3c.

In Spain as well as in the United Kingdom, the generality of education is connected to a high level of tertiary graduates: in 2014 the share is highest in the United Kingdom with 17.6%, Spain ranges fourth, after Austria and France, with 12.1%. While in both countries the prospects of tertiary graduates of gaining a job are very high (compared to the overall youth unemployment rate), employment chances for those with low education are very bad. In the United Kingdom those with low educational attainments in 2014 had a risk of being unemployed of 192% of the average unemployment risk (by far the highest value among the discussed countries). An explanation for this empirical observation was offered by Dolado et. al.

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[16] Theoretical support for this proposition is various, however, empirical studies do not come to an unambiguous result (Quintini, 2011: 23).

(2000) on the basis of empirical data for Spain. They use a matching model with two types of workers, high and low educated, and two types of jobs, high and low skilled. Low educated workers can only apply for low skilled jobs, high educated workers can apply for both types of jobs. Training is required in low skilled jobs for those with a low educational level, but not for the other type of workers. In a simulation it is shown that an increase in the share of highly educated workers increases unemployment rates for both types of workers, as competition for high skilled jobs rises and low educated workers are crowded out from low skilled jobs. Moreover, under certain circumstances[17] there will be less on-the-job training provided by firms to low educated workers, thus further lowering their employment prospects. (Dolado et.al., 2000: 950 – 955)

Data by the ILO (2013: 30/31) suggest that there was a rapid increase in overeducation among young people in the United Kingdom between 2008 and 2010 while it remained stable and at a low level in Spain. Also the degree of undereducation was significantly reduced in the United Kingdom. These data, however, are only to a limited extent able to support the hypothesis that the findings by Dolado et. al. (2000) are transferable to the United Kingdom because, apart from a crowding out of low skilled, an increase in mismatch could also be due to a better educated workforce in general or a secotral shift. It has to be considered that in general, the sources and effects of overeducation are debatable and it is not clear whether policy action is required at all (Quintini and Martin, 2006: 18/19) while undereducation and low educational attainments of youth, as observed in Italy, are certainly worrisome and call for policy action.

While the presented theoretical and empirical evidence is able to identify several possible sources of unemployment for Italy and Spain, the explanatory power for Greece and the United Kingdom is less satisfying. Labour market segmentation theories only provide limited explanations due to either a low share of youth in temporary employment (in Greece) or a low segmentation of the labour market (in the United Kingdom). Although the school-to-work transition might be problematic, youth-to-adult unemployment ratios are not such a strong concern in Greece, leaving the need for other explanations why youth unemployment has reacted so strongly to the last crisis. The United Kingdom, finally, cannot be put in one box together with Greece, Spain and Italy, considering data on the school-to-work transition. Although there might be some room for improvement in this area, it does not seem to be a sufficient explanation for the very high youth-to-adult unemployment ratios.

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[17] Under the condition that the increase of skilled workers is accompanied by an increase in separation rates and the bargaining power and the reservation wages of workers rise, less on-the-job training will be provided (Dolado et. al., 200: 954/955).

5. Policy Recommendations

Two main areas of reform are discussed, concentrating on long-term measures rather than policies to dampen the effects of the last crisis. Firstly, employment protection legislation, with the aim of diminishing the volatility of youth unemployment and facilitating the entrance to permanent employment positions. Secondly, the vocational education system, to facilitate school-to-work transitions and improve the position in the labour market of the least advantaged, i.e. those acquiring only a low level of skills.

While the increased flexibility in European labour markets, due to a deregulation of temporary contracts, might has contributed to a decrease in unemployment rates prior to the crisis (see e.g. Garibaldi and Taddei, 2013; Bentolila et. al., 2012(b)), the combination with highly protected permanent contracts, was shown to have undesirable effects, actually leading to an increase in unemployment (see e.g. Blanchard and Landier, 2002; Cahuc and Postel-Vinay, 2002), implicating a so-called "honeymoon" effect of two-tier reforms. However, Cahuc and Postel-Vinay (2002) have argued that there might be support for this specific form of labour market regulation by a majority of workers, as only a small share of workers has to expect a direct effect by this policy on their welfare.

Thus, although negative effects on employment in general and the increase of insecurity particularly for youth call for a reform of the legislation, this is politically very difficult. Decreasing the protection of permanent contracts is not feasible, as workers employed in these contracts are usually strongly organised in unions and this is still the type of contract most workers are employed in and thus also the median voter (among those in employment) belongs to this group (see Bentolila et. al., 2008: 53, for Spain). Increasing the protection of temporary contracts at the moment would have negative effects on youth employment as it would reduce hiring during the recovery after the crisis and would diminish potential positive effects. As was noted by Pries and Rogerson (2005), in the presence of matchings of unknown quality, firing costs can be detrimental to employment prospects of youth, by decreasing the probability that firms are willing to hire young people and to wait until the match quality is revealed. Thus, temporary contracts, with lower firing costs, are potentially beneficial for young people. Therefore, several economists have proposed the introduction of a single contract for France (Blanchard and Tirole, 2003), Italy (Garibaldi and Taddei, 2013) and Spain (Bentolila et. al. 2008). The basic idea behind all proposals is that lay-off costs should increase gradually with job tenure. As shown in the theoretical part, a reduction of the gap between layoff costs should decrease unemployment by decreasing worker turnover, as the conversion of contracts is facilitated (Bentolila et. al., 2008: 56). Blanchard and Tirole (2003: 37 − 39) extend the

