Labour Market Institutions and Regional Unemployment Disparities

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Labour Market Institutions and Regional Unemployment Disparities

Peter Huber (WIFO, MUAF)

Contribution to the Project

The research will contribute to deciding how labour market and social policy institutions contribute to regional unemployment and social disparities in the EU. From this research suggestions on policies can be developed on how to reduce regional disparities in unemployment and social conditions.

Labour Market Institutions and Regional Unemployment Disparities

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Abstract

We conduct a theoretically based, empirical analysis of the impact of national wage bargaining, labour market and housing market institutions as well as product market regulation on regional unemployment rate disparities. Using both national and regional data on unemployment rates for 14 EU countries for the period 1998 to 2009 we find a robust correlation between centralisation, net replacement rates and regional autonomy with the size of regional unemployment rate disparities within a country and a further potential role for minimum wages, generosity of old age and sickness benefits, marginal tax rates, housing market flexibility, employment protection and the costs of overtime contracts. In contrast to expectations only the regional autonomy index, net replacement rates, sickness benefits and employment protection are positively correlated with regional unemployment rate disparities, while the other robust variables are negatively correlated.

Key – Words: Regional Labour Markets, Institutions, Unemployment Disparities

JEL-Codes: R23, J64

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1. Introduction

Regional labour market disparities, in particular those in unemployment rates, are noticeably higher in EU countries than in many other developed countries. For instance OECD (2005) shows that 8 of the 10 countries with the largest regional unemployment rates disparities among its 27 member states are EU countries (the only non-EU members among the top 10 are Turkey and Mexico). Many studies (e.g. Janiak and Wasmer, 2008, OECD, 2005) have pointed out that this stylized fact impedes on European cohesion and may even threaten the viability of European Monetary Union. Furthermore, many analysts have also suggested that the large regional unemployment rate disparities in the EU are due to institutional factors such as tight labour and product market regulation as well as inflexible housing markets.

Despite this, direct empirical tests of the impact of labour market institutions on regional unemployment rates disparities are rare. A large literature (e.g.: Baccaro and Rei 2007, Nickel et al. 2005, Sachs 2012) exists on the impact of national institutions on national unemployment rates, and another large literature (e.g. Decresin and Fatas, 1995, Baddeley et al. 2000 Janiak and Wasmer, 2008) analyses regional labour market adjustments and regional wage flexibility in the EU and yet another, somewhat smaller, literature considers the impact of national institutions on regional unemployment rate levels (e.g. Caroleo and Copola 2006, Zeilstra and Elhorst 2006). Only very few contributions, however, analyse the impact of national institutions on regional disparities. Among these exceptions Herwatz and Niebuhr (2011) focus on labour demand and find that regulations affecting wages explain a large part of regional labour market disparities in the EU. Che and Spilimbergo (2012) analyse income disparities and find that regional convergence in GDP in a country is facilitated by domestic financial development, trade and current account openness, better institutional infrastructure and labour market reforms. Finally, Longhi et al. (2005), look at the impact of wage bargaining institutions on regional unemployment rate disparities. They show that regional unemployment rate disparities are lowest in countries where wage bargaining is

either very highly or very lowly centralized and decreases with collective bargaining coverage. In addition they find that regional unemployment rates increase with specialisation in countries with an intermediate level of bargaining coordination but decrease with specialisation in countries with either low or high levels of bargaining co-ordination.

In this paper our interest is also with the impact of national institutions on regional unemployment rate disparities. In contrast to Longhi et al. (2005) we, however, aim to present results on a wider set of institutional variables than those concerned with wage bargaining, by conducting a theoretically based, empirical analysis of the impact of national labour and housing market institutions as well as product market regulation on regional unemployment rate disparities. By incorporating a wage curve in the benchmark regional labour market model proposed by Moretti (2010) we show that theoretically regional unemployment rate disparities in a country depend on disparities in productivity and amenities among regions within a country, but also on parameters (such as labour mobility and housing market and wage flexibility) which are *inter alia* shaped by national labour and housing market institutions. We also show that the implications of this model can be tested both by using national and regional data on unemployment rates. Finally, we apply methods of Bayesian Model Averaging and quantile regressions to a data set covering the NUTS 2 regions of 14 EU countries for the period 1998 to 2009, to identify institutions that are robustly correlated with regional unemployment disparities in EU countries.

Following these two methods and using two alternative measures of unemployment rate disparities in a country we find a robust correlation between centralisation, net replacement rates and regional autonomy with the size of regional unemployment rate disparities within a country in all empirical specifications and a further potential role for minimum wages, generosity of old age and sickness benefits, marginal tax rates, housing market flexibility, employment protection and the costs of overtime contracts in some specifications. Somewhat in contrast to our expectations, however, only the regional autonomy index, net replacement rates, sickness benefits and employment protection are

positively correlated with regional unemployment rate disparities, while the other robust variables are negatively correlated.

The remainder of the paper is structured as follows: the next section describes theory, section three discusses the empirical approach, while section four presents the data. Section five presents baseline results and section six extends these results to consider potential interactions between institutions as well as potential heterogeneity of impacts of institutions on different labour market groups. Section seven, finally, draws summarizes the results and draws conclusions.

2. Theory

As a starting point for our discussion we follow Moretti (2011) and consider an economy consisting of two regions indexed by $c \in \{1,2\}$ populated by a continuum of workers/consumers that is normalized to 1. Each worker/consumer inelastically supplies one unit of labour to the labour market and consumes one unit of housing. The share of workers living in region 1 is n_1 and the share of workers living in region 2 is n_2. In contrast to Moretti (2011) we, however, allow some workers to be employed while others are unemployed. Thus $n_c = L_c + U_c$ and $u_c = \frac{U_c}{n_c}$ with L_c the number of employed, U_c the number of unemployed and u_c the unemployment rate in region c. When employed a worker residing in c recieves a wage of W_c and when unemployed no income is recieved.

2.1 Labour Supply

The indirect (expected) utility of worker (i) from living in region c (V_{ic}) is therefore given by:

$$V_{ic} = \left[\frac{W_c(1-u_c)}{R_C}\right]^{\alpha} A_c E_{ic}$$

with A_c a measure of utility derived from region specific ammenities (such as natural beauty) in region c, E_{ic} an individual specific (idiosyncratic) utility term capturing differences in tastes with respect to

amenities in a region, u_c the unemployment rate, R_C the rental price of housing and $\alpha < 1$ a parameter of the utility function. Taking logarithms we get[2]:

$$\ln(V_{ic}) \approx \alpha(w_c - r_c - u_c) + a_c - e_{ic} \quad (1)$$

with small letters designating the logarithm of their capitalized equivalents.

We assume that $e_{i1} - e_{i2}$ is uniformly distributed in the interval $[-s, s]$ (i.e. $e_{i1} - e_{i2} \sim U[-s, s]$). As argued by Moretti (2011) the parameter s captures labour mobility in a country. If s is large this implies important preferences for location and low mobility, while if s is low, mobility is high. In consequence at $s = 0$ perfect mobility prevails. In equilibrium for the marginal worker the utility of living in region 1 and 2 must be equal (i.e. $\ln(V_{i1}) = \ln(V_{i2})$), therefore workers with $e_{i1} - e_{i2} < \alpha(w_1 - w_2 - u_1 + u_2 - r_1 + r_2) + a_1 - a_2$ live in region 1 and all others in region 2. As a consequence:

$$n_1 - n_2 = \frac{\alpha(w_1 - w_2 - u_1 + u_2 - r_1 + r_2) + a_1 - a_2}{s} \quad (2)$$

which noting that $n_2 = 1 - n_1$ gives the following labour supply function in the two regions:

$$n_1 = \frac{1}{2} + \frac{\alpha(w_1 - w_2 - u_1 + u_2 - r_1 + r_2) + a_1 - a_2}{2s} \quad (3)$$

$$n_2 = \frac{1}{2} - \frac{\alpha(w_1 - w_2 - u_1 + u_2 - r_1 + r_2) + a_1 - a_2}{2s} \quad (4)$$

Equations (3) and (4) state that the labour supply in a region increases if the region offers higher amenities and wages and lower unemployment rates than the other region. Furthermore, these equations imply that given disparities in one or more of these factors, labour supply in the advantaged region increases with higher mobility (i.e. decreasing s) and labour supply is more elastic with respect to wage and unemployment rate differentials the higher mobility (the lower s).

2.2 Housing market

Following Moretti (2011) housing supply (H_c) in region c is given by the function $H_c = k_a + k_b r_c$, with $k_b \geq 0$ the price elasticity of housing supply. Low values of k_b therefore signal inflexible

[2] In deriving this equation we use the fact that $\ln(1 - u_c) \approx -u_c$ for u_c close to zero.

housing supply. Since housing demand is equal to n_c and the housing market is assumed to clear this gives $n_c = k_a + k_b r_c$ as an equilibrium condition for the housing market in region c. Taking the difference of this between region 1 and 2 gives $\kappa(n_1 - n_2) = r_1 - r_2$ with $\kappa = \frac{1}{k_b}$ ($\kappa \epsilon [0, \infty)$) measuring the inverse price elasticity of housing supply. Inserting this condition into equation (2) gives:

$$n_1 - n_2 = \frac{\alpha(w_1 - w_2 - u_1 + u_2) + (a_1 - a_2)}{s + \alpha\kappa}$$

which shows that housing market flexibility as measured by the price elasticity of housing supply acts in a similar way as mobility on the elasticity of labour supply in a region. The reason for this is that if housing supply is inelastic (i.e. κ goes to infinity), any differences in nominal income (i.e. wages or unemployment rates) between the two regions, will be fully absorbed through increases in housing prices. As a consequence real incomes will be equalized across regions through housing price changes and there will be no incentives for mobility. By contrast when housing prices react to price changes real income differences between regions (and thus incentives for mobility) can exist.

2.4 Wage setting

Furthermore to allow for unemployment in equilibrium, we assume that wages in an economy are set according to a wage curve introduced to regional labour market economics by Blanchflower and Oswald (1995) and analysed in a large number of empirical contributions since then (see Nijkamp and Poot 2005 for a survey). As pointed out by Bean (1994) this assumption nests a number of wage setting models such as trade union or efficiency wage models. We parametrise this function as $w_c = \phi_0 - \phi_a u_c$, which gives:

$$w_1 - w_2 = -\phi_a\,(u_1 - u_2) \tag{5}$$

as an expression for wage differentials of the region. We therefore get:

$$n_1 - n_2 = \frac{-(1 + \phi_a)\alpha(u_1 - u_2) + (a_1 - a_2)}{s + \alpha\kappa} \tag{6}$$

2.3 Labour demand

Finally, labour demand is determined by firms that produce from labour only, and have a linear labour demand function. Thus once more following Moretti (2011) assuming that (log) labour demand in region c is given by $\chi_c - w_c = \gamma l_c$ and approximating the definition of the unemployment rate equation by $l_c \approx \mathrm{n}_c - u_c$ gives:

$$\tau(x_c - w_c) = \mathrm{n}_c - u_c \tag{7}$$

As a labour demand function, with $\tau = 1/\gamma$ a parameter that measures the flexibility of labour demand. Taking differences in labour demand between region 1 and 2 therefore yields $\tau(x_1 - x_2 - w_1 + w_2) = \mathrm{n}_1 - u_1 - \mathrm{n}_2 + u_2$ and inserting 6 into this gives:

$$\tau(x_1 - x_2) + (1 + \tau\phi_a)(u_1 - u_2) = \mathrm{n}_1 - \mathrm{n}_2 \tag{8}$$

2.5 Equilibrium unemployment rate disparities

Equations 6 and 8 together give:

$$u_1 - u_2 = \frac{(a_1 - a_2) - (s + \alpha\kappa)\tau(x_1 - x_2)}{(s + \alpha\kappa)(1 + \tau\phi_a) + (1 + \phi_a)\alpha} \tag{9}$$

As an equation for equilibrium unemployment rate disparities. This equation states that sufficient conditions for regional unemployment rate disparities are that either wages are fully flexible with respect to a regions' unemployment rate (i.e. zero as ϕ_a goes to infinity) or that $a_1 - a_2 = \tau(s + \alpha\kappa)(x_1 - x_2)$ which implies that either there are no differences in amenities and productivity between regions or that the parameters of this equation are such as to guarantee equality to zero. Thus full wage flexibility is sufficient but not necessary to equalize unemployment rates across regions. If none of these conditions are met unemployment rate disparities are increasing in amenity differentials between region 1 and 2 and decreasing in productivity differentials.

The central variables of interest for the purposes of this paper are, however, the parameters ϕ_a, κ and s. Taking derivatives of equation (9) with respect to these it is easy to see that regional unemployment disparities are decreasing in wage flexibility (ϕ_a). For the parameter s and κ derivatives are positive if

$a_1 - a_2 > \frac{-\tau(1+\phi_a)\alpha}{1+\tau\phi_a}(x_1 - x_2)$ and negative else. This implies that higher mobility (lower s) and more housing market flexibility (lower κ) will lead to lower unemployment rate disparities only in the case that high unemployment regions are also low productivity regions. Intuitively this result can be explained by the fact that if unemployment rate disparities arise mainly because of differences in amenities, increasing labour mobility or higher housing market flexibility will lead to more people moving to regions with high amenities even when unemployment in these regions is high.

Similarly using $n_2 = 1 - n_1$ as well as using equations (6) and (8) we can derive the unemployment rates in each of the regions in the model. In particular the unemployment rate of the high unemployment region (region 1) is given as

$$u_1 = \frac{1+2\tau(\phi_0 - x_1)}{2\tau\phi_a} + \frac{\tau\alpha\phi_a(a_1-a_2)+(1+\tau\phi_a)(x_1-x_2)}{2\tau\phi_a\{(s+\alpha\kappa)[1+\tau\phi_a]+\alpha\phi_a\}} \tag{10}$$

While the unemployment rate in the low unemployment region is given as

$$u_2 = \frac{1+2\tau(\phi_0 - x_2)}{2\tau\phi_a} - \frac{\tau\alpha\phi_a(a_1-a_2)+(1+\tau\phi_a)(x_1-x_2)}{2\tau\phi_a\{(s+\alpha\kappa)[1+\tau\phi_a]+\alpha\phi_a\}} \tag{11}$$

Thus equations (10) and (11) as evidenced by the second term on the right hand side of these equations – imply that variables influencing the parameters ϕ_a, ϕ_b τ and κ should have a smaller impact on high and low unemployment rate regions.

