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# Labor market institutions and labor market performance: what can we learn from transition countries?

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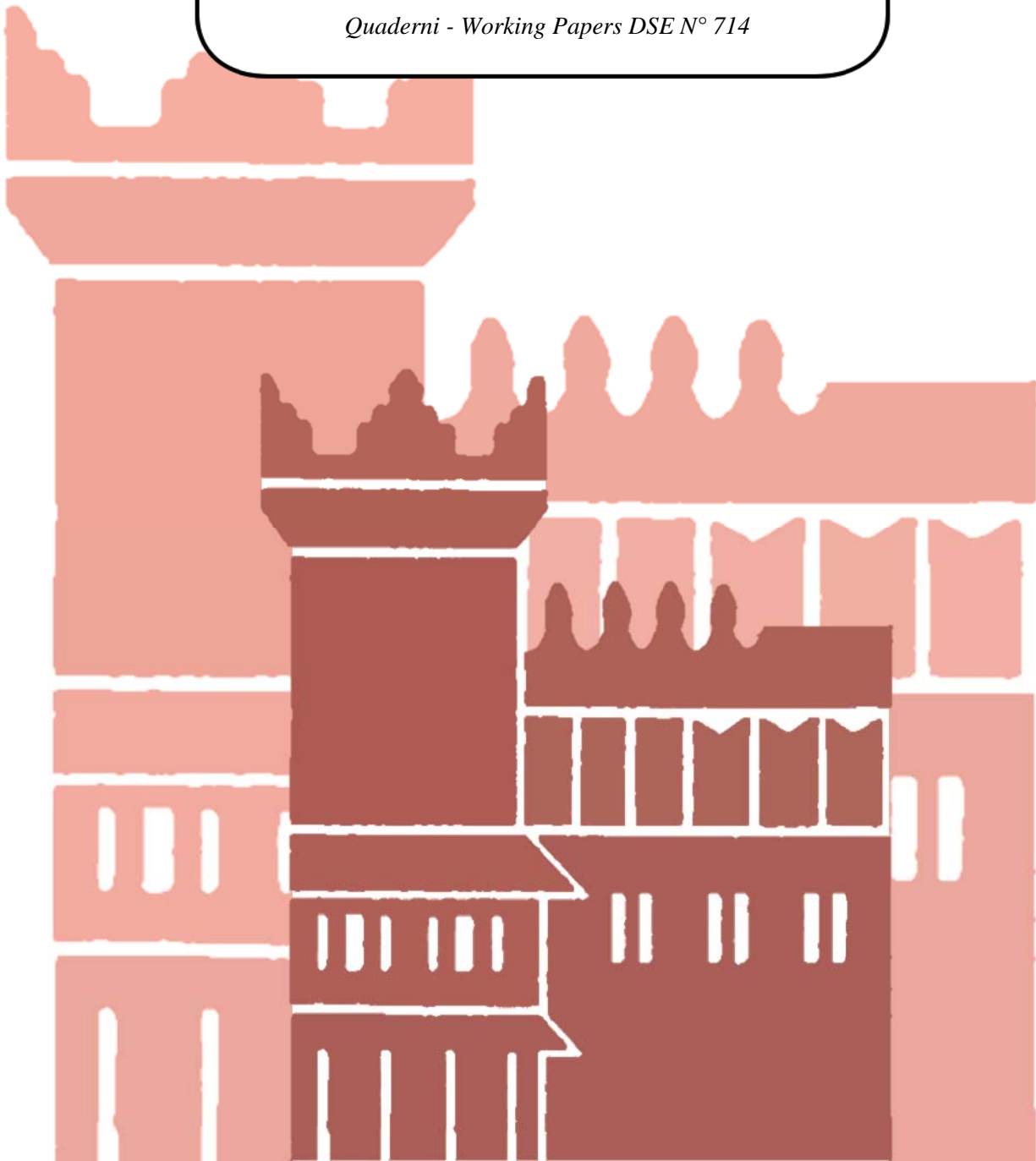


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DEPARTMENT OF ECONOMICS

Labor market institutions and labor market  
performance: what can we learn from  
transition countries?

Hartmut Lehmann  
Alexander Muravyev

*Quaderni - Working Papers DSE N° 714*



# **Labor market institutions and labor market performance: what can we learn from transition countries?\***

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## **Abstract**

This paper studies the relationship between labor market institutions and policies and labor market performance using a new and unique dataset that covers the countries of Eastern Europe and Central Asia, which in the last two decades experienced radical economic and institutional transformations. We document a clear trend towards liberalization of labor markets, especially in the countries of the former Soviet Union, but also substantial differences across the countries studied. Our econometric analysis implies that institutions matter for labor market outcomes, and that deregulation of labor markets improves their performance. The analysis also suggests several significant interactions between different institutions, which are in line with the idea of beneficial effects of reform complementarity and broad reform packages. Finally, we show that there are important advantages of focusing on a broader set of labor market outcomes, and not only on the unemployment rate, which until now has been the main approach in the empirical literature.

Key words: labor market institutions; unemployment; transition economies.

JEL codes: E24, J21, P20.

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## **1. Introduction**

Over the last two decades, the labor economics and macroeconomics literature has seen a lively debate concerning the role of labor market institutions and policies in explaining labor market performance. The initial interest was sparked by the remarkably divergent patterns of unemployment within the group of OECD countries (especially between the US and continental Europe) observed since the 1970s. In the early 1990s, several theoretical contributions, most notably the seminal work by Layard, Nickell and Jackman (1991), provided essential background for the discussion of the role of institutions and policies in shaping aggregate unemployment. At the same time, greater availability of data, in particular, as regards measurement of institutions, spurred quantitative empirical research with important contributions by Scarpetta (1996), Nickell (1997), Elmeskov, Martin, and Scarpetta (1998), as well as by Blanchard and Wolfers (2000), among others. A further impetus for research in this field came from policy recommendations by international organizations such as the OECD and IMF which, based on their own analyses, advocated systematic institutional deregulation of the labor market as a major means of tackling high unemployment (OECD 1994, 1997; IMF 2003).

The early studies, such as Nickell (1997), focused on the role of particular institutions, thus assuming that a great deal of labor market dynamics in the OECD countries can be attributed to changes in institutions only. This purely institutional approach was challenged by a number of scholars who pointed out that changes in institutions between the 1960s and 1980s were infrequent and rather small and thus could not explain the huge divergence in the evolution of labor market aggregates in OECD countries. Consequently, these critics proposed an explanation based on the interaction of institutions with economic shocks (Blanchard and Wolfers 2000; Bertola, Blau and Kahn 2002). While it still remains an open issue whether the model interacting shocks with institutions performs substantially better than the model solely employing institutions (see Nickell, Nunziata and Ochel 2005), the attention of labor

economists has recently shifted to the idea that institutions may interact with each other in a systematic manner (Coe and Snower 1997; Belot and van Ours 2001; Bassanini and Duval 2009). The main issue in this strand of literature is the complementary nature of labor market institutions and policies, which if shown to hold, would provide a rationale for the implementation of broad labor market reform packages. In addition, a growing number of recent studies have focused on the role of institutional arrangements beyond the labor market, such as the degree of competition in the product market and the development of the financial market (e.g., Amable, Demmou, and Gatti 2007; Fiori et al. 2007).

Despite such a large interest in the role of institutions and policies in shaping labor market outcomes, the available evidence in the literature remains inconclusive and often contradictory. The magnitude and statistical significance of coefficients on institutional variables vary a great deal from specification to specification, suggesting the lack of robustness (see, e.g., the assessment in OECD 2006). As stressed by Blanchard (2006) who summarizes the state of knowledge in the field, there is little doubt that institutions matter, the question is which ones and how. While most of the studies suggest that institutional rigidities are indeed responsible, at least partially, for the poor performance of labor markets, and thus support a deregulatory view of labor market policies (IMF 2003; OECD 2006), several authors are critical of this view (Baccaro and Rei 2007; Howell et al. 2007). Also, the question of reform complementarities has not received a clear answer either. Several studies have reported significant coefficients on interactions of institutional variables (Belot and van Ours 2001; Bassanini and Duval 2009), but the results do not appear to be very robust and in some cases cannot be easily interpreted.

The bulk of the available evidence concerning the impact of institutions and policies on labor market performance is based on data from two dozen OECD countries. Only in recent years have some scholars started to look at the role of labor market institutions and

policies in less developed economies (Botero et al., 2004; Feldman 2008). To a considerable extent, such interest stems from a much larger variation in institutions and labor market policies as well as in labor market outcomes across such an extended list of countries, both in the cross-section and time dimension.<sup>1</sup> In addition, data from less developed countries in principle can help reveal whether the previously obtained conclusions for the OECD economies can be generalized to other regions of the world. However, the potential of non-OECD countries to contribute to the economics literature in general has not yet been fully realized because of a general lack of data and/or their low quality.

Our paper thus serves two purposes. Based on a novel and unique hand-collected dataset covering the countries of Eastern Europe and Central Asia over the period 1995 to 2008, it offers a first comprehensive study of the evolution of labor market institutions and policies in the transition economies. The paper also revisits the existing evidence concerning the role of labor market institutions and policies in shaping labor market outcomes, using the newly constructed dataset. In particular, the paper considers the issue of interactions between institutional variables, and thus provides new evidence on the complementary nature of labor market institutions and policies. We hereby focus on employment protection legislation, union density, the tax wedge on labor, the maximum duration of unemployment benefits, the average replacement ratio and expenditures on active labor market policies (ALMP) – the core set of five labor market institutions and policies identified in the literature (Eichhorst, Feil, and Braun 2008). We consider four labor market outcomes, namely the employment-to-population ratio, the unemployment, youth unemployment and long-term unemployment rates.

We believe that our paper provides an important contribution to the ongoing policy debate concerning the role of institutions and policies in shaping labor market outcomes for at

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<sup>1</sup> For example, Djankov and Ramalho (2009, p.11) state: “Developing countries present an exciting venue for studying the impact of regulatory reforms, including of labor reforms. A number of countries, especially in Eastern Europe, have recently undergone significant reforms to make labor regulation more flexible.”

least two reasons. First, the use of new, unexplored data has the potential of providing a robustness check to the results obtained for developed market economies with OECD data. Second, changes in labor market outcomes as well as changes in institutions and policies are more marked over time in transition countries than they are in mature OECD countries providing thus a natural testing ground of the theoretical considerations that link labor market institutions and labor market outcomes. In addition, being the first comprehensive study of its type in the transition region, the paper might be of considerable interest to labor economists who study transition countries.

