DETERMINANTS OF UNEMPLOYMENT IN CENTRAL AND EASTERN EUROPEAN ECONOMIES

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The view that an institutional structure causes rigidities in the labour market is broadly accepted by policy makers. This assessment is conventionally based on unemployment theories that establish a link between labour market institutions and unemployment in the long run. This paper provides an econometric analysis of the determinants of unemployment in the long run in ten Central and Eastern European countries for the period of 2002–2012. Evidence that an institutional structure causes rigidities in the labour market and has a direct effect on the unemployment rate in these economies is found in this study. A set of non-structural indicators, accounted by macroeconomic shocks, also prove to have effects on the labour market outcomes. From a policy making perspective, this suggests that structural labour market reforms and increases in the overall flexibility of the labour market in these economies are necessary to bring unemployment rates down.
Keywords: unemployment, labour market institutions, CEE-10 economies.

Introduction

High unemployment remains one of the main policy concerns in many Central and Eastern European (CEE) countries. Therefore, factors determining its dynamics are the object of an important research area for policy makers aiming to bring unemployment rates down. It is commonly agreed that institutional structure causes rigidities and influences labour market performance but the importance of each institutional factor for the unemployment rate is a matter of empirical research.

The main purpose of this paper is to identify the factors that determine unemployment in the long run in selected CEE countries for the period of 2002–2012. Similar empirical studies that aimed to assess the problem of unemployment in a set of Organization for Economic Co-operation and Development (OECD) and European Union (EU) countries include, among others, Nickell (1997), Blanchard and Wolfers (2000), Nickell *et al.* (2002), Bassanini and Duval (2006) and the most recent — Orlandi (2012). The country panel analysed in this paper consists of ten CEE countries (CEE-10), namely, Bulgaria, the Czech Republic, Estonia, Latvia, Lithuania, Hungary, Poland, Romania, Slovakia and Slovenia. The motivation behind the country selection is based on the assumption that these economies have many common development patterns since the early 1990s and all of them are new members of the EU. The interest in analysing the CEE-10 economies arises also from the fact that these economies in general are exposed to relatively high unemployment rate levels that are typically above those in many other OECD and EU Member States. This naturally raises a question about the determinants of high unemployment rates and the dominant factors that should be primarily targeted at reforms by policy makers aiming to bring unemployment rates down. A special focus in this study is given to Lithuania. In particular, potential differences in the factors affecting unemployment in the long run in Lithuania in comparison to the remaining economies are analysed.

The analysis of the determinants of unemployment begins with identification of potential institutional factors that might have an impact on the labour market outcomes in the long run. These indicators are grounded in unemployment theories and are assumed

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to impact the unemployment rate by affecting demand for labour. The effect on labour demand works either through the matching of the unemployed to job vacancies and/or through excess wage claims in the market. Macroeconomic shocks that partially capture the long run behaviour of the unemployment rate extend the analysis on determinants of unemployment. Their impact on unemployment is seen mainly through the failures of the labour market to adjust to the changing economic environment. Such failures, however, arise out of labour market inflexibility, which is usually directly linked with the institutional set-up of the labour market.

The empirical studies are mostly concerned with examining whether the theoretical link between labour market institutions and unemployment in the long run could be proved to prevail. In empirical modelling, the so called non-accelerating inflation rate of unemployment (NAIRU) or the non-accelerating wage rate of unemployment (NAWRU) often serve as proxies for unemployment in the long run. Econometric techniques also allow the same problems to be assessed by analysing annual unemployment rate figures. This paper uses annual (cyclically unadjusted) figures on unemployment rates to assess unemployment problems in CEE-10 economies and is organised as follows.

Section 1 presents the theoretical background for determinants of unemployment in the long run. Section 2 describes the data and its sources and Section 3 presents the econometric model used to explain the evolution of unemployment rates. Section 4 provides the empirical results for CEE-10 countries.

1. Theoretical framework: determinants of unemployment in the long run

It is assumed in the labour market literature that there are two key types of indicators that determine unemployment in the long run: institutional, or structural, factors and other, non-structural factors.* Labour market institutions essentially affect unemployment levels in two broad ways: by directly affecting the process of matching the unemployed to job vacancies and/or by causing excess wage claims regardless of the excess labour supply on the market. There is a straightforward link between wages and unemployment: demand for labour is negatively related to wages, whereas the unemployment rate itself moves in the inverse direction to labour demand. Non-structural factors, or certain macroeconomic shocks, typically influence unemployment through labour market imperfections. Wage rigidity or overall labour market inflexibility, which in many case is related to institutional set-up, leads to the labour market failure to adjust to these shocks and has adverse effects on the economy's unemployment rate (Blanchard, Wolfers 2000; Nickell *et al.* 2002; Saint-Paul 2004; Bassanini, Duval 2006; Orlandi 2012).

The generosity of the unemployment benefit system is considered to be one of the most important institutional factors affecting unemployment in the economy. The main channel, through which unemployment benefits have a long-term impact on the unemployment rate, is related to incentives to work. By providing income replacement, more generous unemployment benefit systems create a problem of moral hazard. If a low net income gain is obtained when entering employment from unemployment, incentives to work are suppressed because a higher reservation wage is required for the worker to return to the labour market. Therefore, a higher degree of income replacement, as measured by a benefit replacement ratio,** is assumed to be a disincentive, as it encourages a prolonged stay in the unemployment pool, reducing the job search efforts and leading to a higher level of unemployment in the economy. Similarly, a longer period of benefit entitlement also creates a specific type of moral hazard, namely, incentives to remain unemployed for longer periods, especially if at the same time the benefit replacement ratio is high. The coverage of the unemployment benefit system and the strictness in which the system is operating are also of importance in this context. The benefit replacement ratio and the benefit entitlement period alone might not mean much for labour market outcomes at the aggregate level if the coverage of the unemployment benefit system is low and the system is strictly monitored (Holmlund 1998; Nickell *et al.* 2005; Bassanini, Duval 2006; Lauringson 2010; Stovicek, Turrini 2012).

*The determinants of unemployment listed in this section appear in neoclassical, wage bargaining or efficiency wage models. See Pesliakaite (2015) where the simplified mathematical framework is developed and more extensive theoretical explanations are provided.

**The benefit replacement ratio is defined as the ratio of the unemployment insurance benefits and to the total gross earnings received prior to becoming unemployed.

Economic theories suggest that high labour taxes, as reflected by the tax wedge,* also have a negative impact on the labour market outcomes. Its effect on unemployment goes mainly through the same wage channel. Theoretically, the impact of labour taxes on unemployment might be assessed by analysing its effect on labour demand and supply curves in employment versus the net wage framework. The introduction of labour taxation causes adverse shifts in either of these curves (usually labour demand), thereby having a negative effect on employment in the economy. Elasticity of labour demand and supply curves determines which of the curves shifts in response to labour taxation. If employees, along with trade unions, lack bargaining power, the entire tax burden would be passed on to this labour market counterpart with no ultimate effect on the unemployment rate. If, on the other hand, employees and trade unions possess strong bargaining power, the tax wedge would be shifted on to employers, thereby raising labour costs for the firms. In this case, due to net wage resistance, demand for labour would be negatively affected with an eventual adverse effect on unemployment outcomes. Legislation of the net statutory minimum wages in the economy implies that the tax burden cannot be shifted on to employees because of the net wage floors; then the adverse effects on labour demand and the unemployment rate in such economies might be present (Nickell 1997; World Bank 2005; Baccaro, Rei 2007).

Apart from the ability to influence the bearer of the labour tax wedge, trade unions also have power to affect evolution of wages in the economy in other ways. It is considered that strong and influential trade unions might exert constant pressure on wage growth above the market equilibrium level at the cost of a higher unemployment rate. Just union power, however, is not enough to put pressure on wage growth; the level of unionisation (or collective bargaining coverage) in the economy and the degree of coordination in the wage bargaining process also matter. Generally it is considered that higher union coverage, along with strong union power, presses wage growth up at the cost of lower employment, but, in practice, the effect of these aspects varies depending on the collective wage bargaining system in the economy. Higher coordination in the collective wage bargaining process across the economy and across labour market counterparts dampens excess wage claims and balances the negative effects of high union coverage and its strong power. Introduction of minimum wages in an economy also falls under the category of institutional wage determination, and it also is a potential source of an increase in the unemployment rate (Nickell 1997; Nickell *et al.* 2002, 2005; Bassanini, Duval 2006; Baccaro, Rei 2007).

The strong wage bargaining power of employees and their ability to shift a part of the tax burden onto employers can cause a decrease in labour demand, thereby raising the unemployment rate in the economy. However, the bargaining power might, in many cases, also depend on the other labour market structural indicator — strictness of employment protection legislation.** Stricter employment protection could affect labour market outcomes both directly, by influencing matching efficiency on the labour market, and indirectly, by possibly having effect on productivity and wage growth in the economy. In theory, the impact of the strictness of employment laws on unemployment is quite inconclusive — it might affect labour market outcomes through different channels, with largely neutral overall impact on the unemployment (Nickell *et al.* 2002, 2005; Young 2003; Baccaro, Rei 2007).

