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Alka Obadić

Vladimir Arčabić

Lucija Rogić Dumančić

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ZAGREBU



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Alka Obadić

Faculty of Economics and Business, University of Zagreb
J. F. Kennedy Square 6, 10000 Zagreb, Croatia
aobadic@efzg.hr

Vladimir Arčabić

Faculty of Economics and Business, University of Zagreb
J. F. Kennedy Square 6, 10000 Zagreb, Croatia
varcabic@efzg.hr

Lucija Rogić Dumančić

Faculty of Economics and Business, University of Zagreb
J. F. Kennedy Square 6, 10000 Zagreb, Croatia
lrogic@efzg.hr

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Abstract

This paper analyzes labor market institutions convergence in the European Union (EU) to test for economic integration of the EU countries. The convergence is analyzed for five indicators of labor market institutions: employment protection legislation index (EPL), tax wedge, unemployment benefits, active labor market policies, and minimum wages. Convergence is measured using standard beta and sigma convergence complemented with a more sophisticated and more flexible approach of the log-t regression. Annual data for the EU countries from 1993 to 2018 is considered, depending on availability. The results suggest there is no convergence in labor market institutions between EU member states. The differences between institutions are still substantial, and the labor market institutions are changing too slowly to converge. The empirical analysis also considers a possibility of club convergence, differentiating between endogenous clubs based on clustering algorithm and exogenous clubs based on geographical proximity and labor market similarities. Convergence is present only in endogenous clubs. Such results imply different long-run steady states where the differences between countries may be substantial. Since labor market institutions are fundamental determinants of employment and unemployment, differences found in labor market institutions suggest that levels of employment and unemployment in the EU will hardly converge, implying weak labor market integration

Key words

labor market, institutions, convergence, club convergence, clustering algorithm

JEL classification

C33, E02, E24, F45, O52

1. Introduction

A common conclusion by economic analysts and international organizations such as the European Commission, the OECD, and the IMF is that the main cause of high unemployment during the 21st century in developed European countries is due to labor market institutions.

This paper analyzes labor market integration within the European Union. Given the importance of the labor market institutions on the overall labor market outcomes, the paper analyzes the convergence of the labor market institutions. We also consider convergence clubs, allowing for the possibility that groups of countries converge to different steady states. The convergence of labor market institutions would imply that labor markets of the EU member states are approaching the common steady state, thus being integrated. On the other hand, convergence clubs or lack of convergence would suggest weak labor market integration. In that case, labor market outcomes such as employment and unemployment rates may substantially differ between the EU member states. In the long run, they could even move further away.

We consider five different labor market institution indicators over the period from 1993 to 2018. They are employment protection legislation index (EPL), tax wedge, unemployment benefits, active labor market policies, and minimum wages. They cover the most important properties of labor markets, such as labor market rigidity, different employment policy measures as well as labor taxation. Labor market institutions have become extremely important during the COVID-19 crisis. To control the spreading of the virus, the European governments introduced various restrictions and temporarily closed many businesses. On the other hand, to reimburse the workers and owners of the affected businesses, the governments extensively used labor market institutions and policies. This is in line with the “act fast and do whatever it takes” prescription by the leading economists (Baldwin and Weder di Mauro, 2020).

Prominent multi-national institutions began to aggressively promote the need for large-scale labor market deregulation in the early 1990s, most notably in the OECD’s (1994) massive Jobs Study and in the IMF’s (2003) Unemployment and Labor Market Institutions: Why Reforms Pay Off. They have argued that these institutions have created rigidities that account for the relatively slow employment growth and persistently high unemployment experienced by much of the developed world over the last two decades (Baker et al., 2004, p. 1). Most of the studies suggest that institutional rigidities are indeed responsible for the poor performance of labor markets (Lehmann, Muravyev, 2012, p. 237). The new orthodoxy (Freeman, 2005) makes the deregulation of labor market institutions accompanied by high employment and wage flexibility the keys to economic success. Freeman (2005) stresses four recommendations for labor market deregulation: increased flexibility of working time; making wage and labor costs more flexible by removing restrictions; reforming employment security provisions, and reforming unemployment and related benefit systems (Freeman, 2005, p. 131). Therefore, countries with high unemployment have been repeatedly told that they must undertake comprehensive structural reforms to reduce “labor market rigidities”, such as generous unemployment benefit systems, too strong unions, high employment protection (for example, high redundancy costs), high minimum wages, non-competitive mechanism of wage settings, or serious tax distortions.

Given that labor markets operate in conditions of market imperfection, they require certain actions of institutions and an appropriate mix of different regulations, taxes, or subsidies that affect the relationship between workers and employers. Some of the so-called rigidities may represent rough institutional corrections for other distortions in the labor market. Some institutions may be bad for productivity, output, and welfare, but may not lead to an increase in unemployment (Blanchard, Wolfers, 2000, p. 12). Therefore, there is a broad consensus that the introduction of appropriate “rigidities” is desirable. The question is what the „appropriate“ institutions are or how much rigidity is desirable? What are the consequences of deficient institutions, and what are the gains from their repair? The IMF research has shown that well-designed labor market reforms can lead to an increase in output of about 5% and a drop in the unemployment rate of about 3 percentage points (IMF, 2003, p. 129). In doing so, reforms must be comprehensive because partial reforms may be less effective, especially if the labor market is uncompetitive. Therefore, it is very important to explore the relationship between labor market institutions and labor market performance in terms of employment and unemployment.

Individual institutions in the labor market usually do not act autonomously. Their impact on employment, unemployment, wages, and productivity mainly interacts with other labor market institutions. Often one institution is introduced in order to cancel some undesirable effects of another institution. For example, active labor market policy measures have been introduced to reduce the disincentive or sometimes discriminatory effects associated with the introduction of unemployment benefits. Occasionally it is optimal to do the above because different instruments are needed to achieve different goals

This paper contributes to the literature by analyzing the convergence of labor market institutions in the EU. The convergence of labor market institutions would imply they are becoming more integrated. That would be a step forward to labor market integration in the EU as well. We analyze the convergence of five labor market institutions indicators using different convergence test. Besides commonly used beta and sigma convergence, we also test the convergence using a more sophisticated and more flexible approach proposed by Phillips and Sul (2007, 2009) based on the log-t regression. It fixes problems with the traditional beta and sigma convergence tests that may be biased and have low power, as shown in Bernard and Durlauf (1995, 1996). However, the results of different convergence tests are robust in our case, showing no absolute or conditional convergence in labor market institutions. We also analyze different convergence clubs, which are endogenously determined by the clustering algorithm of Phillips and Sul (2007, 2009), or exogenously determined by geographical proximity and labor market similarities. Club convergence is of special importance, as it suggests that groups of countries converge to different steady-state, implying weak labor market integration.

The main results can be summarized as follows. We do not find firm evidence of convergence in labor market institutions. The results are robust when we look for absolute and conditional convergence, and results are robust to different methodologies. The main conclusion of this part of the analysis is that labor market institutions do not converge within the European Union. The differences between institutions are still significant, and they slow down the labor market institution convergence and integration.

Results regarding club convergence show that countries converge to different endogenously determined clubs. The number of clubs depends on the labor market institutions indicator. There are two convergence clubs in minimum wages, three in employment protection legislation and tax wedge, and four and five clubs in active and passive labor market policies, respectively. Convergence clubs are heterogeneous, and countries in clubs do not share common geographical, political, or development similarities as commonly expected. For comparison, we group countries into intuitive (exogenous) clubs, Mediterranean, Continental, Scandinavian, Anglo-Saxon and Eastern. The results of the log-t regression firmly reject convergence for all clubs except the Mediterranean (in case of tax wedge and minimum wages) and Anglo-Saxon (in case of EPL index and tax wedge). It suggests that convergence clubs indeed exist, but they are not as intuitive as expected. Since labor market institutions are fundamental determinants of employment and unemployment, differences we find in labor market institutions suggest that levels of employment and unemployment in the EU will hardly converge, implying weak labor market integration.

The paper is structured as follows. Section two reviews results from the theoretical and empirical literature on the convergence of labor market variables and explains the importance of several labor market institutions. Section three describes data and methodology. Section four presents the main results, while section five concludes.

2. Literature review

The literature review is organized into two parts. First, we focus on the convergence of different macroeconomic variables. The existing literature focused mainly on the analysis of economic growth, prices, production, productivity, and unemployment. As this literature review shows, the existing literature has not analyzed the convergence of the labor market institutions in the EU countries in a way that consistently connects it with the problems of deeper integration of the labor markets. This paper bridges that literature gap. The second part concentrates on labor market institutions in the EU and their rigidities in order to address their connection with labor market performance.

2.1. Convergence in the EU

Economic convergence has been at the center of research for many years, especially within the European Union, where convergence among the Member States is a fundamental precondition for the European Union integration. When analyzing the convergence, the existing literature focuses mostly on per capita income or other related income or productivity measures (Carvalho and Harvey, 2005; Pesaran, 2007; Simionescu, 2015). However, this concept can be applied to other labor market indicators and other markets as such.

After the financial crisis, the labor market, as the prevailing adjustment mechanism, was recognized as the reason for the EU not functioning as the optimal currency area (Eichhorst et al., 2010). Namely, labor mobility requires that job seekers move to other countries and provide labor market long-run adjustment. This should ensure convergence of unemployment rates within the EU (Blanchard and Katz, 1992). However, a return to the natural level of unemployment did not occur (European Commission, 2015). Therefore, in this paper, we put the focus on the role of labor markets in further EU integration and concentrate on labor market institutions convergence, an issue that has not been tackled in the existing literature.