Our data show a fairly modest level of institutional rigidities in the labor market and a general trend towards liberalization since the mid-1990s in the whole transition region. However, there are important differences across countries. In particular, changes in institutions and policies in Central Europe have been rather modest since the mid-1990s, except for the declining unionization and decreasing expenditures on active labor market policies. In contrast, the countries of the former Soviet Union have considerably liberalized their unemployment protection legislation and reduced the tax wedge on labor during the last 15 years, thus establishing the least stringent regulation of the labor market in the whole transition region. The results of our econometric analysis relating institutions and policies to labor market outcomes are generally consistent with the view that institutions matter and that deregulation of the labor market can improve its performance. There is also evidence that institutions interact with each other, which is consistent with the idea of reform complementarities and which provides support for broad labor market reform packages. The study also suggests important advantages of focusing on a broader set of labor market outcomes, and not only the unemployment rate, which until now has been the main approach in the empirical literature.

The remainder of the paper has the following structure. In section 2 we provide a brief overview of the development of labor markets as well as of institutional reforms in transition countries and discuss the hitherto scarce literature linking these two. Section 3 presents the employed data and in doing so discusses the challenges and pitfalls of data collection in the region. The section concludes with a descriptive analysis of the data. Section 4 describes our research strategy and the econometric specifications we use, while section 5 discusses the econometric results. In section 6 we draw some conclusions.

## **2. The evolution of labor market institutions and outcomes in the transition countries and their reflection in the literature**

Several scholars have already attempted to describe the evolution of labor market institutions and policies in the transition countries of Eastern Europe and Central Asia as well as to analyze links between these institutions and policies and the performance of labor markets (e.g., Boeri and Terrel 2002; Cazes 2002; Fialova and Schneider 2009). Besides presenting evidence from this large and important region, several such studies were motivated by the idea that the transition environment provides the researcher with a unique laboratory for hypothesis testing (e.g., Svejnar 1999; Boeri and Lehmann 1999). Indeed, post-communist countries started with pretty similar initial conditions in terms of the performance of their labor markets. The latter were characterized by shortages of labor, no open unemployment, very high levels of unionization, and no unemployment protection.<sup>2</sup> Imposing market forces on the economies shaped by central planning with simultaneous creation, essentially from scratch, of labor market institutions can therefore be regarded as a quasi-natural experiment that may be useful in testing economic theories (see, e.g., Muravyev 2008). Moreover, research focusing on the region can benefit from the enormous fluctuations of key economic

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<sup>2</sup> With respect to open unemployment, the former Yugoslavia seems to be the only important exception. For example, Saveska (2000) shows that Macedonia (one of the six states that comprised the Yugoslav Federation) suffered from double-digit unemployment rates as early as in the late 1970s.



variables over time and across space, which helps identify the relationship between the variables of interest.

We illustrate this point using data on the dynamics of GDP and unemployment in the transition region, which are presented in Tables A1 and A2 in appendix I. The data show that a few years after the start of market reforms, the experiences of transition countries, including labor market outcomes, revealed great differences, often comparable with the differences between US and Western European labor markets (Rutkowski 1996).<sup>3</sup> One important point that the data in Tables A1 and A2 seem to suggest is that the divergent labor market outcomes in transition countries cannot be attributed to economic shocks only.<sup>4</sup> Institutions and policies, whether taken separately or in interactions, should be seriously considered as candidate explanations for this divergence.

The few existing studies that use data from transition countries have documented a number of trends in the evolution of labor market institutions and policies (see, e.g., Svejnar 2004). At the onset of transition, most countries started developing previously missing institutions and policies to ensure an effective functioning of labor markets. At that time, even if substantial unemployment rates were foreseen, the governments, especially in Central Europe, adopted fairly generous unemployment benefits schemes mainly out of political considerations.<sup>5</sup> These were subject to cuts, sometimes dramatic, in the 1990s (Riboud, Sanchez-Paramo, and Silva-Jauregui, 2002) as the governments struggled to keep budget discipline on the background of a considerable and largely unanticipated decline in output

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<sup>3</sup> While the precision of these estimates may be an issue as the concept of GDP was in general not used in Eastern Europe and Central Asia before the early 1990s (the output in the economy was measured as Gross Material Product, which excluded services) the general pattern definitely holds.

<sup>4</sup> The data show, for example, that the initial recession lasted only two years in Poland with GDP exceeding the pre-transition level already in the mid-1990s while neighboring Ukraine started recovering in 2000 only, after having lost almost 60% of its pre-transition GDP level. Interestingly, despite this difference in the magnitude and length of the transition shock, the unemployment rate in Poland has persistently remained much higher than in Ukraine, 19.0% against 8.6% in 2004, as shown in Table 2.

<sup>5</sup> For example, in Poland the strong political position of “Solidarity” allowed the Mazowiecki government in December 1989 to introduce layoffs in labor legislation only in tandem with the introduction of a very generous unemployment benefit system that in its first, albeit short-lived, version did grant open-ended benefits to anybody even if a person had no previous work experience.

(Gomulka 1998). Unionization rates have been in decline throughout the region (Borisov and Clarke 2006; Kohl 2008), although the effectiveness of trade unions in promoting the economic interests of their members may have increased, especially in Central Europe (Rutkowski 1996).<sup>6</sup> The countries of the region introduced a number of tax reforms, e.g., the switch to the flat personal income tax rate has become a common feature of most countries, following the experience of Estonia in 1994. However, the tax burden on labor has remained rather high in Central Europe, though not in most of the other transition countries (World Bank 2007). While active labor market programs have been introduced throughout the region, their share in GDP has been lower than in the old member states of the EU and substantially lower in South-Eastern Europe and the former Soviet Union (World Bank 2005). Importantly, despite these general trends, the variation across countries within the same group has remained considerable. For example, Estonia and Slovenia are often mentioned among the success stories of the economic transition, but they have had perhaps the most dissimilar labor market institutions and policies among the CEE countries in the last 20 years.<sup>7</sup>

Despite the potential benefits from exploring these large variations in labor market outcomes, institutions, and policies in Eastern Europe and Central Asia, relatively little has been done so far. The main reason is the unavailability or the low quality of data, especially from the early stages of the transformation process. As a result, most of the existing studies in the context of transition adopt a partial approach by focusing on particular institutions and policies. For example, Nivorozhkin (2005) studies the effect of ALMP in Russia, Commander and Heitmueller (2007) discuss the role of unemployment insurance in unemployment dynamics of the countries in transition, and Behar (2009) focuses on both tax wedges and

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<sup>6</sup> Prior to 1989, virtually all trade unions in the Soviet bloc were closely affiliated with and controlled by Communist governments and served nearly exclusively as the transmission belt of the policies of the Communist parties to the workforce. Defending the economic interests of workers was not part of the brief of these trade unions.

<sup>7</sup> In the year 2000, Estonia scored 2.4 on the OECD index of employment protection legislation that ranges from 0 to 6, spent less than 0.1 percent of its GDP on active labor market policies and the average unemployment benefit was only 8 percent of the average wage. The corresponding numbers for Slovenia were 3.3, 0.5 percent and 44 percent, respectively.

unemployment benefits in the new EU member states. Those papers that attempt to evaluate the whole set of the core institutions together (along the lines of Nickell 1997) adopt either a purely descriptive approach or supplement data from a few transition countries with data from the OECD economies or EU member states (see, e.g., Cazes and Nesporova 2003b, Ederveen and Thissen 2007, and Fialova and Schneider 2009). While there are potential benefits of combining data from established market economies with those from transition countries, it may require more careful econometric modeling and estimation than has been done thus far to account for different initial conditions, shocks, and differences in the general institutional environment.

Overall, the evidence concerning the link between institutions, policies, and labor market outcomes in transition countries is very limited, hinting at the importance of at least some of the labor market institutions in the countries of the region. Looking at specific institutions, several studies suggest that employment protection may indeed affect labor market outcomes in the transition countries (e.g., Cazes and Nesporova 2003a) as seem active labor market policies (Rovelli and Bruno 2007). The study by Fialova and Schneider (2009) suggests a role played by the tax wedge, but the sample combines transition and OECD countries, while the study by Behar (2009) finds some, albeit weak evidence that tax wedges and the duration of unemployment benefits are associated with poor labor market outcomes. In contrast, Commander and Heitmueller (2007) find no link between the generosity of the unemployment benefits and unemployment rates in transition countries and suggest that the overall link between institutions and unemployment rates is weaker in transition countries than in Western Europe and other OECD countries.

### **3. Data and general trends of labor market outcomes and institutions**

This paper uses a novel and unique hand-collected database of labor market outcomes, institutions and policies in the countries of Eastern Europe and Central Asia assembled by us. To the best of our knowledge, this is the most comprehensive and most up-to-date database of this sort collected for the region. It contains information on key macroeconomic variables (such as GDP growth and inflation), key labor market statistics (the employment-to-population ratio, the unemployment rate, the long-term unemployment rate and the youth unemployment rate), employment protection legislation statistics, which follow the OECD standard (OECD 2004), information about the generosity of the unemployment benefit systems (average replacement ratio and maximum duration of unemployment benefits), about taxation of labor, namely the tax wedge on labor that measures the cumulative effect of the payroll tax paid by employers and income tax paid by employees, expenditures on ALMP as well as key data on trade unions.<sup>8</sup> Details about the construction of the database are shown in Appendix II of the paper.

The main principle underlying the data collection effort was to achieve maximum compatibility of our data with OECD and EU standards. To this purpose, the major sources of data for this paper are the OECD and EUROSTAT databases for the countries that during the 2000s became members of the European Union; World Bank and IMF statistics; as well as national statistical sources. Almost all the required data are easily available from the mentioned sources for Central European countries that joined the EU in 2004. The quality of the data is very high in these cases. As regards countries from South-Eastern Europe and the Commonwealth of Independent States, data availability is more limited and the quality of the collected data is in some cases of a lower standard. In many instances, we have to rely on secondary sources and estimates provided by World Bank or IMF staff in working papers,

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<sup>8</sup> The list contains the core set of five labor market institutions and policies identified in the literature (Eichhorst, Feil, and Braun 2008).

policy reports, etc., country reports published by other institutions (e.g., the ILO and national research centers) as well as academic working papers and articles (e.g., Eamets and Masso 2004, Cazes and Nesporova 2006).