The unemployment benefit system is passively supporting the unemployed, by providing income replacement in the case of a job loss, whereas a number of other labour market policies are directed toward active assistance for the unemployed. Active labour market policies are designed to counsel in the job-search process, provide education and vocational training or assist in job placement. Other programs directly subsidise employment (for instance, by providing hiring subsidies for the private sector, promoting self-employment or directly creating jobs in the public sector) or even targets specific groups in the labour market (youth, long-term unemployed or disabled people). Such policies are found to relate to the reduction of skill-mismatch in the economy, and, if efficiently designed, are contributing to a lower long run unemployment rate in the

*It is defined as a ratio between total labour taxes — overall tax wedge — and total labour costs borne by the employer. In the same manner it is also common to define this variable in absolute terms — as a difference between production wage, which is the labour costs of the firms, and the consumption or net wage available for disposition for employees (Nickell *et al.* 2005; Bassanini, Duval 2006; Orlandi 2012).

**In empirical research one of the most frequently used variables to measure such strictness is the employment protection legislation index derived by OECD.

economy (Nickell 1997; Forslund, Kolm 2000; Martin, Grubb 2001; Nickell *et al.* 2002; Bassanini, Duval 2006; Orlandi 2012).

Taken separately, labour market institutions are considered to have the power to explain the evolution of unemployment in the long run but many of them also interact with each other. One example of this was the influence of union power on tax wedge resistance. There may be some other interactions between labour market structural indicators (Martin, Grubb 2001; Young 2003; Borghijs *et al.* 2003; Bassanini, Duval 2006; Chung, Jeong 2008; Orlandi 2012) and they are considered in more detail in the empirical part of this paper.

In addition to being affected by the labour market institutions, unemployment rates can be influenced by macroeconomic shocks. The role of permanent or long-lasting productivity shocks in the analysis of long-run unemployment is to verify the assertion that wage resistance has adverse effects on labour market outcomes. The starting point would be to assume that permanent deceleration in productivity trend growth cannot be equally and swiftly accompanied with the fall in the wage growth rate. As expectations for increases in wages do not adjust in line with the slowdown in productivity growth, unsustainable wage developments in the economy might be observed for some period of time. In the presence of a productivity shock, wage rigidity emanating from labour market institutions affects labour market outcomes similarly. Moreover, temporary productivity shocks have the ability to explain the evolution of the cyclical part of the unemployment rate (Blanchard, Wolfers 2000; Bertola *et al.* 2001; Nickell *et al.* 2002; Bassanini, Duval 2006; Orlandi 2012).

Less flexible labour markets might fail to adjust not only to productivity shocks but also to other macroeconomic shocks hitting the economy. In a continuously changing economic environment, a persistent labour demand shock might give rise to a skill mismatch problem. If, for instance, labour demand for workers with specific skills increases leading to a falling demand for other workers, unemployment rises within the latter group. This, in turn, alters the unemployment rate in the economy as a whole. Change in demand for skills is not the only situation in the economy that gives rise to labour demand shock. Any other structural change in the economy might lead to similar effects. If an economy is switching from capital-intensive to labour-intensive production technology (or vice versa), this alters the labour share, demand for labour and, consequently, the overall rate of unemployment. Also, cyclical fluctuations in the labour share and thus demand for labour can explain temporary deviations of unemployment from its long run equilibrium rate quite well (Nickell 1997; Blanchard, Wolfers 2000; Bertola *et al*. 2001; Nickell *et al.* 2002, 2005; Bassanini, Duval 2006; Orlandi 2012).

One can also expect a positive relationship between the real interest rate (which is a summary measure of the cost of capital) and unemployment outcomes in the economy. A longer lasting increase in the real interest rate is likely to restrain investments and lead to capital under-accumulation. Accordingly, a decline in employment is needed in order to restore the equilibrium capital-labour ratio. A restrictive monetary policy could therefore be seen as being closely related to a negative labour demand shock or even give an impulse to it.* Monetary policy, as a tool for cyclical stabilisation of the economy, affects temporary real interest rate fluctuations and short-run deviations of the unemployment rate from its long run level (Blanchard, Wolfers 2000; Bertola *et al*. 2001; Bassanini, Duval 2006; Orlandi 2012).

Labour supply shocks should also be considered in the analysis of unemployment.** Labour supply measures, such as introduction of early retirement schemes or reduction in hours worked, are often applied by policy makers with the aim of reducing the unemployment rate. However, it is argued that supply side measures do not help to increase employment. The unemployment rate is entirely determined by real labour demand, and the effect of supply side measures, given the existing institutional structure, tends to diminish in both short and long run. In the long run, labour demand tends to adjust to any labour supply shock through wage correction leaving the unemployment rate unaffected (Nickell 1997; Ball *et al.* 1999; Nickell *et al*. 2002; Orlandi 2012).

*In addition Nickell *et al.* (2002), Baccaro and Rei (2007) consider the case in which an increase in the real interest rate leads to an increase in the returns of non-human wealth. This in turn leads to a rise in the reservation wage requirement and an increase in the labour costs, and therefore triggers a negative labour demand shock.

**A variety of other macroeconomic shocks (deterioration in the terms of trade, shock in inflation, change in central bank dependence index and others) have also gained some interest in empirical literature within the topic (Bassanini, Duval 2006; Baccaro, Rei 2007).

2. Measurement of variables

In this section the data used to analyse the determinants of the long-run unemployment in CEE-10 economies is presented. The countries included in the panel have exhibited quite similar development patterns since the early 1990's and all of them are new EU Member States. The sample size is restricted by data availability and covers the period from 2002 to 2012. The time series of the unemployment rates are plotted in Figure 1 of the Appendix. The graphic representation of all explanatory variables used in the baseline estimations is available in Figures 2–7 of the Appendix. Table 2 of the Appendix provides descriptive statistics for all the indicators used in the baseline equation. All indicators are time varying. The dependent variable, which is the aggregated unemployment rate, is calculated as a share of unemployed persons to the labour force. Data for the analysed CEE-10 countries is gathered from the Eurostat database. The average unemployment rate refers to the 15–74 age groups.

With regard to labour market structural indicators, the labour tax wedge is expected to have a negative impact on employment outcomes. Initial time series of the tax wedge for different groups of earners and different family types is derived by the European Commission (2014). The average labour tax wedge indicator for each individual CEE-10 economy is taken over four different income groups and three different family types.

The unemployment benefit ratio serves as a proxy for the overall generosity of the unemployment benefit system.* It is also expected that an increase in the benefit replacement ratio should have a negative influence on employment. Initial data on replacement rates for different income groups, family types and different duration periods can be found in the European Commissions' database. Benefit replacement ratios over five different income earner groups and three different family types are considered in the calculations of the country's unemployment benefit ratio averages for CEE-10 economies. It is noteworthy that only the replacement rates for the first year of unemployment form the average unemployment benefit ratio. The alternative indicator, denoted as the average net replacement ratio in per cent, is also calculated and used in some specifications of empirically tested models. It is calculated as the average across five different income earner groups, three different family situations, and, moreover, it takes into account unemployment benefit duration periods exceeding one year.

The variable representing the spending on active labour market policies (ALMP) is defined as the aggregate public expenditure on active labour market programs as a share of gross domestic product (GDP). It is expected that ALMP, if effective, should have a positive impact on employment. Disaggregated data on ALMP for CEE-10 countries are gathered from the Eurostat. Additional transformation of the ALMP variable, calculated as public spending on ALMP per unemployed person as a share of GDP per capita, are used in alternative model specifications in the current paper.

The effect of some additional structural indicators on unemployment in CEE-10 economies is evaluated in this paper as well. These variables represent union density, coordination in the wage setting process, minimum wages and the employment protection legislation index. The motivation for not including these indicators to the baseline equation is usually insufficient data availability (except for minimum wages). Therefore, only alternative models include these variables, though the sample sizes are significantly reduced as a result.

Union density is usually used as the simplest proxy to denote collective wage bargaining coverage or, more generally, wage bargaining conditions in the economy. In general cases, higher union density is expected to go along with a decrease in employment. In one model an index measuring a degree of coordination in the wage setting process is also used. This indicator suggests that, in the presence of trade unions in the economy, a higher degree of coordination should generally lead to more favourable employment outcomes. Available data for union coverage is gathered from the OECD database. The index representing a degree of coordination in the wage setting process is calculated by ICTWSS (Institutional Charasteristics of Trade Union, Wage Setting, State Intervention and Social Pacts database, version 4).

*The variable representing the benefit duration period (in months) is, in addition, used in alternative estimation procedures of this study. It enriches the analysis of how the overall generosity of unemployment benefit systems affects unemployment in the long run.

Wage bargaining, occurring at the national levels of economies in the form of statutory minimum wages, is also considered in the analysis. Alternative models assess the impact of the minimum wage on unemployment in the long run. The appropriate measure is calculated as a ratio of minimum wage to the average earnings in the business economy. This proxy is also known as the so called Kaitz index and is provided by the Eurostat. It is expected that the minimum wage, set above the market equilibrium level, might have a negative impact on employment outcomes.