proposal by arguing that the contribution to unemployment insurance by firms should depend on the number of layoffs, because this would help to internalise the negative effects of unemployment. They propose a gradual increase, including a trial and a transition period, where payments are lower but high enough to prevent firms from increasing worker turnover in excess of job turnover. Garibaldi and Taddei (2013: 39 – 41) see the merits of the proposal first, in the possibility of giving flexibility to firms and also the chance, to learn the real productivity of workers in exchange for a compensation in the case of a lay-off. And second, if the payment scheme is well designed, it gives incentives to firms to invest in training and thereby increase productivity, making it more desirable to keep the worker in the firm.

In order to accomplish the above mentioned benefits, much attention has to be given to the specific design of the gradual severance payments. Moreover, as Bentolila et. al. (2012(b)) have pointed out, the political viability of such a reform is questionable as it would end the insider-outsider divide, well established in many European countries.

Another way to strengthen the position of youth in the labour market would be a wage subsidy for youth. This, however, could lead to a redistribution of jobs between young and prime-age workers and program abuse by firms. It would create additional costs for the government at times of tight budgets and it would not reduce the primary distortion to the hiring decision of firms but rather add an additional one. Due to these and other negative effects, wage subsidies are rather seen as a temporary measure. (European Commission, 2010: 83 - 85)

A third possible approach would be using apprenticeships, rather than temporary contracts, as entry port into employment. Although this would not increase job security of young people or the wages they receive, training of young employees would be institutionalised, instead of fully leaving the decision on the quality and quantity of training provided to the firm, and thereby their position towards the firm and compared to those holding permanent contracts would be strengthened. The problems of the implementation of apprenticeship systems and the reform of the vocational education and training (VET) system are now discussed in more detail.

In principle, VET can take many forms: school-based VET, formal apprenticeship schemes or dual vocational training. What can be found in Austria, Denmark, Germany and Switzerland is a dual system, characterised by a high degree of formalisation, a strong involvement of social partners, a school-based part that is financed by the government - providing also general education - and certain requirements for firms as a prerequisite for training apprentices.

This form of VET seems to perform particularly well for three reasons. Firstly, due to the firm-based component allowing for a faster integration into the labour market with a smaller

chance of misalignment between demand and supply of skills. Secondly, because the school-based component allows students to acquire general skills or occupation specific skills, going beyond what can be taught by a particular firm. Thirdly, it guarantees certain quality standards of education and training (Eichhorst, 2015). Although empirical studies on the long-term consequences (in terms of wages and employment) of VET with a firm-based component do not come to a clear, unambiguous conclusion, the evidence that strong apprenticeship systems improve the school-to-work transition and lead to a reduction of unemployment at early stages of the career is strong (Eichhorst, 2015; Ryan, 2001).

According to Dustmann and Schönberg (2012), one important factor for the success of firm-based training schemes is the possibility of firms to credibly commit to the provision of training. As the process of training is rather complex and not easy to specify in a contract, workers will not accept a lower apprenticeship wage if firms cannot credibly promise to teach them new skills and provide training of a certain intensity. Workers run the risk that firms might use them as cheap workforce and let them perform routine tasks, otherwise done by low skilled workers. The authors argue that for a given level of wage compression, firms will provide the socially optimal level of training if they are able to commit to the provision of training. They further argue that Germany, in contrast to the United Kingdom, gives much stronger rights to apprentices to take legal action if firms violate their training obligations. The system in Germany is more transparent as chambers monitor the firms providing training and apprentices also attend vocational schools, providing the possibility to extend their general and specific skills, finishing with a final exam. This exam is centralised and performed by the chambers, securing a certain standard on the side of the firm as well as of the apprentice. (Dustmann und Schönberg, 2012: 36 – 38, 54/55) These characteristics of the German training system can serve as explanation for its success and outline possible measures for the government of the United Kingdom to improve the quality and training intensity within its apprenticeship system.

Furthermore, in order for a dual VET system to be successful, it is necessary that the skills taught in school match the needs and requirements of the labour market. This becomes more and more difficult given the ongoing specialisation of firms, the need for flexibility and increasing demand for highly skilled labour. In Germany this has led to a lack of a sufficient number of apprenticeship places. The German Government reacted to this trend by agreeing with social partners on adapting the curricula and also allowing for apprenticeships over shorter periods. (Quintini and Martin, 2006: 24)

For those countries already having a school-based vocational training system, such as Spain, Greece and Italy, in order to foster cooperation between firms and schools, phases of practical experience should be incorporated more strongly and firms should be asked about their skill requirements and recommendations in order to reform schooling curricula. A further possible approach would be to start in sectoral or regional clusters, where a sufficient support and interest in a specifically skilled labour force by governments and firms can be guaranteed, as this is a vital precondition. (Eichhorst et. al. 2012: 31/32)

Although the measures are concentrated on the level of upper secondary education - and thereby provide help for the transition into the labour market for those with a lack of skills or interest to follow an academic track, by giving them an incentive to continue schooling - the recommendations for reform also apply to the university sector. Establishing more work experience and internships into academic education would facilitate the transition from education to work.