The database covers a 14 years period between 1995 and 2008 and thus excludes the very early years of the transition. We opted not to collect data from the first half of the 1990s for two reasons. First, the limited availability and low quality of data in the early years of the transition, especially in the countries of the former USSR, would leave most of the cells in the database empty. For example, Ukraine, the second largest country in the region, did not produce unemployment statistics based on the ILO definition until the mid-1990s. Second, the early 1990s were still the time of the transition shock, with substantial deviations from equilibrium conditions in the economies. Since the theory underlying our empirical analysis suggests that labor market institutions affect equilibrium unemployment rates, these observations would have been of limited, if any, use in the regression analysis that tries to establish the long-run relationship between labor market institutions and policies on the one hand and labor market outcomes on the other hand.<sup>9</sup>

We had to drop several countries (Belarus, Tajikistan, Turkmenistan, and Uzbekistan) from the final sample because of severe data problems.<sup>10</sup> For example, Belarus does not collect statistics measuring ILO unemployment; moreover, the wage setting in the country is still heavily influenced by the state via the so-called wage grid not only in the public sector, but also in the private sector. Trade unions remain heavily influenced by the state, too. These particular institutional arrangements, prevalent in all four countries, simply imply that the

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<sup>9</sup> Standard remedies suggested in previous studies, such as the use of variables controlling for the output gap, and in particular the estimates based on the Hodrick-Prescott filter, may not suffice in the case of a one-time permanent shock such as the transition-induced collapse of output. For example, Beck, Kamps, and Mileva (2007) argue in the case of Russia that estimates based on the Hodrick-Prescott filter represent very rough approximations of the potential output and should be treated with great caution.

<sup>10</sup> These are also the countries that have been regarded as extreme laggards in transition from plan to market by the EBRD (see EBRD, various years).

standard mode of analysis typical of free market economies cannot be directly applied to this set of countries.

Employing our database, we now turn to a discussion of the general trends in the evolution of labor market institutions and policies, as well as employment outcomes, in the region. This has been done before, but most of the analysis provided in previous studies was more fragmentary (in terms of country coverage as well as in terms of time dimension) and less supported by hard numbers than we have at our disposal in our study.<sup>11</sup> Thus, one of the contributions of our paper is to provide a bigger and cleaner picture of the recent trends in the region.

Because of the small variation over time in a number of key variables (employment protection legislation is probably the best example), we will provide and discuss the key labor market outcome aggregates from four years covering mid- and late transition: 1996, 2000, 2004, and 2008. The labor market institutions and policies are also presented for four years, however with a one year lag, i.e. from 1995 to 2007. For expositional ease, we also classify the countries into three major groups, which are typical of the literature studying the region: Central Eastern Europe (CEE, embracing the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovak Republic, Slovenia), South Eastern Europe (SEE, which includes Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Macedonia, Montenegro, Romania, and Serbia), and the Commonwealth of Independent States (CIS, which until recently included 12 out of 15 constituent republics of the former USSR, namely Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russian Federation, Ukraine Tajikistan, Turkmenistan, and Uzbekistan with Georgia officially leaving the organization in August 2009). For presentational purposes, most data will be shown in such an aggregated form; whenever essential, however, we will also provide and discuss data from particular countries.

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<sup>11</sup> Such previous analyses include Cazes and Nesporova (2003b), Eamets and Masso (2004), World Bank (2005), and Cazes and Nesporova (2006), among others.

Finally, for comparison purposes, we will also provide respective statistics for the US and the old member states of the European Union (the EU-15).

Figures 1 and 2 show some striking patterns of labor market outcomes and labor market institutions regarding the three groups of transition countries, the EU-15 and the United States. The employment-to-population ratio<sup>12</sup> is substantially smaller in SEE than in the other two transition regions. It is u-shaped for CEE and the CIS, indicating an upturn in labor demand in the later part of transition, while in SEE it shows a strong downward trend until 2004. Unsurprisingly the highest ratio is found in the U.S., while the EU-15 ratio, demonstrating a monotonically increasing ratio is only slightly higher than in CEE and the CIS. The unemployment rates also exhibit interesting patterns even if we average the rates within regions. It is noteworthy that unemployment rates have been higher in CEE than in the CIS for the most part of the period considered even though the employment-to-population ratios hardly differ. The other important feature that should be mentioned is the large drop in the unemployment rate between 2004 and 2008 in CEE and SEE, whereas the unemployment rates drop gently in the CIS, in EU-15 and the U.S.<sup>13</sup> Long-term and youth unemployment rates are far higher in SEE than in the other two transition regions. The largest drop in both rates between 2004 and 2008 can be observed in CEE and SEE.<sup>14</sup>

Turning to measures representing labor market institutions we can see the far larger changes in these measures for the transition countries, especially in SEE and the CIS, than for mature capitalist economies. For example, the EPL index falls substantially in SEE and the CIS, in the latter of which the labor market has become even less protection friendly than in the EU-15, where we find a very modest decline over the entire period. We see a falling union

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<sup>12</sup> Since statutory retirement varies across the 5 regions shown in Figure 2, we present the ratios for the population aged between 15 and 59.

<sup>13</sup> Part of this large drop in the unemployment rate in CEE and SEE is caused by the migration possibilities arising after accession of the NMS. However, since labor demand also rises in these countries between 2003 and 2007 (Rutkowski 2007), migration cannot explain the entire drop. Disentangling the various factors causing the fall in unemployment after accession has not been tackled satisfactorily in the literature (see Lehmann 2010).

<sup>14</sup> Again, part of this large drop is the result of increased migration after accession of the NMS.

density rate everywhere, and a particularly pronounced fall in CEE leading to a density rate that is roughly half of the EU-15 rate. In the EU-15 and the U.S., density rates move hardly at all over the period. Inspection of the chart on the tax wedge leads to several noteworthy insights. The tax wedge is far lower in the U.S. than in the other four regions, and the wedge fell dramatically after 1999 in the CIS and declined substantially in SEE. In contrast, there is only a mild downward trend in CEE, something we do not observe in the EU-15 at all. On this measure, labor markets in all transition regions became substantially more flexible than labor markets in the EU-15.

The last three charts deal with active and passive labor market policies and should be looked at together. The EU-15 on average spends roughly 1 percent of GDP on ALMP while all transition regions spend far less. Especially the CIS spends very little on such policies. The U.S., on the other hand has the shortest maximum duration of benefits combined, however, with a relatively high replacement rate. The EU-15 combines long maximum duration with relatively generous unemployment benefit levels, which might in part explain the relatively large long-term unemployment rates. CEE and SEE have maximum durations of roughly one year, whereas the CIS exhibits the shortest durations after the U.S. as of 1999. Compared to the EU-15 and the U.S., replacement rates are very non-generous in CEE and the CIS, while SEE has somewhat higher rates.

Overall, Figures 1 and 2 show large differences across transition regions and over time with regard to labor market outcomes as well as labor market institutions and policies. It is this variation that we wish to exploit in our econometric analysis.

#### **4. Our econometric approach**

Our analysis of the links between labor market outcomes on the one hand and labor market institutions and policies on the other hand draws heavily on the model proposed in the seminal



study by Nickell (1997). In that study, labor market outcome variables are explained by a set of variables measuring institutions and policies, as well as by the change in inflation. We proceed in an essentially similar fashion by considering, in the baseline specification, six variables characterizing institutions and policies as well as two macro controls, the change in inflation and the cumulative growth of GDP in the 3 years before labor market outcomes are measured.<sup>15</sup> We then test the robustness of the results by removing some of the macro controls or replacing them with alternative measures (such as output growth relative to the pre-transition level of 1989)<sup>16</sup> as well as by deleting influential observations from the estimation sample.

The results that we obtain seem to permit a causal interpretation of institutions and policies impacting on labor market outcomes (see the discussion in the results section), although the reversed causation going from outcomes to institutions and policies is in principle conceivable, for example, via the mechanism of elections (Blanchard 2006). We at any rate try to avoid a direct manifestation of the endogeneity problem by using lagged (t-1) values of the explanatory variables, which can then be regarded as predetermined. So, while labor market outcomes are measured in 1996, 2000, 2004, and 2008, data on institutions and policies come from the years 1995, 1999, 2003, and 2007.

Similar to most other studies, we control for omitted factors (including unobserved characteristics of countries) by using random- or fixed-effects specifications of our regression

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<sup>15</sup> Change in inflation is the key control variable introduced in Nickell (1997) to account for the deviation of the unemployment rate from its natural level and is used in most subsequent studies. As there are concerns about the appropriateness of this measure in the transition context (Cazes 2002), our baseline specification includes a measure of a recent change in GDP, which aims to better account for macroeconomic shocks to which transition economies were still prone to even after the initial recession of the late 1980s – early 1990s.

<sup>16</sup> We also have considered several additional control variables, such as proxies for the enforcement of institutions, which is likely to be sub-optimal in the countries studied. We have attempted to introduce a separate variable measuring enforcement of law based on the data from four waves of the Business Environment and Enterprise Performance Survey (BEEPS), as in Pistor, Raiser, and Gelfer (2000). However, these enforcement measures appear to be too noisy and do not alter the baseline results in any substantial way. As the enforcement of employment protection legislation may be stricter in richer countries that spend more on the judiciary, we have also considered introducing a measure of GDP per capita in the regressions. The results remain qualitatively the same as in the baseline specification, however.

model. These are necessary as the small number of degrees of freedom does not allow inclusion of many potentially relevant explanatory variables. Hence, the baseline regression equation can be written in the following way:

$$LMO_{it} = \alpha + \beta_1 EPL_{it-1} + \beta_2 ALMP_{it-1} + \beta_3 TAX_{it-1} + \beta_4 DENS_{it-1} + \beta_5 BEND_{it-1} + \beta_6 BENF_{it-1} + \beta_7 \Delta Inflation_{it-1} + \beta_8 \Delta GDP_{it-1} + \gamma_t + c_i + \varepsilon_{it} \quad (1)$$

where index  $i$  represents country  $i$  and index  $t$  denotes time,  $t \in \{1996, 2000, 2004, 2008\}$ ,  $LMO$  stands for labor market outcomes (the employment-to-population-ratio -  $ER$ , unemployment rate -  $UR$ , long-term unemployment rate -  $LTUR$ , and youth unemployment rate -  $YUR$ ),  $EPL$  measures the strictness of employment protection legislation,  $ALMP$  is the expenditure on active labor policies as a percentage of GDP,  $TAX$  is the tax wedge on labor,  $DENS$  measures union density,  $BENF$  stands for the average unemployment benefit replacement rate,  $BEND$  stands for the maximum duration of unemployment benefits,  $\Delta Inflation$  is the change in inflation between time  $t$  and  $t-1$ ,  $\Delta GDP$  is the cumulative growth of GDP in years  $t-3$ ,  $t-2$ , and  $t-1$ ,  $\gamma$  is a time effect,  $c$  is a country effect and  $\varepsilon$  is a white noise disturbance. Like many of the previous studies, we do not apply logarithmic transformation to the dependent variables in the model.<sup>17</sup>

As can be seen from the specification of equation (1), we only employ one variable measuring the role of trade unions, since we only have reliable data on union density. This is in contrast to the study by Nickell (1997), which in addition uses union coverage rates as well as data on the wage bargaining type of an economy. These two additional variables are generally only available for CEE countries. Furthermore, including, e.g., data on the bargaining type is not only a problem of measurement, but also of how to interpret these data

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<sup>17</sup> The regressions with log dependent variables show qualitatively similar results, albeit the fit of the models and the statistical significance of the coefficients worsen somewhat.

in some less developed transition countries. For example, how would one interpret data on bargaining in a country where trade unions with high membership rates are effectively controlled by the government? It is therefore no surprise that the World Bank did not provide statistics on the coverage rates and bargaining type in the CIS countries (World Bank 2005).<sup>18</sup> At any rate, we believe that we capture the essential aspects of wage setting with our union density variable since it is regarded as the most important of the related factors (Eichhorst, Feil, and Braun 2008).