2.6 Institutions and unemployment rate disparities

A number of authors have argued that the parameters of equations (9), (10) and (11) are closely linked to the institutional set up of an economy. For instance trade union theories (e.g. Oswald, 1985) often suggest that a higher union density or a higher coverage rate of trade union agreements increases wage demands of workers and lowers wage flexibility (see: Blanchard and Giavazzi 2003, Longhi et al. 2005). Calmfors and Driffil (1988) among many others argued that there is an inverse U-shaped relationship between centralisation or (explicit or implicit) co-ordination of wage bargaining and wage flexibility and already Stigler (1946) argues that minimum wages may reduce labour demand and wage flexibility. In terms of our model this would imply that high minimum wages, trade union density and

coverage rates should first of all be positively correlated with a country's regional unemployment rate disparities and should second of all have a smaller effect on the unemployment rates in high than in low unemployment rate regions and also an effect on regional unemployment rate disparities, since all these factors impact on wage flexibility captured by the parameter ϕ_a in the model. There are, however, also important counterarguments to this view. For instance Manning (1995) argues that minimum wages may reduce unemployment by lifting wages to a level where shirking is less likely to occur and a number of authors (e.g. Freeman, 1980) have also stated that higher union power may lead to higher productivity and more employment if unions use their voice to improve working conditions and work organisation.

Similarly, quite a few studies argue that search incentives of workers are influenced by incentives to take up work and by policy measures of governments aimed to improve the capability of unemployed to find work. Holmlund (1998) argues that a higher replacement ratio of unemployment benefits reduces search incentives of the unemployed but may increase search incentives of those not eligible for unemployment benefits. Similarly, higher effective marginal tax rates of the unemployed moving to employment reduce search incentives. Furthermore, active labour market policies if effective – as shown by a large literature on the evaluation of active labour market policies (e.g. Grubb and Martin, 2001) – may help to improve the search effectiveness of the unemployed. Finally, Lundqvuist (2002) shows that stricter employment protection legislation has a twofold impact on search incentives. On the one hand it reduces flows from employment to unemployment (due to higher costs of firing redundant workers). On the other hand it also reduces incentives of firms to hire new workers.

Since these factors all impact on search incentives or the capability of searchers to find employment they can also be expected to influence regional mobility and thus impact on the parameter s in our model. This would imply that higher unemployment disparities are found in countries where search incentives are low (i.e. unemployment benefits and marginal tax rates are high and expenditures on active labour market policies are low) and that high unemployment benefits, marginal tax rates and low

expenditures on active labour market policies increase unemployment rates more in high unemployment regions than in low unemployment rate regions. Once again there are, however, important counter arguments to the hypothesized sign of the impacts. In particular higher unemployment benefits could lead to workers being more choosy about their place of work and higher employment protection legislation could have a similar effect on the side of employers. This in turn could lead to higher quality matches between employers and employees and thus longer employment spells and higher productivity as well as lower unemployment rate disparities.

Finally, Oswald (1996) and a large literature building on him (e.g. Isbaert et al. 2011 and Munch et al. 2008) notices that the structure of housing markets is also among the important institutions influencing regional labour mobility and Janiak and Wasmer (2008) have more recently argued that the rules governing the rental housing market (such as the ease with which non-paying tenants can be evicted) may have an impact on the flexibility of the housing market (captured by the parameter κ in our model). Similarly, some authors (e.g. Felbermayr and Prat, 2011) have argued that also product market regulation may reduce the flexibility of labour demand (i.e. the parameter τ in the model) by reducing an economy's capability to create new jobs. This would imply that regional unemployment rate disparities should increase with housing market rigidity and reduce with lower product market regulation.

3. Empirical Implementation

Thus theoretical considerations suggest that first of all there are ample arguments to support the view that institutions either increase or decrease national unemployment rates as well as unemployment rate disparities within countries. This ambiguity is also reflected in previous empirical work. For instance Sachs (2010) in a short survey of 14 papers on the topic shows that these disagree on the sign of the impact of all of the institutional variables considered above. Our considerations, however, also suggest that a regional analysis can provide additional ways in which theoretical predictions can be tested empirically. A first possibility would be to regress measures of variables that are thought to influence

mobility as well as wage and housing market flexibility on measures of regional unemployment rate disparities within countries, while controlling for other factors influencing this dispersion (e.g. such as disparities in amenities and productivity as suggested by our model). We follow this strategy in section 5.1 below.

This approach, however, has two drawbacks. First, it requires that regional data on unemployment, amenities, productivity as well as any other factors influencing unemployment rate disparities and on national institutions is available on a large set of countries (and potentially time periods) to provide reliable estimates. Such data is not available to us. As shown below even with the best of our efforts, we are able to obtain data on only three time periods for 14 countries. This leads to issues of multicolinearity and robustness of results across different specifications. Second, such a strategy would require identification of an appropriate measure of regional unemployment rates disparities. Available measures of dispersion (such as the standard deviation or the range), however, all share the weakness that they are influenced by both the size of the country as well as the number of regions in a country as well as a large number of badly understood geographical variables, so that in all likelihood such an approach would be subject to measurement error and high co-linearity among indicators. This in turn leads to substantial model uncertainty. We therefore test this hypotheses using data methods of Bayesian Averaging of Classical Estimates (BACE) proposed by Sala-i-Martin et al. (2000) that have been suggested to deal with model uncertainty.[3] This consists of estimating each and every of the 2^k regressions conceivable in a model with k possible variables and performing inference based on a weighted average of the estimates obtained in each specification. In detail we estimate regressions of the form:

$$\Delta \ln(u_{it}) = \lambda + \alpha Y_{it} + \gamma Z_{it} + \xi_{it} \tag{12}$$

[3] See also Hoeting et al. (1999) for an introduction.

where $\Delta \ln(u_{it})$ is a measure of regional unemployment rate disparities within country i in period t, Z_{it} is a vector of explanatory institutional variables affecting search incentives, housing market flexibility (the elasticity of housing supply), wage flexibility or the elasticity of demand for labor and Y_{it} is a vector of further variables such as productivity and amenity disparities that are expected to influence regional disparities for the same country and period, λ is an intercept and ξ_{it} an error term.

Sala-i-Martin et al. (2000) show that under the assumption that the marginal prior density of model j (M_j) is multivariate normally distributed as proposed by Zeller's g-prior structure, choosing the appropriate diffuse prior and assigning equal prior probabilities to all models the expectation of the posterior distribution of the parameters (α) is given by $E(\alpha|y) = \sum_{j=1}^{2^k} P(M_j|y)\hat{\alpha}_j$ and an approximation for its variance is given by $Var(\alpha|y) = \sum_{j=1}^{2^k} P(M_j|y)Var(\alpha|y, M_j) + \sum_{j=1}^{2^k} P(M_j|y)\left[\hat{\alpha}_j - \sum_{j=1}^{2^k} P(M_j|y)\hat{\alpha}_j\right]$ with $P(M_j|y) = T^{-n_j/2}SSE^{-T/2}/\sum_{i=1}^{2^k} T^{-n_i/2}SSE^{-T/2}$ where T is the number of observations, n the number of regressors included in regression j and SSE_i is the sum of squared errors of this regression (see Fernandez et al., 2001 for details) . In this setup there are a number of ways to judge the importance of results. In particular Sala-i-Martin et al. (2000) suggest focusing posterior inclusion probabilities for a variable, which can be calculated by taking the sum of $P(M_j|y)$ across all specifications in which this variable is included. Furthermore, given $P(M_j|y)$, the posterior expectation and variance of the estimated parameters can be calculated and following Masanjala and Papageorgiou (2008) the ratio of the posterior expectation to its variance can be considered "efficient" if this ratio exceeds 1 in absolute value.

A second possibility to test our model is to look at equations (10) and (11). For empirical applications these can be merged into a linearised model given by:

$$u_{it} = \mu + \delta_k X_{it} + \pi_k Z_{it} + \xi_i \tag{13}$$

where X_{it} is a vector of region specific variables believed to impact on unemployment and Z_{it} is a vector of national institutional variables (of the country to which region i belongs) believed to affect

unemployment rates. The δ_k, π_k are parameters whose value may differ in different parts of the unemployment rate distribution. Since theory suggests that the institutional variables have a different impact on high and low unemployment rate regions within a country we use quantile regressions and estimate (13) at the first and third quartile of the unemployment rate distribution (i.e. $k\epsilon\{1,3\}$) and test the hypothesis that $\delta_1 = \delta_3$ since for a variable to increase regional disparities its impact has to be smaller in the lower part of the distribution than in the upper part, while for the variable to reduce disparities the opposite must be the case.

4. Data

To estimate these models we merge data on regional unemployment rates and on the regional determinants of unemployment rates (taken from the EUROSTAT Regio Database, the Cambridge econometrics data set as well as from the OECDs regional data base for the years from 1999 to 2009), with data on regional housing market indicators, and amenities as well as with data on national institutions taken from various sources.

4.1 Regional Data

In detail to construct the dependent variable we extracted regional unemployment rates (as well as youth, long term, male and female unemployment rates) from the (large region – NUTS2) OECD regional data base and augmented this with (NUTS2 level) regional information from EUROSTAT in all cases where either an EU27 country is not an OECD country or where the OECD data showed missing values but EUROSTAT sources provided information. Finally, in a last step these data were augmented by information from Cambridge Econometrics in all cases where missing observations remained. A similar approach was taken for the regional control variables. Here the literature of regional unemployment disparities – national institutions aside - has suggested a large number of different variables that may impact on regional unemployment rate levels. Synthesizing this literature Elhorst (2003) suggests that the following variables are often found to be correlated to regional unemployment rates: the share of young

population, birth and natural population growth rates, labour force participation, migration and commuting rates, the proportion of households in the public rental sector and in owner occupied housing, regional amenities, wages paid relative to productivity and living costs of the region, sector shifts in labour demand, industrial density, vacancy rates and national unemployment rate or the spatial lag of unemployment rates as well as the share of long-term unemployed.[4] From this list we deleted the share of long term unemployed on account of its obvious endogeneity, but added GDP growth and the education structure of the population.

We therefore obtained data on productivity, natural population growth, birth rates, the share of young population (i.e. the share of those aged below 25 in total population), the share of low educated in the labour force (i.e. the share of employed ISCED 2 or lower education in total employment), the share of high educated in the labour force (i.e. the share of employed ISCED 2 or lower education in total employment), the participation rate, migration and commuting rates, the compensation per employee, GDP growth as well as indicators on regional structural change, specialisation and sector structure, which are the turbulence index[5], herfindahl index[6] and the share of agricultural and industry employment from OECD, EUROSTAT and Cambridge Econometrics sources.[7]

Finally, in a last step we augmented this data with data on housing (taken from the EU-SILC), on amenities (taken from Kienast, 2009 and previously used by Rodriguez Pose, 2012) and data on heating degree days obtained from EUROSTAT (as an additional time varying indicator of amenities). We use data on the share of households living in owner occupied and in subsidised housing as well as an indicator of total housing costs on a regional level from EU-SILC data. These data are available on an annual basis.

[4] In addition Elhorst (2003) also mentions the generosity of the social security system and the power of trade unions. These are part of our variables of interest.
[5] This is given as the sum of absolute annual changes in sector employment shares on a crude sector breakdown which differentiates between employment in agriculture, manufacturing, construction, trade and restaurants and transport (as one group), financial services and real estate, and non-market services.
[6] This is based on the same sector breakdown as the turbulence index.
[7] The extracted data set missed data for 7 regions in Germany for two years. For these regions we extra-(or intra-)polated the missing observations based on information available from higher tier (NUTS1) regions and a time trend.

With respect to amenity data, by contrast, aside from heating degree days we also use the indexes on the touristic and recreational, cultural and artistic, aesthetic value of a region and the indexes on the variety of wildlife, the supply of forest products of the housing capacity as well as indices on plant and animal habitats and environmental quality derived by Kienast et al (2009). These data are available for the year 2006. Table 1 presents a full list of the indicators and sources of regional data used in the analysis.

