Unemployment Risks for Low- and Highly-skilled Individuals and the Role of Employment Protection Legislation.

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Abstract:

Within the deregulation discussions going on already for several years, the strictness of employment protection legislation has often been the main subject of criticism. Although there are neither ambiguous theoretical arguments nor convincing empirical evidence, EPL has been declared as one of the main causes of high and persistent unemployment by restricting the numerical flexibility of the entrepreneur. However, the role of EPL and its impact on individual unemployment risks becomes clearer if we take its relation to skills and skill-demand into account. On the basis of EU-SILC survey data (wave 2007), I will show that 1) the relation of EPL and unemployment risks differs between low and highly-skilled individuals and 2) that these effects are mediated by the level of innovative progress in a country. The results of the multilevel analyses allow us to detect reasons not only for differences in unemployment rates within Europe but also for labour market inequalities existing between the low- and highly-skilled.

1. Introduction

Labour market conditions have changed. Technological advances, globalization and the expansion of the labour force have intensified the competition for jobs. This development has strengthened unemployment risks in particular for the low-skilled (Oesch 2010; Iversen/Cusack 2000). Within the ongoing deregulation discussions, the strictness of employment protection legislation has often been the main subject of criticism in this context. Although there are neither ambiguous theoretical arguments nor convincing empirical evidence, EPL has been declared as one of the main causes of high and persistent unemployment by restricting the numerical flexibility of the entrepreneur (see: OECD 1999, 2004; Bertola et al. 1999; Boeri et al. 2000; Walwei 2002; Zientara 2006, Belot et al. 2002).

Actually, from a theoretical perspective, strict EPL provides both positive and negative employment effects. Positive employment effects result from enhancements in labour productivity and reductions in transaction costs (Storm 2007; Williamson 1987). Through the establishment of specific dismissal laws, long contract negotiations at the beginning of the employment relation become obsolete. Job security, afforded by EPL, additionally increases the extent of human capital investments by workers. In order to obtain investment incentives, workers have to be provided with an appropriate employment guarantee, which protects them against the opportunistic behavior of the employer, so that at least investment costs can be amortized (OECD 2004). Strict EPL also tends to increase the extent of cooperation. "Job security promotes the identification of staff with the operational objectives, facilitates the transfer of knowledge and skills, increases willingness to perform, promotes in-house mobility and improves - because of low dismissal risks - the acceptance of technological progress" (translated according to Walwei 1996, p. 225). Lacking EPL might, in contrast, result in more frequent strikes, lower willingness to make concessions of the workers' representatives and increasing extent of shirking (ebd.).

In addition to the establishment of allocative efficiency, regulatory measures also aim to improve the distributive justice within the labour market (European Commission 2007a, Nolte 2001). In this context, one target is the reduction of power imbalances resulting from differences in the property of capital and to protect workers from exploitation by their employers. EPL protects employees against arbitrary dismissals and reduces, due to provisions on notice periods and severance payments, financial dependencies.

However, the restriction of the flexibility of entrepreneurial activity, which is obtained by strict EPL, is also considered to produce negative employment effects (Addison/Teixeira 2001). This is the case, when EPL does not compensate market failures but disturbs the natural market equilibrium. By limiting the freedom of action, for instance, appropriate responses to economic changes are constrained. Compared to labour markets with low requirements on firing rules, employers in strictly regulated markets are restricted in their competitiveness. The comparatively high labour costs

might also result in recruitment freezes and a shift in foreign markets. These considerations suggest taking the economic structure of a country and its implemented production process into account while estimating the effect of EPL on individual unemployment risks. Varying demands for flexibility might result in different outcomes. Moreover, there are good reasons to assume that EPL affects the employment chances of low- and highly-skilled individuals differently. From organizational research we know that firms have different requirements on the flexibility of their workforce. According to Atkins (1984) core-periphery model, there is a greater need of functional flexibility for the core-workforce, which is generally equipped with higher skills; and a higher desire for numerical flexibility for the peripheral - and mostly low-skilled - workers.

Empirical studies examining the impact of EPL on the unemployment rate by taking a cross-national perspective, based on the analysis of aggregated data, detected contradictory results. In some studies, a positive effect of EPL on unemployment rates can be found, in others effects are not significant (see in detail: Belot et al. 2002; OECD 2004, Addison/Teixeira 2001; Baker et al. 2005; European Commission 2006, Skedinger 2010). These studies do not only differ in the regression methods used, but also concerning the control variables that have been taken into account. Mostly, interactions with other institutional variables deregulating the labour markets have been examined, while the economical structure of the country has largely been ignored. So far, there is also only little empirical evidence on the influence of EPL on different skill groups. First hints on cross-national differences are provided by Esping-Anderson (2000). He detected a relation between EPL and the long-term unemployment rate of the low-skilled, but not with the unemployment rate in general. Oesch (2010) who analyzed the development of low-skilled unemployment in OECD countries also did not identify an impact between EPL and the low-skilled unemployment rate. There is no information about the way EPL affects employment chances of the highly-skilled. Moreover, none of the studies included a measure for technological progress or the innovative performance of a country.

Within my paper, I will show that 1) the relation of EPL and unemployment risks differs between low and highly-skilled individuals and 2) that these differences are mediated by the level of innovative progress in a country. For this purpose, I will calculate multilevel analyses on the basis of the EU SILC survey in 2007. By using this method, country differences based on economic conditions and labour market regulation as well the composition of the labour force are taken into account. The results show that there are not only differences in individual unemployment risks within Europe but also in existing labour market inequalities between the low- and highly-skilled.

2. EPL and its skill-specific effects on unemployment risks

Generally, EPL can be described "as restrictions placed on the ability of the employer to utilize labor" (Addison/Teixeira 2001, p.2), or according to the OECD, as "rules governing the hiring and firing process" (OECD 2004, p.64). From an economical perspective, the strictness of EPL is determined by the costs related to the dismissal of an employee. One can distinguish between costs directly associated with a lay-off, quantifiable and already known before the employment relation starts, e.g. severance payments; and indirect costs arising from procedural inconveniences and difficulties to enforce a dismissal. According to the neoclassical employment theory, an increase in labour costs generally leads to a decline in labour demand. Following this assumption, unemployment risks should have to increase for all individuals the stricter dismissal rules are. However, hiring decisions also depend on the employer's expectation to what extent the additional labour costs caused by strict firing rules will be compensated in the future (OECD 2004). As the following considerations show, these expectations vary due to individual skill levels. Furthermore, EPL itself influences labour productivity. Again, there are differences associated with the extent of human capital accumulation.