Besides using a number of additional control variables, we sharpen the robustness of the results by identifying (using Cook's D statistics) and excluding the most influential observations in the models estimated. In particular, we compare the baseline results with those obtained on sub-samples of the original dataset that exclude up to four most influential observations, which amount to roughly 5 percent of the total sample of 75 observations at hand. This type of correction seems important since the data have been assembled from different sources that exhibit potentially different levels of reliability. There are only small differences in the results of our baseline regression whether we keep or exclude the outliers. However, we present the baseline regression results with the outliers excluded, since the exclusion guarantees more accurate estimates of the regression coefficients (see Belsley et al. 1980).

As a next step, pairwise interactions of labor market institutions and policies are added to the baseline specification. Given the low number of degrees of freedom, only one such interaction is inserted at a time. Following Nickell et al. (2005), the interaction terms are defined in the form of products of deviations of the institutional variables from their sample means. For example, in the case of the interaction between the tax wedge (*TAX*) and the size of the unemployment benefit (*BENF*), the following specification is estimated:

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<sup>18</sup> This also suggests that the union density measures in the former Soviet Union need to be taken cum grano salis.

$$LMO_{it} = \alpha + \beta_1 EPL_{it-1} + \beta_2 ALMP_{it-1} + \beta_3 TAX_{it-1} + \beta_4 DENS_{it-1} + \beta_5 BEND_{it-1} + \beta_6 BENF_{it-1} + \beta_7 (TAX_{it-1} - \overline{TAX})(BENF_{it-1} - \overline{BENF}) + \beta_8 \Delta Inflation_{it-1} + \beta_9 \Delta GDP_{it-1} + \gamma_i + c_i + \varepsilon_{it}, \quad (2)$$

where again  $t \in \{1996, 2000, 2004, 2008\}$  and  $\overline{TAX}$  and  $\overline{BENF}$  are the sample means (taken both over time and across countries) of variables  $TAX$  and  $BENF$ , respectively. In our complex case, where we have more than one labor market outcome, the sign of  $\beta_7$  implying complementarity depends on which outcome we analyze and whether we have an institution/policy whose strengthening has a deleterious or beneficial effect in the labor market. When  $LMO$  is an element of the set  $\{UR, LTUR, YUR\}$  and when the two explanatory variables presumably have a deleterious effect on the performance of the labor market (for example, an increase in the variables  $TAX$  and  $BENF$  are supposed to increase unemployment), then a negative and statistically significant coefficient  $\beta_7$  implies complementarity. In the case of labor market outcome  $ER$ , a *positive* and statistically significant coefficient  $\beta_7$  implies reform complementarity. It might be useful to show these points with our specific example of equation (2).

Let  $LMO_{it}$  be  $UR_{it}$ . Then, if we take the partial derivative with respect to  $Tax_{it-1}$  in equation (2), we get:

$$\frac{\partial UR_{it}}{\partial Tax_{it-1}} = \beta_3 + \beta_7 (Benf_{it-1} - \overline{Benf}).$$

The direct partial ( $\beta_3$ ) should be positive, i.e. lowering  $Tax$  should lower  $UR$ . Lowering benefits should also lower unemployment. So, if  $Benf_{it-1}$  is below the sample mean taken over all countries and time, benefits are relatively employment friendly in country  $i$ . This means that the expression in the parenthesis is negative, so a relatively employment friendly benefit level will complement a lowering of the tax wedge, i.e. will augment the direct positive partial, only if  $\beta_7$  is negative. The same reasoning holds for  $LTUR$  and  $YUR$ .

Now let  $LMO_{it}$  be  $ER_{it}$ . Taking the partial derivative with respect to  $Tax_{it-1}$  gives the same result, but the interpretation is now different:

$$\frac{\partial ER_{it}}{\partial Tax_{it}} = \beta_3 + \beta_7 (Benf_{it-1} - \overline{Benf}).$$

The direct partial is now negative, i.e. lowering  $Tax$  should increase  $ER$ . Again, an employment friendly benefit level implies that the expression in brackets is negative. Hence, for benefits to have a complementary effect when the tax wedge is lowered the coefficient  $\beta_7$  has to be positive.

This kind of reasoning can only be invoked if a more “rigid” (or generous) manifestation of both institutions supposedly has a deleterious effect on labor market performance. For example when we include ALMP as the primary variable the reasoning has to be altered since an increase in the expenditures on ALMP supposedly improves the performance of the labor market, i.e. it increases  $ER$  and decreases  $UR$ . So, when  $LMO = ER$  a negative  $\beta_7$  implies complementarity, while a positive  $\beta_7$  holds when  $LMO$  is an element of the set  $\{UR, LTUR, YUR\}$ .

Following Bassanini and Duval (2009) we also apply instrumental variables to the interaction term in order to check for potential spurious correlations between two institutions that might be uncorrelated but where one of the two is a “stand in” for an omitted institution. We instrument each interaction between two institutions, say  $TAX$  and  $BENF$ , with the product of the deviations of  $TAX$  and  $BENF$  from their respective country-specific means.<sup>19</sup>

In a last step, we also consider interactions of institutions with the overall institutional environment, by using the specification suggested by Bassanini and Duval (2009):

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<sup>19</sup> A formal proof of the validity of such instruments is given in the appendix of Bassanini and Duval (2009). From this proof we, of course, cannot conclude that in all cases these instruments are valid.

$$LMO_{it} = \sum_j \beta_j Inst_{it-1}^j + \sum_k \left( \gamma_k \left( Inst_{it-1}^k - \overline{Inst}^k \right) \left( \sum_j \beta_j \left( Inst_{it-1}^j - \overline{Inst}^j \right) \right) \right) + \beta_7 \Delta Inflation_{it-1} + \beta_8 \Delta GDP_{it-1} + \gamma_t + c_i + \varepsilon_{it} \quad (3)$$

where  $\beta_j$  denotes the direct effect of institution  $Inst^j$  at the sample average or, in other words, for a country with an average institutional environment, whereas  $\gamma_k$  indicates the strength of interaction between  $Inst^k$  and the overall institutional environment, the latter of which is captured by the third summation term in (3). In particular, for  $LMO \in \{UR, LTUR, YUR\}$ , higher values of variables measuring institutions that tend to increase unemployment (such as the tax wedge) would drive this term up (as  $\beta_j$  – the direct effect – is positive for these institutions) while higher values of employment-friendly institutions (such as ALMP) would imply a decrease in this term (as  $\beta_j$  is negative). When  $LMO=ER$ , the opposite occurs. We thus have an interpretation of the  $\gamma_k$ 's in equation (3) that is equivalent to the interpretation of  $\beta_7$ , depending on the labor market outcome analyzed and on whether higher values of an institution have a deleterious or beneficial effect on labor market performance. Again,  $t \in \{1996, 2000, 2004, 2008\}$ . We estimate model (3) using non-linear least squares.

Definitions and descriptive statistics of the variables that we use in our regressions are given in Table 1. This table confirms the tremendous variation in the labor market outcomes, institution and policy variables and shows the large differences in the main macro variables such as inflation and GDP growth in our sample of transition countries.

The control variables are correlated with some of the labor market institution measures as Table A3 demonstrates. We also see that employment protection legislation is negatively correlated with the employment-to-population ratio but positively correlated with the other three outcome variables. Union density is negatively correlated with the employment ratio, and has a positive raw correlation with the long-term and youth unemployment rates. Neither

the tax wedge nor benefit duration show significant raw correlations with labor market outcomes, while the replacement rate and ALMP are weakly correlated with long-term and youth unemployment rates, respectively.

## 5. Results

The random effects and fixed effects estimates of the baseline specification (equation 1) are reported in Table 2. The two estimators give very similar results and since the Hausman test does not reject the consistency of the random effects estimator in the sample being analyzed, we find it sensible to focus on the random effects estimates because of their greater efficiency and because a random effects estimator might be considered best in capturing omitted time-invariant institutions. As discussed above, we have undertaken some robustness checks by estimating equation 1 with and without outliers and by also experimenting with different macro controls. The results of the different specifications diverge little and we prefer to present the results with outliers removed – the results with the second set of macro controls are also shown in table A4 in the appendix.<sup>20</sup> As can be seen from Table 2, labor market outcomes are strongly affected by some of the institutions and policies even with year dummies included.

An increase in the employment protection legislation index strongly depresses the employment rate and boosts the youth unemployment rate, a result that 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. It is, also noteworthy that the main countervailing effect of employment protection put forth in the literature, namely reducing outflows from employment into unemployment (see, e.g., Bertola 1990), can also be inferred from the result that overall unemployment is unaffected. So, a high

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<sup>20</sup> The results of the baseline specification that include outliers are presented in Lehmann and Muravyev (2009).

level of employment protection in transition countries might on average prevent workers' job loss even in the face of enforcement problems while at the same time it might make firms hesitant to create new jobs. Expenditures on ALMP do not affect the employment rate confirming our prior, but they strongly impact on the three unemployment rates. For example, an increase of ALMP expenditures of one tenth of a percentage point will lower the overall unemployment rate by slightly less than half a percentage point, the long-term unemployment rate by about one third of and the youth unemployment rate by a bit more than one percentage point. Our results 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. Finally, with the second set of macro controls we also find that a rise in benefit duration raises the long-term unemployment rate (see table A4).