Germany, in the terminology of Wasmer (2006), seems to exhibit an "S" regime with low job finding rates and a medium level of specific education. The youth-to-adult unemployment ratio is, however, very low. This might not only be due to the success of the VET system. While job turnover appears to be low overall, flexibility increased specifically for the low skilled, being the main group affected by temporary employment.

In Germany in 2007, 60% of temporary employees had a low educational level, i.e. less than secondary education, compared to 45% for the EU 15 average. On the other hand only 2% of temporary employees had a tertiary education in Germany, compared to 11% for the EU 15 average and 22% in the United Kingdom. (Eurostat, 2015(p)) Although this might facilitate the transition of low skilled youth into the labour market, complementing a successful transition for those with medium skills via the dual education system, it has to be considered as critical.

It has been shown for Germany that people employed in a temporary contract were more likely to receive a temporary contract afterwards, suggesting a trap in insecure employment. Moreover, previous unemployment spells increase the risk of being in a temporary contract and vice versa, being in temporary employment increases the risk of being unemployed. (Giesecke and Groß, 2003: 171 - 173) Thus, regardless of the success of the dual VET system in Germany, a strengthening of the position of those employed in temporary contracts appears necessary. A combination of both discussed measures, the introduction of a single contract and the enforcement of a firm-based component in education, should be considered by policy makers.

6.   Conclusion

The aim of this thesis has been to address the reasons for youth unemployment in selected European countries, by using search and matching models.

The opening chapter provided an overview of the most important characteristics of youth unemployment. It was shown that in Italy and the United Kingdom youth unemployment appears to be a long-term structural issue, while Spain and Greece are mainly suffering from the effects of the crisis. While all countries, except from the United Kingdom, can be considered as highly segmented labour markets, shares of youth in temporary employment differ a lot, with the highest share in Spain. Also the educational structure differs strongly among countries, with Italy exhibiting high shares of specific and low education, while Spain and the United Kingdom show a high proportion of general and high education.

In the theoretical part of this thesis, selected models to analyse the problem of youth unemployment were presented. Concerning labour market institutions it was argued that high minimum wages and a strong segmentation of the labour market might lead to problems for youth employment. Furthermore it was proposed that educational decisions and job finding rates are dependent on each other and thereby lead to totally different labour markets. Finally, the school-to-work transition was analysed by considering uncertainty on the real productivity of job seekers. It was reasoned that high job finding rates, a high probability of a good match quality and a high share of youth directly entering the labour market increase employment prospects. Finding a real-life equivalent for the second factor is problematic. Therefore, I constructed an indicator with the aim to account for differences in the schooling system at the secondary level, although it has to be considered an approximation.

Given these theoretical predictions, the following chapter provided an overview of the most important empirical facts and a categorisation of the discussed countries into three groups. It seemed reasonable to put together the German-speaking countries Germany and Austria, the low job turnover countries Italy and Greece and the high job turnover countries Spain and the United Kingdom. The countries in the first group stand out due to their low youth unemployment rates and their vocational education system, including a strong firm-based component of education missing in most other countries. Italy and Greece observe long job tenures. However, only in Italy this is connected to high investments in specific skills. While the low job finding rates in Italy have negative effects on youth unemployment, a high specificity of skills should benefit the school-to-work transition. However, the firm-based component is only very weak in Italian vocational education and in general, the schooling system does not appear to perform well. Problems in Spain and the United Kingdom are of a different structure. Job

finding rates are high and job tenures are short, leading to high investment in general skills. While high job finding rates are beneficial for youth, a high generality of skills can be problematic. While in Spain the indicator for a good match quality points to problems in the schooling system, the United Kingdom performs relatively well - although not as good as Austria and Germany - due to some emphasis on the combination of school and work among youth in the United Kingdom. Labour market segmentation can be considered as triggering youth unemployment, especially in Spain and in Italy where a relatively high share of youth is employed on temporary contracts. The discussion of the empirical data has shown that the theoretical explanations provided seem to be insufficient to explain the very high youth-to-adult unemployment ratio in the United Kingdom and the substantial increase in youth unemployment starting with the last crisis in Greece. This indicates the need to supplement findings by using models going beyond the analysis of the search and matching process.

According to the discussion in chapter 4, the most pressing needs for reform appear to be in employment protection legislation and in the education system. A reform of the employment protection legislation could be accomplished by introducing a single contract, as this would reduce insider power and thereby negative consequences for employment chances of youth. Furthermore a reform of the vocational education system and in general, the introduction of a firm-based component at all stages of education seems advisable in order to foster school-to-work transition. A combination of both measures would have the advantage of strengthening the position of youth by reducing insider privileges and by making young workers more valuable to firms as they possess more firm-specific knowledge. Distortions in the hiring decisions of firms would be reduced and young people would be able to reduce their comparative disadvantages (due to less experience) more quickly.