Johnson and Papageorgiou (2018) emphasized the importance of the political implications of convergence. Namely, only under the assumption of the existence of a single steady-state, small-scale interventions can be useful in accelerating the catching-up of poorer countries and moving from one group of convergence to another. If there are multiple steady states, then extensive political interventions are needed.

The literature has analyzed convergence using different macroeconomic indicators. Dvoroková (2014) analyses the impact of the financial crisis on the real convergence among the EU member states and highlights that the process of economic convergence has been undoubtedly marked by the financial crisis. For such assessment, concepts of beta and sigma convergence are applied. Results show that in the period 2001-2012, beta-convergence between the EU Member States can be confirmed. In other words, initially poorer countries showed a higher average rate of economic growth than initially richer states. The author highlights that this fact demonstrates the high economic growth in Latvia, Lithuania, Bulgaria, and Romania. On the other hand, a weak economic growth rate was typical for Portugal, Ireland, Italy, Greece, and Spain. Finally, the author concludes that thanks to the economic development, beta convergence among EU countries occurred.

On the other hand, Estrada, Galí, and López-Salido (2013) examined the patterns of convergence and divergence in unemployment rates, inflation, relative prices, and current account balances among euro area countries. Authors report that the first nine years of EMU were associated with a strong converge in unemployment rates across euro area countries. However, this process was interrupted and reversed during the crisis. Authors also highlight that during the last recession, the EMU has not prevented a large surge in the dispersion of unemployment rates within the euro area. Also, such an increase in dispersion was much larger across the EA countries than for non-EA countries. Authors identify three possible reasons for factors behind those large differences in unemployment rates: common currency, lack of country-specific monetary policies, or stabilizing risk-sharing devices to accommodate country-specific shocks.

Similarly, Raguž Krištić, Rogić Dumančić, and Arčabić (2019) analyze unemployment rates in the euro area (EA) countries to test for EA-related benefits and economic integration of the EA in the form of lower unemployment rates and unemployment rates convergence. The results imply a certain degree of unemployment hysteresis in the EA and support the stochastic convergence of the majority of EA countries. However, results imply that EA membership is not a sufficient condition for stochastic convergence. Authors conclude that although providing initial benefits, EA is not functioning as an optimal currency area. Related to these findings, this paper shows that differences between unemployment and employment rates in EU member states arise from a lack of convergence in labor market institutions among EU countries, which makes further economic integration difficult.

Unemployment rates are also analyzed in Bayer and Juessen (2007). Authors test the convergence hypothesis of regional unemployment rates in Germany. The results of univariate tests suggest that changes in regional unemployment differences are persistent in Germany. However, more powerful panel tests imply that regional unemployment rates converge. Authors argue that such tests identify a moderate speed of convergence at best. Because of a structural break followed by the second oil crisis, authors use tests that allow such a break. After such adjustment, authors report convergence and quick adjustment to an equilibrium distribution of regional unemployment rates.

Monfort, Ordóñez, and Sala (2016) investigated the convergence of income inequality, absolute redistribution, and unemployment. Authors argue that the economic integration process in Europe has not led to real convergence in unemployment and inequality among the European countries. Even though it was expected that after years of EU integration, countries would converge to a single cluster, the author reports a variety of clubs. In other words, economic integration did not lead to real economic convergence, which is consistent with the findings of this paper. In addition, there seem to be prevalent differences in the effectiveness of public policies to combat inequality. The lack of convergence between EU-28 countries is also found in Simionescu (2015), who analyzed the GDP per capita convergence for EU-28 members and for 272 regions corresponding to the NUTS 2 level. The results of the analysis imply that at the national level in the period from 1995 to 2012, there are significant differences between foundation members and CEEC economies. On the other hand, at the regional level, five convergence clubs were identified. Our results also show the existence of some clubs depending on labor market indicator.

Convergence clubs were also found in Bartkowska and Riedl (2012), who analyzed the GDP per capita convergence in 206 zones from Western Europe in the period 1990 – 2002. The results strongly support the existence of six convergence clubs, explaining their formation by initial levels of GDP per capita and human capital. Carvalho and Harvey (2005) formulated the convergence components as a second-order error correction mechanism in order to ensure that the extracted components change smoothly, thereby enabling them to be separated from transitory cycles. The authors found two convergence clubs in the Eurozone area for real GDP per capita. One club consists of low-income countries (Greece, Portugal, Spain) and the other high-income countries' club (Austria, Finland, and five core economies). Authors report that Ireland seems to follow its own growth path, thus being divergent.

Fritsche and Kuzin (2011) tested the convergence in several variables: real GDP per capita, productivity, unit labor cost, and prices level for 12 countries in the Eurozone over the period of 1960-2006. Authors report regional clusters in consumer price level data. Also, the results imply that GDP deflator data and unit labor cost data are far less clustered than CPI data. GDP per capita indicates the existence of three convergence clubs. And finally, productivity data indicate the existence of a small club including fast-growing countries and a club consisting of all other countries. The authors explain the formation of convergence clubs with spatial distance and economic development differences.

Our literature summary shows that the existing literature has not analyzed the convergence of labor market institutions in the EU countries in a way that consistently connects it with the problems of deeper integration of the labor markets. In order to fill that literature gap, the indicators of labor market institutions (employment protection legislation, tax wedge, unemployment benefits, active labor market policies, and minimum wages) and their impact on the labor market are explained and analyzed in more detail below.

2.2. Labor market institutions and their performance

Labor market institutions play an important role in further economic integration among EU countries. Most new EU countries, which have joined the EU after 2004, had rigid labor market institutions. The rigidity of the labor market in these countries was characterized by rigid pay systems and a high degree of employment protection legislation (Nesporova, 2002). Therefore, the Commission advised the new member states to lower their tax wedge, remove disincentives in the benefits system, and increase spending on active labor market policies, in other words: reform their labor market institutions in order to address the poor labor market performance (Ederveen, Thissen, 2007, p. 300). Namely, flexible labor markets (such as the US or the UK labor market) can respond much faster and easier to changes in labor

supply and demand, and it is historically shown that countries with less rigid labor market institutions have lower unemployment rates. Therefore, a relatively fast solution has been found for the new EU members that were facing high unemployment rates at the time of EU accession. Different reforms of the labor market institutions were offered to lower unemployment rates.

Employment protection legislation (EPL)

The employment protection legislation index is an indicator of the level of workers' protection, which quantifies the various actions, costs, restrictions, and deadlines related to the procedure of dismissal and hiring of workers. It covers both individual and collective dismissals on regular contracts and the hiring of workers on temporary contracts. Rigid EPL may have undesirable effects on the labor market and can induce labor market segmentation. Furthermore, strict regulation against dismissals is usually associated with low hiring and firing rates, which contribute to higher unemployment rates and longer periods out of work for vulnerable groups.

Employment protection both decreases the flows of workers through the labor market and increases the duration of unemployment. This makes for a more stagnant labor market, with a higher proportion of long-term unemployed (Blanchard, Wolfers, 2000, p. 12-13; Baker et al., 2004, p. 2). Empirical evidence gathered by Cazes et al. (2012) confirms the findings from earlier studies that there is no clear link between employment protection legislation and employment levels. Regression analysis provided by Lehmann and Muravyev (2012) shows that an increase in the employment protection legislation index strongly depresses the employment rate and boosts the youth unemployment rate. Such a result might be considered in line with the 'classical' explanation that job creation is hindered by too strict employment protection, leaving some of the new labor market entrants in the state of unemployment (Lehmann and Muravyev, 2012, p. 254). Having no impact on the overall unemployment rate, it might additionally imply that strong employment protection pushes workers into unprotected informal employment relationships or directly into the informal sector of the economy (Lehmann and Muravyev, 2012, p. 256). In contrast, some results imply that stricter employment protection significantly lowers unemployment (Ederveen, Thissen, 2007, p. 309). This supports the findings of Belot and Van Ours (2004) but contradicts the results of some other studies. An implication is that a rigid labor market is not necessarily bad for employment (Ederveen, Thissen, 2007, p. 309). Over the 1990s, the introduction of economic and social reforms in transition economies resulted in substantial moderation of EPL, partly enabled by the weakening of trade union power (Ederveen, Thissen, 2007, p. 305).

Tax wedge

The tax wedge measures how much the government seemingly receives as a result of taxing the labor income. A tax wedge is a difference between before-tax and after-tax wages. In the majority of developed countries, progressive tax systems exist, causing taxes to rise with increasing incomes. The decrease in net income may discourage employees to work as much or to find other ways to keep more of the income (for example, by using government benefits). In such a situation, the remaining employees demand higher wages, causing employers to decrease their hiring rate.

Taxes play a huge role in the redistribution of income. A higher tax wedge raises the relative attractiveness of working in the informal sector (Ederveen, Thissen, 2007, p. 302). The empirical results of Ederveen and Thissen (2007) for 20 highly developed OECD countries over the period 1960-1990 imply that the unemployment rate is positively affected by taxes. Also, labor taxes have a negative effect on productivity growth (Anspal, Vörk, 2007). The results of Lehmann and Muravyev analysis also show that a one-point rise in the tax wedge will lower the employment rate by roughly a third of a percentage point but will not influence any of the unemployment rates (Lehmann and Muravyev, 2012, p. 255). Such results suggest that higher labor taxes increase the informal work in transition countries (Lehmann and Muravyev, 2012, p. 256).