Clearly, all these significant results are convincing insofar as they are in line with predictions from the theoretical literature. The results connected to ALMP also strike us as strong evidence that we actually look at causal effects. In many studies one finds a positive coefficient on ALMP expenditures when the unemployment rate is the regressand, pointing to an endogeneity problem: governments might react to higher unemployment rates by raising expenditures on ALMP, leading to a positive correlation between the two variables. In transition countries such a reaction by the government is not very likely given the particularly severe budget constraints and the very low levels of ALMP expenditures. More importantly, the coefficients on ALMP expenditures are negative in Table 2 for all three measures of unemployment thus pointing to a causal effect that runs from ALMP expenditures to unemployment. So, it is not only the fact that we use lagged explanatory variables but the results themselves that strengthen our conviction that we are capturing causal effects in Table 2.<sup>21</sup>

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<sup>21</sup> Since we only have four data points over four year intervals, a Granger Causality Test strikes us as not implementable. It also seems not very meaningful given the lag/lead structure of our data, since a rigorous



Our results might also be interpreted with one other important facet of labor markets in transition economies in mind, namely informal employment. If we are to believe the estimates of Schneider et al. (2010) informality is very wide-spread in transition countries. Some labor market institutions and policies might have an impact on the size of informal employment. Perhaps the most interesting result in this regard is that EPL negatively affects the employment-to-population ratio, but does not appear to affect unemployment, except for youth unemployment. If EPL indeed reduces the employment-to-population ratio, where the ratio captures predominantly formal employment, but this reduction is only accompanied by an increase in youth unemployment, this first of all has the straightforward interpretation that EPL *ceteris paribus* depresses labor demand via the channel of reduced hiring of young workers. But 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. By the same token, our results show that higher tax wedges on labor depress the employment-to-population ratio, but there is no corresponding effect on the unemployment rates. So, this seems to suggest that higher taxes on labor further the incidence of informal work in transition countries.

In OECD (2008), higher values of the two mentioned institutions, EPL and taxes on labor, are indeed found to boost informal employment in the Visegrad countries and in Slovenia. While there is strong and unequivocal evidence that taxes on labor have a deleterious effect on formal employment, the evidence on the impact of EPL is more mixed since only where enforcement mechanisms are weak enhanced employment protection makes firms hire workers on an informal basis. So, even though we do not have a measure of informal employment in our data set, but an imprecise measure of its complement, our results

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interpretation of the Granger Causality Test prompts one only to conclude that one variable leads another variable but not that one variable is truly caused by this other variable.

produced for the largest set of transition countries to date seem to suggest that more rigid labor market institutions and higher costs on labor encourage informal employment.<sup>22</sup>

We now turn to the regression analysis that deals with the interactions of institutions. As already mentioned, we introduce one interaction at a time in the regression model which is then estimated using the random-effects estimator. As we have 6 institutional variables, there are 15 possible interactions. Table 3 shows the results of estimating model (2) for the four dependent variables and 15 pair-wise interactions. Note that the table reports only the estimated coefficients on the interactions as well as the associated standard errors, and each estimate comes from a separate regression.<sup>23</sup> The first interesting result in Table 3 concerns interactions of ALMP with other institutions. As elaborated above, in the case of *ER* a negative and significant coefficient on the interaction of ALMP with another variable, which negatively affects labor market performance, implies complementarity while the coefficient is positive when we deal with *UR*, *LTUR* or *YUR*. We find positive and significant coefficients on the interaction of ALMP with the tax wedge (for unemployment and long-term unemployment), positive and significant coefficients on the interaction of ALMP with union density (in all regressions except for the one with employment to population ratio), as well as a positive and significant coefficient on the interaction of ALMP with EPL in the regression with long-term unemployment rate as the dependent variable. Overall, these results may be interpreted as suggesting that active labor market programs are more effective in tackling the three types of unemployment in an economy with lower taxes, lower unionization, or lower employment protection.

The only other interesting result transpiring from Table 3 concerns the interaction of the tax wedge and benefit duration. This interaction enters the regressions with long-term unemployment and youth unemployment with negative and statistically significant

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<sup>22</sup> Even if there is measurement error in *ER*, as long as this error is not correlated with  $\varepsilon_{it}$ , our results are consistent even though they are not efficient.

<sup>23</sup> These separate regressions are not shown here but available upon request.

coefficients, thus suggesting complementarity between policies aimed at reducing the tax wedge and policies aimed at restricting the duration of unemployment benefits. The effect of one measure will be stronger if accompanied by the other. The point estimates also imply that reducing the costs of labor benefits more young job seekers than the long-term unemployed when benefit duration is simultaneously shortened.

The results related to ALMP do not survive if we instrument the interactions. This, however, does not necessarily imply that all the OLS estimates are spurious since the used instruments turn out to be very weak in the case of four interactions (Table A5). Only when ALMP is interacted with EPL do we have strong instruments but insignificant coefficients on the interactions. It is noteworthy, though, that with strong instruments we have significant and similar point estimates for the interaction of the tax wedge and benefit duration when *LTUR* and *YUR* are the regressands. We also find a significant complementarity of reducing union density and benefit duration for the long-term and young unemployed. As long as unions discriminate against outsiders (the long-term unemployed and the young) shortening the duration of benefits in a less unionized economy might boost outflows out of unemployment for these outsiders.

Most noteworthy is, however, the fact that the interaction of the tax wedge and benefit duration significantly affects long-term and youth unemployment whether we use OLS or IV estimation. We should also stress that for overall unemployment we have a negative coefficient that is close to significance in both OLS and IV regressions. So, in transition countries lowering the cost of labor will result in hires out of unemployment, and in particular out of long-term and youth unemployment, if the cost of searching is increased for the unemployed.

Finally, results of the regression analysis that focuses on systemic interactions across institutions are shown in Table 5. For each *LMO* there are six coefficients characterizing the

direct effect of each institution ( $\beta_j$ ) in as well as six coefficients ( $\gamma_k$ ) characterizing the strength of interaction between each institution and the overall institutional environment. We should interpret the results presented in Table 5 taking into account the substantial increase in the number of regressors in this specification which, given the small number of observations, inevitably implies less precise regression estimates. We therefore discuss not only those coefficients that turn out to be statistically significant at the conventional significance levels, but also the coefficients with t-statistics exceeding unity, since this typically allows to make inferences about the sign of the relationship between the variables of interest).

The estimated direct effects of each institution are in line with those reported in Table 2 for the baseline specification. In particular, *EPL* appears to have a negative effect on *ER* and positive effect on *YUR* across the two set of estimates, albeit in the “systemic interactions” model with *ER* as the dependent variable the coefficient falls short of achieving statistical significance. Similarly, both in the baseline specification and in the “systemic interactions” model the coefficients on the variable *TAX* are negative, close to each other in magnitude and statistically significant, implying that higher taxes decrease the employment-to-population ratio.

With respect to the interactions of individual institutions with the overall institutional environment, the picture is somewhat less clear. Although seven of twenty-four coefficients have t-statistics greater than unity, neither achieves statistical significance at the conventional levels. If one resorts to the sign interpretation of the coefficients with t-statistics greater than unity, five of seven of them have the expected sign.<sup>24</sup> For example, the sign of coefficient  $\gamma$  on variable *BEND* in the equations with *ER*, *UR* and *YUR* as the dependent variables would suggest that lowering benefit duration would lead to a more pronounced decrease in the two unemployment types and a stronger increase in employment if other institutions are more

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<sup>24</sup> The two coefficients that are wrongly signed are those on variables *ALMP* and *TAX* in the *ER* equation.

employment-friendly. Similarly, 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.

We would like to stress that our analysis is only a first attempt at linking labor market outcomes and institutions in transition countries since there are at least three caveats that one might want to address in future research. First, there is a potential for refining the estimates as soon as more data from the transition region become available.<sup>25</sup> The second caveat relates to international migration as a means of mitigating the tension in the labor market. Nickell (1997) proceeded under the assumption that “[d]ifferent European countries are effectively different labor markets with the intercountry movement of labor being very small, mainly because of language and cultural barriers.” This may have been true in the 1980s in the EU-15, but the recent experience of large temporary migration of workers from the new member states to the UK and Ireland has to be interpreted as evidence that migration matters for labor market outcomes in host as well as sender countries. Also, until the crisis 2008, international undocumented migration was a wide spread phenomenon within the transition region itself, with Russia taking the brunt of this migration and having millions of foreign migrants from Central Asia and Caucasus, but also from Moldova, Belarus and Ukraine working predominantly without permits. The third caveat relates to the varying degree of informal employment across transition countries. The informal economy was not insignificant even before the collapse of the iron curtain, but definitely took off in the less developed countries of the region in the 1990s. A dramatic decline in employment-to-population ratios observed in some countries of South-Eastern Europe and of Central Asia might point to a rise in informal employment. Also, Lehmann (2009) moots for, e.g., Macedonia that a large part of the long-

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<sup>25</sup> For example, OECD has recently expanded its EPL database by adding retrospective data for a number of transition countries.

term unemployed are workers who are sporadically employed in the informal economy. Thus informal employment may distort the observed labor market outcomes in the less developed transition countries to some degree. At any rate, these three caveats do not invalidate our results but they point to future potential refinements of our research.

## **Conclusions**

In our analysis we use a unique data set that covers labor market outcomes, labor market institutions and macroeconomic controls from early to late transition, i.e., from 1995 to 2008, for the majority of transition countries, including countries of Central and Eastern Europe (CEE), South-Eastern Europe (SEE) and most of the successor states of the Soviet Union. Our data set is unique in that we bring together compatible data on the above mentioned items from these three regions. We investigate the importance of labor market institutions for labor market outcomes in transition countries. Given the large shocks and their tremendous variation across countries and time and given the fact that changes in labor market institutions over a relatively short span are more pronounced than in mature capitalist economies the pursuit of this research question strikes us as particularly fruitful with the help of the collected data.

The descriptive analysis shows that there are large differences regarding labor market outcomes across the three regions and over time. The general picture regarding the evolution of labor market institutions points to a liberalization of labor markets in the region that is more pronounced than in the old EU member states.

The econometric evidence that we present shows the importance of labor market institutions in the determination of labor market outcomes and is in line with the idea that the deregulation of labor markets improves their performance. In our baseline estimations we use the random effects estimator and lag the institutions and policies by one period. Because of

this estimation strategy and because labor market institutions evolve slowly over time we think of these correlations as pointing to causal effects that run from institutions to labor market outcomes. Importantly, we find that not all of the institutions and policies matter and when they do, then not to the same extent. In particular, we find a robust negative effect of stricter employment protection on employment and a significant positive impact on youth unemployment, while active labor market policies do not affect employment but strongly all three types of unemployment, in particular youth unemployment. The tax wedge is found to have a strong impact on the employment-to-population ratio, but not on any of the unemployment types, a result that might point at a scenario where high labor costs push workers into informal employment. The other institutions do not seem to determine labor market outcomes in a significant way. The results from these base line regressions alone show that we can gain when we analyze more than just the labor market outcome overall unemployment ( $UR$ ).