There are many possible strands for further research. Particularly active labour market policies might be able to facilitate youth employment and it would certainly be desirable to inquire the effects of specific measures on youth. This would further make it possible to connect the findings on employment protection legislation, training and active labour market policies with recommendations for the social security system. Another potentially important institutional factor is how wage setting institutions might interact with other labour market institutions. Finally, the quantitative measures of the education system and the school-to-work transition should only be considered as a first step. A further elaboration on the used indicators or a more qualitative approach would provide possibilities for further research.

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Appendix A: Statistical Terms

Country aggregates (Eurostat, 2015(h)):

EU (15 countries): Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, United Kingdom

EU 27: EU 15 + Bulgaria, Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovenia, Slovakia

EA (17 countries): Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Malta, the Netherlands, Portugal, Spain, Slovakia, Slovenia

Labour Market:

"An **unemployed person** is defined by Eurostat, according to the guidelines of the International Labour Organization, as: someone aged 15 to 74 (in Italy, Spain, the United Kingdom, Iceland, Norway: 16 to 74 years); without work during the reference week; available to start work within the next two weeks (or has already found a job to start within the next three months); actively having sought employment at some time during the last four weeks. The **unemployment rate** is the number of people unemployed as a percentage of the labour force." (Eurostat, 2015(i))

"**Youth unemployment** includes all the youth (i.e people between the ages of 15 and 24, inclusive) who are unemployed. **Youth unemployment rate** is the percentage of the unemployed in the age group 15 to 24 years old compared to the total labour force (both employed and unemployed) in that age group." (Eurostat, 2015(j))

"The indicator **young people neither in employment nor in education and training**, abbreviated as **NEET**, corresponds to the percentage of the population of a given age group and sex who is not employed and not involved in further education or training. The numerator of the indicator refers to persons meeting these two conditions: they are not employed (i.e. unemployed or inactive according to the International Labour Organisation definition); they have not received any education or training in the four weeks preceding the survey. The denominator is the total population of the same age group and sex, excluding the respondents who have not answered the question 'participation to regular education and training'." (Eurostat, 2015(k))

"**Temporary employment** includes work under a fixed-term contract, as against permanent work where there is no end-date. A job may be considered temporary employment (and its holder a **temporary employee**) if both employer and employee agree that its end is decided by objective rules (usually written down in a work contract of limited life). These rules can be a specific date, the end of a task, or the return of another employee who has been temporarily replaced." (Eurostat, 2015(l))

"The **International standard classification of education**, abbreviated as **ISCED**, is an instrument for compiling internationally comparable education statistics. […] ISCED 97 was implemented in the European Union (EU) for collecting data starting with the 1997/98 school year." (Eurostat, 2015(m))

There are seven levels of education in ISCED 97.
- Level 0: **Pre-primary education**
- Level 1: **Primary education**
- Level 2: **Lower secondary education**
- Level 3: **Upper secondary education**
- Level 4: **Post-secondary non-tertiary education**
- Level 5: **Tertiary education (first stage)**
- Level 6: **Tertiary education (second stage)**

(Eurostat, 2015(m))

Labour market characteristics

Employment Protection Legislation (EPL) indicator: "For each country, employment protection legislation is described along 18 basic items, which can be classified in three main areas: i) employment protection of regular workers against individual dismissal; ii) specific requirements for collective dismissals; and iii) regulation of temporary forms of employment. Starting from these 18 basic pieces of information, a four-step procedure has been developed for constructing cardinal summary indicators of EPL strictness that allow meaningful comparisons to be made, both across countries and between different years […]." (OECD, 2004: 102)

Minimum wage levels: "In all cases, the minimum wage measure is defined as the ratio of the nominal value of the minimum wage to an average wage. This is one of the standard indicators used in the literature on minimum wages and is intended to measure the extent to which the minimum wage cuts into the wage distribution, and to capture variation in the relative prices of less-skilled and more-skilled labor induced minimum wages." (Neumark and Wascher, 2004: 226)

Job finding rate: The probability of finding a job is estimated by comparing unemployment numbers of two succeeding periods, taking short-term unemployment (between the two periods) under consideration. Job separation rates afterwards can be calculated using the following equation: $u_t = u_{t-3}(1 - \lambda_t) + u_t^* \lambda_t$ with $\lambda_t = 1 - e^{-3(s_t + f_t)}$ and u_t^* denoting the steady state unemployment rate. (Arpaia and Curci, 2010: 18/19)

Standardized Tests

Programme for international student assessment (PISA): "The OECD Programme for International Student Assessment (PISA) is a collaborative effort among OECD member countries to measure how well 15-year-old students approaching the end of compulsory schooling are prepared to meet the challenges of today's knowledge societies. […] PISA surveys take place every three years. […] The PISA assessments take a literacy perspective, which focuses on the extent to which students can apply the knowledge and skills they have learned and practiced at school when confronted with situations and challenges for which that knowledge may be relevant." (OECD, 2014(d): 22)

Appendix B: Bellman Equations for the Standard Mortensen/Pissarides Model

Equations taken from Pissarides (2000: 40 - 42):