Unemployment benefits (passive unemployment policies)

Unemployment benefit is money that the government regularly pays to unemployed people who are looking for a job who are capable of working and available for work but are unable to find suitable employment, including persons who had not previously been employed. Together with early retirement

benefits, they create two main categories of labor market policy (LMP) supports or passive labor market policies (PLMP) (European Commission, 2018). Spending for PLMPs is very often higher than spending for active labor market policies (ALMPs). This is generally due to both higher coverage and the cost of PLMP. However, the balance between active and passive spending varies substantially across regions. In particular, spending in PLMPs represents around 70% of total spending in labor market policies. The financing of unemployment benefits and active labor market policies falls largely on taxpayers. The unemployment insurance system increases the equilibrium unemployment rate, especially if unemployment lasts longer (Blanchard, Wolfers, 2000, p. 12).

Most of the new East-European governments introduced fairly generous unemployment benefits (both in terms of eligibility, levels, and duration). However, at the beginning of the 1990s, unemployment rose sharply, and so did the claims on benefits (Ederveen, Thissen, 2007). Regarding the unemployment benefit system, some results estimate that the first-year replacement rate has a negative albeit small effect on unemployment, whereas a higher duration of entitlement does significantly increase unemployment (Ederveen, Thissen, 2007, p. 309). At the same time, generous unemployment benefits can raise workers' reservation wages and reduce job search (Baker et al., 2004, p. 2).

In the early weeks of the COVID-19 crises, over half of OECD countries took steps to improve accessibility and/or generosity of "first-tier" unemployment insurance or "second-tier" unemployment assistance benefits. According to the OECD Employment Outlook 2020, sixteen OECD countries widened access to unemployment insurance benefits by reducing or entirely waiving minimum-contribution requirements, extending the qualification period for the employment requirements, or covering groups that had previously not been entitled (OECD, 2020, p. 67). Twelve OECD countries have lengthened the maximum possible duration of unemployment benefit payments, and ten OECD countries temporarily increased benefit levels (OECD, 2020, p. 67) in order to preserve the social and income security of the individuals.

Active labor market policies

The main objective of ALMPs is to increase the employment opportunities for job seekers and to improve matching between jobs (vacancies) and workers (i.e., the unemployed). ALMPs range from institutional and workplace training offers over indirect employment incentives (job-retainment, job-sharing, recruitment subsidy) to the setting up of protected and supported employment or direct job creation (public work schemes) and start-up incentives. In doing so, ALMPs can contribute to employment and GDP growth and reduce unemployment and benefit dependency.

There are many studies discussing the influence of active labor market policies and minimum wages. The regression results by Ederveen and Thissen (2007) show that active labor market policies significantly decrease unemployment. Lehmann and Muravyev (2012) find that expenditures on ALMP do not affect the employment rate, but they strongly decrease the youth unemployment rate. Active labor market policies also have a positive effect on productivity growth (Anspal and Vörk, 2007).

On the other hand, government mandated active labor market policies might also raise labor costs and reduce hiring. If these components of the social protection system are too protective, poorly designed, or poorly matched with one another, they could have substantial negative effects on employment opportunities (Baker et al., 2004, p. 2). An increase in ALMP would have a stronger effect on reducing unemployment in a more employment-friendly institutional environment. Overall, these results provide some evidence in favor of the hypothesis on institutional complementarities (Lehmann and Muravyev, 2012, p. 260).

Minimum wages

Minimum wages have been defined as "the minimum amount of payment that an employer is required to pay wage earners for the work performed during a given period, which cannot be reduced by collective agreement or an individual contract" (ILO, 2014). The purpose of minimum wages is to protect workers against improperly low pay and ensure that a country's working population does not fall below the poverty line. As the price of goods rises, so should the minimum wage. As a result, too high a minimum

wage could lead to increasing unemployment among the low-skilled who are exempted from the minimum wage.

In line with theoretical predictions, minimum wages (measured as a percentage of median wages) significantly raise unemployment. The estimated coefficient implies that increasing the minimum wage relative to the median wage by 1% results in 1.4% more unemployment (Ederveen, Thissen, 2007, p. 310). Blanchard and Wolfers (2000) conclude that labor market institutions affect the composition of the unemployed, thus affecting the effects of unemployment back on wages. For example, a high minimum wage can both increase the effect of adverse shocks on the unemployment rate of the less-educated workers and - because the minimum wage is fixed - reduce the effect of unemployment on wages (Blanchard, Wolfers, 2000, p. 18).

3. Data and methodology

3.1. Data

The data set for this study covers 28 EU member states over the period of 1993-2018, depending on the data availability. The initial data set is an unbalanced panel. The model used in empirical analysis, namely the log-t regression, requires strongly balanced panel data. To accommodate it, we were forced to drop countries and/or time periods with missing data from the analysis. Therefore, a list of countries and time periods slightly varies across different labor market institutions indicators. We list them in Appendix Table A1. Appendix Table A2 provides descriptive statistics of all variables. Appendix Figure A1 plots time series.

The employment protection legislation index (EPL) is collected from OECD Employment Database. It evaluates the regulations on the dismissal of workers on regular contracts and the hiring of workers on temporary contracts. They cover both individual and collective dismissals.

We also consider tax wedge, unemployment benefits, active labor market policies, and minimum wages, which are collected from the Eurostat Database. Tax wedge on labor costs is defined as income tax on gross wage earnings plus the employee's and the employer's social security contributions, expressed as a percentage of the total labor costs of the earner. Unemployment benefits are out-of-work income maintenance and support in the percentage of GDP received by registered unemployed. Active labor market policies present total labor market policy measures expenditures in the percentage of GDP. The annual minimum wage is in the percentage of GDP per capita.

3.2. Methodology

For measuring convergence, we employ standard beta and sigma convergence, which we complement with a more sophisticated and more flexible approach of log-t regression proposed by Phillips and Sul (2007, 2009). Standard beta and sigma convergence tests may be biased and have low power, as shown in Bernard and Durlauf (1995, 1996). The log-t test fixes these issues, and it is preferred over beta and sigma convergence test.

The simplest approach to measuring convergence is sigma convergence. Sigma convergence is simply calculated as a cross-sectional standard deviation of all analyzed countries. Convergence is observed when cross-sectional dispersion decreases over time, or more formally when:

$$\sigma_t < \sigma_{t_0} \quad (1)$$

where σ is a cross-sectional standard deviation and index t_0 indicates the first observable period. We compute sigma convergence for each labor market institutions indicator.

Beta convergence appears when countries with lower starting position grow faster. In other words, there must be a negative relationship between the initial level and growth rate of labor market institutions indicators. The concept of sigma convergence is closely related to the concept of beta convergence, as the decrease in dispersion requires that countries with lower levels grow faster and catch up with other countries. We estimate the following conditional beta convergence model:

$$\Delta^5 x_{it} = \alpha_i + \beta x_{it-5} + \gamma_1 \Delta N_{it-5} + \gamma_2 \Delta y_{it-5} + e_{it} \quad (2)$$

where $\Delta^5 x_{it}$ represents a five-year overlapping growth rate of particular labor market institutions indicator, x_{it-5} is the initial level of the same indicator, and we control the model for initial growth rates of employment (ΔN_{t-5}) and GDP (y_{it-5}). We estimate the same model for all labor market institutions indicators. This model measures conditional convergence, as the model controls for growth rates of employment and GDP. Convergence is observed when the estimated β is negative and statistically significant.

Equation (2) is a version of the dynamic panel data model, as shown in Caselli et al. (1996) and Bond et al. (2001). Caselli et al. (1996) and Bond et al. (2001) suggest using GMM estimation for such growth equations, and we use system GMM estimation proposed by Arellano and Bover (1995) and Blundell and Bond (1998), which is preferred in this case (see Bond et al., 2001). The basic idea is to estimate a system of equations in both first-differences and levels, where the instruments for the level equation are lagged first-differences of the series. We use two-step estimation and robust standard errors. The fixed effects are removed by first differencing instead of forward orthogonal deviation, as panel data are strongly balanced.

Phillips and Sul (2007, 2009) developed relative transitions curves and log-t test for convergence which, combined with a clustering algorithm, can endogenously determine convergence clubs. Their method builds upon a neoclassical growth model and provides the necessary flexibility to accommodate heterogeneous technology in growth models. In essence, the model tests for a decrease in cross-sectional dispersion over time, which suggests convergence.

Suppose a neoclassical growth model such as one used in Phillips and Sul (2009):

$$\log y_{it} = \log \tilde{y}_i^* + \log A_{i0} + [\log \tilde{y}_{i0} - \log \tilde{y}_i^*]e^{-\beta_{it}t} + g_{it}t \quad (3)$$

where y_{it} is output per capita with its initial (\tilde{y}_{i0}) and steady-state levels (\tilde{y}_i^*) and A_{i0} represents the initial level of technology. Convergence parameter β_{it} and output growth rate g_{it} are allowed to vary over time and across countries, capturing heterogeneity. The model can be rewritten as:

$$\log y_{it} = \left(\frac{a_{it} + g_{it}t}{\mu_t} \right) \mu_t = b_{it}\mu_t \quad (4)$$

where the term a_{it} captures all right-hand side variables from equation (3) except $g_{it}t$. Equation (4) is a form of the dynamic factor model, which consists of a common component μ_t shared by all countries, and country-specific factor loading b_{it} showing a share of a common trend for each EU country. In our paper, the common component captures EU institutions, EU wide policies, and other political and trade factors shared by all countries. On the other hand, factor loading b_{it} is a key coefficient showing how important is the common component for individual countries.