Table 1: Data collected at the regional NUTS 2 level

Variable	Description	Sources
	Dependent variables	
ln_UN_RATE	Log unemployment rate	OECD, EUROSTAT, CE
ln_LTURATR	Log long term unemployment rate	OECD, EUROSTAT, CE
Ln_urate_fe	Log female unemployment rate	OECD, EUROSTAT, CE
Ln_urate_ma	Log male unemployment rate	OECD, EUROSTAT, CE
Ln_urate_yo	Log youth unemployment rate	OECD, EUROSTAT, CE
	Independent variables	
	STRUCTURE	
Lnturb	Log of turbulence indicator (based on 6 sectors)	OECD, EUROSTAT, CE
Lnherf	Log of herfindahl index (based on 6 sectors)	OECD, EUROSTAT, CE
Lnaggsh	Log of share of agricultural employment	OECD, EUROSTAT, CE
Lnindsh	Log industrial employment share	OECD, EUROSTAT, CE
Lnlowedsh	Log of share of low educated workforce (ISCED 2 or lower)	OECD, EUROSTAT, CE
Lnhighedsh	Log of share of high educated workforce (ISCED 5 or higher)	OECD, EUROSTAT, CE
Lnpopden	Log population density	OECD, EUROSTAT, CE
	ECONOMIC VARIABLES	
GDP_PC_gr_CP	GDP per capita growth	OECD, EUROSTAT, CE
LnPA_RATE	Log of participation rate	
Lncompens	Log compensation per employee	OECD, EUROSTAT, CE
Lnprod	Log Labor Productivity	OECD, EUROSTAT, CE
	DEMOGRAPHY	
Lnoldsh	Log share of old population (over 64)	OECD, EUROSTAT, CE
Lnbirthr	Log birthrate	OECD, EUROSTAT, CE
Popgr	Population growth	OECD, EUROSTAT, CE
Lnyoungsh	Log share of young population (under 25)	OECD, EUROSTAT, CE
Migrate	Migration rate	OECD, EUROSTAT, CE
Lncommrate	Log of out commuting rate	OECD, EUROSTAT, CE
	HOUSING MARKET	
lnhouscost	Log average housing costs in reion	EU-SILC
lnownoccrate	Log share owner occupied housing	EU-SILC
lnsubsocccrate	Log share subsidized and free housing	EU-SILC
	Ammentities	
Lnheat_day	Log number of actual heating degree days	EUROSTAT
lnWildProd	Log index of variety in fauna and flora	Kienast (2009)
lnForest	Suplly of fiber timber and non-timber forest goods	Kienast (2009)
lnTransp	Log index of capacity of landscape to supply transportation and housing	Kienast (2009)
lnClimate	Log index of ecosystems ability to influence environmental quality	Kienast (2009)
lnHabitat	Log index of provision of suitable living space for flora and fauna	Kienast (2009)
lnAesth	Log index of benefits related to non-recreational appeal of landscape	Kienast (2009)
lnRecrTour	Log index of landscape services from landscapes with touristic or recreational value	Kienast (2009)
lnCultArt	Log index of Cultural and Artistic landscape values	Kienast (2009)
	Others	
ln_m_no_regs	Number of regions	OECD, EUROSTAT, CE

Source: own calculations

One drawback of the data is that the indicators taken from the EU-SILC are only available for a rather limited subset of EU countries and often refer to higher levels of regional aggregation than NUTS2. We deal with this issue by merging EU-SILC data belonging to higher tier regions to all NUTS2 regions below this higher tier level. Even in this way we were, however, only able to obtain data on 14 EU countries[8] with more than one NUTS2 region[9]. A further caveat is that the list of regional indicators is rather long and there is substantial co-linearity among the variables (in particular among those measuring amenities). We therefore decided to reduce the number of indicators by - as a preparatory step to our analysis – running a similar BACE analysis as described above for national data on the regional level. In this analysis the regional unemployment rate (relative to the country average) was the dependent variable and all regional indicators (again measured relative to the country average) mentioned in table 1 were used as independent variables. The results of this analysis are reported in Table A6 in the annex and suggest that among the potential explanatory variables the following have a posterior inclusion probability in excess of our prior of 0.5: industrial employment share, compensation per employee, participation rate, migration rate, share of elder population, average housing costs in region and the indices of capacity of landscape to supply transportation and housing, of benefits related to non-recreational appeal of landscape, of ecosystems' ability to influence environmental quality, of cultural and artistic landscape values, of share of high educated workforce and of provision of suitable living space for flora and fauna. These variables should therefore definitely be included in the further analysis. However, since in the subsequent analysis we will also be using a number of alternative dependent variables and out of a concern for potential missing variable bias we also decided to maintain all variables with a posterior inclusion probability of more than 0.15. So that the share owner occupied housing, heating degree days, index of landscape services from touristic/recreational value, population density were added to the list of

[8] These are Austria, Belgium, Czech Republic, Germany, Spain, Finland, France, Greece, Hungary, Ireland, Italy, Poland, Portugal and Sweden

[9] We omit countries with one NUTS 2 region since by definition unemployment rate disparities cannot be measured in these countries.

variables for further analysis, while the supply of fibre, timber and non-timber forest goods, out commuting rate, population growth, share of young population, share subsidized housing, birth rate, share of agricultural employment, index of variety in fauna and flora, herfindahl index, turbulence indicator and GDP per capita growth were dropped on account of a very low expected explanatory power.

4.2 National data

This slightly reduced regional data set was then augmented with national institutional data compiled from a variety of sources. In particular we focus on the following indicators (see also table 2):

1. Data on labour market regulation – here we use the data on minimum wages in % of the median wage, the strictness of employment protection legislation, replacement rates as well as replacement rates including social and housing markets, and data on marginal tax rates (as captured by the effective marginal tax rate when moving from unemployment to employment in a job earning 33% of the average national income) provided by OECD. In addition we also use the share of GDP spent for active labour market policies. These data have been widely used in studies measuring the impact of labour market institutions on national unemployment rates (e.g. Nickel et al 2005, Amable 2007, Bassanini and Duval 2006 or Baccaro and Rei 2007) and are all (except for employment protection legislation data - which is available for three points in time) available on an annual frequency.
2. Data on wage bargaining and trade union organisation – These consist of data on the organisation of trade union bargaining and social pacts from Visser (2011). From this we extract the indicators of trade union density, adjusted trade union coverage and centralisation, concentration and co-ordination of wage bargaining in the respective countries. Again these data are available on an annual frequency.
3. Housing market indicators – In addition we also include the housing market formalism index from Djankov et al. (2003). This has recently been used by Janiak and Wasmer (2008) to proxy for housing market flexibility. This indicator measures the number of juristic procedures necessary to ligitate an non-paying tenant. It is, however, only available for one period.

Table 2: National Indicators and Sources

Variable	Description	Sources
	WAGE SETTING	
ln_CENT	Centralisation of wage bargaining	Visser (2011)
ln_UD	union density	Visser (2011)
ln_CONC	Concentration of wage bargaining	Visser (2011)
ln_WCOORD	Wage setting coordination	Visser (2011)
ln_AdjCov	Adjusted Coverage	Visser (2011)
MINW_Mean_	Minimum wage in % of median wage (0 if no minimum wage)	OECD
ln_NRR_	Net replacement rate	OECD
ln_NRR_SAHB_	Net replacement rate including soial and housing assitance	OECD
ln_PMR_	Product market regulation index	OECD
ln_ALMP_	Active labour market policy expenditure in % of GDP	OECD
	SEARCH INCENTIVES	
ln_ETR_UN_33_NC_S_NK	Effective marginal tax rate for unemployed moving to employment at 33% of mean wage	OECD
ln_index_sick2	Level of sickness and health benefits	Botero et al (2004)
ln_index_old_202	Level of old age, disability and death benefits	Botero et al (2004)
	HOUSING MARKET FLEXIBILITY	
ln_all_indexn_e	Formality Index for eviction from housing	Djankov et al (2003)
	OTHERS	
ln_OECD_EP_v1_	Employment protection index	OECD
Ln_rai	Regional autonomy index	Hooghe et al (2010)

4. Data on product market regulation – We use the product market regulation indicator developed by the OECD, which again has been widely used in the literature.
5. Finally, we augment this data with some indicators taken from Botero et al. (2003), which measure the level of old age and social security benefits and the generosity of sickness and health benefits to control for further aspects of the generosity of the social security system not covered by other data and an indicator of regional autonomy (the so called RAI indicator) developed by Hooghe et al. (2010) also used by Ezcurra and Rodríguez-Pose (2011).

4.3 Descriptive Statistics

Since we are interested in the long term impact of institutions on regional unemployment rate disparities and because some of our institutional variables are measured only infrequently we collapse our data into three time periods (1998 to 2001, 2002 to 2005 and 2006 to 2009) by taking averages over all variables of interest. Based on these three periods we construct two versions of the data: In the first version we calculate indicators of regional unemployment rates, productivity and amenity disparities

(such as the standard deviation and the average absolute deviation from the mean[10]) at the national level, while we include national level institutions as potential explanatory variables. This is a national level data set, used to test the first hypothesis of our model; that national institutions have an impact on measures of regional unemployment rate dispersion in a country. In the second version we take regional unemployment rates and further explanatory variables of regional unemployment rates and attach to each regional observation the indicators of the national institutions of the country in which this region is located so that in this data the development of 180 regions is considered. This data will subsequently be used to test the second hypothesis derived from our model; that institutions impact differently on high and low unemployment regions.

Table 3: Descriptive Statistics of OECD and EU Datasets at the national level

	mean	standard deviation	mean	standard deviation
	Average absolute deviation from the mean		standard deviation	
ln(unemployment rate)	0.53	0.66	0.8	0.62
ln(productivity)	13.82	2.21	14.13	2.18
ln(number of regions)	2.31	0.75	2.31	0.75
ln(heating days)	5.35	0.78	5.62	0.77
ln(cultural products)	2.82	0.73	3.09	0.72
ln(transport and housing)	3.6	0.48	3.88	0.46
ln(climate)	2.86	0.5	3.12	0.47
ln(habitat)	3.42	0.66	3.67	0.63
ln(aesthetics)	3.43	0.65	3.68	0.63
ln(recreation and tourism)	3.42	0.65	3.66	0.63
ln(cultural and artistic value)	3.4	0.66	3.66	0.64
	country mean		country mean	
ln(centralisation of bargaining)	-1	0.39	-1	0.39
ln(union density)	3.32	0.6	3.32	0.6
ln(concentration of bargaining)	-1.3	0.45	-1.3	0.45
ln(bargaining coordination)	1.09	0.42	1.09	0.42
ln(adjusted coverage rate)	4.23	0.34	4.23	0.34
ln(net replacement rate)	3.61	0.41	3.61	0.41
ln(net replacement rate incl. social and housing)	3.93	0.3	3.93	0.3
ln(product market regulation)	0.56	0.32	0.56	0.32
ln(active labour market policy exp)	-0.49	0.61	-0.49	0.61
ln(employment protection)	0.76	0.33	0.76	0.33
ln(minimum wage)	-4.74	5.11	-4.74	5.11
ln(marginal tax to employment)	4.33	0.2	4.33	0.2
ln(Formality index housing)	1.3	0.16	1.3	0.16
ln(index sick benefits)	-0.31	0.17	-0.31	0.17
ln(index old age benefits)	-0.47	0.23	-0.47	0.23
ln(regional autonomy index)	13.96	8.41	13.96	8.41

Source: Regional data set see tables 1 and 2

[10] We focus on these two measures of regional dispersion because the standard deviation is a measure used in many empirical analyses of regional labor market disparities, while the average absolute deviation from the mean most closely resembles the measure of disparities derived in the theoretical part of the paper.

Table 4: Descriptive Statistics for regional datasets

	mean	Std. Dev.	Minimum	Maximum
ln(unemployment rate)	-0.08	0.39	-1.37	1.08
ln(log-term unemployment rate)	-0.17	0.63	-3.81	1.33
ln(youth unemployment rate)	-0.06	0.34	-1.09	0.89
ln(male unemployment rate)	-0.08	0.40	-1.21	1.05
ln(female unemployment rate)	-0.08	0.39	-1.29	1.15
ln(productivity)	-0.50	1.19	-6.14	2.46
ln(industry share)	-0.05	0.33	-1.21	0.65
ln(compensation)	-0.14	0.56	-2.28	1.01
ln(participation rate)	0.00	0.08	-0.51	0.19
ln(transport and housing)	-0.03	0.22	-0.75	0.61
ln(aesthetics)	-0.01	0.15	-0.33	0.38
migration rate	0.31	0.53	-0.88	2.63
ln(climate)	0.00	0.10	-0.21	0.46
ln(share old)	-0.01	0.13	-0.37	0.44
ln(culture and art)	-0.01	0.14	-0.34	0.38
ln(high education share)	-0.03	0.24	-0.71	0.86
ln(habitat)	-0.01	0.14	-0.35	0.38
ln(housing costs)	-0.01	0.14	-0.51	0.45
ln(owner occupation rate)	0.00	0.07	-0.45	0.13
ln(heating days)	-0.02	0.19	-0.83	0.73
ln(recreation and tourism)	-0.01	0.14	-0.36	0.38
ln(population density)	-0.51	0.93	-2.76	2.19
ln(union density)	3.14	0.57	2.03	4.39
ln(adjusted coverage)	4.25	0.30	3.57	4.60
ln(bargaining concentration)	-1.34	0.46	-2.13	-0.54
ln(wage co-ordination)	1.09	0.44	0.00	1.61
ln(centralisation)	-1.03	0.38	-1.58	-0.07
ln(product market regulation)	0.59	0.31	-0.15	1.35
ln(net replacement rate)	3.63	0.42	2.97	4.15
ln(net replacement rate incl soc. & hous. ben.)	3.88	0.34	3.06	4.26
ln(active labour market policy)	-0.42	0.61	-2.17	0.51
ln(employment protection)	0.82	0.25	-0.07	1.30
ln(minimum wage)	-5.66	5.24	-11.51	-0.67
ln(marginal tax rate moving to employment)	4.30	0.19	3.90	4.71
ln(cost of overtime employment)	-0.17	0.50	-3.23	0.00
ln(index old age benefits)	-0.46	0.24	-1.12	-0.19
ln(index sick benefits)	-0.36	0.19	-0.63	-0.11
ln(index housing market eviction)	1.34	0.13	0.93	1.57
ln(regional autonomy index)	2.75	0.59	1.25	3.38
number of observations	540			

S: Regional database see tables 1 and 2

Table 3 displays the descriptive statistics for the variables included in the national level data. It shows that for unemployment rates the average absolute deviation from the mean in the average country was around 1.7 ($= e^{0.53}$) percentage points in the three periods considered and that the standard deviation in unemployment rates within a country was around 2.2 percentage points. The variation of unemployment rate disparities among countries is, however, also rather large, with the coefficient of variation exceeding unity. Similarly, these data also point to rather large productivity differentials within countries, and also high variation of most institutional variables. Table 4, by contrast, reports the

descriptive statistics for those variables included at the regional level. Unsurprisingly - given the larger number of observations available this data contains substantially more variation in unemployment rates. Thus for instance the unemployment rate in the average region of the 14 countries over the time periods considered was around 8% with the standard deviation amounting to about 4 percentage points.

5. Results

5.1 Results of Country level estimates

Table 5 presents the results estimating the impact of national institutions on two measures of regional unemployment rate disparities (the average absolute deviation from the mean on the left hand side of the table and the standard deviation on the right hand side) on a national level. Looking at the posterior inclusion probability of the variables of interest for both measures of regional disparities 6 institutional and 4 amenity variables as well as (the standard deviation and the absolute deviation from the mean of) productivity differentials have a higher posterior inclusion probability than the prior (of 0.5). Among institutional variables these are the regional autonomy index, centralization of wage bargaining, marginal tax rate, net replacement rate including social and housing benefits, minimum wages and the index for the generosity of the old age benefits. Among the amenity variables (the standard deviation and the absolute deviation from the mean of) climatic conditions, non-recreational appeal of the landscape (aesthetics), suitable living space for fauna and flora and cultural and artistic amenities have a posterior inclusion probability higher than 0.5. This suggests that these institutional and amenity variables are the ones most robustly correlated with regional unemployment rate disparities within a country.