Expected asset value of a job with productivity $1 \geq x \geq R$:

$$rJ(x) = px - \omega(x) + \lambda \int_R^1 J(s)dG(s) - \lambda J(x)$$

Expected returns to workers:

$$rW(x) = \omega(x) + \lambda \int_R^1 W(s)dG(s) + \lambda G(R)U - \lambda W(x)$$

Sharing rule of the surplus (according to Nash-Bargaining):

$$W(x) - U = \beta[J(x) + W(x) - V - U]$$

Expected profits from a new job vacancy:

$$rV = -pc + q(\theta)[J(1) - V]$$

Free-entry condition:

$$J(1) = \frac{pc}{q(\theta)}$$

Expected return of unemployed workers:

$$rU = z + \theta q(\theta)[W(1) - U] = z + \frac{\beta}{1 - \beta}pc\theta$$

Appendix C: Figures for Illustration

Figure 1: Job creation line and Beveridge curve
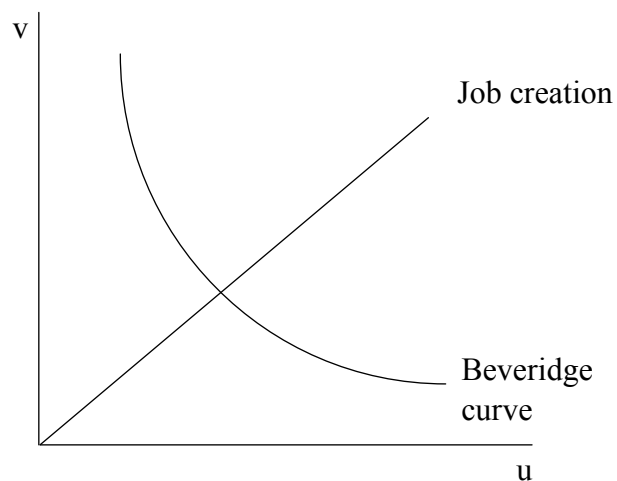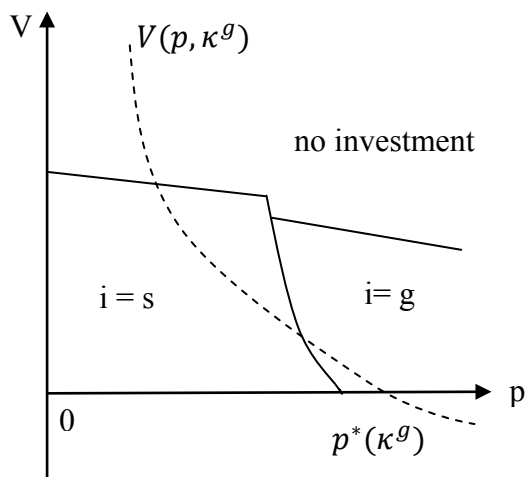(own presentation following Pissarides, 2000: 20)

Figure 2: Supply decision of skills
(own presentation following Wasmer, 2006: 816; κ^g denotes the fraction of workers with general skills)

Determination of the equilibrium in the Pries/Rogerson model:

In equilibrium it must hold that $S(\bar{\pi}) = 0$. Substitution of the equilibrium condition and $S(1) = (1 - \bar{\pi})g(\bar{\pi})$, with $g(\bar{\pi})$[18] being the first derivative of $S(\pi)$, yields the *optimal match formation (OMF) condition* (Pries and Rogerson, 2005: 821):

$$\frac{v}{u}\frac{\theta}{1 - \theta}[(1 - \beta)c_e + c_v] + [1 - \beta(1 - \lambda)]c_e =$$

$$(x^b - a) + [1 - \beta(1 - \lambda)(1 - \alpha)]g(\bar{\pi})\bar{\pi} \qquad (9)$$

The curve is upward-sloping in $\bar{\pi}/\theta$ – space. The equilibrium is given by the intersection of equation (9) with the *free entry condition (FE)*:

$$(1 - \beta)c_e + c_v = \beta q(1 - \theta)g(\bar{\pi})\int_{\bar{\pi}}^{1}(\pi - \bar{\pi})dH(\pi) \qquad (10)$$

which is a downward-sloping curve in $\bar{\pi}/\theta$ – space. (Pries and Rogerson, 2005: 821/822)

Figure 3: Equilibrium determination in terms of labour market tightness (v/u) and reservation probability
(own presentation following Pries and Rogerson (2005: 823)

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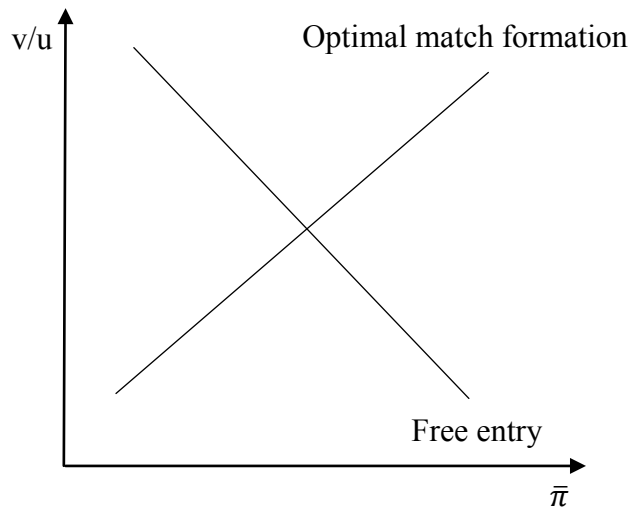
[18] $S' = \dfrac{x^g - x^b}{1 - \beta(1 - \lambda)(1 - \alpha\bar{\pi})} \equiv g(\bar{\pi})$