Relative transition curves are used for empirical analysis of factor loadings b_{it} . They are computed as the relative departure of each EU country from the average:

$$h_{it} = \frac{b_{it}}{\frac{1}{N} \sum_{i=1}^N b_{it}} = \frac{x_{it}}{\frac{1}{N} \sum_{i=1}^N x_{it}} \quad (5)$$

Where x_{it} represents each of our five labor market institutions indicators, and we analyze them separately. Countries converge when relative transition curves approach unity. We apply Hodrick and Prescott (1997) filter (HP) and use trend series to remove cyclical components, as suggested by Phillips and Sul (2009).

Relative transition curves are a very flexible tool for analyzing convergence, as they allow for all possible paths over time and only require that curves approach unity. However, they are not a formal way of analyzing convergence, as they only allow a visual inspection. Still, relative transition curves can be used to compute a quadratic distance measure for the panel from the common limit with the following transformation:

$$H_t = \frac{1}{N} \sum_{i=1}^N (h_{it} - 1)^2. \quad (6)$$

Now, countries converge when H_t approaches zero over time. Phillips and Sul (2007) develop a log-t regression that uses a quadratic distance measure as a convergence indicator:

$$\log \frac{H_1}{H_t} - 2 \log(\log t) = a + \gamma \log t + u_t \quad (7)$$

Term $2 \log(\log t)$ is a penalty function and its function is to improve test performance. Term u_t is an iid error. Convergence is tested with the γ coefficient. Negative and statistically significant γ implies divergence. If $0 \leq \gamma < 2$, there is a conditional convergence in growth rates. For absolute convergence to hold $\gamma \geq 2$. The critical value at 5% level of significance is ± 1.65 . As suggested by Phillips and Sul (2007, 2009), we remove the cyclical component from the data using HP filter, and we discard the first third of initial observations.¹

We determine endogenous convergence clubs based on the log-t regression and the accompanying clustering algorithm proposed by Phillips and Sul (2007, 2009). Club convergence can be tested when there is no convergence in the full sample of countries. In the first step of the algorithm, countries are sorted in the panel in descending order. In the second step, a core group of countries is formed based on the highest value of t-statistics, which must be greater than -1.65 . The remaining countries form a complementary group, and in the third step, one by one country is added to the core group and is tested for convergence. The country is added to the core group if the t-statistics is greater than -1.65 . When all countries that satisfy the condition are added to the core group, the first club is formed. In the fourth step, the log-t test is applied to the group of remaining complementary countries. If the t-statistic is greater than -1.65 , the second convergence club is identified. If not, steps (1) to (3) are repeated on the group of remaining countries to identify other convergence clubs. Each club must have at least two countries. At the end of the algorithm, it is possible that some countries do not converge to any other country. Such remaining countries form a diverging group.

When initial clubs are identified, we test them for merging by applying the log-t test on them again. Club 1 and club 2 are merged if we cannot reject convergence between them. Then they form a new club 1, which is then tested for merging with club 3 and so on. Arčabić (2018) showed there is a trade-off between the number of clubs and the statistical significance of estimated clubs when clubs are merged. We opt for fewer clubs and merge them, but the results do not change much. We report only the results of merged clubs, while the full results are available upon request.

We also test for convergence in exogenously defined clubs. In that case, we apply the log-t regression on predetermined clubs without the clustering algorithm.

4. Results

Results are organized as follows. We first present results on the absolute and conditional convergence between EU countries in section 4.1. Simple sigma and conditional beta convergence tests are considered, as well as the log-t regression. The main conclusion is there is no conditional convergence between EU member states. Next, in section 4.2., we discuss results on the club convergence, allowing for the possibility that EU member states converge in different clubs. We consider five clubs based on the literature: Mediterranean, Continental, Scandinavian, Anglo-Saxon, and Eastern. We call these clubs exogenous, and we apply the log-t regression on each of these clubs. Furthermore, we also analyze endogenous clubs based on the Phillips and Sul (2007, 2009) clustering algorithm and compare the results. We conclude there is limited evidence of club convergence, as it depends on the labor market institutions indicator and group of countries.

¹ See Phillips and Sul (2007, 2009) for full technical details. In the empirical analysis, we use procedures provided by Du (2017). See Arčabić (2018) for empirical application to fiscal convergence and sustainability

4.1. Absolute and conditional convergence of labor market institutions

Figure 1 shows the results of simple sigma convergence for five labor market institutions indicators. The results are mixed with consecutive periods of convergence and divergence. Sigma convergence is computed as cross-sectional standard deviation where the decrease in dispersion indicates convergence. The employment protection legislation index from Figure 1(a) shows mainly constant standard deviation from 1993 to 2009 and substantial decrease after 2010, which coincides with the Eurozone sovereign debt crisis when most countries experience a drop in employment protection legislation. Similarly, the tax wedge (Figure 1b) and minimum wages (Figure 1e) also show more prominent signs of sigma convergence after 2010. On the other hand, passive and active labor market policies (Figures 1c and 1d) experience divergence during the Global financial crisis and Eurozone sovereign debt crisis. However, before and after the crises, we observe patterns of convergence. Therefore, both indicators show a reclin-S pattern during the 2005-2017 period. In sum, we do not find obvious evidence of convergence in labor market institutions, as the results are mixed.

These results are mainly confirmed when we use more sophisticated methods, such as conditional beta convergence and log-t test. Simply put, we do not find strong evidence of conditional convergence between all EU member states. Table 1 presents the results of the conditional beta convergence from the dynamic panel data model. Each column shows convergence results for a single labor market institutions indicator. The dependent variable is an overlapping five-year growth rate, while the key independent variable is the initial level of the indicator. We control all models with the growth rate of employment and GDP. As usual, convergence is present when there is a negative relationship between the growth rate and the initial level of the indicator.

Only active labor market policy indicator shows statistically significant convergence with the estimated coefficient of -0.518 , while other labor market institutions indicators are statistically equal to zero. GDP growth is significant in models (2), (3), and (5), while employment growth is only significant in the case of model (2). Test statistics is displayed at the bottom of Table 1. The F-test suggests a poor performance of models (1) and (2), which is in line with the obtained results. The Hansen's test for overidentification suggests that instruments are robust, and we keep the number of instruments below the number of countries in the model.

Analyzing beta convergence using dynamic panel data is useful for analyzing conditional convergence within the EU. However, it is difficult to use the same model for analyzing club convergence. Simply put, clubs can be rather small, consisting of only two countries. Such small clubs are not convenient to analyze using dynamic panel data, and some other methods should be employed. We resolve this issue by using relative transition curves and log-t test by Phillips and Sul (2007, 2009).

Lack of conditional convergence in labor market institutions is confirmed with relative transition paths and more formal log-t regression proposed by Phillips and Sul (2007, 2009). Figure 2 shows relative transition curves, which should approach unity when there is convergence. However, it is clear that the curves are equally scattered at the beginning and the end of the sample for all five variables, indicating a lack of convergence. On each plot in Figure 2, we show countries with the biggest relative departure from the mean. Portugal and the UK have the highest and the lowest employment protection legislation, respectively (Figure 2a). Likewise, the tax wedge is the highest in Belgium and the lowest in Ireland (Figure 2b). Figure 2(c) shows that France has the highest unemployment benefits, while on the other hand, the lowest benefits are in Slovakia and Romania. Active labor market policies are the highest in Denmark but the lowest in Estonia and Romania (Figure 2d). Finally, countries with the highest (lowest) minimum wages are Malta and France (Czechia and Luxembourg), as shown in Figure 2(e).

The log-t regression results are presented in Table 2. Results for all EU countries are in the second column, and convergence is strongly rejected for all five variables, as indicated in the table. This formally confirms the visual inspection of relative transition curves. In conclusion, different convergence tests provide mixed results, but a more formal analysis gives a firm conclusion that labor market institutions do not converge within the European Union. The differences between institutions are still substantial, and the labor market institutions are changing too slowly to converge.

4.2. Club convergence of labor market institutions

Lack of convergence within all EU member states opens a question of club convergence. We consider two types of clubs; endogenous clubs based on Phillips and Sul (2007, 2009) clustering algorithm and exogenous clubs based on geographical proximity and labor market similarities. Club convergence is indirectly related to discussions on the EU core and periphery or divisions in old and new EU member states. Therefore, it is expected to find groups of countries with similar characteristics.

Table 2 presents the results of the clustering algorithm. For each labor market institution indicator, we find two or more clubs. Countries that form each convergence club are presented in Figure 3. As elaborated in the methodology section, log-t regression shows divergence when γ is negative. If $0 \leq \gamma < 2$, there is conditional convergence in growth rates, and for $\gamma \geq 2$, there is an absolute convergence. The critical value for the t-test on the γ coefficient is ± 1.65 .