Strict dismissal rules promote the employees with job security. Assuming that workers behave reciprocically (Homans 1958; Blau 1964) one may expect employees to respond protection with higher levels of cooperation. The added value for the company resulting from an increased level of cooperation depends on how important cooperation in the production process is. The more ambiguous and unstructured the task is and the higher the required skill levels are, the more difficult the monitoring of performance is (Jones 1984). Productivity benefits from strict firing rules, thus, derives priory for high-skilled workers.

Job security gained by strict dismissal restriction further provides incentives for workers to invest in firm-specific human capital (OECD 2004). Firm-specific human capital increases the individual value added. The higher the worker's productivity in the company, the smaller the incentive to terminate is. Therefore, the longer tenure lasts, the lower the risk of being fired is. Elderly, whose seniority is usually larger, have productivity advantages compared to younger employees. Since the rates of productivity increase in addition with the degree of skill, dismissal risks - for the same seniority – decrease more for highly-skilled than for low-skilled workers (Layte et al. 2002; Nolte 2001). Due to the productivity expectations of the employer, hiring decisions are again positively influenced for highly-skilled workers by strict firing rules. In contrast, low-skilled people suffer on hiring disadvantages. Thus, entering and reentering the labour market from non-employment is harder for unqualified individuals the more rigid EPL is.

On the other hand, strict firing rules might reduce the number of dismissals within a company. From the viewpoint of an employer, an effective dismissal occurs whenever the marginal return of an employee is negative, but the costs of continued

employment are positive (Nolte 2001). Dismissal regulations increase separation costs, for example by severance payments, and thus delay the optimal moment of a dismissal in a company. Is work due to less quantity demanded less productive (reducing the marginal productivity) while easily replaceable, a reduction in labour demand follows through redundancies. In general, labour demand for simple activities is more price elastic. According to Davis and Reeve (1997), the more easily input factors are substitutable, the more it responds to price fluctuations (here: in terms of decreasing marginal labour productivity). The price elasticity for highly-skilled workers is rather low. They are more costly to replace because of their specific skills and, furthermore, they are also able to do most of the unskilled jobs. Highly-skilled employees might be even indispensable as important service providers for the production process of the company. "In a cyclical downturn, firms thus have an interest in 'hoarding' skilled workers, which means that the burden of adjustment is shifted to lower educated workers, who are more easily replaced once a recession is over" (Oesch 2010, p. 43). Because the highly-skilled are mainly unaffected, the number of layoffs due to declines in consumer demand is therefore, at least in the short run, particularly reduced for unskilled workers when EPL is strict.

While both, the low- and the highly-skilled have to face higher labour costs in countries where EPL is strict, employment advantages with which workers are provided differ. The highly-skilled have better employment opportunities, since employers rather tend to expect them to compensate the labour costs caused by EPL. In the case of the low-skilled, anticipated production benefits are rather small. In return, the risk of being dismissed decreases with the strictness of EPL, while the number of dismissals for the highly-skilled due to their already privileged situation, is hardly affected. However, the consequences on the individual unemployment risks are not clear. I argue, whether the detrimental or beneficial effects prevail depend on the economic context of the country: the innovation potential available. In countries where there is a general high demand of functional flexibility on the core workforce in order to produce high quality or to invent new products, the highly-skilled should profit from strict EPL and improve their employment chances. Job stability is useful in order to develop their productivity potentials. On the same time, strict EPL derogates the level of numerical flexibility that is needed for the peripheral workforce. Thus, the negative effect of strict EPL might overweigh in the case of the low-skilled and turn into an employment barrier increasing individual unemployment risks by reducing hiring chances.

In less developed countries, differences in the likelihood of being unemployed should be lower between both groups. Highly- and low-skilled workers partly compete for the same jobs. Thus, productivity differentials arising from strict EPL are less big compared to more innovative countries. On the other hand, the need for numerical flexibility in the case of unqualified work is less strong. The positive employment effects for the low-skilled, the reduced number of firings, are more likely to overweigh in countries with less technological progress. However, whether the adverse or

beneficial effects predominate is an empirical question. From the theoretical considerations we can conclude that:

H1: For the highly-skilled, it is more likely that the employment advantages (due to increases in productivity) overweigh the employment disadvantages (due to the restricted flexibility and high labour costs), the more innovative a country's economy is. Thus, it is more likely that unemployment risks for the highly-skilled decrease due to an increase in EPL, the higher the innovative potential of the country is.

H2: For the low-skilled, it is more likely that the employment advantages (reduced number of dismissals) overweigh the employment disadvantages (due to the restricted flexibility and high labour costs), the less innovative a country's economy is. Therefore, it is more likely that unemployment risks for the low-skilled grow due to an increase in EPL, the higher the innovative potential of the country is.

3. Data and methods

3.1. Data

The analysis is based on data from the EU-SILC survey (European Union survey on income and living conditions) collected in 2007 (EU-SILC 2010). The main aim of the survey is to give insights into topics of income, poverty, social exclusion and living conditions. This also includes individual information on unemployment. Data is used from 21 different countries belonging to the EU (AT, BE, CZ, DE, DK, EE, ES, FI, FR, GR, HU, IE, IT, LU, NL, PL, PT, SE, SI, UK) plus Norway.[1] I concentrate on the civilian labour force aged between 16 and 64 inclusively.[2]

The unemployment risk, the dependent variable of the analysis, is measured by the likelihood of being unemployed. For this purpose, I build a dichotomous variable, which is derived from the self-defined economic status of the respondents. If the respondent was unemployment at the time of the interview, the variable is scored 1 otherwise 0. In accordance with Oesch (2010) I do not share the view that the likelihood of being employed is a better indicator in order to measure poor labour market health. Employment of women especially depends on cultural and political determinants. Moreover, individuals changing their employment status from employment to unemployment are more affected in their psychological well-being than people becoming economically inactive (Winkelmann/Winkelmann 1998).