Appendix D: Variables Affecting the School-to-Work Transition

Table 6: Evaluation of the expected value of π (specifically for secondary graduates)

	Vocational education at upper secondary level[1] (2012)	Share of school- and work-based pro-grammes[2] (2012)	Annual expenditure per student[3] (all secondary education) (2011)	PISA – Test Score[4] (2012)	$E(\pi)$
Austria	H	H	H	M	H
France	M	L	H	M	M
Germany	M	H	H	H	H
Greece	L	L	?	L	L
Italy	H	L	L	L	L
Spain	M	L	M	L	L
United Kingdom	L	M	M	H	M

Short description: H: high, M: medium, L: low, ?: data are missing. The final evaluation of the expected value is based on taking the average of all considered indicators, weighted equally. Numbers were assigned to the three categories: H = 1, M = 0, L = (-1). If the sum of all numbers for one country is zero, the final evaluation is M. In all other cases, if the sum divided by four is larger than zero, the final evaluation is H and L otherwise.
[1] Source: OECD, (2014(a): 314).
[2] Refers to those enrolled in upper secondary education. Source: OECD, (2014(a):314).
[3] Source: OECD, (2014(a): 215). Data for Greece are not available. Evaluation compared to the OECD average.
[4] Source: OECD, (2014(c): 5). The performance in mathematics, reading and science is considered. Evaluation compared to the OECD average.

Table 7: Construction and evaluation of the variable ζ

	Employed PT as % of 15 to 29 year-olds while in education[1] (2010)	Employed FT as % of 15-29 year-olds while in education[1] (2010)	ζ
Austria	M	H	H
France	L	L	L
Germany	M	H	H
Greece	L	L	L
Italy	L	L	L
Spain	L	L	L
United Kingdom	H	M	H

Short description: PT: part-time, FT: full-time, H: high, M: medium, L: low. For explanations on how the final evaluation was carried out, see the short description below table 6.
[1] Source: OECD, (2014(a):387).

Appendix E: Additional Empirical Data

Graph 7: Average job tenure (in years) in selected European countries (age 25 to 54); 1995 - 2013
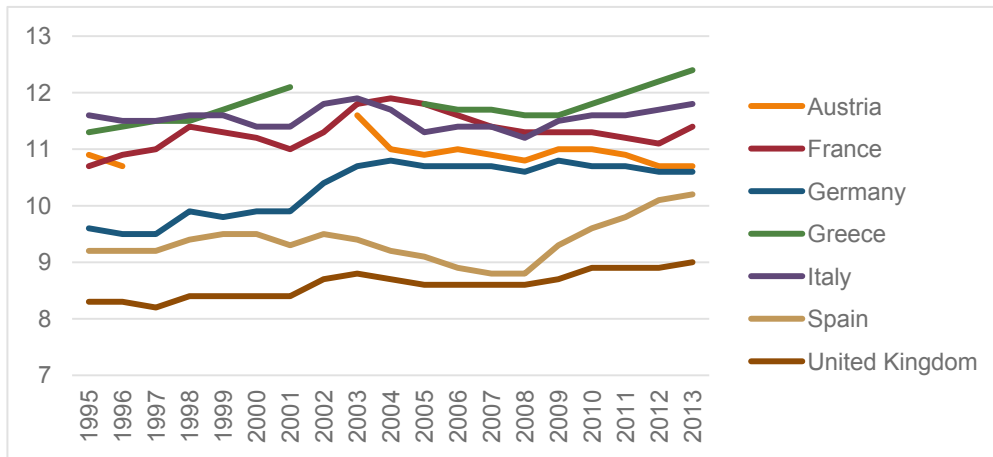
Source: OECD, (2015(c)).