For labor market institutions indicators, employment protection legislation, and tax wedge, we find three clubs and also one divergent group. In both cases, the first club is the biggest one and contains more than half countries. The second club is smaller, and the third club is the smallest. Tax wedge divergent group contains Denmark and Poland, which do not converge to any club. Looking at the estimated log-t coefficient, only the third club is statistically significant, showing strong convergence. This club is also expected and can be declared as an Anglo-Saxon club, as it contains the UK and Ireland, plus the Netherlands when the tax wedge is observed (see Figure 3). The other two clubs are only loosely related, but there are some overlapping of the countries in the first club. Employment protection legislation Club 1 contains Austria, Belgium, France, and Germany, but also Denmark, Finland, Sweden, and the Netherlands as well as Italy, Portugal, and Spain, Czechia, and Poland. These countries would be typically grouped in three or four different clubs, such as continental, Scandinavian, Mediterranean, and Eastern. Therefore, countries that form the first and the second club are very heterogeneous, and they seem to converge to some other criteria than simple geographical, political, or development similarities. It is also possible that their convergence is due to multiple criteria, but the factors that affect club formation are beyond the scope of this paper. We also stress that the estimated convergence coefficient is statistically insignificant, which suggests only weak convergence between countries.

Active and passive labor market policies also show evidence of club convergence, and we observe some similarities in club formation between the two labor market institution indicators. There are five convergence clubs for unemployment benefits plus Belgium, which does not converge to any club. However, only the third club shows statistically significant convergence, while in others, the estimated γ coefficient is statistically equal to zero, again suggesting weak convergence. On the other hand, the active labor market policies index shows four convergence clubs, and all of them are highly statistically significant. The divergent group, in this case, consists of Denmark and Romania. Countries in the active labor market policy Club 4 are comparable to countries in unemployment benefits Club 3. Again, countries that form both clubs are heterogeneous. In both clubs, we find Germany on the one hand, and Greece, Bulgaria, Estonia, Latvia, Lithuania, Slovakia, and Slovenia on the other hand. These countries have substantially different labor markets, especially when Germany and Greece are compared. Therefore, countries in the clubs are not intuitively related, and we can conclude that convergence clubs do not share common geographical, political, or development similarities as commonly expected.

A similar conclusion holds for convergence clubs in minimum wages. We find two clubs that show strong signs of convergence, as the estimated γ -s are positive and statistically significant. Countries that form clubs are again heterogeneous. Even the UK and Ireland are grouped in two different clubs, which is not the case with other variables.

Next, we turn to the issue of club convergence, where clubs are exogenous and based on the literature. We form five different clubs based on geographical proximity and labor market similarities. These are the Mediterranean, Continental, Scandinavian, Anglo-Saxon, and Eastern. A full list of countries and their characteristics in each of these clubs is provided in Appendix Table A3 (see more in Obadić, 2012).

EU member states have different approaches to labor market institutions, and the application of flexibility and security forms the concept of flexicurity. In doing so, they often use quite different

policies and tools to ensure flexicurity. The balance between these two elements requires fairly different interventions due to the specificity of the starting points. Moreover, according to the Common Principles of Flexicurity, each Member State can follow its own path of flexicurity, which reflects national specificities and establishes its own forms of economic and social regulation (European Foundation, 2008).

According to the results obtained by cluster analysis in the literature (Gaard, 2005; European Commission, 2006; Muffels and Luijkx, 2008), countries may be classified into five different clusters or clubs. As they are mainly grouped according to flexibility and security labor market characteristics, it is possible to differentiate between five flexicurity policy/institutional features. Selected European countries are clustered into five groups or clubs based on estimates of national flexicurity characteristics (Table A3 in Appendix).

Mediterranean countries are characterized by low to average unemployment benefits, strict availability for work requirements, passive labor market policies, and high employment protection legislation. Countries that form that club are Croatia, Cyprus, Greece, Italy, Malta, Portugal, and Spain. On the other hand, the Continental club consists of Austria, Belgium, France, Germany, Luxembourg, and Slovenia. The continental club is characterized by generous unemployment benefits, varying demand of availability, passive labor market policies, and average to high employment protection legislation. Denmark, Sweden, the Netherlands, and Finland form the Scandinavian club. This club is characterized by high unemployment benefits, strict availability for work requirements, active labor market policies, and low to average employment protection legislation. Ireland and the UK form Anglo-Saxon club characterized by low unemployment benefits, few formal demands on availability, small share of active labor market policies, and weak employment protection legislation. Finally, the Eastern European club consists of Bulgaria, Czechia, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, and Slovakia. It is characterized by low unemployment benefits, varying demand of availability, active labor market policies, and low to average employment protection legislation.

It can be concluded that the Anglo-Saxon and Nordic countries have the best position given that they simultaneously achieve a high level of flexibility and job security. Mediterranean and continental countries as regulated systems of flexicurity have worse systems.

Results on the convergence of exogenous clubs are presented in Table 3, where we apply the log-t test to each club. We provide γ coefficient and the accompanying t-statistics. When the t-statistics is lower than the critical value of -1.65 , we reject the convergence hypothesis, which is marked with an asterisk. It is easy to observe that convergence is rejected in almost all clubs except Anglo-Saxon club for EPL index and tax wedge and Mediterranean club for tax wedge and minimum wages. The convergence of the Anglo-Saxon club is comparable with our results from endogenous club convergence. Other results suggest that commonly observed clubs based on geographical proximity and labor market similarities do not actually converge and should be revised.

In conclusion, the results suggest a lack of convergence of labor market institutions at the EU level. Also, there are different convergence clubs depending on the labor market institution indicator. Convergence clubs imply different long-run steady states where the differences between countries may be substantial. Labor market institutions are fundamental determinants of employment and unemployment. Differences we find in labor market institutions suggest that levels of employment and unemployment in the EU will hardly converge, implying weak labor market integration. In this way, our results just confirm the findings of Baker et al. (2004) and Cazes et al. (2012), who conclude that it is difficult to assess the impact of individual labor market institutions since they are often inconclusive and vary from country to country. Further on, Cazes et al. (2012) conclude that irrespective of the methodology used, that the magnitude and direction of the impact of stringency of labor legislation on employment and unemployment are rather mixed (Cazes et al., 2012, p. 37).

Figure 4 shows that the results of the log-t test are comparable with the beta convergence concept. Figure 4 shows scatter diagrams for five labor market institutions indicators with the initial level of the indicator on the horizontal axis and growth rate between the first and the last period on the vertical axis. This is

equivalent to beta convergence of the form $1/T \cdot [(y_{iT} - y_{i1})/y_{i1}] = c + \beta y_{i1} + e_i$ where the dependent variable is the growth rate regressed on the initial level of the variable.

In Figure 4, we plot the initial level and the growth rate of each endogenously estimated club to relate club convergence obtain from log-t regression with the beta convergence concept. A negative slope in the scatter diagram suggests the existence of beta convergence.

Results for the employment protection legislation from Figure 4(a) show that all three clubs have a negative slope of the regression line, suggesting beta convergence. The dispersion in the first club is somewhat bigger due to Spain and Portugal, which are farther away from other countries. However, Club 1 is also the largest club, and the dispersion is not unexpected.

Tax wedge clubs from Figure 4(b) also show clear signs of beta convergence, except in the case of the second club, where we observe substantial dispersion and the horizontal regression line. Unemployment benefits are plotted in Figure 4(c), where we find five clubs. All clubs show beta convergence except Club 2, which consists of Denmark and Portugal. Active labor market policies and minimum wages (Figure 4(d) and 4(e), respectively) are compatible with the beta convergence concept, as all clubs have a negative slope of the regression line. These clubs converge according to log-t regression and are statistically significant, which is in line with the low dispersion evident from Figure 4(d) and 4(e).

5. Conclusion

Since the introduction of the single currency, the main focus of many economists, politicians, and the public was on the success and future of the EU integration and how successful the EU was in functioning as the optimal currency area. As expected, the early research focused on monetary policy and its role in this process. However, the recent global financial crisis has shown that a system has been created with a fault, and the reasons for difficult integration have become increasingly sought in the different functioning of the labor markets among the EU member states. Eichhorst et al. (2010) highlight that the labor market functioning is the prevailing adjustment mechanism that, after the financial crisis, was recognized as the reason for the EU not functioning as the optimal currency area. This raises the question of why return to the natural level of production, employment, and unemployment did not occur in many EU countries (European Commission, 2015).

In addition, the success of the EU itself can best be measured through the degree of market integration of its member states. In this context, the fundamental task of the EU economic policymakers is to achieve and then accelerate convergence among EU member states. This mainly refers to the reduction of differences in living standards and working conditions. When analyzing the convergence, the existing literature focused mostly on the main macroeconomic variables such as income and productivity (Carvalho and Harvey, 2005; Pesaran, 2007; Simionescu, 2015), or prices, unemployment, and employment (Estrada, Galí, and López-Salido, 2013).

This paper takes a step further by focusing on the role of the labor market institutions convergence in further EU integration, which is not present in the existing literature. This paper considers five labor market institutions indicators: employment protection legislation index (EPL), tax wedge, unemployment benefits, active labor market policies, and minimum wages.

We test the convergence in labor market institutions among the EU countries using standard beta and sigma convergence and recently developed the log-t test by Phillips and Sul (2007, 2009). Depending on the data availability, the period from 1993 to 2018 has been analyzed. We also investigate if the EU member states converge in different clubs. Two types of clubs are considered: endogenous clubs based on Phillips and Sul (2007, 2009) clustering algorithm and exogenous clubs based on geographical proximity and labor market similarities. Exogenous clubs consist of five different clubs based on geographical proximity and labor market similarities: Mediterranean, Continental, Scandinavian, Anglo-Saxon and Eastern.