The employment protection legislation (EPL) index is often used as a proxy to measure the flexibility of the labour market. The methodology to derive the EPL index is developed by the OECD and estimates could be found in the OECD database.* EPL sub-indexes — employment protection for regular contracts (EPRC) and employment protection for temporary contracts (EPT) — are used in this paper to assess the impact of employment protection on labour market outcomes in CEE-10 economies whereas, as discussed in the theoretical part, the impact of the stringency of labour laws on unemployment is inconclusive.

Three macroeconomic shocks (namely, productivity, labour demand and real interest rate shocks) are used to extend analysis on determinants of unemployment in CEE-10 countries. Each of these shocks is used in the baseline equation as well as in alternative models and captures partially cyclical and partially structural behaviour of unemployment rates in the economies.The productivity shock is expressed as labour productivity growth, which is approximated by the difference between real GDP and employment growth rates. Data for real GDP and employment is provided by the Eurostat. The theory would predict that a decrease in growth in productivity should cause an increase in the unemployment rate. Evolution of the labour share in the construction sector is considered to serve as a proxy for labour demand shock. Labour share in the construction sector is measured as the ratio of the number of employees in this sector to the total number of employees. Initial data for these indicators is gathered from the Eurostat database. The variable is calculated as its deviation from the mean.** By using this variable as a proxy for the labour demand shock, it is expected that an increase in the labour share should be associated with a decrease in the unemployment rate and vice versa.

The long-term real interest rate is used as a proxy for the real interest rate shock. In particular, real interest rate time series are constructed taking the difference between the nominal long-term government bond yield (with approximate maturity of 10 years) and the annual change of GDP price inflation. Data for these variables is gathered from the Eurostat database (except for Estonia).*** Economic theory predicts that increases in the interest rate level are supposed to be in line with lower employment and thus an increase in the unemployment rate.

In addition to those shocks, the output gap is used in alternative models to the baseline equation to replace three other shocks, namely, productivity, real interest and labour demand shocks. The output gap, however, captures the entirely cyclical behaviour of the unemployment rate. It is expected to be negatively related to the evolution of unemployment, i.e. a positive output gap would be associated with the decrease in unemployment. This variable for CEE-10 economies is obtained for each country separately as a gap between actual and potential output series as a ratio of the potential GDP, calculated by applying the Hodrick-Prescott filter (with smoothening parameter $\lambda = 100$). Historical real GDP time series, along with the forecast for 2015, are extracted from the annual macroeconomic database of the European Commission's Directorate AMECO.****

*EPL index calculation for Lithuania could be found in Pesliakaite and Siaudvytis (2015).

**Country-specific means are calculated for the period 1999/2000–2013.

***For Estonia, data for the nominal long run interest rate is gathered from the Bank of Estonia statistical database. It accounts for interest rate paid for the long-term (5–10 years) loans, denominated in euro, to non-financial corporations.

****The motivation of the choice of such proxies in the analysis of unemployment in the long run, their measurement, expected signs in regressions and data sources are described in more detail in Pesliakaite (2015).

3. Empirical techniques

The baseline equation for the multiple country analysis includes some of the potential structural determinants of the unemployment rate along with macroeconomic control variables. In the baseline equation no interdependence between structural indicators is considered. The empirically tested baseline model is intended to explain past unemployment trends and its static form is designed by using simple individual-specific and time-specific fixed effects model as follows:

$$u_{it} = \sum_j \beta_j X_{it}^j + \sum_j \chi_j Z_{it}^j + \alpha_i + \lambda_t + \varepsilon_{it}, \quad (1)$$

where u_{it} is the unemployment rate at time t for country i, X_{it}^j stands for labour market institutional variables for country i, whereas Z_{it}^j denotes observed macroeconomic shocks. α_i is individual-specific fixed effects, capturing country specific and time-invariant unobservable shocks and λ_t is time-specific fixed effects which serves as a proxy for time-varying common unobservable shocks affecting all countries simultaneously (Bassanini, Duval 2006; Orlandi 2012).* Regarding labour market structural indicators, X_i^j includes the labour tax burden, the unemployment benefit system and active labour market policies in the baseline model. In alternative representations, X_i^j is augmented with minimum wages, union density, employment protection legislation and some other variables that may have additional power to explain unemployment in CEE-10 economies. Z_i^j in Equation (1) represents labour productivity, labour demand and real interest rate shocks. In some alternative models these shocks are replaced with the single variable — the output gap. In this type of regressions, where all labour market indicators are expressed in percentage form, the magnitude of significant estimated coefficients would indicate the impact on the unemployment rate of a one percentage point change in structural and non-structural indicators.

In addition to the baseline model, augmented models, usually with one interaction term between labour market structural indicators, are also estimated and take the following general form:

$$u_{it} = \sum_j \beta_j X_{it}^j + \gamma_{kh}\left(X_{it}^k - \bar{X}^k\right)\left(X_{it}^h - \bar{X}^h\right) + \sum_j \chi_j Z_{it}^j + \alpha_i + \lambda_t + \varepsilon_{it}, \quad (2)$$

where the additional term $\gamma_{kh}\left(X_{it}^k - \bar{X}^k\right)\left(X_{it}^h - \bar{X}^h\right)$ denotes the interaction term between labour market institutional indicators. $\bar{X}^k$ and $\bar{X}^h$ are the sample means of the structural indicators X_{it}^k and X_{it}^h respectively. Thus, interactions are usually expressed as a product of the relevant variables, i.e. in multiplicative terms, whereas the variables themselves are calculated as their deviations from the mean. The significance of the coefficients γ_{kh} in the augmented regression of Equation (2) would provide economic evidence that complementarity of reforms X_{it}^k and X_{it}^h do matter (Bassanini, Duval 2006; Baccaro, Rei 2007). The possibility of such interactions was considered in the theoretical part of this paper, whereas interpretation of the concrete interaction terms would be discussed more extensively by presenting the results of the estimations in the sections below.

4. Determinants of unemployment: discussion over results and policy implications

This section of the paper presents and discusses the results on determinants of unemployment in CEE-10 countries. In the last subsection, estimation results of this study are also compared to similar studies, which analyse determinants of unemployment in EU-13 and OECD-21 economies.

4.1. Estimation results

The baseline equation is estimated with a simple panel individual-specific and time-specific fixed effects model. Here, the annual unemployment rate is regressed on three institutional labour market indicators — labour tax wedge, unemployment benefit replacement ratio and active labour market policies-to-GDP ratio — and three non-structural variables, i. e. labour productivity, labour demand and real interest rate shocks.

Table 1 reports results of the estimations; all significant regression coefficients are correctly signed. Column (1) relates to the partial model where only labour market structural indicators are considered; column (2) relates to the partial model where the unemployment rate is regressed only on a set of macroeconomic controls. These models serve mainly for coefficient stability checking. Column (3) reports results from the baseline equation with both structural and non-structural indicators included in the model. Column (4) considers the dynamic model with a lagged dependent variable. Here, the difference

*Correctness of this specification is tested with appropriate tests.

GMM Arellano-Bond one-step estimator (GMM) is employed for robustness check of the results for the baseline regression.* Columns (5) and (6) present alternative models on determinants of unemployment rate where the majority of institutional explanatory variables (except for labour tax wedge) and shocks as in formulation (6) are replaced by alternative indicators. With these setups, it is tested whether redefining the most of the variables affects considerably results of the baseline model.

Table 1

Unemployment equation, 2002–2012

	(1)	(2)	(3) Baseline equation	(4) Robustness check	(5)	(6)
					Alternative models	
	Panel individual and time-specific fixed-effects	Panel individual and time-specific fixed-effects	Panel individual-and time-specific fixed-effects	GMM Arellano-Bond one-step estimator	Panel individual-specific fixed-effects	Panel individual-specific fixed-effects
	Reduced static model: structural indicators only	Reduced static model: macroeconomic shocks only	Static model: baseline equation	Dynamic model	Static model: with alternative structural variables	Static model: with alternative structural variables; gap version
Unemployment (–1)				0.15 (0.17)		
Labour tax wedge	0.49 (0.17)***		0.35 (0.11)***	0.40 (0.18)**	0.26 (0.13)*	0.21 (0.11)*
Unemployment benefit ratio — 1st year of unemployment	–0.02(0.06)		–0.02 (0.05)	–0.02 (0.06)		
Net replacement ratio					–0.01 (0.10)	0.04 (0.08)
Active labour market policies	–4.92(2.58)*		–4.56 (2.30)*	–5.06 (2.33)**		
Active labour market policies (alt.)					–0.28 (0.09)***	–0.25 (0.06)***
Labour demand shock		–1.44 (0.18)***	–1.33 (0.20)***	–1.38 (0.32)***	–1.79 (0.34)***	
Productivity shock		–0.07(0.08)	–0.08(0.08)	–0.18 (0.08)**	–0.04 (0.08)	
Real interest rate shock		0.08 (0.03)**	0.09 (0.04)**	0.06 (0.03)*	0.08 (0.03)**	
Output gap						–0.38 (0.02)***
Trend					0.25 (0.13)**	0.26 (0.07)***
Fixed effects	yes	yes	yes	yes	yes	yes
Time effects	yes	yes	yes	yes	no	no
R-squared	0.84	0.89	0.92		0.84	0.91