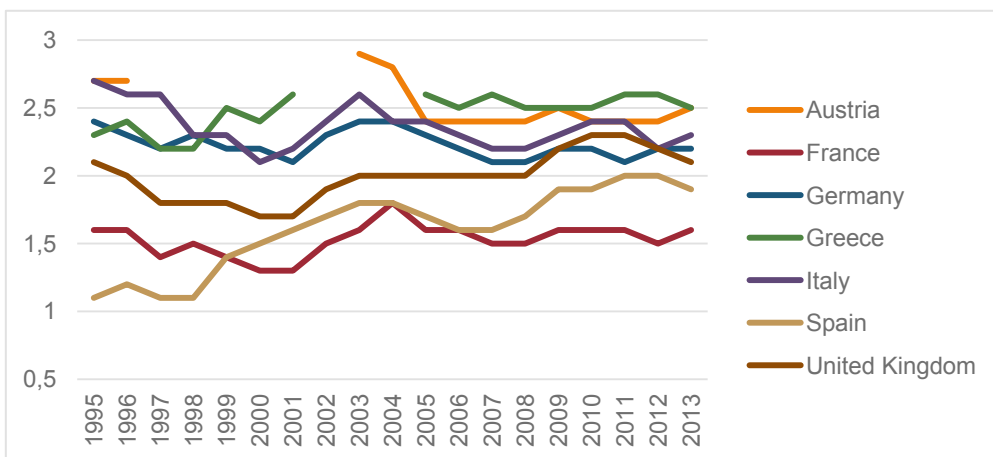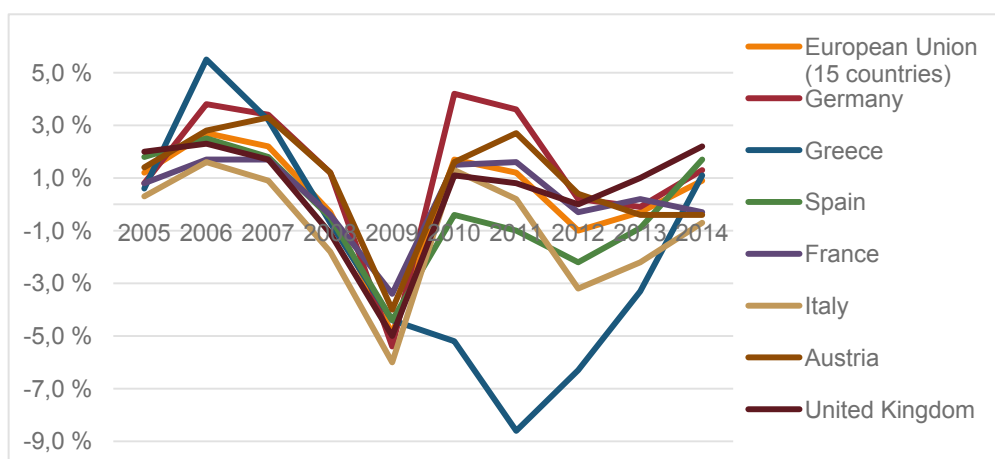*Graph 8: Average job tenure (in years) in selected European countries (age 15 to 24); 1995 - 2013)*

Source: OECD, (2015(c)).

Graph 9: Changes in the gross domestic product (at market prices); 2005 - 2014

Source: Eurostat, (2015(m)).

Table 8: Incidence of over- and undereducation by age groups (in %); 2002, 2004, 2008, 2010

		2002		2004		2008		2010	
		Young	Mature	Young	Mature	Young	Mature	Young	Mature
Austria	Overeducation	3.4	3.6	4.0	6.0	8.7	6.4		
	Undereducation	38.1	45.0	43.0	33.9	31.1	35.9		
France	Overeducation	24.0	5.9	19.0	6.2	12.1	8.3	14.6	9.3
	Undereducation	9.6	31.7	15.4	34.9	22.8	28.5	16.6	32.2
Germany	Overeducation	7.3	13.7	8.5	11.2	10.3	10.6	4.7	11.1
	Undereducation	34.4	22.6	33.0	24.1	29.9	23.8	44.2	21.3
Greece	Overeducation	11.3	7.5	21.8	10.9	16.2	9.9	15.3	12.6
	Undereducation	33.8	48.2	18.1	38.3	24.4	37.3	18.1	30.6
Italy	Overeducation	4.5	1.7	5.3	4.0				
	Undereducation	45.2	54.7	35.9	45.5				
Spain	Overeducation	14.8	7.4	13.1	7.3	12.4	9.3	12.7	11.4
	Undereducation	37.2	45.6	40.7	45.1	42.8	42.6	35.8	35.5
UK	Overeducation	9.4	5.6	11.2	6.4	12.0	12.8	24.0	12.9
	Undereducation	45.4	47.8	34.4	48.5	32.3	33.9	25.5	34.1

Data: ILO, (2013: 30/31). Own compilation. Young: 15 to 29 years; Mature: older than 30 years.

Table 9: Relative Earnings of workers by educational level; 2000, 2005, 2010 - 2012

	Educational attainment	2000	2005	2010	2011	2012
Austria	Below upper secondary	m	74	69	69	70
	Tertiary	m	158	165	166	171
France	Below upper secondary	m	86	82	m	m
	Tertiary	m	144	154	m	m
Germany	Below upper secondary	76	89	88	88	84
	Tertiary	145	159	172	169	174
Greece	Below upper secondary	m	m	m	62	79
	Tertiary	m	m	m	171	152
Italy	Below upper secondary	78	m	77	m	m
	Tertiary	138	m	147	m	m
Spain	Below upper secondary	m	80	80	80	m
	Tertiary	m	137	140	141	m
United Kingdom	Below upper secondary	69	71	67	69	70
	Tertiary	160	158	165	157	156
EU21 average	Below upper secondary	**82**	**81**	**78**	**78**	**78**
	Tertiary	**155**	**159**	**162**	**160**	**162**

Source: OECD, (2014(a): 142). 25-64 year-olds with income from employment; upper secondary education = 100.