Among these variables, however, only the index of regional autonomy in a country and the net replacement rate (including social and housing benefits) are positively correlated with regional unemployment rate disparities, while the others (centralization of wage bargaining, marginal tax rates, minimum wages, and the index of old age benefits) are negatively correlated. This suggests that countries with high regional autonomy and high net replacement rates (including social and housing benefits)

robustly have higher unemployment rate disparities, while countries with high centralization of bargaining as well as marginal tax rates of moving into employment, minimum wages and generous old age benefits – somewhat contrary to expectations – tend to have lower ones. The amenity variables, by contrast, as predicted by theory, all (except for the index of suitable living space for fauna and flora) have a positive impact on regional unemployment rate disparities. Countries with larger disparities in these amenities therefore also have larger regional unemployment rate disparities.

Table 5: Results of country level bayesian averaging regressions (unemployment rate)

Dependent Variable: Average deviation from the mean of unemployment rates				Dependent Variable: Standard deviation of unemployment rates			
	Coef.	Std.Err.	pip	Variable	Coef.	Std.Err.	pip
ln(regional autonomy index)	0.77	0.34	0.92	ln(regional autonomy index)	0.87	0.32	0.96
ln(centralisation)	-1.49	0.80	0.89	ln(centralisation)	-1.63	0.78	0.90
ln(climate)	3.80	2.32	0.87	ln(marg. tax rate moving to employment)	-2.44	1.12	0.88
ln(marg. tax rate moving to employment)	-2.23	1.08	0.87	ln(climate)	4.05	2.15	0.87
ln(aesthetics)	6.48	4.52	0.80	ln(culture and art)	49.44	27.30	0.85
ln(net repl. rate incl. soc. & hous. ben)	3.61	2.46	0.78	ln(habitat)	-67.15	40.19	0.82
ln(minimum wage)	-0.13	0.10	0.77	ln(productivity)	-0.34	0.21	0.79
ln(productivity)	-0.21	0.15	0.76	ln(net repl. rate incl. soc. & hous. ben.)	3.22	2.02	0.79
ln(index old age benefits)	-2.47	1.90	0.74	ln(index sick benefits)	2.29	1.52	0.77
ln(habitat)	-27.07	25.99	0.71	ln(recreation and tourism)	13.31	13.32	0.76
ln(culture and art)	21.37	22.12	0.66	ln(index old age benefits)	-1.91	1.29	0.75
ln(index housing market eviction)	-1.36	1.36	0.63	ln(minimum wage)	-0.09	0.07	0.72
ln(net replacement rate)	-0.79	0.92	0.57	ln(aesthetics)	2.80	2.51	0.67
ln(adjusted coverage)	-0.38	0.55	0.42	ln(adjusted coverage)	-0.45	0.54	0.49
ln(union density)	0.23	0.38	0.36	ln(transport and housing)	0.39	1.06	0.39
ln(number of regions)	-0.05	0.35	0.35	ln(number of regions)	0.02	0.33	0.29
ln(cost of overtime employment)	0.32	0.80	0.35	ln(cost of overtime employment)	0.10	0.43	0.28
ln(recreation and tourism)	-2.26	7.27	0.33	ln(union density)	0.10	0.26	0.20
ln(transport and housing)	0.16	1.44	0.24	ln(wage co-ordination)	0.19	0.46	0.20
ln(wage co-ordination)	0.18	0.51	0.22	ln(product market regulation)	0.08	0.20	0.20
ln(heating days)	-0.09	0.26	0.21	ln(index housing market eviction)	-0.23	0.75	0.19
ln(active labour market policy)	0.05	0.12	0.19	ln(heating days)	-0.05	0.15	0.16
ln(bargaining concentration)	0.00	0.24	0.18	ln(bargaining concentration)	0.06	0.26	0.14
ln(product market regulation)	0.07	0.19	0.18	ln(net replacement rate)	0.01	0.33	0.13
ln(index sick benefits)	0.10	0.54	0.17	ln(active labour market policy)	-0.01	0.07	0.09
ln(employment protection)	-0.02	0.22	0.11	ln(employment protection)	-0.02	0.16	0.09
_cons	-6.42	8.31	1.00	_cons	-6.55	7.55	1.00

Coeff=weighted coefficient estimate based on 67,108,864 models, Std.Err. = weighted standard error of the estimate, pip=posterior inclusion probability. Variables above bold line have a posterior inclusion probability of more than 0.5.

In addition to these variables in the case of the average absolute deviation from the mean also the net replacement rate as well as the housing market formality index and in the case of the standard deviation sickness benefits and the (the standard deviation and the absolute deviation from the mean of) recreational value of the region attain posterior inclusion probabilities in excess of 0.5. Once more,

however, all the institutional variables in this set except for sickness benefits have a negative impact on regional unemployment rate disparities.

There are a number of potential theoretical explanations for these stylized facts. For instance the positive impact of regional autonomy on regional unemployment rates may arise from the fact that in regions with a higher autonomy usually there is a closer link between regional tax revenues and expenditures. This may lead to excessive austerity in poorer, high unemployment regions with a lower tax base. Similarly, the negative effect of minimum wages on regional unemployment rate disparities could (in line with Manning, 1995) be argued by the fact that minimum wages aside from having a direct impact on the employment level may also have an effect on search incentives of the unemployed, that may be higher in high unemployment than in low unemployment regions[11]. The negative impact of centralisation of wage bargaining - as already argued in the Calmfors and Driffil (1988) - could stem from the fact that in more centralized wage setting regimes, wage bargaining has to take more account of the results of their wage bargaining on aggregate unemployment rates and thus of low productivity in high unemployment rate regions and sectors. The negative impact of the generosity of old age benefits on regional disparities, by contrast, may arise because in economies where old age pensions are generous, the elder prefer to move to inactivity rather than unemployment. Finally, the negative impact of replacement rates could be due to unemployment insurance systems with more generous replacement rates generating higher search intensity among those not eligible for benefits or because such systems allow the unemployed to search for a longer period for higher match quality.

5.2 Results of estimates at regional level

Irrespective of the explanation, these stylized facts question the assumption that the large regional unemployment rate disparities in European countries are solely due to rigid labour market institutions. To

[11] In this context simulations by Cahuc and Zylberberg (2004) suggest that at low levels of minimum wages this search incentive effect will dominate the unemployment effect and lead to falling unemployment rates with increasing minimum wages.

dig a little deeper into this finding Table 6 reports the results of quantile regressions at the regional level. In these regressions regional unemployment rates as well as all explanatory variables are measured in (log) deviations to the country mean. The coefficients can therefore be interpreted as the marginal effects at the respective quartiles of the national unemployment rate distributions. Looking first at the results with respect to the regional control variables we find that the industry share, compensation per employee, the migration rate, transport and housing amenities as well as a favourable climate belong to the variables that are significantly correlated with regional unemployment rates in both the first and the third quartile of the unemployment rate distribution. Of these variables a high wage rate - after controlling for productivity, which, however, remains insignificant in all specifications - is positively correlated to unemployment rates as are favourable climatic conditions and regions with transport and housing amenities. This corroborates previous findings in the literature on regional labour markets (see Elhorst, 2003 for a survey) that a high level of amenities and a high level of wages relative to productivity tend to increase unemployment rates. These variables as shown in the last columns of table 6, where we report results for a test of the null-hypothesis that the coefficients at the first and third quartile are equal to each other, however, all impact to the same degree at both the first and the third quartile of the unemployment rate distribution, so that these variables neither increase nor decrease regional unemployment rate disparities.

In addition quite a few control variables (such as participation rates, share of old workers, cultural and artistic amenities, housing costs, the share of owner occupied housing and population density) are significantly correlated with regional unemployment rates only at one of the quartiles. Among these variables, however, the hypothesis of equal impacts at the first and the third quartile of the distribution can be rejected at the 5% level only for population density and at the 10% level for aesthetic amenities. According to the results a higher population density reduces unemployment rates in low unemployment regions (at the bottom quartile of the unemployment rate distribution) but has no effect in high

unemployment rate regions (at the third quartile). Aesthetic amenities, by contrast, are individually insignificant at both analysed quartiles.

Table 6: Quantile Regression results for aggregate unemployment rate

	25th percentile		75th percentile		Difference 25th - 75the percentile	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
ln(productivity)	-0.01	0.02	-0.01	0.02	0.01	0.02
ln(industry share)	-0.33 ***	0.08	-0.32 ***	0.07	0.01	0.09
ln(compensation)	0.16 ***	0.04	0.17 ***	0.03	0.01	0.04
ln(participation rate)	-1.07 ***	0.31	-0.29	0.27	0.79	0.36
ln(transport and housing)	1.69 ***	0.42	2.00 ***	0.35	0.31	0.49
ln(aesthetics)	-0.40	0.65	-1.69	0.55	-1.30 *	0.77
migration rate	-0.31 ***	0.05	-0.31 ***	0.04	0.00	0.06
ln(climate)	1.27 ***	0.48	1.56 ***	0.41	0.28	0.56
ln(share old)	-0.33 *	0.17	-0.09	0.15	0.23	0.22
ln(culture and art)	-5.13	3.43	-5.82 **	2.91	-0.70	4.42
ln(high education share)	0.05	0.10	0.00	0.08	-0.05	0.14
ln(habitat)	1.79	3.48	0.63	2.95	-1.16	4.80
ln(housing costs)	0.03	0.16	-0.25 *	0.14	-0.29	0.20
ln(owner occupation rate)	0.11	0.32	-0.56 *	0.27	-0.67	0.44
ln(heating days)	0.14	0.15	0.08	0.13	-0.07	0.22
ln(recreation and tourism)	1.99	1.86	4.82 ***	1.57	2.83	2.25
ln(population density)	-0.12 ***	0.03	-0.01	0.03	0.11 **	0.05
ln(union density)	0.33 **	0.15	0.58 ***	0.13	0.25	0.19
ln(adjusted coverage)	0.31	0.34	0.68 **	0.29	0.37	0.53
ln(bargaining concentration)	-0.18	0.28	0.22	0.23	0.40	0.32
ln(wage co-ordination)	-0.09	0.28	0.22	0.23	0.31	0.39
ln(centralisation)	-0.97 *	0.50	-2.24 ***	0.42	-1.27 **	0.61
ln(product market regulation)	-0.47 ***	0.14	-0.38 ***	0.12	0.10	0.17
ln(net replacement rate)	0.71 **	0.37	0.16	0.31	-0.54	0.48
ln(net replacement rate incl soc. & hous. ben.)	0.40	0.43	1.60 ***	0.36	1.21 **	0.55
ln(active labour market policy)	-0.41 ***	0.12	-0.18 *	0.10	0.23	0.15
ln(employment protection)	-0.08	0.35	0.89 ***	0.29	0.97 **	0.45
ln(minimum wage)	-0.01	0.02	-0.05 ***	0.02	-0.04	0.03
ln(marginal tax rate moving to employment)	-1.26 ***	0.31	-1.43 ***	0.26	-0.17	0.41
ln(cost of overtime employment)	0.03	0.19	-0.56 ***	0.16	-0.59 **	0.28
ln(index old age benefits)	0.31	0.49	-0.60	0.41	-0.92	0.72
ln(index sick benefits)	-0.82	0.60	0.22	0.51	1.04	0.71
ln(index housing market eviction)	2.44 ***	0.39	1.80 ***	0.33	-0.64	0.54
ln(regional autonomy index)	-0.04	0.17	0.46	0.14	0.49 **	0.21
_cons	-3.91 ***	4.09	-13.28 ***	3.47	-9.37 *	5.55
Pseudo R2	0.4789		0.4958			
Number of Observations	540		540		540	

Table reports results of quantile regression at the 25th and 75th percentile and in the last column difference in coefficients between 25th and 75the quartile, Dependent variable=regional unemployment rate, coef.=estimated coefficient. Std. Err.=Standard Error of the esrimate, *** (**)(*) signify significance of the parameter estimate at the 1% (5%) (10%) level, respectively.

Of the institutional variables only few are significant. Of the six robust institutional variables according to the BACE analysis (regional autonomy, centralization, marginal tax rates, net replacement rates, minimum wages and generosity of the old age benefits) only three have a significantly different impact on different parts of the unemployment rate distribution. These are the centralisation of wage

bargaining, which has a stronger and more significant negative impact on unemployment rates in high unemployment regions than in low unemployment regions, net replacement rates (including social and housing benefits), which is significantly positively correlated with unemployment rates in high unemployment regions but insignificantly positively in low unemployment rate regions, and the regional autonomy index, which has an insignificantly negative correlation in the low unemployment rate regions and an insignificantly positive one in high unemployment rate regions so that the difference in parameters between the two quartiles is significantly positive.

For the other three institutional variables that were indicated as robustly correlated with unemployment rate disparities in the previous analysis, by contrast, differences in parameters between the first and the third quartile remain insignificant. The signs of the changes in parameters between the first and the third quartile accord with previous findings though. Minimum wages are slightly more strongly negatively correlated with unemployment rates in high than in low unemployment rate regions (but insignificantly so in both regions). The marginal tax rate of moving to employment is significantly negatively correlated with unemployment both in high and low unemployment regions but slightly more so in high unemployment rate regions and old age benefits are negatively correlated with the unemployment rates in high unemployment rate regions only, but remain are an insignificant determinant of unemployment rates in both high and low unemployment rate regions.