[1] Cyprus and Island had to be excluded because of missing information on the macro level. Slovakia has been identified as an outlier.

[2] People in education, retirement, compulsory military communities or service, people fulfilling domestic tasks and care responsibilities, being permanent disabled or unfit to work or people who are economically inactive for other reasons are excluded from the analysis.

The skill-level is operationalized by the ISCED-97 scheme, which categorizes individual skills into seven classes according to their degree of education and vocational training (UNESCO 2010). For my analysis, I created three ISCED variables, summing up pre-primary, primary and lower secondary education into one dummy-variable, upper secondary and postsecondary non tertiary education in another dummy-variable, and first and second stage of tertiary education into a third dummy-variable. The former represents low-skilled the latter highly-skilled individuals[3].

As additional control variables at the micro level, I check for age, gender and migration background. Age is divided into three age-groups: 15 to 29 years, 30 to 49 years and 50 to 64 years. Migration background is derived from information on the country of birth: born in the country of residence, EU, outside the EU[4].

At the macro level, the main independent variable is EPL. In order to operationalize the strictness of firing rules, I resort to a measure provided by the OECD. The EPL index includes dismissal rules for regular employment, restrictions on the use of temporary employment and additional rules for collective dismissals. The index consists of information on procedural processes, compensation payments, notice periods, and the difficulty of dismissal. It also captures information about the possibilities of using temporary employment (for detailed information see Venn 2009). The strictness of EPL is valued on a scale from 0 to 6, where larger numbers mean stricter regulation. Except for Luxembourg, Slovenia and Estonia, where information firstly was provided in 2008, data refers to the year 2007.

The innovative performance of the country is measured by the Summary Innovation Index (SII) provided by the European Comission in 2007 (2007b). The SII encompasses five key dimensions to cover various aspects of the innovation process: 1. structural conditions required for innovation potential (innovation drivers), 2. investments in R&D activities (knowledge creation), 3. efforts towards innovation at the firm level (innovation & entrepreneurship), 4. performance expressed in terms of labour and business activities and their value added in innovative sectors (applications) and 5. achieved results in terms of successful know-how (intellectual property).

In order to control for other institutional influences on EPL, it is also controlled for active labour market policies (ALMP), the generosity of unemployment benefits and the bargaining coverage. Active labour market policies are measured by expenditures as percentage of GDP spend for “activating the unemployed, helping people moving from involuntary inactivity into employment, or maintaining the jobs of persons threatened by unemployment” (EUROSTAT 2011). Unemployment benefits cover the net replacement rates at the initial phase of unemployment for an one-earner married-couple with average wage (OECD 2011). The variable bargaining

[3] This categorization is oriented on the classification of EUROSTAT.

[4] Health also determines individual unemployment risks. Unfortunately, the EU-SILC provides only incomplete information on the subjective health status of the respondents. By using health as control variables to many individuals or, moreover, countries have to be excluded.

coverage includes the proportion of employees covered by wage bargaining agreements (Visser 2009). ALMP and unemployment benefits refer to 2007. Because of numerous missings, 2006 has been chosen as reference year for the bargaining coverage. The intention of controlling for other types of labour market regulation is due to the fact, that employment disadvantages and advantages might be compensated by other institutional effects on the individual unemployment risks (de Beer/Schils 2009).

3.2 Methodology

The analysis focuses on potential cross-level effects of EPL (macro level) on the unemployment risks of differently skilled individuals (micro level). Multi-level regressions allow the estimation of variations at various levels simultaneously (Raudenbush/Bryk 2002). Instead of analyzing the consequences of a change in labour market regulation, results demonstrate, whether there is a current relation observable in Europe between the individual unemployment risks, the strictness of EPL and the the level of extent innovative performance. Moreover, models enable the examination of compositional effects derived by the structure of the labour force. Differences in the age-structure and degree of female employment are taken into account. Multi-level models provide, therefore, an additional advantage over regression techniques using only aggregated variables.

Because the likelihood of unemployment is measured by a dichotomous variable, a binary-logistic multi-level model has to be calculated in order to account for the non-linearity of the outcome variable. This happens by means of the logit link function (ebd):

$$\text{(Level 1)} \qquad \eta_{ij} = \log\left(\frac{\varphi_{ij})}{1-\varphi_{ii}}\right) = \beta_{0j+}\beta_{1j}x_{1j}. \qquad [1]$$

where η_{ij} is the log of the odds of success and ϕ_{ij} is the probability that the observed event (here: being unemployed) occurs. The term on the right of the equation includes the structural model. β_{0j} represents the context dependent regression intercept, β_{1j} the regression slope and x_{ij} the micro level predictor.

The structural equation of the macro level models corresponds to the equation of a linear multi-level model. Within the analysis, the intercept β_{0j} representing the individual unemployment risk, is assumed to vary by context. Variance is considered to be explained, at least partially, by specific context characteristics:

$$(Level\ 2) \qquad \beta_{0j} = \gamma_{00} + \gamma_{01}W_j + u_{oj} \qquad [2]$$