Results on the absolute and conditional convergence between the EU member states can be summarized as follows. The results of simple sigma convergence for five labor market institutions indicators are mixed with consecutive periods of convergence and divergence. Therefore, we do not find obvious

evidence of convergence in labor market institutions. These findings are confirmed when we apply conditional beta convergence and log-t test. The main conclusion of the first part of the analysis is that labor market institutions do not converge within the European Union. The differences between such institutions are still significant, and they slow down the labor market institution convergence.

The second part of our research analyzed club convergence of labor market institutions. The results of the clustering algorithm based on Phillips and Sul (2007, 2009) find two or more endogenous clubs for each labor market institution indicator. We find three clubs in employment protection legislation and tax wedge. When analyzing active and passive labor market policies, they also show evidence of club convergence. Passive labor market policies measured with unemployment benefits show five clubs, but only the third club shows statistically significant convergence. Furthermore, the active labor market policies index shows four convergence clubs, and all of them are highly statistically significant. Convergence clubs are heterogeneous, and they do not share common geographical, political, or development similarities as commonly expected when analyzing the literature. All these conclusions are also valid for convergence clubs in minimum wages, where we find two clubs that show strong signs of convergence. Finally, the results of exogenous clubs grouped as the Mediterranean, Continental, Scandinavian, Anglo-Saxon, and Eastern European clubs do not show convergence. We can easily reject convergence in all clubs except Anglo-Saxon club for EPL index and tax wedge and Mediterranean club for tax wedge and minimum wages. Furthermore, the convergence of the Anglo-Saxon club is comparable with obtained results from endogenous club convergence. For the rest of the clubs, based on geographical proximity and labor market similarities, we can conclude that they do not converge.

There are some important implications of our study for the economic policy. Labor market institutions are fundamental determinants of employment and unemployment performance, and the lack of convergence that we find in labor market institutions suggest that levels of employment and unemployment in the EU will hardly converge, implying weak labor market integration. As long as EU labor market characteristics are different at the core of their functioning, member states' adjustment is difficult, and countries will adapt differently to shocks, as the recent financial crisis has clearly shown. Our results show that more work has to be done by the EU policymakers for labor market integration to occur.

Tables

Table 1. Beta convergence results based on panel data models

VARIABLES	(1) Δ^5 EPL index	(2) Δ^5 Tax wedge	(3) Δ^5 Unem. benefits	(4) Δ^5 ALMP	(5) Δ^5 Min. wage
Employment protection legislation ($t-5$)	0.404 (0.62)				
Tax wedge ($t-5$)		0.113 (0.15)			
Unemployment benefits ($t-5$)			0.184 (0.16)		
Active labor market policies ($t-5$)				-0.518** (0.24)	
Minimum wages ($t-5$)					-0.019 (0.14)
Δ Employment ($t-5$)	0.024 (0.02)	0.254** (0.11)	-0.017 (0.02)	0.007 (0.01)	-0.062 (0.21)
Δ GDP ($t-5$)	-0.024 (0.02)	-0.131** (0.06)	0.034*** (0.01)	-0.001 (0.01)	0.203** (0.08)
Constant	-0.949 (1.48)	-4.297 (5.66)	-0.245* (0.13)	0.209* (0.10)	0.385 (5.12)
Observations	247	322	192	184	266
Number of id	18	23	24	23	19
F-test	0.467	0.168	0.009	0.023	0.022
# of instruments	16	22	22	22	19
Sargan test	0.553	0.911	5.65e-09	0.438	0.713
Hansen test	0.446	0.371	0.289	0.308	0.514
AR(2)	0.029	0.020	0.806	0.125	0.006

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The model is estimated with System-GMM.

Table 2. Results of the log-*t* test for convergence and endogenous clubs

(a) EPL index							
log(t)	All Countries	Club1 [13]	Club2 [3]	Club3 [2]			
Coeff	-0.408*	-0.0450	0.0700	1.334			
t-stat	-7.923	-0.426	0.487	3.573			
(b) Tax wedge							
log(t)	All Countries	Club1 [13]	Club2 [5]	Club3 [3]	Group [2]		
Coeff	-0.683*	-0.132	0.0790	0.768	-4.152*		
t-stat	-21.12	-1.621	0.477	7.192	-6.890		
(c) Unemployment benefits							
log(t)	All Countries	Club1 [7]	Club2 [2]	Club3 [10]	Club4 [2]	Club5 [2]	Group [1]
Coeff	-1.211*	0.0450	-2.534	0.162	0.585	-1.951	-
t-stat	-94.88	0.284	-1.131	6.604	1.642	-1.082	-
(d) Active labor market policies							
log(t)	All Countries	Club1 [4]	Club2 [2]	Club3 [5]	Club4 [10]	Group [2]	
Coeff	-1.289*	0.407	1.021	0.571	0.416	-1.117*	
t-stat	-63.21	6.657	35.67	2.394	4.574	-36.53	
(e) Minimum wages							
log(t)	All Countries	Club1 [12]	Club2 [7]				
Coeff	-0.381*	0.273	1.005				
t-stat	-8.436	3.042	4.275				

Note: * represents a rejection of convergence at the 5% level. The numbers in brackets show a number of countries in the club. Only results of final classification after club merging are presented. Countries that form different clubs are presented in Figure 3. Group indicates a divergent group of countries.

Table 3. Results of the log-*t* test for convergence among exogenous clubs

(a) EPL index					
log(t)	Mediterranean	Continental	Scandinavian	Anglo-Saxon	Eastern
Coeff	-0.271*	-0.290*	-0.716*	1.334	-0.643*
t-stat	-3.426	-27.49	-14.54	3.573	-27.33
(b) Tax wedge					
log(t)	Mediterranean	Continental	Scandinavian	Anglo-Saxon	Eastern
Coeff	0.682	-0.192*	-1.206*	3.081	-1.266*
t-stat	3.315	-2.802	-22.77	5.914	-34.21
(c) Unemployment benefits					
log(t)	Mediterranean	Continental	Scandinavian	Anglo-Saxon	Eastern
Coeff	-0.800*	-1.411*	-2.421*	n/a	-1.893*
t-stat	-15.87	-21.35	-170.4	n/a	-16.60
(d) Active labor market policies					
log(t)	Mediterranean	Continental	Scandinavian	Anglo-Saxon	Eastern
Coeff	-0.133*	-1.722*	-2.035*	n/a	-1.956*
t-stat	-1.765	-12.34	-138.7	n/a	-99.66
(e) Minimum wages					
log(t)	Mediterranean	Continental	Scandinavian	Anglo-Saxon	Eastern
Coeff	0.221	-0.907*	n/a	-6.177*	-0.899*
t-stat	1.330	-258.5	n/a	-6.380	-77.11

Note: * represents a rejection of convergence at the 5% level. Countries that form clubs are listed in Appendix Table A3.