Furthermore, in this specification among the institutional variables product market regulation and active labour market policies are significantly negatively correlated with unemployment rates in both high and low unemployment regions, while the index of housing market eviction is positively correlated with unemployment rates in both these region types. For these significant variables the parameter differences between the first and the third quartile of the unemployment rate distribution are insignificant, however. Finally, there are also a number of variables that are only significant determinants of regional unemployment rates in either the high or low unemployment rate regions. These are net replacement

rates, which are positively correlated with unemployment rates in low unemployment rate regions, employment protection, which impacts positively on unemployment rates in high unemployment regions, and costs of overtime employment, which reduce unemployment in low unemployment regions. For employment protection and costs of overtime employment these differences in parameters are large enough to be significant, so that according to the results in table 6, employment protection increases, while higher costs of overtime employment reduce unemployment rate disparities in a country. For net replacement rates differences in parameters between the first and the third quartile, by contrast, are too small to be significant.

6. Extensions

6.1 Interactions and non-linearities

In sum results so far therefore suggest a rather robust positive correlation between net replacement rates and regional autonomy and a robustly significant negative one between the centralisation of wage bargaining and unemployment rate disparities in a country. In addition they indicate a further potential role for minimum wages, generosity of old age and sickness benefits, marginal tax rates, employment protection legislation, housing market flexibility and the costs with which overtime contracts can be obtained in shaping regional unemployment rate disparities in the EU. Somewhat in contrast to expectations, however, only the regional autonomy index, net replacement rates, sickness benefits and employment protection are positively correlated with regional unemployment rate disparities, while the other potentially robust variables are negatively correlated with regional unemployment rate disparities.

Focusing exclusively on only linear effects of institutions, as in the previous analysis may, however, be overly restrictive for the purpose of the current analysis. Countries and thus also regions are embedded in a number of institutional arrangements that can be expected to interact in a number of ways. As a consequence interactions between institutions and non-linearities in their impact have also featured

prominently in the literature on the impact of labour market institutions on national unemployment rates. Thus already Calmfors and Driffil (1988) stress that there may be nonlinearities in the effects of centralization of wage bargaining, with both very highly centralized and very decentralized wage bargaining systems having the lowest national unemployment rates and Longhi et al. (2005) propose an interaction of the coverage rate and centralization of wage bargaining on the regional level, so that unemployment rate disparities are largest in countries with a high coverage rate but a medium centralization of wage bargaining.

In addition Cahuc and Zylberberg (2004) present a model to show that if wages are flexible employment protection may have no effect on unemployment, but that when wages are fixed they may. This in turn implies an interaction between employment protection legislation and wage bargaining institutions that is also argued for in Elmeskov et al. (1998). Coe and Snower (1997) argue that the presence of generous unemployment benefits and rigid employment protection increases unemployment rates because in this case benefits will reduce search incentives of the unemployed and employment protection will reduce search incentives of employers. Finally, Belot and van Ours (2004) argue that union density should have a more damaging effect in decentralized systems of wage bargaining and that the effects of changes in replacement rates and labour taxes may depend on the structure of the bargaining system. These authors find that including such interactions in regressions on national unemployment rates substantially improves the fit of the equation and that a number of institutional variables are significant only when interacted with other variables.

Testing for such effects in a BACE framework is, however, complicated by the fact that when including interactions and higher order terms of the independent variables, one would also like to have the main effects included in the regression. This is not guaranteed in the standard BACE framework, where variables are included one at a time. Sachs (2011) and Crespo-Cuaresma (2011) therefore suggests that when analysing interactions and higher order terms with Bayesian Averaging methods the main effects

should be included (with a prior inclusion probability of 1) in each and every equation. Even following this approach, however, testing such interactions is limited by data availability. Given that we test 16 institutional variables there is a maximum of 136 squared terms and interactions between two variables that would need testing for a complete analysis. This is not feasible given the sample size of our data. As consequence based on theoretical considerations and on the results of the previous literature we focus on a much reduced set of interactions and higher order terms. In detail here we proceed as follows:

First, we include with a prior inclusion probability of 1 all those institutional and amenity variables as well as productivity that were found to be robustly correlated with one of the measures regional disparities in the previous section. These are: the regional autonomy index, centralization of wage bargaining, the marginal tax rate of moving from unemployment to employment, the net replacement rate (including social and housing benefits), minimum wages and the indeces for the generosity of the old age benefits, climatic conditions, of non-recreational appeal of the landscape (aesthetics), of suitable living space for fauna and flora, cultural and artistic amenities, housing market formalism, sickness benefits and the recreational value of regions. In addition, since interactions of these variables with other variables have been found to be important in the related literature on the impact of institutions on national unemployment rates, we add to this measures of wage bargaining co-ordination, adjusted coverage rates, employment protection, union density and product market regulation.

Second, based on theoretical considerations and previous results we test whether the square of centralisation as well as the interaction between first, employment protection and replacement rates, wage bargaining coordination, marginal tax rates, adjusted coverage rates, union density, minimum wages, second, product market regulation and marginal tax rates, union density and minimum wages, third, marginal tax rates and adjusted wage bargaining coverage and coordination, fourth union density and replacement ratio, adjusted wage bargaining coverage and coordination as well as fifth between adjusted coverage rates and centralisation and replacement rates are robustly correlated either with the average

absolute deviation from the mean of unemployment rates or their standard deviation at the country level using BACE methods.

Table 7: Results of country level bayesian averaging regressions including interactions

Dependent Variable	Average deviation from the mean of unemployment rate			Standard deviation of unemployment rates			
Variable	Coef.	Std. Err.	pip	Variable	Coef.	Std. Err.	Pip
ln(empl.prot)Xln(repl. rate)	-6.24	0.91	1.00	ln(empl.prot)Xln(repl. rate)	-3.43	2.14	0.81
ln(empl.prot)Xln(wage coord)	-2.38	0.95	0.97	ln(empl.prot)Xln(wage coord)	-0.39	1.01	0.74
ln(marginal tax rate)Xln(empl. Prot.)	1.35	1.12	0.67	ln(empl.prot)Xln(min. wage)	0.09	0.13	0.41
ln(centralisation)Xln(adj. coverage)	-1.98	2.06	0.49	ln(union dens.)Xln(adj. Coverage)	0.35	0.78	0.22
ln(prod. market reg.)Xln(marg. tax rate)	0.95	0.99	0.36	ln(union dens.)Xln(wage coord.)	0.14	0.43	0.21
ln(empl.prot)Xln(adj coverage)	0.48	1.03	0.34	ln(marginal tax rate)Xln(wage coord.)	-0.41	1.08	0.18
ln(centralisation)^2	-0.36	0.71	0.27	ln(marginal tax rate)Xln(empl. Prot.)	0.22	0.59	0.18
ln(prod. market reg.)Xln(union dens.)	0.25	0.17	0.26	ln(min wage)Xln(marg. Tax rate)	-0.03	0.10	0.18
ln(marginal tax rate)Xln(adj. coverage)	-0.23	1.74	0.17	ln(prod. market reg.)Xln(marg. tax rate)	0.25	0.75	0.17
ln(marginal tax rate)Xln(wage coord.)	-0.19	0.61	0.15	ln(repl. Rate)Xln(adj. Coverage)	0.53	2.20	0.13
ln(empl.prot)Xln(union dens.)	0.09	0.61	0.15	ln(marginal tax rate)Xln(adj. coverage)	-0.34	2.76	0.11
ln(repl. Rate)Xln(adj. Coverage)	0.07	1.48	0.13	ln(centralisation)Xln(adj. coverage)	-0.26	1.42	0.10
ln(union dens.)Xln(wage coord.)	-0.04	0.32	0.13	ln(empl.prot)Xln(adj coverage)	0.23	1.40	0.09
ln(min wage)Xln(marg. Tax rate)	-0.01	0.05	0.13	ln(marginal tax rate)Xln(union dens.)	0.07	0.42	0.08
ln(marginal tax rate)Xln(union dens.)	0.15	0.67	0.12	ln(marginal tax rate)Xln(repl. Ratio)	0.02	0.34	0.07
ln(prod. market reg.)Xln(min. wage)	0.00	0.01	0.12	ln(empl.prot)Xln(union dens.)	-0.04	0.39	0.07
ln(union dens.)Xln(adj. Coverage)	0.08	0.35	0.11	ln(centralisation)^2	-0.04	0.35	0.07
ln(empl.prot)Xln(min. wage)	0.01	0.05	0.11	ln(prod. market reg.)Xln(min. wage)	0.00	0.01	0.07
ln(marginal tax rate)Xln(repl. Ratio)	-0.06	0.58	0.10	ln(prod. market reg.)Xln(union dens.)	0.00	0.05	0.06
_cons	-24.03	28.87	1.00	_cons	-11.99	30.35	1.00
ln(productivity)	-0.36	0.06	1.00	ln(productivity)	-0.49	0.10	1.00
ln(aesthetics)	9.71	1.70	1.00	ln(aesthetics)	3.51	2.15	1.00
ln(climate)	4.80	0.88	1.00	ln(climate)	5.82	0.99	1.00
ln(culture and art)	23.68	13.53	1.00	ln(culture and art)	66.73	15.25	1.00
ln(habitat)	-32.45	13.53	1.00	ln(habitat)	-89.68	20.69	1.00
ln(recreation and tourism)	-1.33	1.56	1.00	ln(recreation and tourism)	18.06	9.23	1.00
ln(regional autonomy index)	1.32	0.16	1.00	ln(regional autonomy index)	1.07	0.21	1.00
ln(minimum wage)	-0.12	0.20	1.00	ln(minimum wage)	-0.06	0.40	1.00
ln(index housing market eviction)	-0.83	1.08	1.00	ln(index housing market eviction)	0.16	1.18	1.00
ln(index sick benefits)	5.50	1.47	1.00	ln(index sick benefits)	3.52	1.34	1.00
ln(marginal tax rate moving to employment)	-4.27	1.16	1.00	ln(marginal tax rate moving to employment)	-1.96	0.87	1.00
ln(wage co-ordination)	3.07	3.20	1.00	ln(wage co-ordination)	1.75	5.04	1.00
ln(adjusted coverage)	-2.70	7.12	1.00	ln(adjusted coverage)	-2.96	7.40	1.00
ln(net replacement rate incl. social and housing)	10.99	6.63	1.00	ln(net replacement rate incl. social and housing)	5.12	2.81	1.00
ln(employment protection)	17.65	7.01	1.00	ln(employment protection)	11.34	8.56	1.00
ln(union density)	-0.90	3.76	1.00	ln(union density)	-1.89	3.67	1.00
ln(centralisation)	4.50	1.93	1.00	ln(centralisation)	-1.14	0.61	1.00
ln(product market regulation)	-5.07	4.69	1.00	ln(product market regulation)	-1.02	3.32	1.00
ln(index old age benefits)	-4.68	1.43	1.00	ln(index old age benefits)	-2.59	1.40	1.00

Dependent variable: unemployment rate disparities. Coef.=weighted coefficient estimate based on 524,288 models, Std.Err.=weighted standard error of the estimate, pip=posterior inclusion probability. _cons= constant. Variables above bold line have a posterior inclusion probability of more than 0.5.

We find that only three interactions (those between employment protection and the replacement rate, between employment protection and wage coordination and between marginal tax rates and employment protection) have a posterior inclusion probability higher than 0.5 for the average deviation from the mean. By contrast, for the standard deviation such a robust correlation exists only for the interaction of employment protection and replacement rates and employment protection and wage

coordination (table 7). Taken together these results therefore lend support to the expectations in Cahuc and Zylberberg (2004), Elmeskov et al (1998) and Snower and Coe (1997) that employment protection has an effect on unemployment rate disparities in countries only when interacted with wage bargaining institutions and factors influencing the search incentives of the unemployed. Once more, however, the coefficient of the BACE analysis implies a negative impact of the robust interactions on regional unemployment rate disparities in all cases but that of marginal tax rates and employment protection.

Table 8: Quantile regression results for aggregate unemployment rates (interaction terms)

	25th percentile		75th percentile		Difference 25th - 75the percentile	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
ln(marginal tax rate)Xln(wage coord.)	-2.68	5.11	-1.86	5.38	0.82	9.43
ln(marginal tax rate)Xln(adj. coverage)	3.92	6.46	3.32	6.81	-0.60	10.43
ln(marginal tax rate)Xln(repl. Ratio)	-0.64	4.36	1.20	4.59	1.84	8.23
ln(marginal tax rate)Xln(empl. Prot.)	-0.47	2.44	-0.79	2.57	-0.33	3.96
ln(marginal tax rate)Xln(union dens.)	-2.28	2.93	-2.74	3.09	-0.46	5.01
ln(repl. Rate)Xln(adj. Coverage)	-2.58	4.53	-2.06	4.78	0.52	7.75
ln(empl.prot)Xln(union dens.)	1.66	3.17	2.57	3.34	0.91	5.21
ln(empl.prot)Xln(adj coverage)	-5.47	3.75	-3.13	3.95	2.35	6.50
ln(empl.prot)Xln(wage coord)	2.88	1.96	1.85	2.07	-1.02	3.88
ln(union dens.)Xln(adj. Coverage)	2.60	2.83	-1.90	2.99	-4.50	5.12
ln(union dens.)Xln(wage coord.)	0.54	1.17	1.25	1.23	0.72	1.88
ln(centralisation)Xln(adj. coverage)	-4.23	8.87	0.96	9.35	5.19	14.77
ln(centralisation)^2	1.73	3.24	-0.54	3.41	-2.27	5.20
ln(empl.prot)Xln(repl. rate)	-3.76 **	0.74	-1.38	0.83	2.38 **	1.19
ln(empl.prot)Xln(min. wage)	0.31	0.30	0.25	0.32	-0.06	0.50
ln(min wage)Xln(marg. Tax rate)	-0.05	0.55	-0.09	0.58	-0.04	0.91
ln(prod. market reg.)Xln(union dens.)	0.10	0.58	0.01	0.61	-0.09	0.88
ln(prod. market reg.)Xln(min. wage)	-0.03	0.12	-0.05	0.13	-0.02	0.18
ln(prod. market reg.)Xln(marg. tax rate)	-0.24	2.41	0.40	2.54	0.64	3.69
Pseudo R2	0.4825		0.4610			
Number of Observations	540		540		540	

Table reports results of quantile regression at the 25th and 75th percentile and in the last column difference in coefficients between 25th and 75the quartile, coef.=estimated coefficient. Std.Err.= Standard Error, *** (**)(*) signify significance of the parameter estimate at the 1% (5%) (10%) level respectively. Further controls (as in table 6) not included (see table A1 for full specification). Dependent variable: unemployment rates.