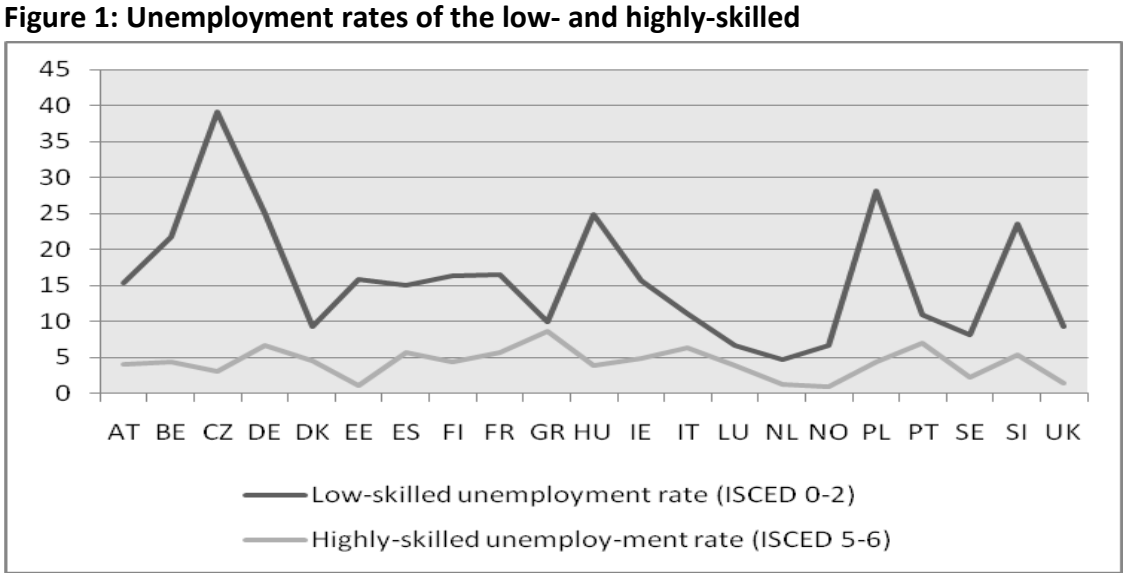
The regression intercept β_{0j} encompasses for every country j a context independent intercept γ_{00} plus a slope $\gamma_{01,}$ a macro level predictor w_j and the residual term u_{oj}.

In order to avoid three-way interaction effects, models are estimated for highly- and low-skilled people separately. For each group the main effects of EPL are calculated under control of age, gender, country of birth and the innovative performance of the economy. Equal weights are used so that the contextual factors of each country have the same influence regardless of their actual population size.[5]

4. Results

On average, unemployment risks for the low-skilled are remarkably higher than for the highly-skilled. However, between and within countries, there are large differences. The highest low-skilled unemployment rates can be observed in the Czech Republic (39.1 percent), Poland (28.1 percent), and Germany (25 percent). In these countries, at least one quarter of the low-skilled workforce is unemployed. Very small low-skilled unemployment rates can be observed in the Netherlands (4.7 percent), Luxembourg and Norway (each 6.7 percent).

Figure 1: Unemployment rates of the low- and highly-skilled



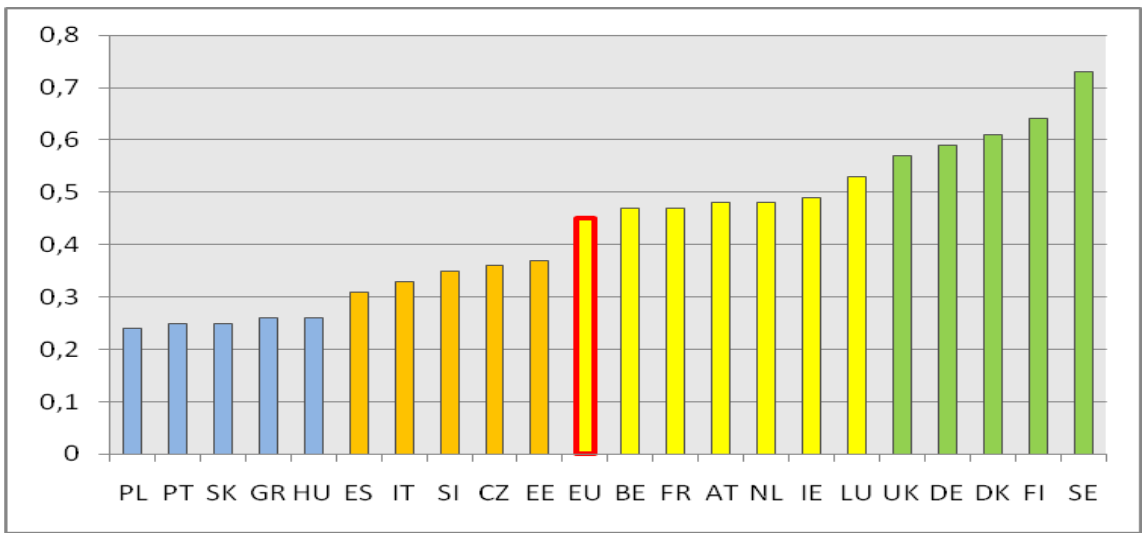
Source: EU-SILC 2007

The least variation between the unemployment rates of both skill groups can be observed in Greece. Here, the unemployment rate of the low-skilled is only 1.14 times higher than that of the highly-skilled. The largest differences exist in Estonia. Unemployment rates of the low-skilled are 14.36 times higher. Unemployment rates of the highly-skilled are generally relatively low and reach from 1 percent in Norway to

[5] Results do not allow the interpretion of the intercept as representing the average European unemployment risks. Since some countries are missing, this is not appropriate anyway.

8.7 percent in Greece. Figure 2 shows the calculated values of the Summary Innovation Index for 21 European countries and the average score over all countries belonging to the European Union. Although there is a process of convergence in innovation performance observable in Europe (PRO INNO 2008), we still find large differences between the countries. Sweden, Finland, Denmark, Germany and the UK belong to the innovation leaders and score far above the EU27 average. Luxembourg, Ireland, the Netherlands, Austria, France and Belgium are Innovation followers scoring close to but still above the value of the EU. Estonia, the Czech Republic, Slovenia, Italy and Spain are grouped as moderate innovators and reach an innovation level that is a bit lower than the EU average. Hungary, Greece, Slovakia, Portugal and Poland, the catching-up countries, have only poor innovation performance (ebd).