Figures

Figure 1. Sigma convergence results

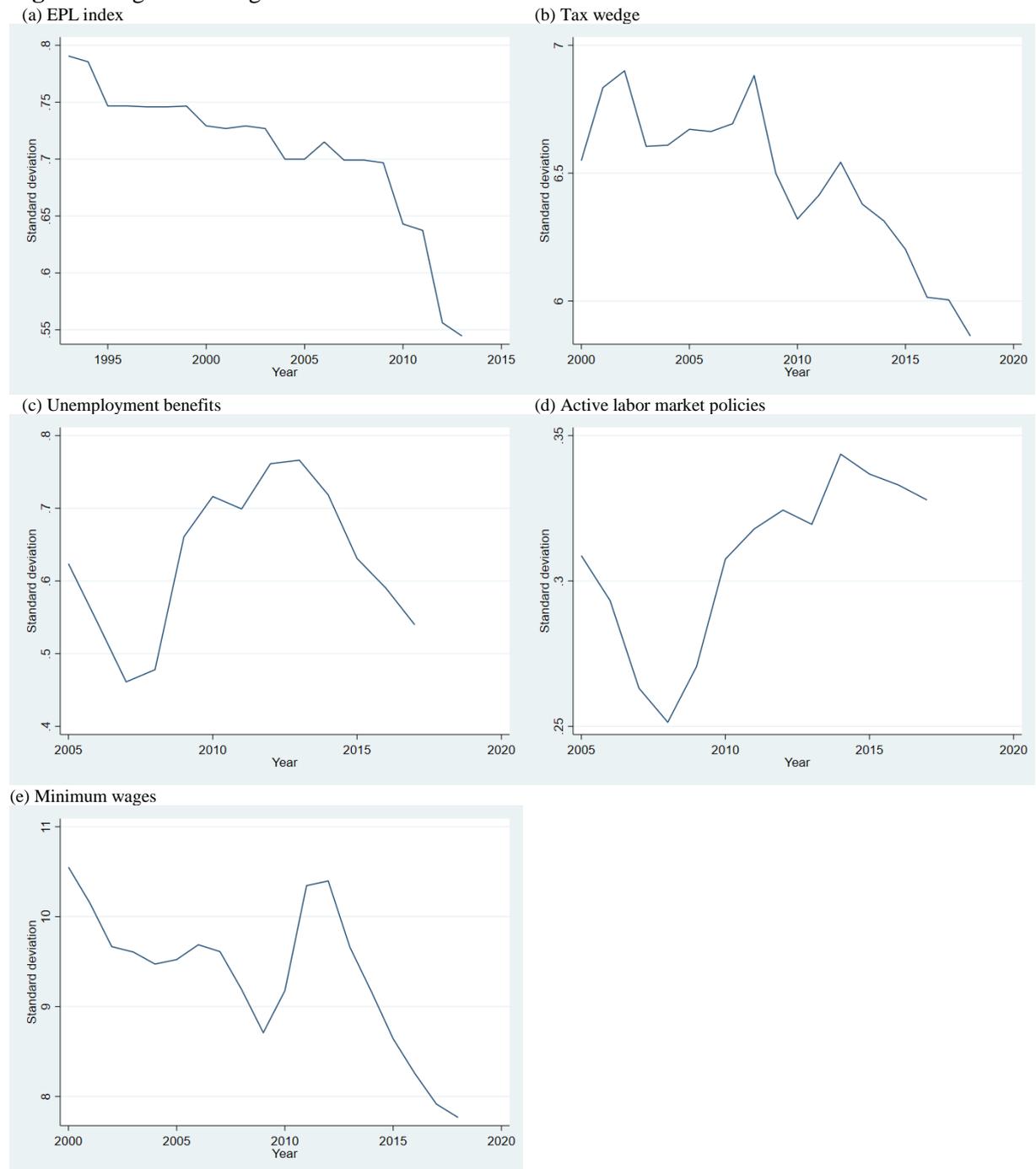


Figure 2. Relative transition paths

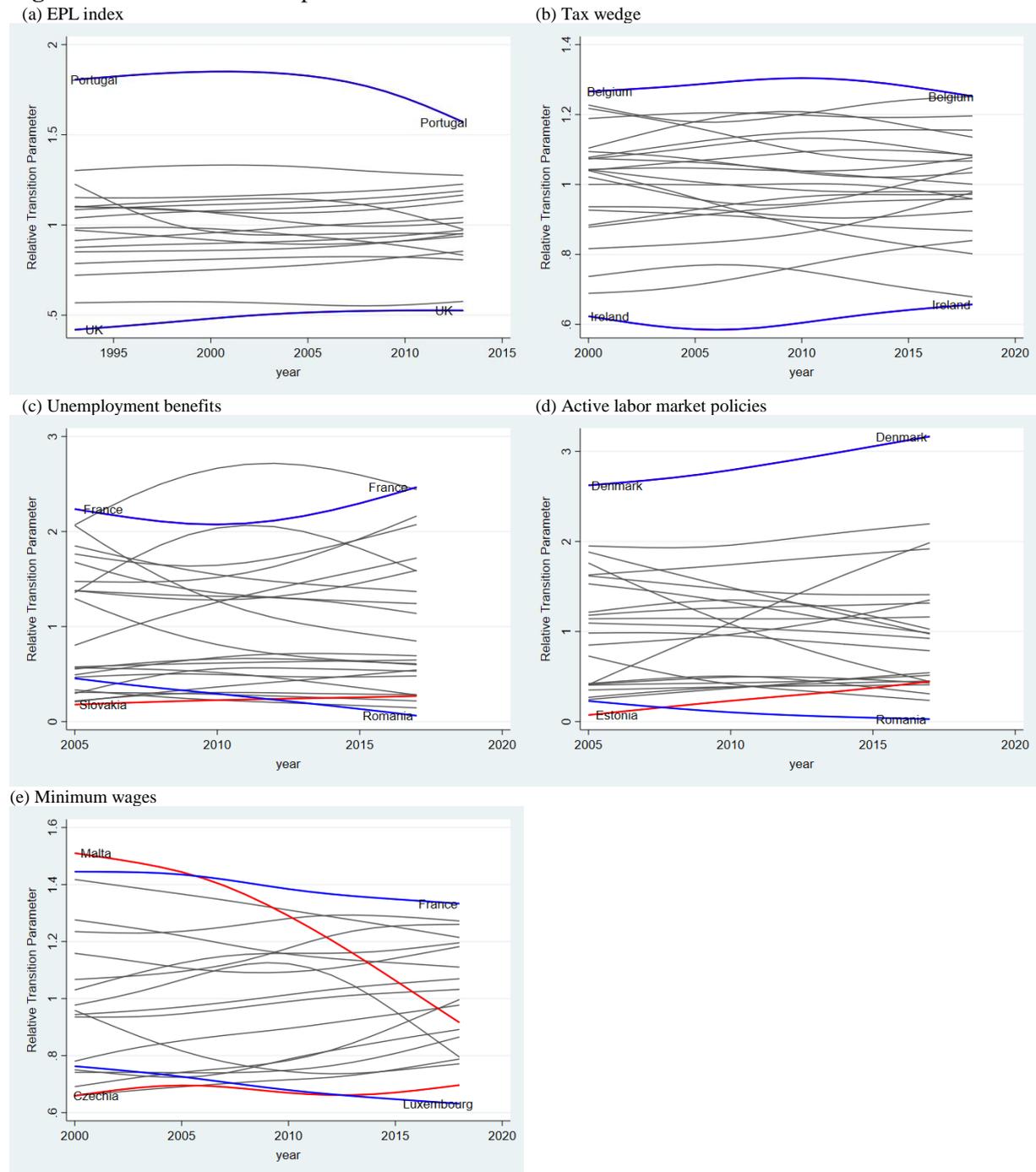
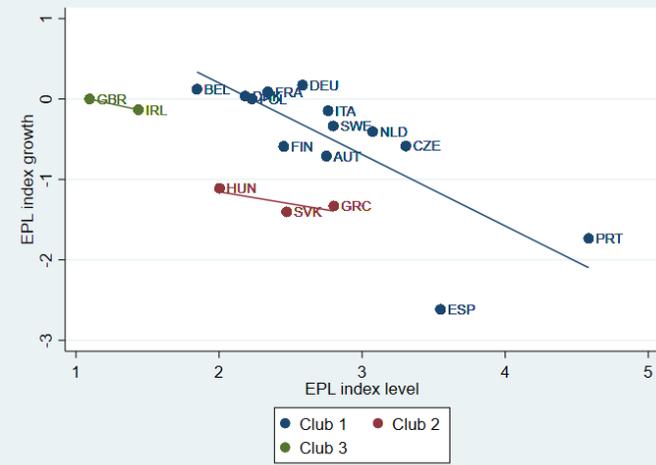


Figure 3. Convergence clubs

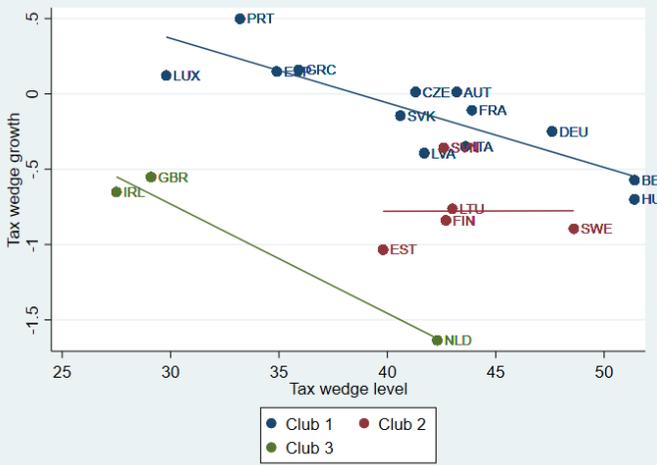
	Club 1	Club 2	Club 3	Club 4	Club 5	Divergent group
EPL index	Austria Belgium Czechia Denmark Finland France Germany Italy Netherlands Poland Portugal Spain Sweden	Greece Hungary Slovakia	Ireland UK			
Tax wedge	Austria Belgium Czechia France Germany Greece Hungary Italy Latvia Luxembourg Portugal Slovakia Spain	Estonia Finland Lithuania Slovenia Sweden	Ireland Netherlands UK			Denmark Poland
Unemp. Benefits	Austria Finland France Ireland Italy Netherlands Spain	Denmark Portugal	Bulgaria Estonia Germany Greece Latvia Lithuania Luxembourg Slovakia Slovenia Sweden	Czechia Hungary	Poland Romania	Belgium
ALMP	Finland Hungary Luxembourg Sweden	Austria France	Belgium Ireland Netherlands Portugal Spain	Bulgaria Czechia Estonia Germany Greece Latvia Lithuania Poland Slovakia Slovenia		Denmark Romania
Min. Wages	Belgium Bulgaria France Greece Hungary Latvia Netherlands Poland Portugal Slovenia Spain UK	Czechia Estonia Ireland Lithuania Luxembourg Malta Slovakia				