Abstract

Youth unemployment is a growing concern in many European countries. This thesis aims to address the causes for high youth unemployment rates as well as high youth-to-adult unemployment ratios for a selected number of European countries. These are Austria, France, Germany, Greece, Italy, Spain and the United Kingdom. The first step in the analysis is to look on empirical data, highlighting the structure of youth unemployment and the most important labour market institutions. Secondly, theoretical models belonging to the search and matching literature in the tradition of Mortensen and Pissarides (1994) are presented. Thirdly, theoretical predictions are tested by confronting them with empirical observations. In a last step policy recommendations are given on how to tackle the problem of youth unemployment.

The structure and causes of youth unemployment vary substantially among countries. The focus of this thesis is on labour market segmentation theories and the analysis of the school-to-work transition. While a highly segmented labour market and a large share of youth in temporary employment contributes to explaining the substantial increase of youth unemployment in Spain and Italy, this explanation is less plausible for all other countries, given the institutional conditions. The school-to-work transition appears problematic for all countries, compared to the situation in Austria and Germany. The German-speaking countries are standing out by a strong connection between school and work in their vocational education system. This connection is missing in all other countries, except from the United Kingdom, where a high share of youth combines school and work, while a dual system is also missing.

Based on the analysis, policymakers are recommended to strengthen the position of young people in the labour market by introducing a single employment contract, reducing the volatility of youth employment and improving their relative position towards prime-age workers, protected by permanent contracts. A second area for policy reform is the vocational education system. Particularly the firm-based component should be expanded, not only on the upper secondary level but also for those in tertiary education. Firm-based training increases the value of young workers to firms and thereby can supplement the introduction of a single contract.

This thesis provides a combination of selected theoretical models of the search and matching literature and supportive empirical facts and studies. By using this approach it is possible to highlight interactions between the education system, labour market institutions and youth unemployment. These interactions are also reflected in the policy recommendations.

Zusammenfassung

Jugendarbeitslosigkeit ist ein wachsendes Problem in vielen Europäischen Ländern. Diese Masterarbeit hat das Ziel, sowohl die Gründe für steigende Jugendarbeitslosigkeit, als auch für Unterschiede in der Arbeitsmarktposition von Jugendlichen im Vergleich zu Erwachsenen zu untersuchen. Die behandelten Länder sind Deutschland, Frankreich, Griechenland, Großbritannien, Italien, Österreich und Spanien. Am Beginn der Arbeit steht eine Darstellung der empirischen Daten zur Jugendarbeitslosigkeit und der wichtigsten institutionellen Arbeitsmarktcharakteristika. In einem zweiten Schritt werden ausgewählte theoretische Modelle der sogenannten Such- und Matching- Literatur in der Tradition von Mortensen und Pissarides (1994) präsentiert. Danach werden die empirischen Daten mit den theoretischen Erklärungen zusammengeführt und durch weitere Studien ergänzt, um die Validität der theoretischen Modelle zu beurteilen. Schließlich werden auf Grundlage der ausgeführten Analyse Handlungsempfehlungen für Entscheidungsträger formuliert.

Die Struktur und die Gründe für Jugendarbeitslosigkeit sind in den behandelten europäischen Ländern sehr unterschiedlich. Der Fokus dieser Arbeit liegt insbesondere auf Arbeitsmarktsegmentierungstheorien und der Analyse des Übergangs von Ausbildung in den Arbeitsmarkt. Eine starke Segmentierung des Arbeitsmarktes und ein hoher Anteil von Jugendlichen in befristeten Arbeitsverträgen erscheinen als plausible Erklärung für den starken Anstieg der Jugendarbeitslosigkeit in Spanien und Italien. Der Übergang von der Ausbildung in den Arbeitsmarkt ist in allen Ländern, abgesehen von Deutschland und Österreich, eher schwierig. Die deutschsprachigen Länder zeichnen sich durch eine starke Kooperation des Bildungssystems mit Firmen, insbesondere durch das duale Ausbildungssystem, aus. Ein solches System kann in keinem der anderen Länder festgestellt werden, obwohl sich Großbritannien durch einen hohen Anteil von Jugendlichen, die Ausbildung und Arbeit kombinieren, auszeichnet.

Auf Grundlage der durchgeführten Analyse wird die Empfehlung ausgesprochen, die Segmentierung des Arbeitsmarktes durch die Einführung eines einheitlichen Arbeitsvertrages zu beenden. Würde nur eine Art von Arbeitsvertrag bestehen, könnte die Volatilität der Jugendbeschäftigung reduziert und die Position der Jugendlichen gestärkt werden. Darüber hinaus erscheint eine Reform des (Aus-)Bildungssystems durch eine stärkere Einbeziehung von Firmen ratsam und sollte gemeinsam mit einer Reform des Beschäftigungsschutzes durchgeführt werden.

Die Analyse von ausgewählten theoretischen Modellen der Such- und Matching- Literatur, die besonders relevant für die Erklärung von Jugendarbeitslosigkeit sind, in Verbindung mit

empirischen Daten und Studien, wie sie in dieser Arbeit durchgeführt wird, ist nach meinem Wissen neu. Dieser Ansatz ermöglicht es Interaktionen zwischen dem Bildungssystem, Arbeitsmarktinstitutionen und Jugendarbeitslosigkeit zu untersuchen, welche sich auch in den Politikempfehlungen wiederspiegeln.

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Wien, August 2015