When we look at single interactions of one policy or one institution with one other institution we can establish two interesting results. First, active labor market policies, which never impact on employment, are more effective in tackling the three types of unemployment in an economy where taxes on labor are lower, there is less unionization and lower employment protection. The second result, which is particularly robust, points to a complementary interaction of the tax wedge and the duration of unemployment benefits. Lowering taxes on labor will decrease long-term and youth unemployment more when benefit duration is shortened. This implies a clear interaction of labor demand and labor supply as firms will hire more workers whose search costs have increased and thus whose reservation wages have fallen.

Our analysis of the interactions of individual institutions with the overall institutional environment is somewhat plagued by the low degrees of freedom. We, therefore, highlight

results with a t-statistic greater than 1 as we thus can establish the sign of the interaction. Two results are particularly noteworthy. Shortening benefit duration will raise employment in a more pronounced way and will have a larger negative impact on unemployment and youth unemployment if the overall environment is more employment-friendly. Furthermore, under such circumstances, an increase in expenditures on ALMP will more dramatically lower the unemployment rate. These results in tandem with those about individual interactions demonstrate that reforming two institutions jointly or applying broad reform packages will generate larger benefits than focusing on the reform of one single labor market institution.



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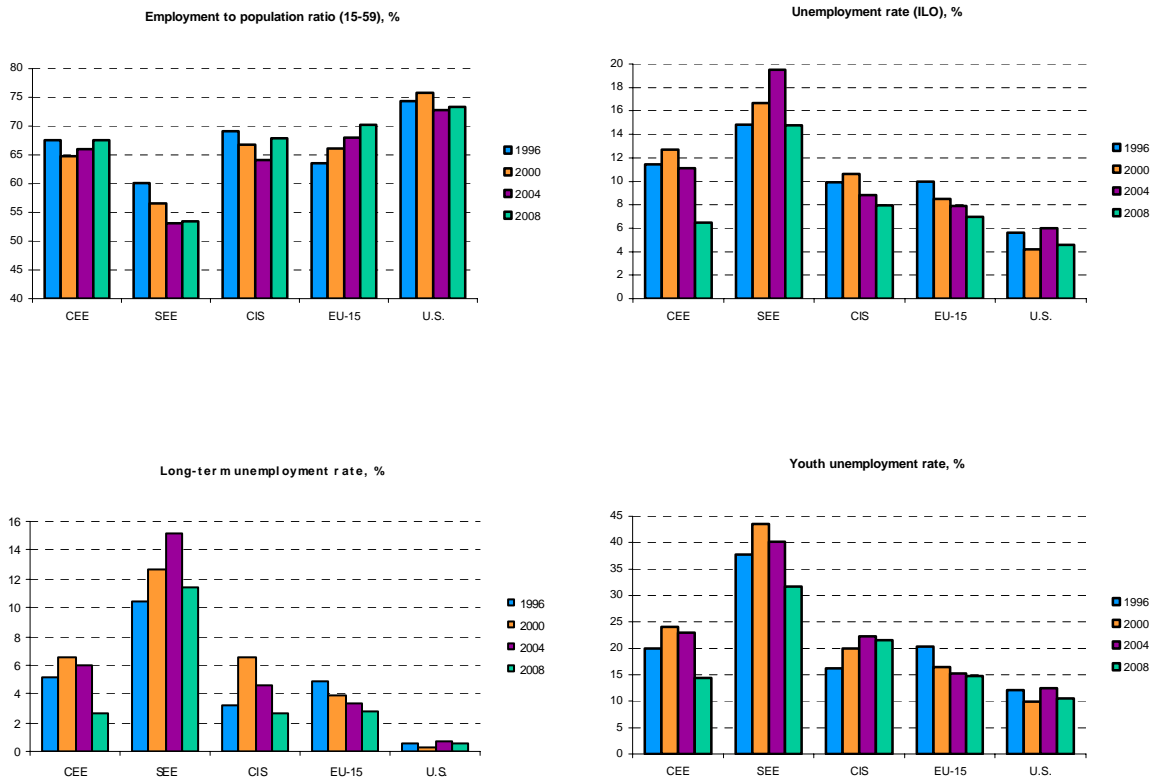
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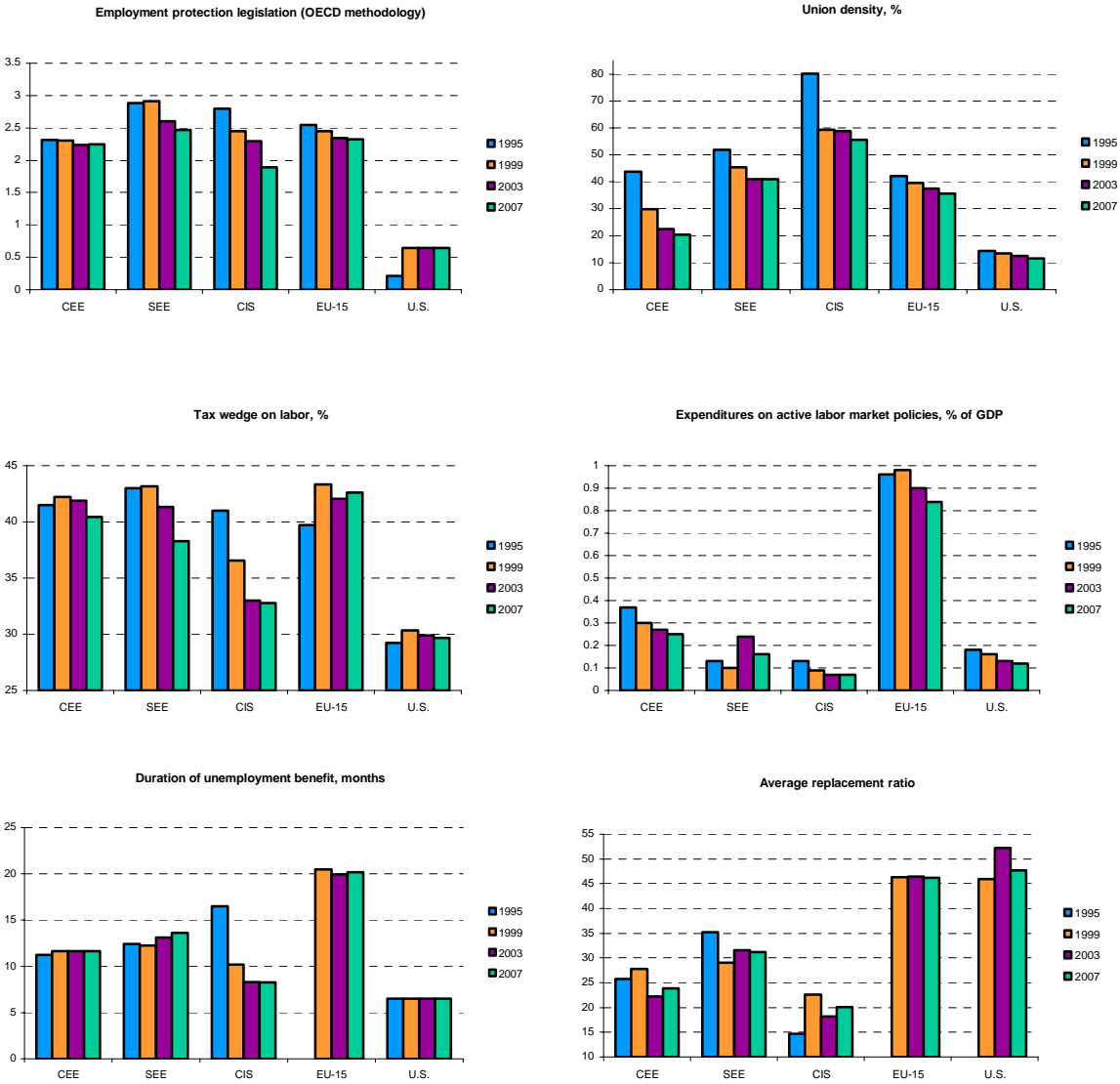
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**Figure 1. Labor market outcomes by region.**



**Figure 2. Labor market institutions by region.**



Source: For transition countries: Data Base of IZA Program Area “Labor markets in emerging and transition economies”, OECD and Eurostat for other countries.

**Table 1. Descriptive statistics and definitions of variables, final estimation sample.**

Variable	Short description	Obs	Mean	Std. Dev.	Min	Max
ER	Employment-to-population ratio, %	75	61.92	9.97	33.60	77.60
UR	Unemployment rate (ILO), %	75	12.13	7.15	3.90	37.20
LTUR	Long-term unemployment rate (ILO), %	71	7.62	6.88	0.57	31.77
YUR	Youth unemployment rate (percent unemployed among 15-24 years old)	74	27.33	15.19	7.20	69.50
EPL	Employment protection legislation, overall index (OECD)	75	2.46	0.55	1.52	4.10
DENS	Union density, %	75	40.54	19.51	13.18	94.00
TAX	Tax wedge on labor, %	75	39.63	4.75	23.00	48.27
ALMP	Expenditures on active labor market policies, % GDP	75	0.20	0.18	0.01	0.83
BENF	Unempl. benefit replacement ratio (average benefit to average wage)	75	26.11	10.81	7.00	60.00
BEND	Maximum duration of unemployment benefit, months	75	11.97	5.21	6.00	24.00
$\Delta$ Inflation	Change in inflation rate, %	75	-6.77	26.01	-110.60	58.07
$GDP_{t-1}/GDP_{1989}$	GDP level in relation to GDP in 1989	75	0.91	0.31	0.34	1.77
$\Delta$ GDP_3Y	Cumulative GDP growth in the three preceding years	75	1.15	0.18	0.76	2.00

Source: Data Base of IZA Program Area "Labor markets in emerging and transition economies."