Figure 4. Beta convergence within clubs

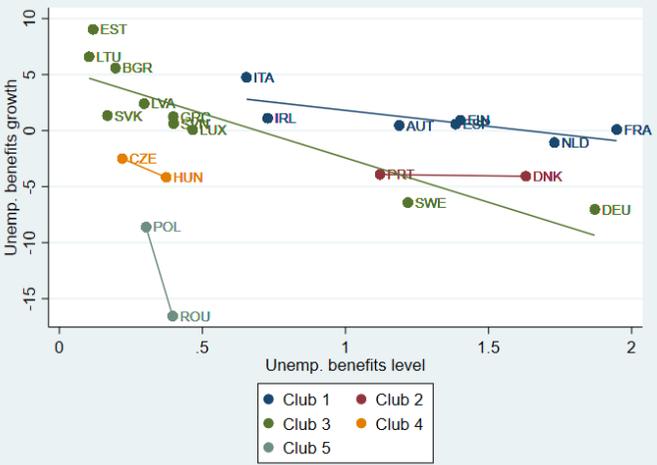
(a) EPL index



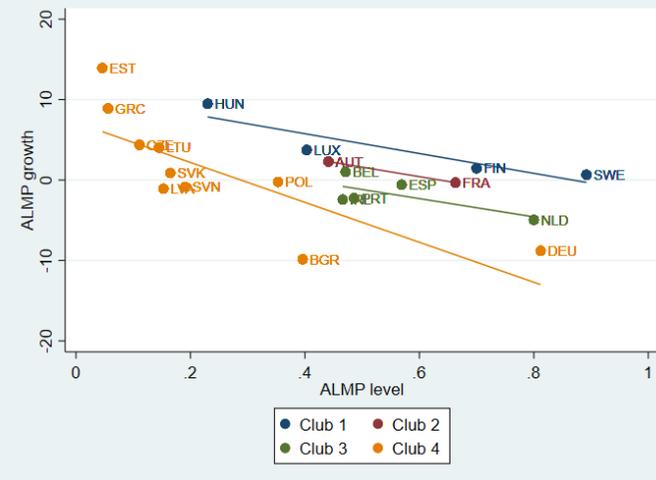
(b) Tax wedge



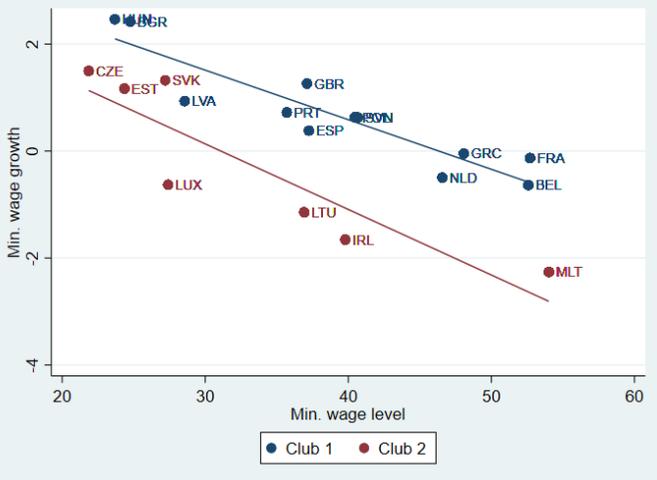
(c) Unemployment benefits



(d) Active labor market policies



(e) Minimum wages



APPENDIX A: Data sample and descriptive statistics

Table A1. List of countries for each labor market institutions indicator

EPL index	Tax wedge	Unemp. benefits	ALMP	Min. wages
Austria	Austria	Austria	Austria	Belgium
Belgium	Belgium	Belgium	Belgium	Bulgaria
Czechia	Czechia	Bulgaria	Bulgaria	Czechia
Denmark	Denmark	Czechia	Czechia	Estonia
Finland	Estonia	Denmark	Denmark	France
France	Finland	Estonia	Estonia	Greece
Germany	France	Finland	Finland	Hungary
Greece	Germany	France	France	Ireland
Hungary	Greece	Germany	Germany	Latvia
Ireland	Hungary	Greece	Greece	Lithuania
Italy	Ireland	Hungary	Hungary	Luxembourg
Netherlands	Italy	Ireland	Ireland	Malta
Poland	Latvia	Italy	Latvia	Netherlands
Portugal	Lithuania	Latvia	Lithuania	Poland
Slovakia	Luxembourg	Lithuania	Luxembourg	Portugal
Spain	Netherlands	Luxembourg	Netherlands	Slovakia
Sweden	Poland	Netherlands	Poland	Slovenia
UK	Portugal	Poland	Portugal	Spain
	Slovakia	Portugal	Romania	UK
	Slovenia	Romania	Slovakia	
	Spain	Slovakia	Slovenia	
	Sweden	Slovenia	Spain	
	UK	Spain	Sweden	
		Sweden		
# of countries: 18	# of countries: 23	# of countries: 24	# of countries: 23	# of countries: 19
Time period 1993-2013	Time period 2000-2018	Time period 2005-2017	Time period 2005-2017	Time period 2000-2018

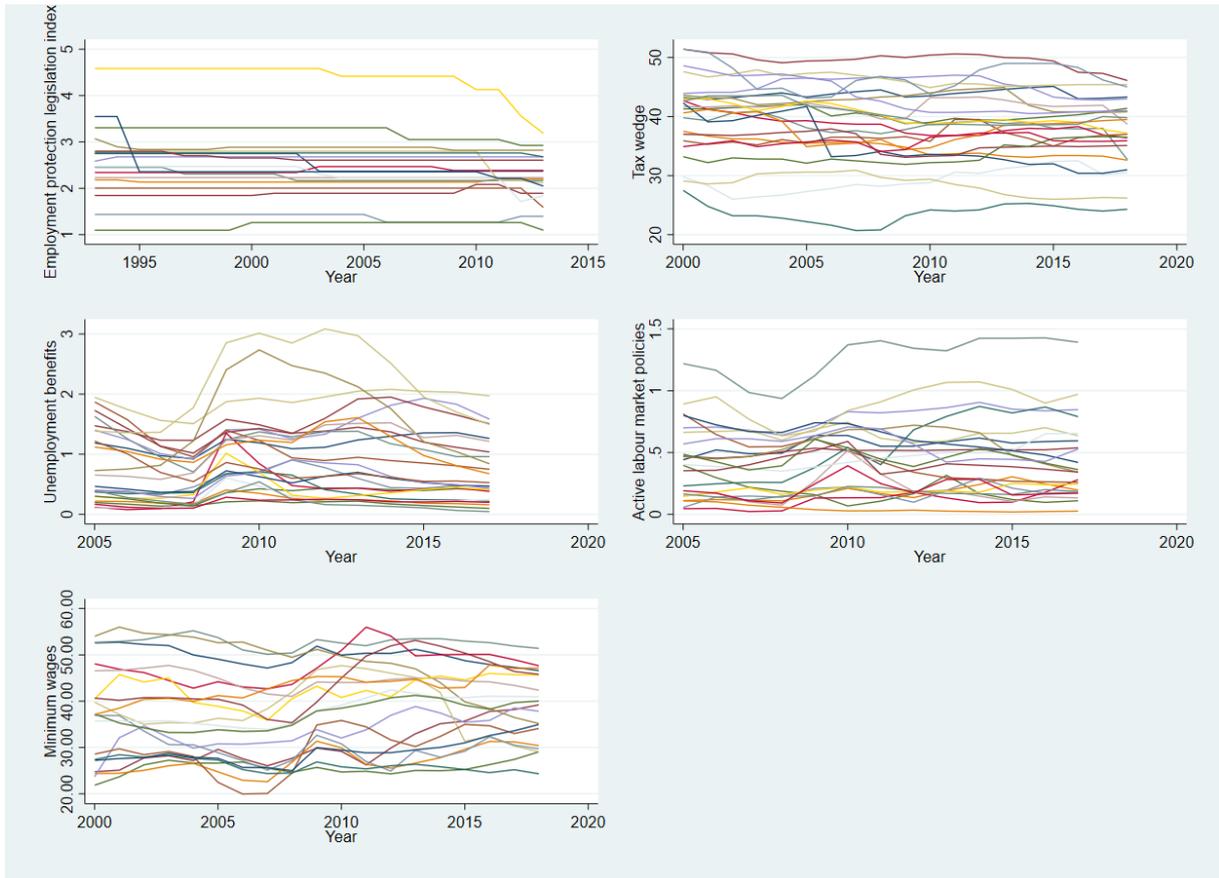
Table A2. Descriptive statistics of main variables

Variable		Mean	Std. Dev.	Min	Max	# of observations
EPL index	overall	2.44	.69	1.09	4.58	N=378
	between		.69	1.19	4.37	n=18
	within		.16	1.25	3.55	T=21
Tax wedge	overall	38.61	6.38	20.70	51.40	N=437
	between		6.25	23.70	49.58	n=23
	within		1.81	32.92	45.84	T=19
Unemp. Benefits	overall	.86	.64	.05	3.08	N=312
	between		.58	.19	2.17	n=24
	within		.28	.02	2.02	T=13
ALMP	overall	.44	.30	.02	1.42	N=299
	between		.29	.04	1.27	n=23
	within		.10	.11	.80	T=13
Min. wage	overall	37.78	9.26	19.94	56.01	N=361
	between		8.75	25.62	52.66	n=19
	within		3.60	24.66	46.90	T=19

Table A3. List of countries in exogenous clubs and characteristics of their labor market policies

Mediterranean	Continental	Scandinavian	Anglo-Saxon	Eastern
Croatia Cyprus Greece Italy Malta Portugal Spain	Austria Belgium France Germany Luxembourg Slovenia	Denmark Finland Netherlands Sweden	Ireland UK	Bulgaria Czechia Estonia Hungary Latvia Lithuania Poland Romania Slovakia
<ul style="list-style-type: none"> • Low to average unemployment benefits • Strict availability for work requirements • Passive LMP • High EPL 	<ul style="list-style-type: none"> • Generous unemployment benefits • Varying demand of availability • Passive LMP • Average to high EPL 	<ul style="list-style-type: none"> • High unemployment benefits • Strict availability for work requirements • Active LMP • Low to average EPL 	<ul style="list-style-type: none"> • Low unemployment benefits • Few formal demands on availability • A small share of active LMP • Weak EPL 	<ul style="list-style-type: none"> • Low unemployment benefits • Varying demand of availability • Active LMP • Low to average EPL

Figure A1. Time series data



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