The results of these regressions, however, also lend further support to the significance of a number of institutional and amenity variables found in the previous analysis. Although these variables were included in all of the regressions of the current analysis and thus, on account of having a prior inclusion probability of one, also have a posterior inclusion probability of one the ratio of the weighted mean coefficient to its weighted standard error for the regional autonomy index, sickness benefits, marginal tax rates, net replacement rates, centralisation and old age benefits as well as of all the (standard deviations or absolute deviations from the mean of) amenity measures except for the recreational and

touristic value of the landscape suggest that these variables have an impact on unemployment rate disparities that has the same sign as found previously. In addition to this employment protection turns out to have a positive impact on unemployment rate disparities irrespective of the measure of disparities used. This therefore indicates that after including interactions of employment protection with other institutional variables also the main effect of this variable turns significant.

Aside from the interaction terms with employment protection, however, none of the interactions is robustly correlated with unemployment rate disparities at the national level. As a consequence – except for employment protection – interactions between institutional variables seem to be of a lesser importance for explaining regional unemployment rate disparities.

This finding is corroborated when including the interactions in the quantile regression at the regional level. Here as shown in table 8 (where only the coefficients of the interaction terms are reported) all interaction terms except for the employment protection-replacement rate interaction remain insignificant. As can, however, also be seen from table A1 in the appendix (where all coefficients are reported) this extension has to be interpreted with some care, since also all of the main effects for institutional variables lose significance. This may imply that the large number of regressors included in this analysis makes it difficult to identify effects.

6.2 Different subgroups of the labour market

Institutions could, however, also have a different impact on different labour market segments. Thus for instance one could expect that disparities in long-term unemployment are more strongly associated with institutional factors (such as those affecting search incentives) than aggregate unemployment and that young unemployed are affected in a different way by the institutional set up of a country (e.g. generous pension systems) than old workers and also that male and female workers react differently to different institutions. We therefore conducted a similar analysis as above for regional disparities in terms of the long term unemployment rate, the youth unemployment rate as well as the

unemployment rates of both males and females. In each of these analyses we first of all conducted a Bayesian Averaging analysis on the average absolute deviation from the mean of the respective unemployment rates as well as the standard deviation based on national data and augmented this with results of a quantile regression on regional data.

The results of these extensions (shown in tables A2 to A5 in the annex and summarized in table 8) suggest some interesting variation in the institutional determinants of regional unemployment rate disparities for some subgroups. Thus of the three most robust variables found in the previous analysis (centralization, net replacement rates, and regional autonomy) bargaining centralisation is mainly associated with regional unemployment disparities of long term unemployed and women and potentially also youth unemployment, while the positive impact of net replacement rates primarily stems from the positive impact of this variable on the long term unemployment rate. Also this variable quite often has a significant negative impact on regional disparities in quantile regression for other labour market segments. Regional autonomy, finally, is robustly positively associated with higher youth unemployment rate disparities, only.

Table 8: Summary of results of the impact of institutions on unemployment rate disparities for individual sub-groups

	BACE		Quartile regressions	
	robust positive	robust negative	Significant positive	Significant negative
long term unemployment rate	- **co-ordination**	- **centralisation** - **old age benefits** - *product market regulation*	- net replacement incl social and housing benefits	- cost of overtime employment
Youth unemployment	- **Minimun wages** - **Sick benefits** - *regional autonomy* - *old age benefits*	- *Centralisation*		- net replacement incl social and housing benefits - housing market
Male unemployment rate	- **housing market** - *old age benefits*	- *minimum wages*		- Net replacement rates incl. social and housing - adjusted coverage
Female unemployment rate	- **housing market** - *sick benefits*	- **centralisation**		- adjusted coverage - Net replacement rates incl. social and housing

Note: table shows a summary of findings of both BACE analyses on national data and quantile regression results for regional data. For results in the BACE analysis variables printed in bold letters have a posterior inclusion probability in excess of 0.5 for both measures of regional disparities, variables displayed in italics have a posterior inclusion probability in excess of 0.5 for only one measure of regional disparities.

Of the other candidates identified higher old age benefits negatively impact on long term unemployment rate disparities, while they impact positively on youth and male unemployment rate disparities. This lends some support to the hypothesis that this variable primarily acts on regional unemployment rate disparities through making early retirement of long term unemployed more attractive. Minimum wages, by contrast, only reduce disparities in male unemployment rates, but robustly increase those of youths in BACE regressions, while housing market flexibility is not associated with long term unemployment rate disparities but positively with both male and female unemployment rate disparities and negatively (at least in quartile regressions) with youth unemployment rate disparities. Furthermore costs of overtime payments only work to reduce unemployment rate disparities in long term unemployment regressions and more generous sickness benefits are potentially associated with higher disparities in female unemployment.

In addition to this in these regressions some additional variables that potentially impact only on some subgroups of the labour market can be identified. Thus more product market regulation increase disparities in long term unemployment. This may be due to the limiting factor product market regulation presents for persons wanting to found their own enterprises, the adjusted coverage rate reduces both male and female unemployment rate disparities and higher wage co-ordination is associated with high regional disparities in long term unemployment. This may indicate that long term unemployed have a more pronounced outsider position in wage bargaining in highly coordinated wage bargaining systems.

7. Summary and Discussion

This paper presents a theoretically based, empirical analysis of the impact of national labour and housing market institutions as well as product market regulation on regional unemployment rate disparities. By incorporating a wage curve in the benchmark regional labour market model proposed by Moretti (2010) we showed that theoretically regional unemployment rate disparities in a country depend both on disparities in productivity and amenities among regions within a country, but also on parameters

(such as labour mobility and housing market and wage flexibility) which are *inter alia* shaped by national labour and housing market institutions.

We used methods of Bayesian Model Averaging and quantile regression on a data set covering NUTS 2 regions of 14 EU countries for the period 1998 to 2009 to identify robust correlations in the data. We find such a correlation between centralisation, net replacement rates and regional autonomy with the size of regional unemployment rate disparities within a country in all empirical specifications and a further potential role for minimum wages, generosity of old age and sickness benefits, marginal tax rates, housing market flexibility, employment protection and the costs of overtime contracts in some regressions. Somewhat in contrast to our expectations, however, only the regional autonomy index, net replacement rates, sickness benefits and employment protection seem to be positively correlated with regional unemployment rate disparities, while the other robust variables seem to be negatively correlated with regional unemployment rate disparities.

Our results from Bayesian Averaging also indicate that employment protection is a more robust determinant of regional unemployment rate disparities, when interacted with measures of wage setting institutions and thus provide support to the hypothesis that employment protection has an impact on unemployment rate disparities only when wages are inflexible. Furthermore, the results point to some interesting differences in the effects of institutions on the unemployment rates of different subgroups of the labour market.

These results – in particular the finding of a robust negative impact of many institutional variables on regional unemployment rates – therefore question the assumptions made by many analysts that the large regional disparities in the EU are primarily caused by institutional factors. Much rather it seems that these disparities may be more closely linked to differences in amenities, specialisation and productivity between regions. We, however, have to acknowledge some limitations to our results. The first is that we analyse only a rather limited number of countries and regions, future analysis should therefore extend

finding to a larger set of countries. The second is that the methods used in the current analysis are strongly geared towards identifying robust correlations and can say very little on causality. Thus our results should be augmented by research using methods that are more geared to identifying such causality before drawing firm conclusions.

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Table A1: Quantile regression results for aggregate unemployment rates with interaction terms (full specification)

	25th percentile		75th percentile		Difference 25th - 75the percentile	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
ln(productivity)	-0.01	0.01	-0.01	0.02	0.01	0.02
ln(industry share)	-0.31 ***	0.06	-0.26 ***	0.06	0.05	0.08
ln(compensation)	0.11 ***	0.03	0.23 ***	0.03	0.12 **	0.05
ln(participation rate)	-1.21 ***	0.24	-0.54 **	0.25	0.67	0.38
ln(transport and housing)	1.47 ***	0.30	1.93 ***	0.32	0.46	0.40
ln(aesthetics)	-0.72	0.47	-1.82 ***	0.49	-1.10	0.69
migration rate	-0.24 ***	0.04	-0.30 ***	0.04	-0.05	0.06
ln(climate)	0.97 ***	0.35	1.50 ***	0.37	0.54	0.44
ln(share old)	-0.15	0.13	-0.08	0.13	0.07	0.18
ln(culture and art)	-2.92	2.47	-6.89 ***	2.61	-3.97	3.83
ln(high education share)	-0.31 ***	0.09	0.04	0.10	0.35 **	0.14
ln(habitat)	0.97	2.51	0.39	2.65	-0.58	4.23
ln(housing costs)	-0.04	0.15	-0.37	0.16	-0.34	0.24
ln(owner occupation rate)	-0.10	0.24	-0.48	0.25	-0.38	0.41
ln(heating days)	0.01	0.11	0.10	0.11	0.09	0.19
ln(recreation and tourism)	0.99	1.34	6.20 ***	1.42	5.20 **	2.26
ln(population density)	-0.02	0.03	0.03	0.03	0.05	0.04
ln(union density)	-3.23	22.12	16.78	23.32	20.01	39.91
ln(adjusted coverage)	-14.30	49.53	3.16	52.21	17.46	81.09
ln(bargaining concentration)	-1.26	0.88	-0.47	0.93	0.78	1.53
ln(wage co-ordination)	10.67	23.01	3.50	24.25	-7.17	40.67
ln(centralisation)	21.10	41.78	-4.32	44.04	-25.42	70.02
ln(product market regulation)	0.32	10.30	-2.34	10.86	-2.65	16.31
ln(net replacement rate)	-0.52	1.25	-0.28	1.32	0.24	2.07
ln(net replacement rate incl soc. & hous. ben.)	19.42	24.45	6.04	25.77	-13.38	47.77
ln(active labour market policy)	-0.14	0.26	-0.14	0.27	0.00	0.41
ln(employment protection)	30.69	22.94	11.53	24.18	-19.16	37.32
ln(minimum wage)	-0.02	2.31	0.27	2.43	0.29	3.80
ln(marginal tax rate moving to employment)	-4.24	15.88	-7.56	16.74	-3.32	24.28
ln(cost of overtime employment)	-0.85	0.89	-0.13	0.93	0.72	1.28
ln(index old age benefits)	-1.68	2.74	0.41	2.89	2.09	4.14
ln(index sick benefits)	0.24	4.11	-0.41	4.33	-0.65	6.14
ln(index housing market eviction)	4.00	3.96	1.60	4.18	-2.40	6.86
ln(regional autonomy index)	-0.71	1.79	1.47	1.89	2.18	3.49
ln(marginal tax rate)Xln(wage coord.)	-2.68	5.11	-1.86	5.38	0.82	9.43
ln(marginal tax rate)Xln(adj. coverage)	3.92	6.46	3.32	6.81	-0.60	10.43
ln(marginal tax rate)Xln(repl. Ratio)	-0.64	4.36	1.20	4.59	1.84	8.23
ln(marginal tax rate)Xln(empl. Prot.)	-0.47	2.44	-0.79	2.57	-0.33	3.96
ln(marginal tax rate)Xln(union dens.)	-2.28	2.93	-2.74	3.09	-0.46	5.01
ln(repl. Rate)Xln(adj. Coverage)	-2.58	4.53	-2.06	4.78	0.52	7.75
ln(empl.prot)Xln(union dens.)	1.66	3.17	2.57	3.34	0.91	5.21
ln(empl.prot)Xln(adj coverage)	-5.47	3.75	-3.13	3.95	2.35	6.50
ln(empl.prot)Xln(wage coord)	2.88	1.96	1.85	2.07	-1.02	3.88
ln(union dens.)Xln(adj. Coverage)	2.60	2.83	-1.90	2.99	-4.50	5.12
ln(union dens.)Xln(wage coord.)	0.54	1.17	1.25	1.23	0.72	1.88
ln(centralisation)Xln(adj. coverage)	-4.23	8.87	0.96	9.35	5.19	14.77
ln(centralisation)^2	1.73	3.24	-0.54	3.41	-2.27	5.20
ln(empl.prot)Xln(repl. rate)	-3.76 **	1.74	-1.38	1.83	2.38	3.19
ln(empl.prot)Xln(min. wage)	0.31	0.30	0.25	0.32	-0.06	0.50
ln(min wage)Xln(marg. Tax rate)	-0.05	0.55	-0.09	0.58	-0.04	0.91
ln(prod. market reg.)Xln(union dens.)	0.10	0.58	0.01	0.61	-0.09	0.88
ln(prod. market reg.)Xln(min. wage)	-0.03	0.12	-0.05	0.13	-0.02	0.18
ln(prod. market reg.)Xln(marg. tax rate)	-0.24	2.41	0.40	2.54	0.64	3.69
_cons	-10.85	138.27	-42.12	145.74	-31.26	222.60
Pseudo R2	0.4825		0.4610			
Number of Observations	540		540		540	

Table reports results of quantile regression at the 25th and 75th percentile and in the last column difference in coefficients between 25th and 75the quartile, coef.=estimated coefficient. Std.Err.=Standard Error, *** (**)(*) signify significance of the parameter estimate at the 1%, (5%), (10%) level, respectively. Dependent variable: unemployment rate.