**Table 2. Labor market performance, institutions and policies: baseline regression results with outliers eliminated.**

	Employment rate		Unemployment rate		Long-term unemployment rate		Youth unemployment rate	
	RE	FE	RE	FE	RE	FE	RE	FE
EPL	-4.345*** (1.449)	-4.258** (1.505)	0.255 (0.705)	0.079 (0.779)	0.223 (0.552)	0.078 (0.636)	5.677*** (1.537)	5.206*** (1.496)
ALMP	2.798 (2.753)	2.736 (3.100)	-4.633** (1.928)	-4.342* (2.327)	-3.182** (1.597)	-2.762 (1.851)	-11.481*** (3.194)	-11.736*** (3.167)
TAX	-0.308** (0.144)	-0.336** (0.148)	-0.064 (0.132)	-0.061 (0.129)	-0.048 (0.096)	-0.032 (0.094)	-0.452 (0.290)	-0.372 (0.317)
DENS	-0.031 (0.039)	-0.007 (0.048)	0.030 (0.031)	0.033 (0.031)	0.006 (0.031)	0.007 (0.030)	0.037 (0.046)	0.031 (0.051)
BEND	-0.141 (0.186)	-0.139 (0.193)	0.020 (0.103)	0.016 (0.121)	0.043 (0.070)	0.045 (0.072)	0.040 (0.191)	-0.051 (0.227)
BENF	0.009 (0.099)	0.014 (0.112)	0.026 (0.075)	-0.012 (0.090)	0.011 (0.050)	-0.028 (0.055)	-0.013 (0.160)	-0.076 (0.181)
ΔInflation	-0.015 (0.028)	-0.020 (0.028)	0.005 (0.013)	0.007 (0.013)	0.008 (0.011)	0.010 (0.011)	-0.034 (0.034)	-0.031 (0.032)
ΔGDP_3Y	-2.983 (2.609)	-2.543 (3.045)	-8.475*** (2.788)	-8.198** (3.182)	-8.094*** (2.112)	-8.399*** (2.251)	-16.471*** (5.067)	-15.888*** (5.424)
Y2000	-2.122 (1.784)	-1.642 (1.730)	2.643** (1.331)	2.579* (1.305)	2.014* (1.068)	1.956* (1.028)	7.447*** (2.615)	6.916** (2.567)
Y2004	-4.004* (2.066)	-3.314 (2.115)	2.155 (1.731)	1.931 (1.647)	2.292 (1.405)	2.108 (1.289)	6.376** (2.838)	5.693* (2.783)
Y2008	-3.477 (2.414)	-2.792 (2.332)	-0.719 (1.794)	-0.898 (1.665)	-0.122 (1.584)	-0.275 (1.444)	-0.904 (2.955)	-1.437 (2.819)
Intercept	92.457*** (6.852)	91.701*** (8.100)	21.166*** (7.298)	22.225*** (7.200)	16.563*** (5.250)	17.617*** (5.448)	47.262*** (15.965)	47.594*** (15.898)
r2	0.36	.36	0.59	.59	0.60	.60	0.66	.66
N	74	74	73	73	69	69	73	73
Spec. tests:								
Breusch-Pagan	67.74 (0.000)		72.51 (0.000)		72.48 (0.000)		50.25 (0.000)	
Hausman	1.14 (0.999)		1.56 (0.999)		2.59 (0.995)		2.58 (0.995)	

Notes: The results are obtained using the random- (RE) or fixed-effects (FE) estimators with cluster-robust standard errors (clustering by country). Standard errors are reported in parentheses. Asterisks denote significance levels: \*\*\* - significant at 1%, \*\* - significant at 5% and \* - significant at 10%. R2 refers to the within variation in the data. Breusch and Pagan test for random effects as well as Hausman test are reported at the foot of the table. The first number in these tests is the Chi2 statistics, the second number is the probability level.

**Table 3. Pairwise interactions between different institutions and policies.**

	ER	UR	LTUR	YUR
ALMP_TAX	-1.109 (0.806)	1.602** (0.746)	1.647** (0.725)	1.424 (1.090)
ALMP_DENS	-0.135 (0.186)	0.399** (0.179)	0.332** (0.156)	0.609** (0.271)
ALMP_BENF	-0.145 (0.331)	-0.119 (0.276)	-0.021 (0.210)	0.067 (0.535)
ALMP_BEND	-0.563 (0.417)	-0.036 (0.417)	0.037 (0.374)	-0.204 (0.665)
ALMP_EPL	1.526 (4.546)	5.344 (3.254)	5.556* (3.065)	6.409 (4.880)
EPL_TAX	0.094 (0.224)	0.329 (0.200)	0.299 (0.192)	0.375 (0.352)
EPL_DENS	0.018 (0.060)	0.004 (0.045)	0.002 (0.032)	-0.052 (0.094)
EPL_BENF	-0.106 (0.071)	-0.003 (0.090)	-0.005 (0.085)	0.102 (0.177)
EPL_BEND	0.042 (0.122)	-0.121 (0.147)	-0.098 (0.148)	-0.383 (0.351)
TAX_DENS	0.000 (0.006)	0.004 (0.006)	0.008 (0.006)	-0.008 (0.009)
TAX_BENF	0.019 (0.016)	-0.016 (0.014)	-0.007 (0.012)	-0.022 (0.027)
TAX_BEND	-0.003 (0.036)	-0.040 (0.026)	-0.045* (0.024)	-0.121*** (0.037)
DENS_BENF	-0.003 (0.004)	-0.001 (0.003)	0.002 (0.003)	0.003 (0.006)
DENS_BEND	-0.007 (0.005)	-0.003 (0.005)	-0.002 (0.005)	-0.011 (0.013)
BENF_BEND	-0.011 (0.013)	-0.000 (0.009)	-0.000 (0.007)	0.019 (0.015)

Notes: Each coefficient in the table is taken from a separate regression (the baseline specification augmented with a single interaction). The results are obtained using the random-effects estimators with cluster-robust standard errors (clustering by country). Standard errors for the coefficient on the interaction terms are reported in parentheses. Asterisks denote significance levels: \*\*\* - significant at 1%, \*\* - significant at 5% and \* - significant at 10%.

**Table 4. Pairwise interactions between different institutions and policies: IV regressions.**

	ER	UR	LTUR	YUR
ALMP_TAX	-7.288 (8.551)	-1.330 (4.226)	-5.068 (6.594)	3.124 (8.333)
ALMP_DENS	-0.321 (0.527)	0.371 (0.357)	0.208 (0.289)	0.261 (0.706)
ALMP_BENF	-0.528 (2.179)	-0.907 (1.745)	-0.276 (1.530)	-0.931 (3.199)
ALMP_BEND	-3.262 (4.442)	4.495 (4.534)	2.416 (3.038)	8.293 (9.658)
EPL_ALMP	138.042 (202.926)	-109.376 (389.907)	18.663 (41.185)	-101.27 (126.051)
EPL_TAX	1.746 (1.308)	-0.088 (0.976)	0.731 (0.746)	-3.633 (2.637)
EPL_DENS	0.029 (0.137)	0.031 (0.098)	0.033 (0.061)	0.192 (0.200)
EPL_BENF	-0.023 (0.205)	-0.051 (0.153)	-0.128 (0.135)	0.009 (0.293)
EPL_BEND	-0.382 (0.432)	-0.381 (0.333)	-0.37 (0.258)	-0.952 (0.638)
TAX_DENS	0.102 (0.135)	-0.012 (0.054)	-0.001 (0.132)	-0.161 (0.123)
TAX_BENF	0.032 (0.023)	-0.006 (0.017)	0.004 (0.017)	-0.007 (0.037)
TAX_BEND	-0.028 (0.054)	-0.062 (0.039)	<b>-0.059**</b> (0.030)	<b>-0.143**</b> (0.064)
DENS_BENF	0.003 (0.012)	-0.017 (0.011)	-0.005 (0.007)	-0.019 (0.017)
DENS_BEND	0.005 (0.013)	-0.016 (0.010)	<b>-0.015*</b> (0.009)	<b>-0.045**</b> (0.022)
BENF_BEND	-0.062 (0.181)	-0.059 (0.086)	-0.007 (0.037)	-0.11 (0.204)

Notes: Each coefficient in the table is taken from a separate regression (the baseline specification augmented with a single interaction). The results are obtained using the random-effects estimators with cluster-robust standard errors (clustering by country). Standard errors for the coefficient on the interaction terms are reported in parentheses. Asterisks denote significance levels: \*\*\* - significant at 1%, \*\* - significant at 5% and \* - significant at 10%.

**Table 5. Systemic interactions across institutions, non-linear OLS estimates.**

	ER	UR	LTUR	YUR
$\beta$ : Direct effect of institutions:				
EPL	<b>-2.028</b> (1.624)	0.205 (0.550)	0.240 (0.437)	<b>3.448*</b> (1.743)
ALMP	0.189 (2.766)	-0.589 (1.592)	-0.155 (0.425)	-2.820 (3.228)
TAX	<b>-0.382*</b> (0.192)	0.132 (0.134)	0.102 (0.141)	0.018 (0.166)
DENS	<b>-0.147</b> (0.097)	<b>0.042</b> (0.034)	0.003 (0.015)	-0.042 (0.042)
BEND	<b>-0.254</b> (0.206)	-0.047 (0.100)	-0.042 (0.092)	-0.091 (0.137)
BENF	0.013 (0.107)	0.017 (0.053)	0.019 (0.040)	-0.070 (0.094)
$\gamma$ : Interactions between institutions and the sum of direct effects:				
EPL	-0.012 (0.507)	0.638 (1.233)	0.822 (2.287)	0.591 (0.730)
ALMP	<b>1.237</b> (1.207)	<b>8.789</b> (8.707)	16.950 (24.339)	3.259 (4.054)
TAX	<b>-0.027</b> (0.022)	-0.022 (0.095)	-0.003 (0.119)	0.115 (0.159)
DENS	-0.012 (0.025)	0.009 (0.033)	0.008 (0.040)	<b>-0.040</b> (0.034)
BEND	<b>0.060</b> (0.045)	<b>-0.092</b> (0.090)	-0.064 (0.107)	<b>-0.207</b> (0.191)
BENF	0.009 (0.015)	-0.091 (0.113)	-0.096 (0.185)	0.057 (0.068)
Other variables:				
$\Delta$ Inflation	-0.001 (0.042)	-0.005 (0.015)	0.003 (0.012)	-0.029 (0.044)
$\Delta$ GDP_3Y	-7.108* (3.935)	-9.256*** (2.818)	-9.726*** (1.955)	-14.451** (5.783)
Country dummies	YES***	YES***	YES***	YES***
Time dummies	YES***	YES***	YES***	YES***
r <sup>2</sup>	0.99	.98	.99	.99
N	75	75	71	74

Notes: The results are obtained using a non-linear OLS estimator with cluster-robust standard errors (clustering by country). Standard errors are reported in parentheses. Asterisks denote significance levels: \*\*\* - significant at 1%, \*\* - significant at 5% and \* - significant at 10%. Coefficients with corresponding t-statistics greater than 1 in absolute value, are marked bold italic.