Notes: *, **, ***statistically significant at the 10%, 5% and 1% levels respectively. Cross-section (PCSE) standard errors are used to control for panel heteroscedasticity. The necessity for individual specific fixed-effects and time-specific fixed-effects, if included, is tested with redundancy test in models (1)–(3). In baseline static models (1), (2) and (3) country specific trends for Poland, Slovakia and the Czech Republic are included in estimations. These trends account for country-specific unidentified shocks and are used for residual correction. In models (5) and (6) a linear trend has been added to the estimations. It captures common unobservable shocks for all countries with a similar pass through effect on unemployment rate (Orlandi 2012). For any interaction terms included, both variables are expressed as their deviations from country-specific sample means (Bassanini, Duval 2006; Nickell *et al.* 2002). In the difference GMM Arellano-Bond one step estimator procedure lagged endogenous variable in levels and all explanatory variables are used as instruments in estimation. Table 1 of the Appendix reports unit root test results for the variables.

Source: the author's calculations.

*The motivation for the choice of GMM is that simple panel individual and time-specific fixed-effect methods lead to inconsistent estimates when dynamic models with lagged dependent variable are considered. GMM estimation procedure solves these problems.

The main results are as follows. The effect of the labour tax wedge on unemployment varies around 0.4–0.5 as implied by estimates presented in columns (1)–(4) of Table 1, and the impact of this variable appears to be statistically significant. Such results support insights of economic theory about tax wedge resistance in CEE-10 economies; however, the source of resistance cannot be identified from these representations. Turning to spending on the active labour market policies, they also appear to have significant impact

on unemployment outcomes, in particular, by effectively reducing skill mismatch. The effect varies in the range of –4.6 and –5.1. The unemployment benefit ratio, on the contrary, does not seem to have any significant effect on incentives to work and the possible explanation for this might be relatively low benefit replacement ratios in economies under consideration. Out of institutional indicators, the dominant factor determining unemployment rates in CEE-10 economies appears to be the labour tax wedge. Active labour market policies, though in much smaller magnitude, are among key drivers behind unemployment.* Macroeconomic control variables, accounted by productivity, labour demand and real interest rate shocks, suggest that the overall economic conditions also matter in explaining evolution of unemployment rates. The most plausible conclusion with regard to significance of the real interest rate shock in estimations is that the effect of the real interest rate on capital accumulation is not limited to only the short-run; the effect might be protracted in time, having longer-lasting impact on demand for labour. On the contrary, the effect of productivity shock, even though non-robust, in many representations appears to be statistically insignificant.** This would point toward quickly adjusting expectations and wages in response to a decline in productivity growth under unfavourable economic conditions.*** An increase in labour demand exerts a strong positive impact on the unemployment rate in CEE-10 labour markets. This result thereby implies that an increase in the labour share, along with a decrease in the real interest rate, is among the key non-institutional factors that might bring unemployment rates down, though labour market institutions, in particular, the labour tax wedge, appear to outweigh considerably the impact of these shocks on unemployment. Finally, the inclusion of the lagged dependent variable alters the results from the baseline equation relatively little, as evidenced by the GMM estimates in column (4).

Alternative expressions of structural indicators, as reported by the estimates of columns (5)–(6) of Table 1, does affect the results of the baseline equation — but mainly the magnitude of the impact, not the significance of the estimated coefficients. In these models the impact of the tax wedge on the unemployment rate is considerably lower as compared to the results from the baseline equation, especially in the specification in which macroeconomic controls are replaced with the single output gap variable. The variable related to the active labour market policies, redefined as the public spending on ALMP per unemployed person as a share of GDP per capita, appears to have a significant positive impact on labour demand, similarly to the baseline equation. The net replacement rate appears to be statistically insignificant; these results are again in line with the estimates obtained by the baseline equation.

The effect of minimum wages on unemployment deserves a special note. The coefficient estimates of the baseline model augmented with the minimum wage seem to suggest that minimum wages do not have a significant impact on unemployment rates in CEE-10 economies. That is accounted by a statistically insignificant coefficient for the minimum wages in equations presented in columns (1) and (4) of Table 2. These findings might imply that a reasonable minimum to average wage ratio, the right timing for the minimum wage hikes or low coverage of the minimum wage earners can offer a possible explanation for the negligible effect of minimum wages on labour market outcomes. The current study does not provide empirical evidence in support of theoretical claims that in the presence of minimum wages the labour tax wedge ought to exhibit additional resistance. An estimation of model specifications with interaction between minimum wages and the labour tax wedge are presented in columns (2), (3) and (5) of the same table and show the insignificance of the estimated interaction term. Inclusion of the minimum wage and its interaction with the labour tax wedge in estimations does not provide any additional information on how the effect of the labour tax wedge on unemployment rate changes in the presence of minimum wages.

*The dominance is evaluated by calculating the product of each estimated coefficient from the regression and values of the relevant explanatory variable.

** Replacement of this variable with a change in the productivity growth or lagged value of its growth does not change the general conclusion.

***Some papers analysing wage rigidity based on the firm-level data, find evidence that it might be present in CEE-10 economies with certain types of labour market institutions (Babecky *et al.* 2009). These findings, however, do not relate wage rigidity to the productivity shock.

Table 2

Unemployment equation with minimum wages, 2002–2012

	(1)	(2)	(3)	(4)	(5)
	Panel individual and time-specific fixed-effects	Panel individual and time-specific fixed-effects	GMM Arellano-Bond one-step estimator	Panel individual-specific fixed-effects	Panel individual-specific fixed-effects
	Static model: with minimum wage	Static model: with minimum wage and its interaction with labour tax wedge	Dynamic model: with minimum wage and its interaction with labour tax wedge	Static model: gap version with minimum wage	Static model: gap version with minimum wage and its interaction with labour tax wedge
Unemployment rate (–1)			0.12 (0.14)		
Labour tax wedge	0.31 (0.10)***	0.30 (0.11)***	0.34 (0.19)*	0.20 (0.11)*	0.20 (0.11)*
Minimum wage	0.08 (0.06)	0.06 (0.08)	0.16 (0.12)	0.00 (0.05)	–0.04 (0.06)
Labour tax wedge* Minimum wage		–0.03 (0.04)	–0.05 (0.06)		–0.05 (0.06)
Unemployment benefit ratio — 1st year of unemployment	–0.02 (0.04)	–0.02 (0.04)	0.03 (0.06)		
Net replacement ratio				0.05 (0.09)	0.04 (0.09)
Active labour market policies	–4.82 (1.92)**	–4.99 (1.99)**	–5.89 (2.24)**		
Active labour market policies (alt.)				–0.25 (0.06) ***	–0.27 (0.06)***
Labour demand shock	–1.35(0.28)***	–1.36 (0.29)***	–1.50 (0.26)***		
Productivity shock	–0.07 (0.10)	–0.07 (0.10)	–0.10 (0.06)		
Real interest rate shock	0.08 (0.04)**	0.08 (0.04)**	0.03 (0.03)		
Output gap				–0.38 (0.03)***	–0.39 (0.03)***
Trend				0.26 (0.07)***	0.25 (0.07)***
Fixed effects	yes	yes	yes	yes	yes
Time effects	yes	yes	yes	no	no
R-squared	0.92	0.92		0.91	0.92

Notes: see notes for Table 1; in static models (1) and (2), the country specific trends for Poland, Slovakia and the Czech Republic are included in estimations.

Source: the author's calculations.

As opposed to the case of minimum wages, interactions between some other institutional variables appear to play an important role in explaining the evolution of unemployment rates. The results of the models with such interactions are presented in Table 3. In this table, column (1) presents results of the augmented equation where the labour tax wedge is interacted with active labour market policies. Column (2) reports results of the model where the unemployment benefit ratio for the first year of unemployment is replaced with two other structural labour market indicators — the net replacement ratio and the eligibility period to receive unemployment benefits, and these variables are interacted with each other. In column (3) an interdependence between active labour market policies and unemployment benefit ratio is tested.

The key conclusion from the results appearing in column (1) of Table 3 is that the interaction between the labour tax wedge and active labour market policies appears to play a role in labour market outcomes. The significant negative coefficient of the interaction term has an interpretation that as government spending on active labour market policies rises, the impact of the tax wedge on unemployment diminishes. Although it is usually considered that an increase in spending on active labour market policies is financed by taxes and, thereby, might lead to an increase in the tax wedge, the evidence found here does not support such claims. Results in this particular case point toward the conclusion that active labour market policies are effective and cause a decrease in

non-wage costs for employers. This in turn dampens the impact of higher tax wedge on demand for labour and unemployment originating from the tax wedge resistance.