Table A2: Results of country level bayesian averaging regressions (long term and youth unemployment rate)

Average deviation from the mean				Standard deviation			
Variable	Coef.	Std. Err.	pip	Variable	Coef.	Std. Err.	pip
Dependent variable: Long term Unemployment rate							
ln(wage co-ordination)	1.78	0.58	0.94	ln(wage co-ordination)	1.68	0.55	0.94
ln(centralisation)	-2.01	0.69	0.94	ln(centralisation)	-1.88	0.68	0.94
ln(index old age benefits)	-1.69	0.79	0.89	ln(index old age benefits)	-1.57	0.74	0.89
ln(number of regions)	0.35	0.28	0.68	ln(number of regions)	0.37	0.27	0.71
ln(product market regulation)	0.27	0.34	0.45	ln(product market regulation)	-0.28	0.33	0.50
ln(transport and housing)	0.18	0.31	0.39	ln(transport and housing)	0.14	0.31	0.31
ln(regional autonomy index)	0.14	0.26	0.29	ln(bargaining concentration)	0.16	0.34	0.25
ln(bargaining concentration)	0.12	0.33	0.22	ln(regional autonomy index)	0.12	0.25	0.25
ln(aesthetics)	0.09	0.47	0.15	ln(marg. tax rate to employment)	-0.19	0.42	0.23
ln(recreation and tourism)	0.17	1.56	0.15	ln(heating days)	-0.05	0.14	0.17
ln(marg. tax rate to employment)	-0.12	0.37	0.15	ln(habitat)	-0.81	7.25	0.16
ln(culture and art)	0.09	1.35	0.14	ln(recreation and tourism)	0.37	2.81	0.16
ln(habitat)	-0.17	1.82	0.14	ln(culture and art)	0.54	4.74	0.15
ln(index sick benefits)	-0.31	0.99	0.14	ln(index sick benefits)	-0.25	0.83	0.14
ln(net replacement rate)	-0.12	0.43	0.13	ln(aesthetics)	0.03	0.44	0.13
ln(heating days)	-0.02	0.10	0.11	ln(net repl. rate incl. Soc. & hous. ben)	-0.12	0.46	0.12
ln(adjusted coverage)	-0.06	0.27	0.11	ln(cost of overtime employment)	0.04	0.17	0.12
ln(net repl. rate incl. Soc. & hous. ben)	-0.09	0.40	0.10	ln(adjusted coverage)	-0.05	0.24	0.10
ln(cost of overtime employment)	0.02	0.13	0.10	ln(net replacement rate)	-0.06	0.29	0.09
ln(employment protection)	-0.02	0.15	0.08	ln(productivity)	0.00	0.05	0.08
ln(productivity)	0.00	0.02	0.07	ln(climate)	0.05	0.35	0.08
ln(climate)	0.02	0.15	0.07	ln(employment protection)	-0.02	0.13	0.07
ln(union density)	0.01	0.09	0.07	ln(union density)	0.01	0.08	0.06
ln(minimum wage)	0.00	0.01	0.07	ln(minimum wage)	0.00	0.01	0.06
ln(active labour market policy)	0.00	0.05	0.05	ln(active labour market policy)	0.00	0.05	0.05
ln(index housing market eviction)	0.00	0.17	0.05	ln(index housing market eviction)	-0.01	0.17	0.05
_cons	-5.86	4.02	1.00	_cons	-4.70	4.45	1.00
Dependent variable: Youth unemployment rate							
ln(minimum wage)	0.61	0.17	1.00	ln(aesthetics)	-19.22	2.90	1.00
ln(index sick benefits)	9.17	2.91	1.00	ln(minimum wage)	0.56	0.10	1.00
ln(index housing market eviction)	13.69	5.73	1.00	ln(index housing market eviction)	16.76	2.22	1.00
ln(aesthetics)	-18.62	14.48	0.89	ln(climate)	-3.70	0.94	0.98
ln(transport and housing)	12.42	7.13	0.79	ln(transport and housing)	15.15	4.38	0.96
ln(climate)	-2.27	1.48	0.78	ln(index sick benefits)	7.51	2.71	0.93
ln(productivity)	-0.32	0.21	0.75	ln(number of regions)	1.52	1.23	0.92
ln(habitat)	-35.19	45.43	0.62	ln(productivity)	-0.35	0.15	0.89
ln(number of regions)	1.89	1.76	0.61	ln(habitat)	9.79	18.39	0.55
ln(centralisation)	-1.47	1.65	0.60	ln(index old age benefits)	0.66	0.87	0.50
ln(regional autonomy index)	0.68	0.65	0.60	ln(net repl. rate incl. Soc. & hous. ben)	0.79	1.11	0.47
ln(recreation and tourism)	28.89	33.44	0.54	ln(recreation and tourism)	5.81	27.14	0.45
ln(culture and art)	20.36	38.59	0.38	ln(culture and art)	-2.90	17.32	0.37
ln(cost of overtime employment)	-1.77	3.24	0.33	ln(cost of overtime employment)	-0.55	1.14	0.31
ln(union density)	0.36	0.64	0.31	ln(union density)	-0.19	0.36	0.30
ln(net replacement rate)	0.39	0.90	0.30	ln(heating days)	-0.16	0.35	0.28
ln(wage co-ordination)	-0.44	0.86	0.28	ln(wage co-ordination)	-0.15	0.40	0.20
ln(net repl. rate incl. Soc. & hous. ben)	0.40	0.99	0.24	ln(bargaining concentration)	-0.03	0.39	0.14
ln(adjusted coverage)	0.21	0.56	0.21	ln(centralisation)	-0.01	0.59	0.13
ln(bargaining concentration)	-0.11	0.47	0.18	ln(net replacement rate)	-0.09	0.62	0.11
ln(heating days)	0.07	0.23	0.17	ln(adjusted coverage)	0.00	0.26	0.09
ln(index old age benefits)	0.00	0.77	0.16	ln(marg. tax rate to employment)	-0.08	0.38	0.09
ln(active labour market policy)	0.03	0.14	0.09	ln(product market regulation)	0.02	0.10	0.08
ln(product market regulation)	0.02	0.11	0.07	ln(regional autonomy index)	0.01	0.14	0.08
ln(employment protection)	-0.03	0.25	0.07	ln(active labour market policy)	0.01	0.10	0.06
ln(marg. tax rate to employment)	-0.04	0.33	0.07	ln(employment protection)	0.00	0.19	0.06
_cons	-39.83	11.97	1.00	_cons	-38.88	7.02	1.00

Coeff=weighted coefficient estimate based on 67,108,864 models, Std.Err.=weighted standard error of the estimate, pip=posterior inclusion probability. Variables above bold line have a posterior inclusion probability of more than 0.5.

Table A3: Results of country level Bayesian averaging regressions (male and female unemployment rate)

Average deviation from the mean				Standard deviation			
Variable	Coef.	Std. Err.	pip	Variable	Coef.	Std. Err.	pip
Dependent variable: Male Unemployment rate							
ln(transport and housing)	17.49	9.35	0.86	ln(index housing market eviction)	27.97	9.48	0.99
ln(index housing market eviction)	15.96	11.32	0.77	ln(transport and housing)	11.44	11.20	0.59
ln(minimum wage)	-0.50	0.40	0.73	ln(recreation and tourism)	57.00	87.37	0.56
ln(aesthetics)	-9.70	16.49	0.48	ln(aesthetics)	-13.77	16.53	0.52
ln(number of regions)	2.39	3.18	0.46	ln(heating days)	-1.75	2.24	0.46
ln(recreation and tourism)	18.32	45.16	0.39	ln(habitat)	-27.48	80.54	0.38
ln(culture and art)	-7.72	40.63	0.36	ln(cost of overtime employment)	-2.36	3.49	0.38
ln(index sick benefits)	6.07	9.93	0.36	ln(minimum wage)	0.16	0.25	0.36
ln(net repl. rate incl. Soc. & hous. ben)	2.16	4.43	0.27	ln(culture and art)	-16.85	39.25	0.30
ln(habitat)	-9.27	39.54	0.25	ln(net repl. rate incl. Soc. & hous. ben)	2.66	4.97	0.30
ln(cost of overtime employment)	-1.45	3.76	0.25	ln(number of regions)	-0.82	2.85	0.25
ln(climate)	-1.38	3.24	0.24	ln(climate)	-1.29	2.93	0.24
ln(regional autonomy index)	0.64	1.56	0.23	ln(productivity)	-0.24	0.62	0.23
ln(productivity)	-0.14	0.41	0.20	ln(bargaining concentration)	-0.77	2.09	0.19
ln(centralisation)	-0.78	3.14	0.20	ln(wage co-ordination)	-0.61	2.13	0.17
ln(heating days)	-0.49	1.33	0.19	ln(regional autonomy index)	0.36	1.10	0.16
ln(net replacement rate)	0.22	3.48	0.17	ln(net replacement rate)	-0.64	2.52	0.15
ln(wage co-ordination)	-0.24	2.39	0.16	ln(employment protection)	-0.96	2.91	0.15
ln(product market regulation)	0.43	1.33	0.13	ln(product market regulation)	0.37	1.18	0.13
ln(bargaining concentration)	-0.27	1.56	0.12	ln(index old age benefits)	-0.59	2.44	0.13
ln(marg. tax rate to employment)	0.79	3.16	0.12	ln(union density)	-0.04	0.88	0.09
ln(index old age benefits)	-0.58	2.56	0.12	ln(centralisation)	-0.19	1.70	0.09
ln(adjusted coverage)	0.13	2.12	0.10	ln(marg. tax rate to employment)	0.32	2.18	0.09
ln(employment protection)	-0.47	2.15	0.10	ln(index sick benefits)	0.49	2.93	0.09
ln(union density)	0.14	1.06	0.09	ln(adjusted coverage)	0.11	1.65	0.08
ln(active labour market policy)	0.03	0.68	0.08	ln(active labour market policy)	0.00	0.62	0.08
_cons	-64.32	31.11	1.00	_cons	-69.35	34.85	1.00
Dependent variable: Female unemployment rates							
ln(transport and housing)	23.45	9.14	0.93	ln(index housing market eviction)	33.42	9.07	1.00
ln(minimum wage)	-0.68	0.42	0.85	ln(transport and housing)	19.40	13.58	0.74
ln(index housing market eviction)	18.46	11.25	0.84	ln(recreation and tourism)	58.07	90.29	0.58
ln(index sick benefits)	10.13	11.51	0.55	ln(minimum wage)	-0.29	0.32	0.51
ln(number of regions)	3.08	3.78	0.52	ln(aesthetics)	-13.76	17.35	0.50
ln(aesthetics)	-9.44	18.18	0.47	ln(net repl. rate incl. Soc. & hous. ben)	5.90	7.41	0.48
ln(net repl. rate incl. Soc. & hous. ben)	4.42	6.34	0.45	ln(climate)	-2.72	3.93	0.42
ln(culture and art)	-13.12	51.08	0.40	ln(habitat)	-29.39	85.44	0.42
ln(recreation and tourism)	21.00	54.11	0.40	ln(culture and art)	-22.40	44.95	0.34
ln(regional autonomy index)	1.48	2.43	0.37	ln(bargaining concentration)	-1.81	3.19	0.34
ln(climate)	-2.31	3.94	0.36	ln(product market regulation)	1.20	2.03	0.31
ln(product market regulation)	1.37	2.23	0.33	ln(net replacement rate)	-1.80	4.13	0.30
ln(habitat)	-11.68	49.98	0.28	ln(regional autonomy index)	0.93	1.68	0.30
ln(net replacement rate)	0.03	5.03	0.28	ln(number of regions)	-0.43	3.03	0.26
ln(centralisation)	-1.39	3.78	0.25	ln(cost of overtime employment)	-1.87	3.79	0.26
ln(productivity)	-0.16	0.46	0.24	ln(heating days)	-0.93	2.06	0.25
ln(wage co-ordination)	-0.13	2.34	0.18	ln(productivity)	-0.14	0.61	0.20
ln(marg. tax rate to employment)	1.50	4.32	0.18	ln(index old age benefits)	-0.86	2.90	0.16
ln(cost of overtime employment)	-0.91	3.71	0.18	ln(index sick benefits)	1.53	4.93	0.16
ln(index old age benefits)	-1.05	3.89	0.16	ln(wage co-ordination)	-0.43	2.06	0.15
ln(bargaining concentration)	-0.40	1.88	0.15	ln(employment protection)	-0.49	2.14	0.11
ln(heating days)	-0.06	1.34	0.13	ln(centralisation)	-0.16	2.04	0.10
ln(union density)	0.17	1.57	0.13	ln(union density)	-0.04	0.88	0.09
ln(adjusted coverage)	0.01	2.15	0.10	ln(active labour market policy)	-0.04	0.70	0.09
ln(active labour market policy)	0.01	0.76	0.09	ln(marg. tax rate to employment)	0.32	2.08	0.09
ln(employment protection)	-0.31	1.84	0.09	ln(adjusted coverage)	0.12	1.68	0.08
_cons	-84.51	40.39	1.00	_cons	-97.72	45.44	1.00

Coef.=weighted coefficient estimate based on 67,108,864 models, Std.Er.=weighted standard error of the estimate, pip=posterior inclusion probability.Variables above bold line have a posterior inclusion probability of more than 0.5.