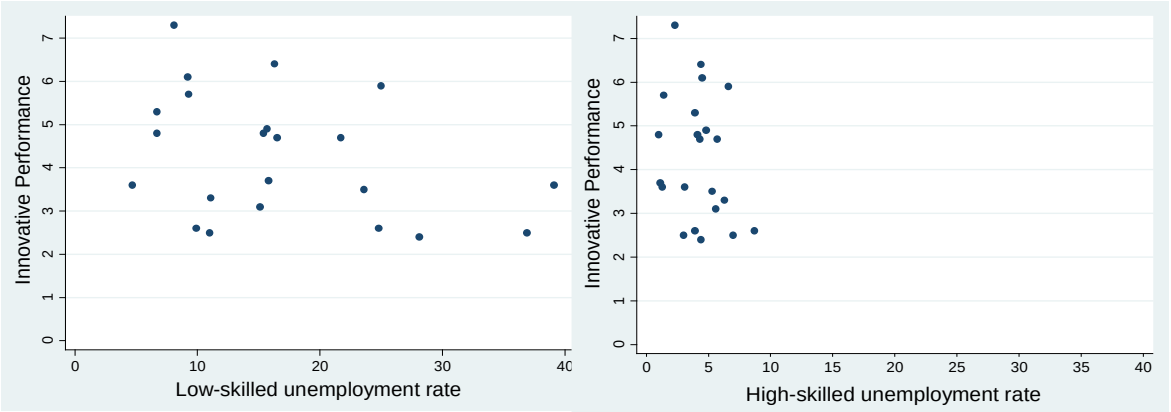
Figure 2: The 2007 Summary Innovation Index (SII)



Source: based on PRO INNO 2008, p.7

The scatterplot in figure 3 shows a relation between low-skilled unemployment and innovative performance. The correlation coefficient for both variables scores at -0.37 and is significant at the 10 percent level. Thus, instead of increasing unemployment risks for the low-skilled due to structural change, we can observer better employment opportunities where the level of innovative performance is high. There is no significant relation (-0.26) between the high-skilled unemployment rate and the innovative performance of the country.

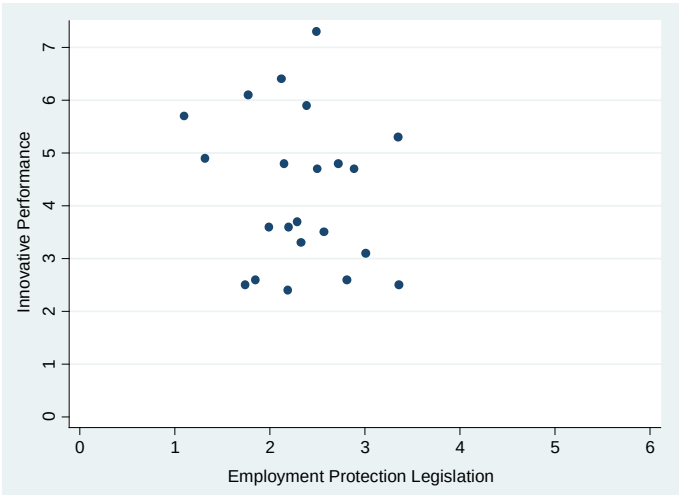
Figure 3: Innovation Performance and Unemployment[6]



Source: own calculation

Furthermore, there is no statistical significant impact between Employment Protection Legislation and Innovative Performance. Sweden, for instance, the country with the highest innovative performance, scores medium at the EPL index. The same is true for Poland, which has the lowest SII score. Thus, general entrepreneurial needs are not reflected in the degree of employment flexibility and might thus lead to deviating labour market outcomes.

Figure 4: Innovative Performance and Employment Protection Legislation



Source: own calculation

The following section dealing with multilevel regression results firstly concentrates on the outcomes for the low-skilled. From the ANOVA-model (not illustrated here) we can derive the Intra-Class-Correlation (ICC) that shows to what proportion the total variance of the unemployment risk is explained by country level differences. For the low-skilled unemployment risks, the ICC is 12.63. That means nearly 13 percentage of the total variance is due to country specific determinants. Table 2 contains the results

[6] Unemployment rates are based on EU-SILC data, wave 2007. The SII is rescaled by multiplying the original score by 10.

of the logistic-multilevel analyses describing the relation between individual unemployment risks, EPL and the innovative performance of the country. All models control on the individual level for age, gender and the country of birth. The three models show the effects of EPL under different economic circumstances, while the variable EPL is always mean centered (mean = 2.32). In Model 1, the effect of EPL refers to an economy with the lowest innovation performance observable in the sample (minimum = 2.4). In Model 2, the variable measuring innovation performance is mean centered (mean = 4.4) and in Model 3, I calculated the effects of EPL under the assumption that we have a country with the highest innovation potential observable (maximum = 7.3). The results clearly show that the relation between EPL and the low-skilled unemployment risk is determined by the level of innovation performance. As expected, the coefficient of EPL increases the more innovative the country is. This is shown by the positive interaction effect between EPL and the innovative performance. In Model 1 and Model 2 we can even observe negative significant effects of EPL, while the effect of EPL in Model 3 is significant and positive. However, as the innovation coefficient shows, an increase in innovation performance is generally related to a decrease in the unemployment risk of the low-skilled.

Tab. 2 Logistic-Multilevel Regression: Low-skilled Unemployment

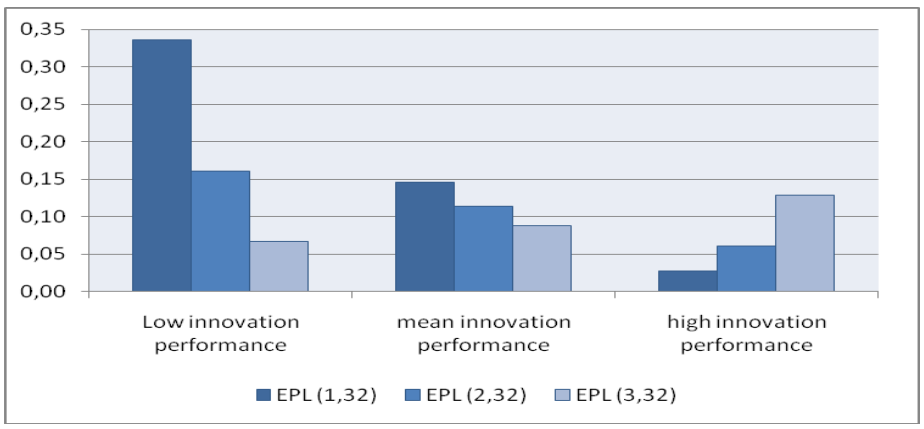
	Model 1: Lowest innovation performance			**Model 2: Mean innovation performance**			**Model 3: Highest innovation performance**		
	b		*S.E.*	b		*S.E.*	b		*S.E.*
Intercept	-1.653	***	*0.145*	-2.052	***	*0.132*	-2.747	***	*0.251*
EPL	**-0.973**	*******	*0.242*	**-0.285**	*****	*0.147*	**0.829**	*******	*0.265*
Innovation	-0.213	***	*0.06*	-0.213	***	*0.06*	-0.213	***	*0.06*
EPL*Innovation	0.368	***	*0.085*	0.368	***	*0.085*	0.368	***	*0.085*
Variance components	0.327	***		0.327	***		0.327	***	
N	46605			46605			46605		
N	21			21			21		
Macro Iterations	2			2			2		
degrees of freedom	17			17			17		