Table 3

Unemployment equation with interactions, 2002–2012

	(1)	(2)	(3)
	Panel individual and time-specific fixed-effects	Panel individual and time-specific fixed-effects	Panel individual and time-specific fixed-effects
	Static model: with interaction between labour tax wedge and active labour market policies	Static model: with interaction between net replacement rate and unemployment benefit duration	Static model: with interaction between active labour market policies and unemployment benefit ratio
Labour tax wedge	0.28 (0.10)***	0.27 (0.12)**	0.29 (0.11)**
Unemployment benefit ratio — 1st year of unemployment	–0.01 (0.04)		–0.02 (0.05)
Net replacement ratio		–0.05 (0.11)	
Unemployment benefit duration		0.14 (0.17)	
Active labour market policies	–7.67 (3.27)***	–4.71 (2.30)**	–4.17 (2.34)*
Labour demand shock	–1.23 (0.20)***	–1.23 (0.20)***	–1.23 (0.20)***
Productivity shock	–0.07 (0.08)	–0.08 (0.07)	–0.08 (0.07)
Real interest rate shock	0.10 (0.04)***	0.08 (0.04)**	0.09 (0.04)**
Net replacement ratio* Unemployment benefit duration		0.04 (0.03)	
Labour tax wedge* Active labour market policies	–2.37 (1.27)**		
Active labour market policies* Unemployment benefit ratio — 1st year of unemployment			–0.09 (0.23)
Fixed effects	yes	yes	yes
Time effects	yes	yes	yes
R-squared	0.92	0.92	0.92

Notes: see note for Table 1; in static models (1), (2) and (3), the country specific trends for Poland, Slovakia, the Czech Republic as well as common trend for the Baltic States are included in estimations.

Source: the author's calculations.

Testing other hypotheses, model results do not provide evidence suggesting that the interactions between labour market structural indicators matter (see columns (2) and (3) in Table 3). The eligibility period to receive unemployment benefits along with its interaction with net replacement ratio does not appear to significantly affect unemployment. Although the signs of the estimated coefficients support the theoretical claim that a longer eligibility period to receive unemployment benefits might strengthen the negative impact of the net replacement ratio on unemployment outcomes, relatively low benefit replacement ratios in CEE-10 economies do not seem to have a significant impact on incentives to work. Higher spending on active labour market policies theoretically might reduce the adverse impact of the unemployment benefit ratio on unemployment by making job taking more attractive but the empirical results show no significant impact, again possibly due to relatively low benefit replacement.

Limited time series data on the variables representing union density, index representing coordination in wage setting process and on the EPL index was the main reason that these variables did not appear in the baseline model. Their effects on unemployment are tested in additional representations. Estimation results are presented in Table 4, but small-sample results should be treated with caution. Column (1) in Table 4 presents the results of the impact of employment protection legislation on unemployment. Column (2) reports estimates with the variable representing the level of unionisation in economies.

In column (3), in addition to union density, the index representing coordination in the wage bargaining process along with the interaction between these two terms appears in the estimations. Finally, column (4) reports results from the equation where union density is interacted with the labour tax wedge.

The evidence that employment protection legislation has an impact on unemployment in CEE-10 economies is not found in this study. This model, however, lacks stability and does not perform well as it is estimated on a greatly reduced sample.

Table 4

Unemployment equation with EPL and union density, 2002–2012

	(1)	(2)	(3)	(4)
	Panel individual and time-specific fixed-effects	Panel individual and time-specific fixed-effects	Panel individual and time-specific fixed-effects	Panel individual and time-specific fixed-effects
	Static model: with EPL and interaction between EPL parts	Static model: with union density	Static model: with union density, coordination and their interaction	Static model: with union density and interaction with labour tax wedge
Labour tax wedge	0.26 (0.09)***	0.37 (0.10)***	0.27 (0.10)**	0.36 (0.14)**
Unemployment benefit ratio — 1st year of unemployment	0.02 (0.05)	– 0.06 (0.06)	0.01 (0.06)	–0.05 (0.07)
Active labour market policies	–4.95 (2.17)**	–6.43 (4.68)**	–4.61 (2.70)	–6.51 (3.07)**
Union density		0.28 (0.12)***	0.27 (0.08)***	0.28 (0.09)***
Coordination			–0.57 (0.32)*	
Union density* Coordination			–0.30 (0.10)***	
EPRC	–0.38 (1.94)			
EPT	–0.60 (2.74)			
EPRC* EPT	–16.50 (10.35)			
Union density* Labour tax wedge				0.00 (0.05)
Labour demand shock	–2.26(0.31)***	–0.86 (0.23)***	–0.86 (0.13)***	–0.85 (0.14)***
Productivity shock	0.00 (0.06)	–0.03 (0.07)	–0.02 (0.05)	–0.03 (0.06)
Real interest rate shock	0.03 (0.02)*	0.05 (0.04)**	0.05 (0.02)**	0.05 (0.03)*
Fixed effects	yes	yes	yes	yes
Time effects	yes	yes	yes	yes
R-squared	0.98	0.98	0.98	0.98

Notes: see note for Table 1; in models (2), (3) and (4), the country specific trends for Poland, Slovakia, the Czech Republic as well as common trend for the Baltic States are included in estimations; in model (1) country specific trend for the Czech Republic and common trend for the Baltic States are included in estimations.

Source: the author's calculations.

In contrast, inclusion of the variable representing union density suggests the effect of the level of unionisation on labour market outcomes is significant and varies around 0.27–0.28 in all specifications. That implies that higher union coverage should be usually associated with higher unemployment rates. Although results in column (3) show that higher coordination in the wage bargaining process has positive effects on employment; this effect is captured by the negative sign of the index representing coordination in the wage bargaining process. The interaction term between these two indicators also appears to be negative, indicating that the effect of union density on unemployment weakens if higher coordination in the wage bargaining process is present. All these results are in line with the economic theory and do not contradict the findings that productivity shock appears to have no significant impact on unemployment in CEE-10 economies. Even in the presence of trade unions, slowdown in productivity growth could be accompanied by quick wage adjustment to the new economic environment. Also, in the CEE-10 economies in which the level of unionisation is high, union density, together with the labour wedge,

appears to be among the dominant factors in determining unemployment rates. Lastly, no evidence is found that union density causes the tax wedge rigidity, as indicated by an insignificant coefficient of the interaction term between union density and the labour tax wedge. These results are somewhat disappointing, as no additional insights could be provided in this study about the source of labour tax wedge resistance.*

*Although one of the possible explanations to the tax wedge rigidity could be the strong individual bargaining power of employees.

4.2. Case study: identifying Lithuania — results from the reduced equations

A special section is given to one of the CEE-10 economies, namely, Lithuania. In particular, it is aimed to evaluate if there is any significant difference in the institutional factors affecting the unemployment rate in Lithuania and the rest of the CEE-10 economies. In order to test for this, reduced static models are estimated. Here the unemployment rate is regressed on the single labour market structural indicator with slope dummy variables.** The results of the reduced static equations are reported in Table 5. The general conclusion is that the same structural indicators explain the evolution of the unemployment rate in Lithuania as in the remaining economies. In addition, no structural indicators display any systematic difference in this country compared to the rest of the country set.***

**More specifically, the regressions take form of

$$u_{it} = \beta_j X_{it}^j D^{Lithuania} + \beta_j X_{it}^j D^{Others} + \\ + \sum_j \chi_j Z_{it}^j + \alpha_i + \lambda_t + \varepsilon_{it},$$

where $D^{Lithuania}$ is equal to 1 for Lithuania and 0 otherwise and D^{Others} is equal to 0 for the Lithuania and 1 otherwise.

***If there are differences in the magnitudes of the estimates is tested with Wald test.

Table 5

Unemployment equation, 2002–2012

	(1)	(2)	(3)	(4)
	Panel individual and time-specific fixed-effects	Panel individual and time-specific fixed-effects	Panel individual and time-specific fixed-effects	Panel individual and time-specific fixed-effects
	Reduced static model: with labour tax wedge only	Reduced static model: with net replacement rate only	Reduced static model: with active labour market policies (alt) only	Reduced static model: minimum wages only
Labour tax wedge* Lithuania	0.44 (0.20)**			
Labour tax wedge* Others	0.21 (0.09)**			
Net replacement rate* Lithuania		0.06 (0.07)		
Net replacement rate* Others		0.51 (0.33)		
Active labour market policies (alt.)* Lithuania			–0.21 (0.08)***	
Active labour market policies (alt.)* Others			–0.25 (0.10)***	
Minimum wage* Lithuania				0.09 (0.21)
Minimum wage* Others				0.09 (0.06)
Labour demand shock	–1.43 (0.15) ***	–1.34 (0.20) ***	–1.46 (0.25) ***	–1.38 (0.26)***
Productivity shock	–0.06 (0.07)	–0.06 (0.08)	– 0.08 (0.11)	–0.07 (0.10)
Real interest rate shock	0.08 (0.03)**	0.08 (0.03)**	0.04 (0.03)	0.06 (0.04)*
Fixed effects	yes	yes	yes	yes
Time effects	yes	yes	yes	yes
R-squared	0.90	0.93	0.90	0.89

Notes: see notes for Table 1; in models (1)–(4), the country specific trends for Poland, Slovakia and the Czech Republic are included in estimations.