Table A4: Quantile Regression results for long term and youth unemployment rate

	25th percentile		75th percentile		Difference 25th - 75the percentile		25th percentile		75th percentile		Difference 25th - 75the percentile	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
	Dependent variable: Long Term Unemployment rate						Dependent variable: Youth unemployment					
ln(productivity)	0.00	0.03	0.00	0.02	0.01	0.03	0.01	0.02	-0.08 ***	0.02	-0.09 ***	0.03
ln(industry share)	-0.45 ***	0.12	-0.52 ***	0.09	-0.07	0.15	-0.32 ***	0.06	-0.15 **	0.07	0.17 *	0.09
ln(compensation)	0.08	0.06	0.20 ***	0.04	0.12 *	0.07	0.11	0.03	0.16 ***	0.04	0.05	0.04
ln(participation rate)	-2.15 ***	0.50	-0.60	0.37	1.56 ***	0.56	-0.32	0.25	-0.01	0.30	0.31	0.38
ln(transport and housing)	3.13 ***	0.67	3.56 ***	0.50	0.43	0.76	0.56 *	0.34	1.76 ***	0.40	1.20 **	0.53
ln(aesthetics)	-1.58	1.04	-2.29 ***	0.77	-0.71	1.36	-0.34	0.52	-1.67 ***	0.63	-1.33 *	0.75
migration rate	-0.52 ***	0.08	-0.44 ***	0.06	0.08	0.11	-0.14 ***	0.04	0.02	0.05	0.17 **	0.07
ln(climate)	2.60 ***	0.77	3.33 ***	0.57	0.73	0.78	0.74 *	0.39	1.93 ***	0.47	1.19 **	0.58
ln(share old)	0.48 *	0.28	0.32	0.20	-0.15	0.35	0.27 **	0.14	0.17	0.17	-0.11	0.23
ln(culture and art)	-8.27	5.50	-10.49 **	4.07	-2.22	6.30	-1.57	2.77	-3.08	3.31	-1.51	4.38
ln(high education share)	0.02	0.16	-0.40 ***	0.11	-0.42 **	0.19	-0.59 ***	0.09	-0.39 ***	0.11	0.19	0.14
ln(habitat)	5.01	5.59	6.39	4.13	1.37	6.86	2.96	2.81	7.17 **	3.36	4.21	4.62
ln(housing costs)	-0.06	0.26	-0.49 **	0.19	-0.44	0.31	0.08	0.15	-0.35 **	0.18	-0.42 *	0.22
ln(owner occupation rate)	0.46	0.52	-0.75	0.38	-1.21	0.92	-0.08	0.27	-0.84 ***	0.32	-0.76	0.48
ln(heating days)	0.43 *	0.24	0.36 **	0.18	-0.07	0.36	0.31 **	0.12	0.14	0.14	-0.17	0.23
ln(recreation and tourism)	1.35	2.98	2.21	2.20	0.86	3.84	-1.72	1.50	-4.67 **	1.80	-2.95	2.37
ln(population density)	-0.01	0.06	0.11 ***	0.04	0.12 *	0.07	0.06 **	0.03	0.05	0.04	-0.01	0.04
ln(union density)	0.25	0.24	0.52 ***	0.18	0.27	0.30	0.11	0.10	0.35 ***	0.12	0.23	0.18
ln(adjusted coverage)	0.34	0.55	1.38 ***	0.41	1.05	0.72	0.03	0.24	-0.91 ***	0.29	-0.94 **	0.43
ln(bargaining concentration)	0.81 *	0.44	0.49 *	0.33	-0.32	0.52	-0.07	0.22	-0.32	0.27	-0.25	0.35
ln(wage co-ordination)	-0.08	0.44	0.67 **	0.33	0.75	0.59	-0.31	0.20	-0.54 **	0.24	-0.23	0.36
ln(centralisation)	-2.37 ***	0.79	-3.03 ***	0.59	-0.65	0.94	-0.14	0.37	0.34	0.45	0.48	0.64
ln(product market regulation)	-0.46 **	0.22	-0.41 **	0.16	0.04	0.25	-0.44 ***	0.10	-0.36 ***	0.12	0.08	0.15
ln(net replacement rate)	1.05 *	0.59	0.28	0.44	-0.79	0.66	0.49 *	0.29	1.30 ***	0.34	0.81	0.49
ln(net replacement rate incl soc. & hous. ben.)	-0.16	0.68	1.73 ***	0.50	1.89 **	0.81	0.35	0.27	-0.88 ***	0.33	-1.24 **	0.49
ln(active labour market policy)	-0.15	0.20	-0.10	0.14	0.05	0.25	-0.36 ***	0.09	-0.44 ***	0.11	-0.08	0.15
ln(employment protection)	-0.61	0.55	0.94 **	0.41	1.55 **	0.69	-0.01	0.24	0.29	0.28	0.30	0.38
ln(minimum wage)	-0.01	0.03	-0.07 ***	0.02	-0.06	0.05	-0.02	0.01	0.01	0.02	0.03	0.03
ln(marginal tax rate moving to employment)	-0.61	0.50	-1.29 ***	0.37	-0.68	0.62	0.15	0.23	-0.51	0.28	-0.67	0.42
ln(cost of overtime employment)	0.00	0.30	-0.83 ***	0.22	-0.83 **	0.40	-0.14	0.12	0.05	0.14	0.19	0.20
ln(index old age benefits)	0.14	0.78	-1.27 **	0.58	-1.41	1.02	-0.04	0.35	0.64	0.42	0.68	0.69
ln(index sick benefits)	-1.23	0.96	-1.11	0.71	0.12	1.08	0.37	0.40	0.31	0.48	-0.06	0.64
ln(index housing market eviction)	3.17 ***	0.62	2.31 ***	0.46	-0.86	0.79	0.68 ***	0.24	-0.13	0.28	-0.82 **	0.37
ln(regional autonomy index)	-0.12	0.27	0.46 **	0.20	0.58 *	0.33	0.19 **	0.09	0.15	0.11	-0.04	0.17
_cons	-8.99	6.57	-22.62 ***	4.85	-13.63 *	8.18	-5.69 **	2.05	4.39 *	2.45	10.08 **	4.08
Pseudo R2	0.4852		0.5069				0.2256		0.2015			
Number of Observations	540		540		540		540		540		540	

Table reports results of quantile regression at the 25th, 50th and 75th percentile, coef.= estimated coefficient. Std.Err.= Standard Error of the estimate, *** (**)(*) signify significance of the parameter estimate at the 1% (5%) (10%) level respectively

Table A5: Quantile Regression results for male and female unemployment rate

	25th percentile		75th percentile		Difference 25th - 75the percentile		25th percentile		75th percentile		Difference 25th - 75the percentile	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
	Dependent variable: Male unemployment rate						Dependent variable: Female unemployment rate					
ln(productivity)	-0.01	0.02	-0.10 ***	0.02	-0.10 ***	0.04	-0.01	0.02	-0.09 ***	0.03	-0.08 **	0.04
ln(industry share)	-0.45 ***	0.06	-0.34 ***	0.09	0.11	0.11	-0.13 **	0.07	-0.04	0.11	0.09	0.11
ln(compensation)	0.14 ***	0.03	0.28 ***	0.05	0.14 ***	0.05	0.09 ***	0.03	0.33 ***	0.05	0.24 ***	0.05
ln(participation rate)	-0.58 **	0.25	0.22	0.38	0.80 *	0.42	-0.44	0.27	-0.24	0.44	0.20	0.43
ln(transport and housing)	1.12 ***	0.33	1.82 ***	0.51	0.70	0.61	1.11 ***	0.36	1.44 **	0.59	0.33	0.62
ln(aesthetics)	-0.04	0.52	-0.72	0.79	-0.68	0.89	-0.40	0.55	-1.78 *	0.91	-1.38	0.87
migration rate	-0.19 ***	0.04	-0.06	0.06	0.13 **	0.07	-0.10 **	0.04	-0.01	0.07	0.09	0.07
ln(climate)	0.78 **	0.39	1.52 **	0.59	0.74	0.60	0.76 *	0.41	1.00	0.68	0.23	0.65
ln(share old)	0.12	0.14	0.10	0.21	-0.02	0.25	0.32 **	0.15	0.44 *	0.24	0.12	0.25
ln(culture and art)	-5.99 **	2.75	-7.14 *	4.17	-1.15	4.87	-6.68 **	2.93	-4.23	4.82	2.45	5.86
ln(high education share)	-0.59 ***	0.09	-0.59 ***	0.13	-0.01	0.17	-0.53 ***	0.09	-0.29 *	0.15	0.24	0.16
ln(habitat)	8.60 ***	2.79	7.86 *	4.23	-0.74	5.54	9.23 ***	2.97	2.90	4.89	-6.33	6.21
ln(housing costs)	0.04	0.15	-0.11	0.22	-0.15	0.25	0.02	0.15	-0.19	0.25	-0.21	0.25
ln(owner occupation rate)	-0.09	0.26	-0.53	0.40	-0.44	0.51	-0.33	0.28	-1.03 **	0.46	-0.71	0.46
ln(heating days)	0.26 **	0.12	0.46 **	0.18	0.20	0.19	0.17	0.13	0.34 *	0.21	0.18	0.19
ln(recreation and tourism)	-3.76 **	1.49	-1.99	2.26	1.77	3.05	-3.35 **	1.59	1.60	2.61	4.95 *	2.71
ln(population density)	0.06 *	0.03	0.13 ***	0.04	0.07	0.05	0.01	0.03	0.04	0.05	0.03	0.05
ln(union density)	0.12	0.10	0.33 **	0.16	0.21	0.16	-0.01	0.11	0.24	0.18	0.25	0.19
ln(adjusted coverage)	-0.01	0.24	-0.90 **	0.36	-0.89 **	0.41	-0.26	0.25	-1.01 **	0.42	-0.75 *	0.45
ln(bargaining concentration)	-0.13	0.22	0.00	0.33	0.12	0.36	-0.48	0.23	-0.51	0.39	-0.03	0.36
ln(wage co-ordination)	-0.38 *	0.20	-0.35	0.30	0.03	0.33	-0.46 **	0.21	-0.22	0.35	0.24	0.37
ln(centralisation)	0.07	0.37	-0.04	0.56	-0.11	0.60	0.93 **	0.40	0.70	0.65	-0.22	0.67
ln(product market regulation)	-0.42 ***	0.10	-0.38 **	0.15	0.04	0.16	-0.17	0.11	-0.06	0.18	0.11	0.18
ln(net replacement rate)	0.62 **	0.29	1.21 ***	0.43	0.59	0.43	0.33	0.30	1.03 **	0.50	0.69	0.49
ln(net repl. rate incl soc. & hous. ben.)	0.19	0.27	-0.78 *	0.41	-0.97 *	0.52	0.12	0.29	-0.98 **	0.48	-1.10 **	0.55
ln(active labour market policy)	-0.38	0.09	-0.28 *	0.14	0.11	0.14	-0.44 ***	0.10	-0.24	0.16	0.19	0.16
ln(employment protection)	-0.07	0.23	0.02	0.36	0.09	0.36	-0.40	0.25	-0.12	0.41	0.28	0.47
ln(minimum wage)	0.00	0.01	0.02	0.02	0.02	0.02	0.01	0.01	0.03	0.02	0.02	0.03
ln(marg. tax rate moving to empl.)	0.13	0.23	-0.06	0.35	-0.19	0.45	0.27	0.25	-0.54	0.41	-0.81	0.54
ln(cost of overtime employment)	-0.05	0.12	0.13	0.18	0.19	0.20	0.12	0.13	0.25	0.21	0.13	0.23
ln(index old age benefits)	0.22	0.35	0.59	0.53	0.37	0.61	0.78 **	0.37	0.99	0.62	0.21	0.69
ln(index sick benefits)	0.26	0.40	0.84	0.60	0.59	0.63	-0.49	0.42	-0.05	0.70	0.44	0.66
ln(index housing market eviction)	0.39 *	0.24	0.08	0.36	-0.31	0.43	0.32	0.25	-0.07	0.41	-0.39	0.44
ln(regional autonomy index)	0.06	0.09	0.17	0.14	0.11	0.17	-0.08	0.10	-0.09	0.16	-0.01	0.18
_cons	-4.23 ***	2.04	2.33	3.09	6.57	4.12	-0.84	2.17	7.42	3.57	8.26 *	4.54
Pseudo R2	0.2675		0.2486				0.2486		0.2208			
Number of Observations	540		540		540		540		540		540	

Table reports results of quantile regression at the 25th, 50th and 75th percentile, coef.= estimated coefficient. Std.Err.= Standard Error of the estimate, *** (**)(*) signify significance of the parameter estimate at the 1% (5%) (10%) level, respectively

Table A6: Results of Bayesian averaging (dependent variable: log regional unemployment rate)

	Posterior inclusion Probability	Posterior Mean	Posterior Stadard Deviation
Log industrial employment share	1.00	-0.274	0.052
Log compensation per employee	1.00	0.210	0.024
ln(participation rate	1.00	-1.098	0.217
Log index of capacity of landscape to supply transportation and housing	1.00	1.899	0.370
Log index of benefits related to non-recreational appeal of landscape	0.99	-1.589	0.420
Migration rate	0.98	-0.151	0.038
Log index of ecosystems ability to influence environmental quality	0.98	1.294	0.435
Log share of old population (over 64)	0.85	-0.297	0.165
Log index of Cultural and Artistic landscape values	0.74	-4.859	3.728
Log of share of high educated workforce (ISCED 5 or higher)	0.71	-0.152	0.116
Log index of provision of suitable living space for flora and fauna	0.59	3.634	3.545
Log average housing costs in region	0.56	-0.200	0.204
Log share owner occupied housing	0.40	-0.193	0.269
Log number of actual heating degree days	0.21	0.039	0.087
Log index of landscape services from touristic/recreational value	0.21	0.561	1.260
Log population density	0.14	-0.005	0.015
Supply of fiber timber and non-timber forest goods	0.09	0.041	0.187
Log of out commuting rate	0.08	-0.002	0.008
Population growth	0.07	-0.144	2.275
Log share of young population (under 25)	0.07	-0.012	0.063
Log share subsidized housing	0.06	0.003	0.024
Log birthrate	0.06	-0.007	0.045
Log of share of agricultural employment	0.05	0.000	0.007
Log index of variety in fauna and flora	0.05	-0.006	0.058
Log of herfindahl index (based on 6 sectors)	0.04	0.002	0.050
Log of turbulence indicator (based on 6 sectors)	0.04	-0.362	0.334
GDP per capita growth	0.04	0.000	0.002
_cons	1.00	-0.046	0.017
Log Labor Productivity	1.00	-0.002	0.003
Number of observations		540	

Source: own calculations

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Project Information

Welfare, Wealth and Work for Europe

A European research consortium is working on the analytical foundations for a socio-ecological transition

Abstract

Europe needs a change: The financial crisis has exposed long neglected deficiencies in the present growth path, most visibly in unemployment and public debt. At the same time Europe has to cope with new challenges ranging from globalisation and demographic shifts to new technologies and ecological challenges. Under the title of Welfare, Wealth and Work for Europe – WWWforEurope – a European research consortium is laying the analytical foundations for a new development strategy that enables a socio-ecological transition to high levels of employment, social inclusion, gender equity and environmental sustainability. The four year research project within the 7th Framework Programme funded by the European Commission started in April 2012. The consortium brings together researchers from 33 scientific institutions in 12 European countries and is coordinated by the Austrian Institute of Economic Research (WIFO). Project coordinator is Karl Aiginger, director of WIFO.

For details on WWWforEurope see: www.foreurope.eu

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