*Dependent variable: unemployed: yes/no, each country has an equal weight, Population average model with robust standard errors, controlled for age, gender and country of birt, reference: male, aged 30-49 years, born in the country of residence, * significant at 10 percent-level, ** significant at 5 percent level, *** significant at 1 percent level*

Based on these three models, we can calculate the probabilities of being unemployed. As usual for logistic models, the effects at the end of the continuum (low/high performance) are much larger than in the middle (mean innovative performance). In particular where the innovation potential is very low, increases in EPL are related with a remarkably decrease of individual unemployment risks. The increase in the likelihood

of being unemployed related to an increase in EPL in high innovative countries is much smaller.

Figure 5: Predicted probabilities: Low-skilled unemployment



Low innovation performance = 2.4, mean innovation performance = 4.4, high innovation performance = 7.3, source: own calculation

After controlling for other forms of labour market regulation, i.e. unemployment benefits, active labour market policies and bargaining coverage, we still find the expected effects of EPL, when innovation performance is either minimal or maximal (see Tab. C, Annex) However, although still negative, the significance of EPL disappears, when all variables are centered around their mean. The labour market institutions thus compensate for the outcomes of flexible dismissal rules. However, the coefficients related to labour market regulations are not significant themselves. Nevertheless, from the intercept we can see slightly smaller unemployment probabilities for the low-skilled the more rigid the other types of labour market regulation are.

For the highly-skilled there is an ICC of 11.7. Thus, the proportion of unexplained variance due to country differences is comparable to that of the low-skilled. However, the relation between EPL, individual unemployment risks and innovation performance is not that clear. Although we can observe that the effect of EPL decreases when the economic conditions change in the direction of higher innovation potential, they are not significant if innovation performance is maximal. Moreover, the effect of EPL is always positive. Thus, although the value of the coefficient declines, an increase of EPL always leads to higher unemployment risks of the highly-skilled. In contrast to the low-skilled, there is no significant effect of innovation performance on unemployment nor is its interaction with EPL meaningful.

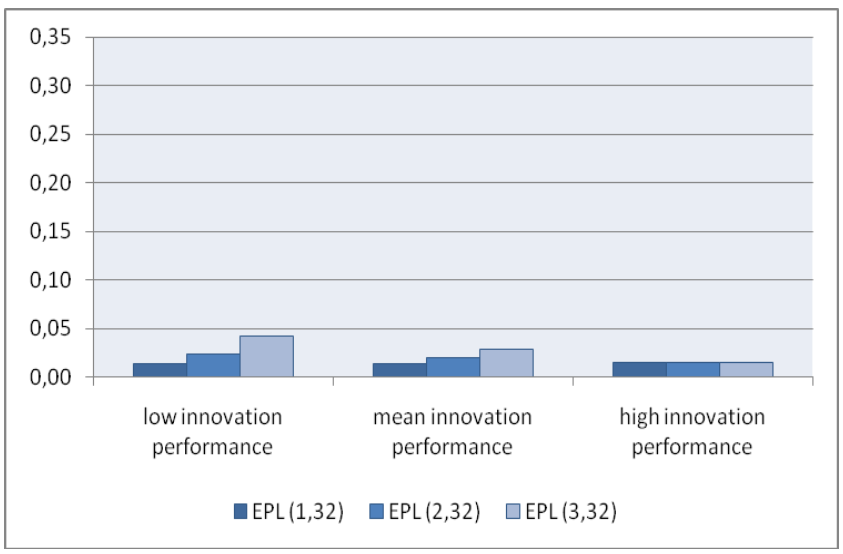
Tab 3: Logistic Multilevel Analyses: Highly-skilled Unemployment

	Model 4: Lowest innovation performance			**Model 5: Mean innovation performance**			**Model 6: Highest innovation performance**		
	b		*S.E.*	b		*S.E.*	b		*S.E.*
Intercept	-3,71	***	*0,155*	-3,885	***	0,084	-4,167	***	*0,183*
EPL	**0,6**	***	*0,188*	**0,361**	***	0,111	**0,025**		*0,304*
Innovation	-0,093		*0,06*	-0,093		0,06	-0,093		*0,06*
EPL*Innovation	-0,128		*0,089*	-0,128		0,089	-0,128		*0,089*
Variance components	0,302	***		0,302	***		0,302	***	
N	57798			57798			57798		
N	21			21			21		
Macro Iterations	2			2			2		
degrees of freedom	17			17			17		

*Dependent variable: unemployed: yes/no, each country has an equal weight, Population average model with robust standard errors, controlled for age, gender and country of birt, reference: male, aged 30-49 years, born in the country of residence, * significant at 10 percent-level, ** significant at 5 percent level, *** significant at 1 percent level*

The predicted probabilities in figure 6 demonstrate clearly that unemployment risks of the highly-skilled are generally very low. Under the condition of low and mean innovation performance, we can see an increase in the individual unemployment probability. However, these are very small and differences due to a change in EPL do not even exceed 2 percentage points.