Source: the author's calculations.

4.3. Comparison of results to the other studies

In this section, the results of this study for CEE-10 economies are compared to the results obtained by Orlandi (2012) that investigated unemployment problems in EU-13 Member States and Bassanini and Duval (2006) that focused on OECD-21 country set (see Table 6). These particular studies employ the same estimation techniques and most of labour market structural indicators for CEE-10 are defined identically as in these studies.****

****Even though the study of EU-13 Member States evaluates the determinants of NAWRU in the baseline equation, the model used for robustness check reports results on the actual unemployment rate.

Table 6

Comparing results with studies for EU-13 and OECD-21 countries

	Results of this study	Orlandi (2012)	Bassanini, Duval (2006)
	Method: panel individual and time-specific fixed-effects	Method: panel individual and time-specific fixed-effects	Method: panel individual and time-specific fixed-effects
	Sample: CEE-10	Sample: EU-13	Sample: OECD-21
	All coefficients from the baseline equation		
Labour tax wedge	0.35 to 0.49 (*)	0.26 to 0.33 (*)	0.25 (*)
Total tax wedge	#NA	#NA	0.15 to 0.31 (*)
Unemployment benefit ratio — 1st year of unemployment	–0.02	#NA	0.09
Net replacement ratio	–0.01 to 0.04	0.02 to –0.10 (*)	0.04 to 0.13 (*)
Active labour market policies	–5.06 to –4.56 (*)	#NA	#NA
Active labour market policies (alt.)	–0.25 to –0.28 (*)	–0.06 to –0.04 (*)	–0.03 (*)
Union density (**)	0.26 to –0.28 (*)	0.09 to 0.13 (*)	0.06 (*)

Note: *denotes significant coefficients and **denotes alternative, not baseline, model results.

Source: the author's calculations.

The estimates obtained by this study appear to be qualitatively similar to the results of the other studies, though the majority of labour market structural indicators tend to have a higher impact on unemployment in CEE-10 economies. The impact of the labour tax wedge on the unemployment rate is slightly higher in CEE-10 economies than in EU-13 and OECD-21 countries. By contrast, estimates on the active labour market policies and union coverage show that these variables have a much greater effect on demand for labour in CEE-10 economies. However, as CEE-10 countries generally exhibit higher level of the long-run and annual unemployment rates as well as higher overall volatility of economic activity, these results seem plausible. With regard to the unemployment benefit ratio, it appears to be an important determinant of unemployment in EU-13 and OECD-21 countries, but not in CEE-10 economies. The reasons behind this could relate, as was already noted, to relatively low unemployment benefit ratios and less generous unemployment benefit systems in CEE-10 countries.

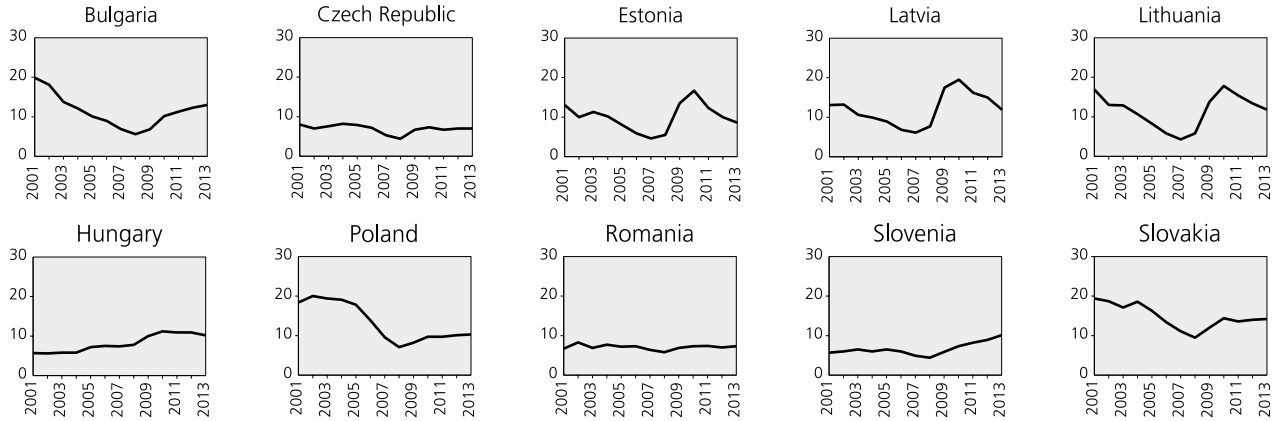
Conclusions

This paper provided evidence that labour market institutions matter in explaining unemployment rates in the set of the CEE economies. These results are of importance from the policy perspective, namely, in the context of policy aims to bring down the unemployment levels in these countries.

This empirical study confirmed that a reduction in the labour tax wedge and an increase in spending on labour market policies have significant positive effects on labour market outcomes. On the other hand, the empirical analysis did not provide evidence that the unemployment benefit ratios should have an impact on unemployment. From the policy making perspective, this would suggest that policies to keep relatively low unemployment benefit ratios (along with the short eligibility period to receive benefits) should be preserved to avoid providing disincentives for job taking and exerting upward pressure on wage claims. The adverse effect of the union power on employment could be considerably reduced by the increase in the degree of coordination in the wage bargaining process. More generally, complementary use of labour market policies is advisable to offset the adverse impact of institutional factors on unemployment rates. Macroeconomic shocks also are found to play an important role in explaining unemployment outcomes.

In general, the main policy implication from this study is that an increase in the overall labour market flexibility is required to bring unemployment rates down as it would allow quicker adjustment of the CEE-10 labour markets to unfavourable changes in economic environment.

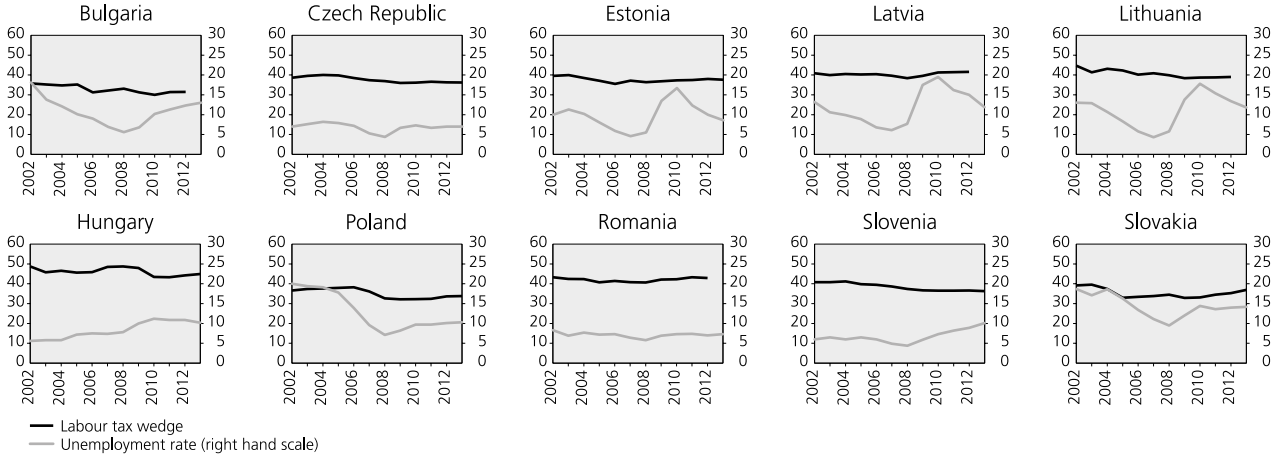
Fig. 1. Annual unemployment rates across CEE-10 countries, 2002–2013⁺



Note: ⁺*measured* as a share of unemployed to the labour force, in per cent.

Source: Eurostat (2014).

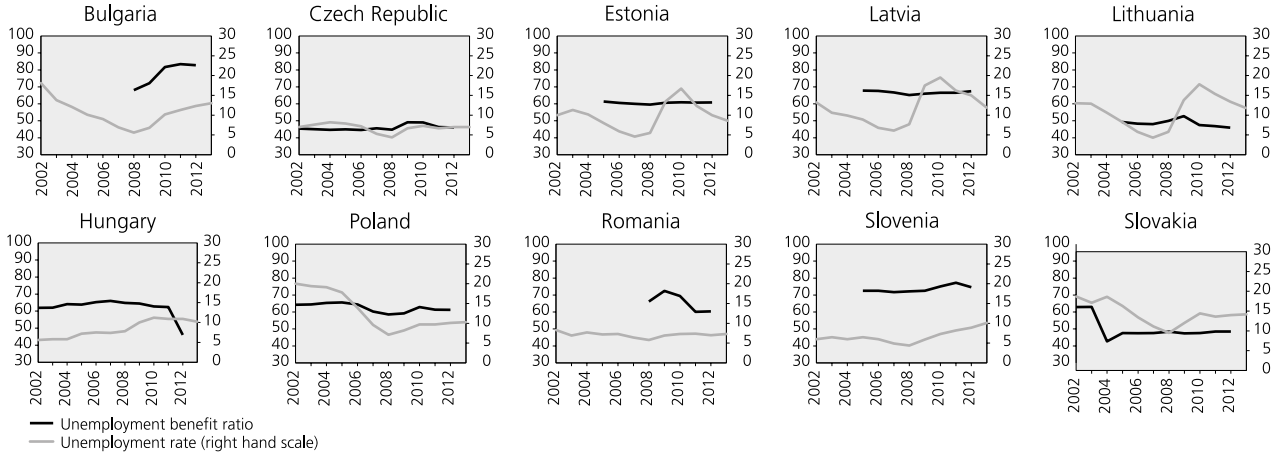
Fig. 2. Labour tax wedge and unemployment rate across CEE-10 countries, 2002–2013⁺



Note: ⁺labour tax wedge is measured as a ratio between the sum of labour taxes and total labour costs, in per cent.

Sources: Eurostat (2014), European Commission (2014).

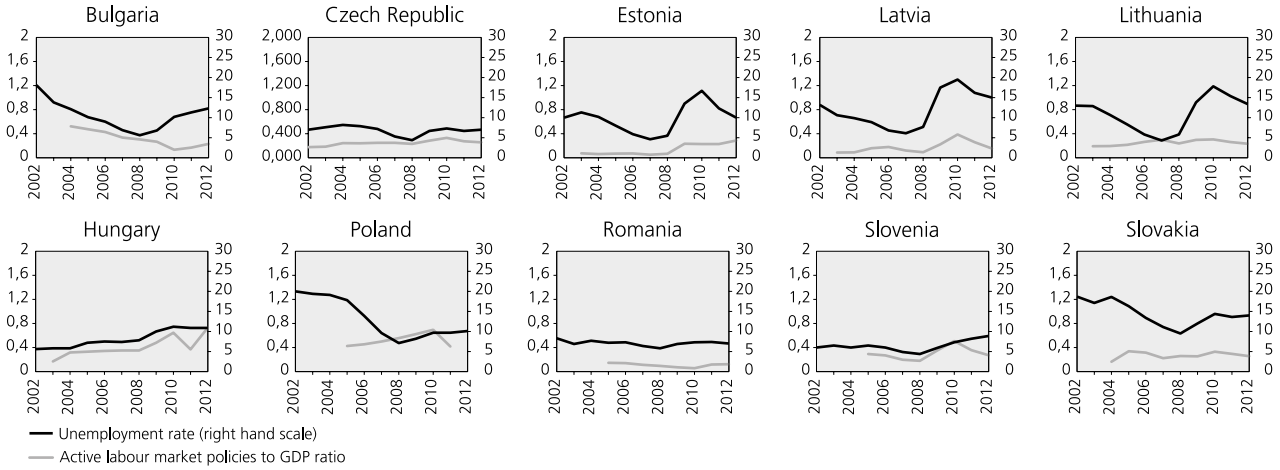
Fig. 3. Unemployment benefit ratio – 1st year of unemployment and unemployment rate across CEE-10 countries, 2002–2012⁺



Note: ⁺unemployment benefit ratio — 1st year of unemployment is measured as share of unemployment insurance benefit to previous total gross earnings, in per cent.

Sources: Eurostat (2014), European Commission (2014).

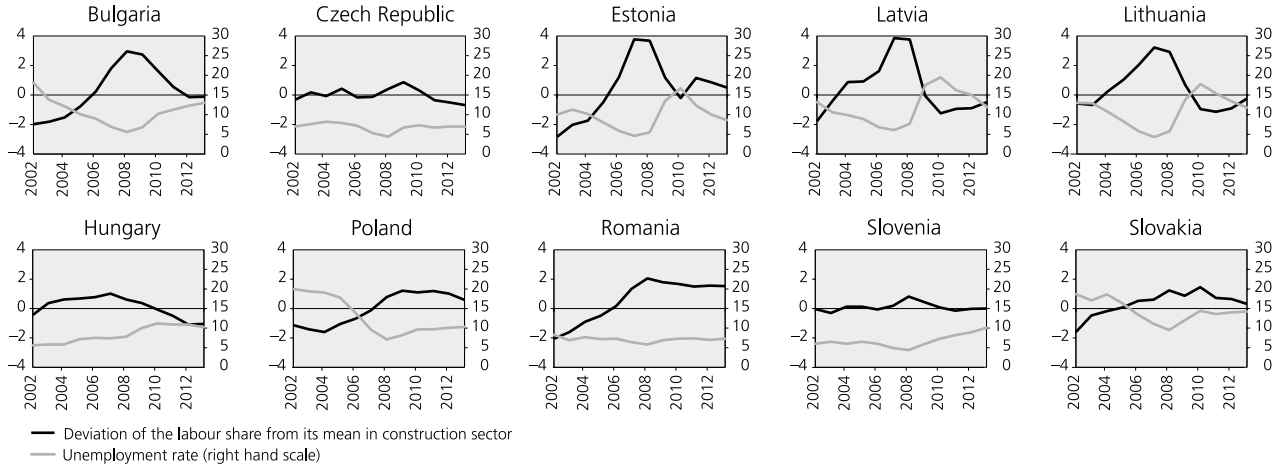
Fig. 4. Active labour market policies to GDP ratio and unemployment rate across CEE-10 countries, 2002–2012⁺



Note: ⁺active labour market policies to GDP ratio is measured as public expenditure aggregate on active labour market program as a share of GDP, in per cent.

Source: Eurostat (2014).

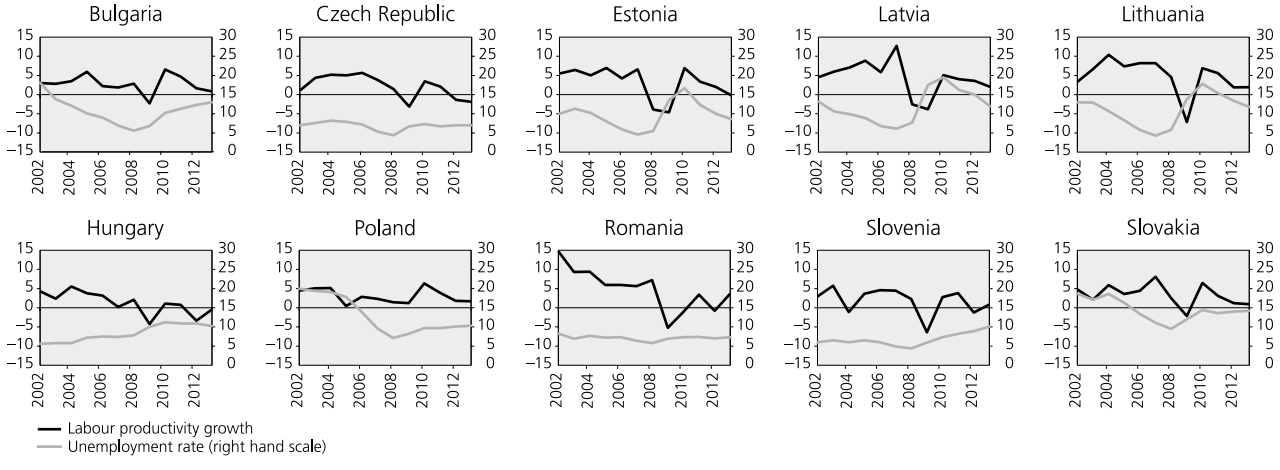
Fig 5. Deviation from the mean for the employment share in the construction and unemployment rate across CEE-10 countries, 2002–2013⁺



Note: ⁺deviation from the mean for the employment share in the construction is measured as a ratio of employees in construction sector to the total employees in economy, deviation from the mean, in per cent.

Source: Eurostat (2014).