Figure 6: Predicted Probabilities: Highly-skilled unemployment



After controlling also for unemployment benefits, active labour market policies and bargaining coverage (see table D, annex), EPL loses its significance under the assumption of mean innovation performance. Bargaining coverage is positive and

significant. The more workers are bounded by collective agreements, the higher the unemployment risks for the highly-skilled individuals are. Moreover, the innovation coefficient has become negative and significant, while the interaction effect remains insignificant. Under the condition of low innovation performance, the unemployment risk of the highly-skilled increases with an intensification of EPL.

5. Discussion

The results clearly show that unemployment risks for highly-skilled individuals are much lower than for the low-skilled. In some countries these differences are larger than in others. However, the results could not confirm that the unemployment likelihood for low-skilled workers is particularly high in countries that have faced huge technological progress. The assumption that low-skilled workers do not meet the requirements of a high developed labour market appears to be wrong. Instead, for both, the low- and the highly-skilled, the likelihood to be unemployed is smaller the better the innovative performance of the country is. However, the analyses provide some evidence that labour market inequalities might be caused by the strictness of EPL, dependent on the innovative performance of the country.

In fact, the results show that low- and highly-skilled individuals are differently affected by EPL. While the effect of EPL on the unemployment likelihood increases for the low-skilled, the higher the innovative performance of the country is, it decreases for the highly-skilled. This means that the low-skilled are more able to gain employment advantages resulting from strict dismissal rules in less developed countries. There, the reduction of dismissals due to the increase of separation costs affects the employment chances positively. As the regression coefficients have shown, the positive employment effects even overweigh the negative resulting particularly from high labour costs. In contrast, in high developed countries, an increase in EPL raises their individual unemployment risk. Dismissal rules turn into employment barriers, since rigid EPL restricts the degree of the numerical flexibility needed. The decrease in the number of hirings then influences the possibility to overcome unemployment or to (re)enter the labour market what itself affects the unemployment likelihood positively.

For the highly-skilled, unemployment risks due to EPL decreases the higher the innovation potential is. However, the effects of EPL are always positive. The employment advantages gained by a potential increase in productivity are not able to compensate for the labour costs and restricted flexibility that are both associated to EPL. Generally, the influence provided by different levels of dismissal regulation is not very huge. This is due to the fact that the highly-skilled do already occupy a priviledged position with low unemployment risks.

However, effects are also partly influenced by other types of labour market regulation that might compensate for the consequences of EPL. For the low-skilled, EPL

loses significance under the condition of mean innovative performance after controlling for ALMP, UB, and bargaining coverage. The control variables themselves are not meaningful for the estimation of the unemployment probability. For the highly-skilled, effects of EPL almost entirely disappear. Only the positive effect of EPL for countries with the lowest innovative performance remains. Also the interaction between innovation and dismissal rules loses significance. However, it has turned out that the degree of bargaining coverage has a positive effect on the unemployment risks of the highly-skilled. The more workers are bounded by collective agreements, the higher the probability for the highly-skilled to become jobless. This is a bit surprising, since wage restrictions lead primarily to a redistribution of rents from the highly- to the low-skilled. In order to satisfy higher wage demands for unskilled labour, wages for qualified labour have to be squeezed (Acemoglu 1997). Basically, an employment-boosting effect would have been expected for the highly-skilled. However, if wage restrictions leads to great reductions of the overall labour demand, the demand for qualified labour might also decrease.

To sum up, there are indeed positive and negative employment effects arising from strict EPL. These effects vary between the low- and the highly-skilled and depend on the innovative performance of the country. Analyses that do not account for these differences might gain biased results. Numerous studies might yield no significant result concerning the influence of EPL, because the effects probably have balanced themselves out if not controlling for skills and the economic structure. The paper, however, demonstrates that EPL in fact explains differences in individual unemployment risks and existing labour market inequalities. It also cleans up with the prejudice that strict EPL is the main cause of high and persistent unemployment.

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APPENDIX

Tab. A: Unemployment rates

Country	Low skill unemployment rate (ISCED 0-2)	Middle skill unemployment rate (ISCED 3-4)	High skill unemployment rate (ISCED 5-6)	Total unemployment rate	Difference in low and high skill unemployment rates*
AT	15,40	7,10	4,10	7.3	3.76
BE	21,70	11,30	4,30	8.4	5.05
CZ	39,10	10,10	3,10	10.4	12.61
DE	25,00	11,90	6,60	9.6	3.79
DK	9,20	2,80	4,50	4.7	2.04
EE	15,80	5,80	1,10	4.4	14.36
ES	15,10	8,60	5,60	9.2	2.70
FI	16,30	10,50	4,40	8.0	3.70
FR	16,50	8,70	5,70	8.7	2.89
GR	9,90	10,90	8,70	9.7	1.14
HU	24,80	9,40	3,90	9.5	6.36
IE	15,70	7,00	4,80	7.8	3.27
IT	11,10	8,30	6,30	8.7	1.76
LU	6,70	3,80	3,90	4.6	1.72
NL	4,70	1,90	1,30	2.1	3.62
NO	6,70	2,1	1,0	2.3	6.70
PL	28,10	15,20	4,40	12.6	6.39
PT	11,00	11,90	7,00	10.1	1.57
SE	8,10	4,80	2,30	3.9	3.52
SI	23,60	11,90	5,30	11.3	4.45
UK	9,30	3,20	1,40	2.9	6.64

** The unemployment rates of the highly-skilled multiplied by this factor result in the unemployment rates of the low-skilled. For instance, the unemployment rate of the low-skilled in Germany is 3.79 times higher than the unemployment rate of the highly-skilled.*

Tab. B: Macro level determinants

Country	EPL	Innovative performance	Unemployment Benefits	ALMP	Bargaining coverage
AT	2,15	4,8	67	0,51	99
BE	2,5	4,7	55	1,02	96
CZ	1,99	3,6	65	0,12	44
DE	2,39	5,9	73	0,46	63
DK	1,77	6,1	73	1,02	82
EE	2,29	3,7	60	0,03	22
ES	3,01	3,1	77	0,56	80
FI	2,12	6,4	73	0,71	90
FR	2,89	4,7	69	0,68	95
GR	2,81	2,6	49	0,15	85
HU	1,85	2,6	73	0,23	35
IE	1,32	4,9	57	0,48	44
IT	2,33	3,3	70	0,37	80
LU	3,35	5,3	88	0,38	60
NL	2,2	3,6	77	0,72	82
NO	2,72	4,8	69	0,45	72
PL	2,19	2,4	48	0,4	35
PT	3,36	2,5	77	0,37	62
SE	2,49	7,3	62	0,87	92
SI	2,57	3,5	85	0,11	100
UK	1,1	5,7	66	0,05	34
Mean	2,32	4,36	68,24	0,46	69
Min	1,10	2,40	48,00	0,03	22,00
Max	3,36	7,30	88,00	1,02	100,00