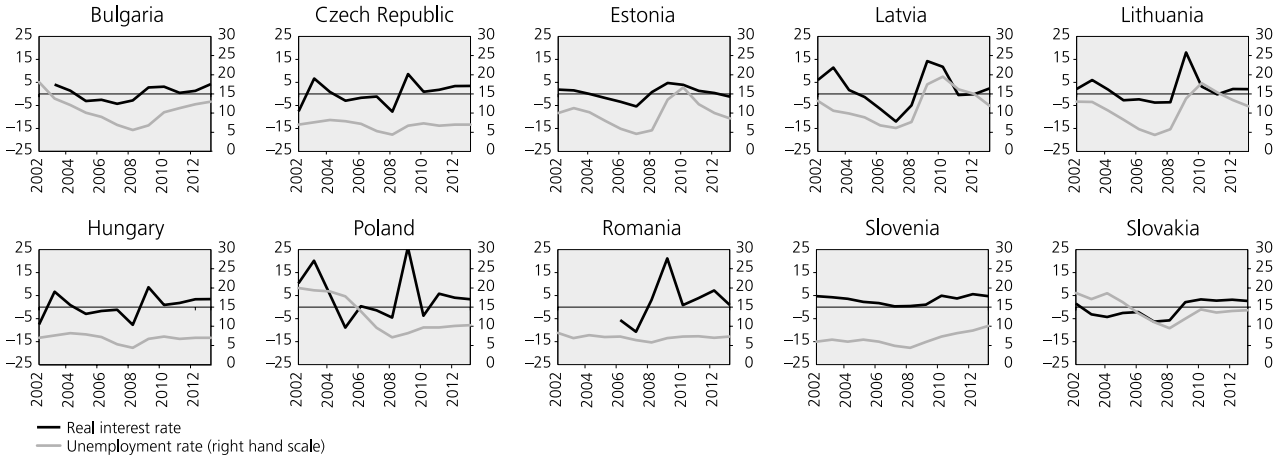
Fig. 6. Labour productivity growth and unemployment rate across CEE-10 countries, 2002–2013⁺



Note: ⁺labour productivity growth is measured as annual growth in labour productivity, in per cent.

Source: Eurostat (2014).

Fig. 7. Real interest rates and unemployment rate across CEE-10 countries, 2002–2013⁺



Note: ⁺real interest rates are measured as the difference between nominal long-term government bond yield and annual change in GDP deflator, in per cent.

Sources: Eurostat (2014), Bank of Estonia (2014).

Table 1

Unit root test results, 2002–2012⁺

	Levin, Lin and Chu (common unit root)	Im, Pesaran and Shin (individual unit roots)
Unemployment rate	–2.91*	–0.83
Labour tax wedge	–3.09*	–0.56
Unemployment benefit ratio — 1st year of unemployment	–34.64*	–7.61*
Active labour market policies to GDP ratio	–3.64*	–1.07
Deviation from the mean for the employment share in the construction	–3.97*	–1.65*
Labour productivity growth	–4.48*	–1.40*
Real interest rate	–4.83*	–1.85*

Notes: ⁺numbers denotes statistics for unit root tests; * denotes rejection of the null hypothesis at the 10% significance level. Even though some tests fail to reject the null hypothesis of the unit root, these results are disregarded as these variables are stationary by construction.

Source: the author's calculations.

Table 2

Descriptive statistics for unemployment and selected indicators, 2002–2012[+]

per cent

	Mean	Standart deviation	Minimum	Maximum	Mean	Standart deviation	Minimum	Maximum
	Unemployment rate				Labour tax wedge			
Bulgaria	10.56	3.58	5.60	18.10	32.87	2.02	29.99	35.72
Czech Republic	6.85	1.11	4.40	8.20	37.80	1.55	35.98	40.05
Estonia	9.82	3.66	4.60	16.70	37.59	1.32	35.49	39.96
Latvia	11.95	4.59	6.10	19.50	40.35	0.94	38.42	41.59
Lithuania	11.02	4.39	4.30	17.80	40.66	2.04	38.40	44.71
Hungary	8.19	2.18	5.60	11.20	46.25	2.05	43.28	48.77
Poland	13.15	5.00	7.10	20.00	35.19	2.54	32.18	38.26
Romania	7.11	0.65	5.80	8.30	42.03	0.99	40.61	43.29
Slovenia	6.42	1.32	4.40	8.90	38.59	1.91	36.49	41.23
Slovakia	14.43	2.99	9.50	18.70	35.14	2.46	32.86	39.57
Pooled sample	9.95	4.12	4.30	20.00	38.65	4.11	29.99	48.77
	Unemployment benefit ratio — 1st year of unemployment				Active labour market policies to GDP ratio			
Bulgaria	77.63	7.02	68.10	83.43	0.32	0.13	0.13	0.52
Czech Republic	45.97	1.64	44.62	49.12	0.25	0.04	0.18	0.33
Estonia	60.56	0.56	59.53	61.37	0.14	0.09	0.05	0.29
Latvia	66.74	0.87	65.22	67.82	0.18	0.09	0.09	0.39
Lithuania	48.58	2.11	45.93	52.72	0.25	0.04	0.19	0.31
Hungary	62.16	5.49	46.10	66.02	0.41	0.17	0.17	0.73
Poland	62.53	2.51	58.53	65.6	0.52	0.11	0.42	0.69
Romania	65.69	5.47	60.07	72.43	0.11	0.03	0.06	0.15
Slovenia	73.54	1.90	71.68	77.23	0.30	0.10	0.18	0.51
Slovakia	47.90	0.48	47.45	48.48	0.28	0.04	0.22	0.34
Pooled sample	59.77	10.37	42.70	83.43	0.27	0.15	0.05	0.73
	Labour productivity growth				Real interest rate			
Bulgaria	2.99	2.37	–2.29	6.56	0.05	2.98	–4.27	4.06
Czech Republic	2.51	2.83	–3.14	5.67	0.11	5.16	–7.73	8.64
Estonia	3.50	4.15	–4.63	6.95	0.37	3.00	–5.46	4.76
Latvia	4.67	4.66	–3.82	12.72	1.81	8.32	–11.97	14.30
Lithuania	5.08	4.71	–7.16	10.38	1.90	6.21	–3.73	18.01
Hungary	1.42	3.04	–4.25	5.56	4.38	6.51	–6.47	17.46
Poland	3.19	1.92	0.45	6.36	4.90	10.62	–8.90	26.03
Romania	4.95	5.63	–5.24	14.70	2.86	10.14	–10.73	21.20
Slovenia	1.95	3.53	–6.40	5.75	2.99	1.89	0.32	5.60
Slovakia	3.64	2.80	–2.17	8.09	–1.00	3.70	–6.29	3.35
Pooled sample	3.39	3.77	–7.16	14.70	1.81	6.38	–11.97	26.03

Note: [+]descriptive statistics for labour demand shock is not reported here. This variable per definition has a zero mean.

Source: the author's calculations.

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Santrauka

NEDARBĄ VIDURIO IR RYTŲ EUROPOS ŠALYSE LEMIANTYS VEIKSNIAI

Jurgita Pesliakaitė

Straipsnyje nagrinėjami nedarbą Vidurio ir Rytų Europos (VRE) šalyse ilguoju laikotarpiu lemiantys veiksniai. Analizė apima 2002–2012 m. laikotarpį, jai pasirenkamos dešimt VRE šalių, būtent Bulgarija, Čekija, Estija, Latvija, Lietuva, Vengrija, Lenkija, Rumunija, Slovėnija ir Slovakija. Dėmesio skiriama Lietuvai: nedarbo lygį Lietuvoje lemiančius veiksnius lyginant su kitose devyniose VRE šalyse nedarbo lygį lemiančiais veiksniais, siekiama išsiaiškinti tiek veiksnių skirtumus, tiek tuos skirtumus galinčias paaiškinti priežastis.

Šalių atranką lemia tai, kad visų dešimties VRE šalių ekonominė raida jau nuo XX a. paskutinio dešimtmečio pasižymi panašumais ir visos jos yra naujosios Europos Sąjungos (ES) narės. Svarbi paskata yra ir tai, kad šioms šalims dažnai būdingas aukštas nedarbo lygis, paprastai aukštesnis už nedarbo lygį kitose ES ar Ekonominio bendradarbiavimo ir plėtros organizacijos šalyse.

Atlikus ekonometrinę analizę nustatoma, kad tiesioginę įtaką nedarbo lygiui VRE šalyse turi darbo rinkos institucinė struktūra. Ji lemia darbo rinkos nelankstumą. Teigiamą įtaką darbo rinkai turi darbo mokesčių pleišto mažinimas ir išlaidų aktyviosios darbo rinkos priemonėms didinimas. Kita vertus, didelio nedarbo išmokų poveikio nedarbui nenustatyta. Tai būtų nuoroda, kad darbo rinkos politiką reikėtų rinktis tokią, kuria būtų palaikomas žemas nedarbo išmokų lygis ir taip apsisaugoma tiek nuo paskatų nedirbti, tiek nuo spaudimo darbo užmokesčiui. Neigiama profsąjungų įtaka nedarbui gerokai sumažėtų pagerinus koordinavimo derantis dėl darbo užmokesčio procesą. Apibendrinant galima pasakyti, kad viena kitą papildančių darbo rinkos politikos priemonių taikymas gali atsverti neigiamą institucinio pobūdžio veiksnių įtaką nedarbo lygiui. Svarbus vaidmuo lemiant nedarbo lygio rodiklius tenka ir makroekonominiams šokams, būtent darbo paklausos šokui ir ilgalaikių palūkanų normų šokui.

Pagrindinė darbo išvada yra tai, kad nedarbo lygį VRE šalyse sumažintų darbo rinkos lankstumo didinimas – tai leistų darbo rinkoms greičiau prisitaikyti prie nepalankių ekonominės aplinkos pokyčių.