**The original values of the Summary Innovation Index (SII) provided by the European Commission (2007b) were multiplied by 10 in order to gain more comparable measures.*

Tab C: Low-skilled unemployment risks, logistic multilevel analyses

	flexible regulation, minimial innovation			mean regulation, minimal innovation			regulation max, minimal innovation		
	b		SE	b		SE	b		SE
Intercept	**-1,587**	***	**0,246**	**-1,631**	***	**0,213**	**-1,693**	***	**0,52**
EPL	**-0,980**	**	**0,333**	**-0,98**	**	**0,333**	**-0,98**	**	**0,333**
Innovation	-0,226	**	0,094	-0,226	**	0,094	-0,226	**	0,094
EPL*Innovation	0,365	***	0,100	0,365	***	0,1	0,365	***	0,1
UB	-0,008		-0,01	-0,008		-0,01	-0,008		-0,01
ALMP	0,052		0,512	0,052		0,512	0,052		0,512
Union Coverage	0,002		0,006	0,002		0,006	0,002		0,006
	flexible regulation, mean innovation			mean regulation, mean innovation			rigid regulation, mean innovation		
	b		SE	b		SE	b		SE
Intercept	**-2,01**	***	**0,334**	**-2,053**	***	**0,143**	**-2,116**	***	**0,408**
EPL	**-0,297**		**0,211**	**-0,297**		**0,211**	**-0,297**		**0,211**
Innovation	-0,226	**	0,094	-0,226	**	0,094	-0,226	**	0,094
EPL*Innovation	0,365	***	0,1	0,365	***	0,1	0,365	***	0,1
UB	-0,008		-0,01	-0,008		-0,01	-0,008		-0,01
ALMP	0,052		0,512	0,052		0,512	0,052		0,512
Union Coverage	0,002		0,006	0,002		0,006	0,002		0,006
	flexible regulation, maximal innovation			mean regulation, maximal innovation			rigid regulation, maximal innovation		
	b		SE	b		SE	b		SE
Intercept	**-2,693**	***	**0,57**	**-2,736**	***	**0,333**	**-2,799**	***	**0,358**
EPL	**0,808**	**	**0,291**	**0,808**	**	**0,291**	**0,808**	**	**0,291**
Innovation	-0,226	**	0,094	-0,226	**	0,094	-0,226	**	0,094
EPL*Innovation	0,365	***	0,1	0,365	***	0,1	0,365	***	0,1
UB	-0,008		-0,01	-0,008		-0,01	-0,008		-0,01
ALMP	0,052		0,512	0,052		0,512	0,052		0,512
Union Coverage	0,002		0,006	0,002		0,006	0,002		0,006

Dependent variable: unemployed: yes/no, each country has an equal weight, Population average model with robust standard errors, controlled for age, gender and country of birth

** significant at 10 percent-level, ** significant at 5 percent level, *** significant at 1 percent level*

Tab D: Highly-skilled unemployment risks, logistic multilevel analyses

	flexible regulation, minimial innovation			mean regulation, minimal innovation			regulation max, minimal innovation		
	b		SE	b		SE	b		SE
Intercept	**-4,064**	***	**0,217**	**-3,537**	***	**0,187**	**-3,138**	***	**0,429**
EPL	**0,379**	**	**0,156**	**0,379**	**	**0,156**	**0,379**	**	**0,156**
Innovation	-0,18	*	0,087	-0,18	*	0,087	-0,18	*	0,087
EPL*Innovation	-0,093		0,056	-0,093		0,056	-0,093		0,056
UB	-0,003		0,006	-0,003		0,006	-0,003		0,006
ALMP	0,16		0,289	0,16		0,289	0,16		0,289
Union Coverage	0,012	***	0,004	0,012	***	0,004	0,012	***	0,004
	flexible regulation, mean innovation			mean regulation, mean innovation			rigid regulation, mean innovation		
	b		SE	b		SE	b		SE
Intercept	**-4,402**	***	**0,283**	**-3,874**	***	**0,095**	**-3,475**	***	**0,307**
EPL	**0,205**		**0,139**	**0,205**		**0,139**	**0,205**		**0,139**
Innovation	-0,18	*	0,087	-0,18	*	0,087	-0,18	*	0,087
EPL*Innovation	-0,093		0,056	-0,093		0,056	-0,093		0,056
UB	-0,003		0,006	-0,003		0,006	-0,003		0,006
ALMP	0,16		0,289	0,16		0,289	0,16		0,289
Union Coverage	0,012	***	0,004	0,012	***	0,004	0,012	***	0,004
	flexible regulation, maximal innovation			mean regulation, maximal innovation			rigid regulation, maximal innovation		
	b		SE	b		SE	b		SE
Intercept	**-4,947**	***	**0,494**	**-4,419**	***	**0,28**	**4,020**	***	**0,247**
EPL	**-0,076**		**0,241**	**-0,076**		**0,241**	**-0,076**		**0,241**
Innovation	-0,18	*	0,087	-0,18	*	0,087	-0,18	*	0,087
EPL*Innovation	-0,093		0,056	-0,093		0,056	-0,093		0,056
UB	-0,003		0,006	-0,003		0,006	-0,003		0,006
ALMP	0,16		0,289	0,16		0,289	0,16		0,289
Union Coverage	0,012	***	0,004	0,012	***	0,004	0,012	***	0,004

Dependent variable: unemployed: yes/no, each country has an equal weight, Population average model with robust standard errors, controlled for age, gender and country of birth

** significant at 10 percent-level, ** significant at 5 percent level, *** significant at 1 percent level*