## Appendix I

**Table A1. GDP level in percentage of GDP in 1989 (pre-transition).**

country	1992	1996	2000	2004	2008
Albania	60.1	85.7	102.4	127.7	161.7
Armenia	47.6	48.8	59.2	92.6	145.2
Azerbaijan	67.9	37.4	51.1	71.7	160.3
Belarus	88.1	65.5	86.5	113.6	163.4
Bosnia & Herzegovina	35.0	32.0	61.7	73.8	92.4
Bulgaria	77.2	72.1	76.4	93.0	118.7
Croatia	67.3	74.0	81.9	98.1	115.6
Czech Republic	84.6	97.1	100.5	113.6	141.0
Estonia	67.4	67.5	88.0	117.6	145.2
Georgia	37.0	26.6	31.8	41.3	56.7
Hungary	82.4	88.5	106.3	125.9	138.5
Kazakhstan	84.0	61.4	69.1	103.1	140.8
Kyrgyzstan	83.9	59.1	72.4	87.3	104.9
Latvia	54.6	50.3	63.0	84.5	110.0
Lithuania	70.6	56.8	68.0	91.8	119.7
Macedonia	79.0	71.8	82.0	84.5	101.7
Moldova	58.1	36.8	34.5	45.2	56.8
Montenegro	60.5	49.3	56.9	62.7	84.5
Poland	88.1	109.6	134.3	150.8	185.6
Romania	75.0	88.1	80.2	101.5	129.7
Russia	78.7	58.0	65.2	82.5	107.9
Serbia	60.5	49.3	52.0	63.2	79.2
Slovakia	77.6	89.1	98.7	117.7	159.8
Slovenia	82.1	95.8	114.5	131.3	160.4
Tajikistan	65.6	38.3	46.1	67.6	89.7
Turkmenistan	90.9	58.6	76.6	143.4	221.3
Ukraine	77.5	40.5	40.7	57.3	69.6
Uzbekistan	89.8	83.8	96.9	117.9	161.5

Source: IMF (World Economic Outlook), World Bank (World Development Indicators), and EBRD.

**Table A2. Unemployment rates in the transition countries, %.**

country	1992	1996	2000	2004	2008
Albania	26.0	12.0	16.8	14.4	12.7
Armenia	1.8	9.3	11.7	9.6	6.3
Azerbaijan	0.2*	0.9*	12.8	8.4	6.1
Belarus	0.5*	4.0*	2.1*	1.9*	0.8*
Bosnia & Herzegovina	n/a	n/a	16.0	22.0	23.4
Bulgaria	15.3*	13.5	16.3	12.0	5.6
Croatia	15.3*	10.0	16.1	13.8	8.4
Czech Republic	2.6*	3.9	8.8	8.3	4.4
Estonia	3.7	9.9	13.6	9.7	5.5
Georgia	2.3*	2.4*	10.8	12.6	16.5
Hungary	9.8	9.9	6.4	6.1	7.8
Kazakhstan	0.4*	13.0	12.8	8.4	6.6
Kyrgyzstan	0.1*	4.3*	13.9	8.5	11.1
Latvia	2.3*	20.6	14.4	10.4	7.5
Lithuania	3.5*	16.4	16.4	11.4	5.8
Macedonia	26.3*	31.9	32.2	37.2	33.8
Moldova	0.7*	1.5*	8.5	8.1	4.0
Montenegro	n/a	26.1**	26.5**	30.3	14.7
Poland	13.6*	12.3	16.1	19.0	7.1
Romania	8.2*	6.7	7.1	8.0	5.8
Russia	5.2	9.7	9.8	7.8	6.4
Serbia	n/a	26.1**	12.1	18.5	13.6
Slovakia	11.4*	11.3	18.6	18.1	9.5
Slovenia	11.5*	7.3	7.2	6.1	4.4
Tajikistan	0.4*	2.6*	9.3	7.4	2.3*
Turkmenistan	2.4*	1.9*	4.9	2.6*	4.1*
Ukraine	0.4*	7.6	11.6	8.6	6.4
Uzbekistan	0.1*	0.3*	0.4*	0.4*	0.2*

Sources: ILO, IMF, TransMonee database. Observations marked by asterisk (\*) represent registered unemployment rate. Data for Tajikistan 2008 refer to 2007. Observations marked by double asterisk (\*\*) are registered unemployment rates for Yugoslavia; data taken from UNECE Economic Survey of Europe 1998 No. 1 and 2001 No. 2. Data for Turkmenistan 1992 refer to 1991, data for 1996 refer to 1997 and data for 2008 refer to 2006. Data for Ukraine 1992 refer to 1993. Data for Uzbekistan 2008 refer to 2006.

**Table A3. Piecewise correlations of the variables, final estimation sample.**

	ER	UR	LTUR	YUR	EPL	DENS	TAX	ALMP	BENF	BEND	$\Delta$ Inflation	$\Delta$ GDP_198	$\Delta$ GDP_3Y
ER	X												
UR	-0.71***	X											
LTUR	0.00	0.00	X										
YUR	-0.74***	0.81***	0.82***	X									
EPL	0.00	0.00	0.00	0.00	X								
DENS	-0.32***	0.34***	0.35***	0.42***	0.38***	X							
TAX	-0.25**	0.17	0.20*	0.24**	0.03	0.00	X						
ALMP	0.08	0.15	0.08	-0.09	0.04	0.00	-0.27**	X					
BENF	0.48	0.21	0.50	0.46	1.00	0.02	0.33***	0.22*	X				
BEND	0.09	-0.09	-0.12	-0.19*	-0.07	-0.18	0.00	0.23*	0.22*	X			
$\Delta$ Inflation	0.46	0.43	0.31	0.10	0.52	0.12	0.12	0.05	0.06	0.51***	X		
$\Delta$ GDP_198	-0.13	0.17	0.20*	0.09	0.14	0.10	0.10	0.05	0.06	0.01	0.00	X	
$\Delta$ GDP_3Y	0.28	0.14	0.09	0.45	0.24	0.40	0.11	0.36	0.06	0.01	0.00	0.15	X
GDP <sub>t-1</sub> /GDP <sub>1989</sub>	-0.09	0.04	0.05	0.09	0.22*	0.12	0.11	0.36	0.06	0.01	0.00	0.15	0.21
	0.45	0.72	0.66	0.45	0.05	0.30	0.31	0.07	0.65	0.56	0.19	0.31***	0.01
	0.00	-0.15	-0.13	-0.17	-0.23**	-0.12	-0.21*	0.05	-0.07	-0.15	X		
	0.98	0.19	0.27	0.14	0.04	0.31	0.07	0.65	0.56	0.19		X	
	0.09	-0.24**	-0.21*	-0.23**	-0.29**	-0.55***	0.12	0.20*	-0.07	0.13	0.15		X
	0.45	0.04	0.09	0.05	0.01	0.00	0.32	0.09	0.53	0.27	0.21		
	-0.08	-0.22*	-0.14	-0.06	-0.07	-0.18	-0.45***	-0.14	-0.02	-0.14	0.33***	0.31***	X
	0.49	0.06	0.24	0.64	0.53	0.13	0.00	0.24	0.85	0.24	0.00	0.01	

Note: Asterisks denote significance levels: \*\*\* - significant at 1%, \*\* - significant at 5% and \* - significant at 10%.

**Table A4. Additional estimates with change in inflation and  $GDP_{t-1}/GDP_{1989}$  as macro-controls, outliers removed.**

	Employment rate		Unemployment rate		Long-term unemployment rate		Youth unemployment rate	
	RE	FE	RE	FE	RE	FE	RE	FE
EPL	-4.399*** (1.690)	-4.068** (1.800)	-0.243 (1.035)	-0.438 (1.130)	0.548 (0.649)	0.296 (0.678)	3.408* (1.853)	2.872 (2.090)
ALMP	6.150* (3.416)	7.361* (3.761)	-5.152*** (1.915)	-5.144** (2.329)	-4.310*** (1.286)	-4.028** (1.515)	-12.185*** (4.345)	-12.009** (4.957)
TAX	-0.249 (0.169)	-0.279 (0.194)	0.081 (0.121)	0.075 (0.132)	0.006 (0.100)	0.045 (0.120)	0.312 (0.250)	0.389 (0.291)
DENS	-0.079 (0.059)	-0.075 (0.067)	0.024 (0.038)	0.032 (0.042)	-0.023 (0.035)	-0.018 (0.034)	0.022 (0.066)	0.019 (0.067)
BEND	-0.094 (0.190)	-0.123 (0.214)	0.088 (0.086)	0.046 (0.122)	0.125** (0.059)	0.090 (0.053)	0.274 (0.229)	0.083 (0.293)
BENF	-0.023 (0.095)	-0.018 (0.118)	-0.031 (0.072)	-0.067 (0.090)	-0.001 (0.052)	-0.058 (0.057)	-0.181 (0.156)	-0.272 (0.184)
$\Delta$ Inflation	0.013 (0.024)	0.011 (0.024)	-0.004 (0.014)	-0.005 (0.014)	0.001 (0.011)	0.000 (0.011)	-0.029 (0.045)	-0.022 (0.038)
$GDP_{t-1}/GDP_{1989}$	1.213 (5.053)	1.119 (6.023)	-4.299 (3.455)	-4.714 (4.372)	-3.377 (2.951)	-4.983 (4.066)	-7.028 (6.548)	-5.865 (7.983)
Y2000	-4.770** (1.941)	-4.459** (2.015)	2.758* (1.531)	2.847* (1.568)	1.959* (1.041)	1.925* (1.017)	6.097** (2.647)	5.341** (2.567)
Y2004	-8.229*** (2.073)	-7.961*** (2.234)	2.414 (2.147)	2.479 (2.355)	1.884 (1.780)	2.133 (1.968)	5.350 (3.361)	4.336 (3.464)
Y2008	-8.277** (3.492)	-7.925** (3.730)	0.145 (2.928)	0.481 (3.348)	-0.155 (2.818)	0.600 (3.314)	0.929 (4.665)	-0.311 (5.083)
Intercept	91.423*** (6.982)	91.580*** (9.244)	11.456* (6.662)	13.006* (7.171)	7.991* (4.638)	9.204* (4.878)	12.362 (13.349)	14.683 (15.310)
r2	0.43	.43	0.51	.51	0.48	.5	0.56	.57
N	71	71	71	71	67	67	70	70

Notes: The results are obtained using the random- (RE) or fixed-effects (FE) estimators with cluster-robust standard errors (clustering by country). Standard errors are reported in parentheses. Asterisks denote significance levels: \*\*\* - significant at 1%, \*\* - significant at 5% and \* - significant at 10%. R2 refers to the within variation in the data.



**Table A5. Results of the F-test for the strength of the instruments in the first-stage regressions.**

	ER	UR	LTUR	YUR
ALMP_TAX	1.1	1.1	1.0	1.1
ALMP_DENS	2.5	2.5	2.3	2.2
ALMP_BENF	0.8	0.8	1.5	1.5
ALMP_BEND	1.2	1.2	1.1	1.1
EPL_ALMP	8.5	8.5	<b>19.3</b>	<b>13.1</b>
EPL_TAX	<b>13.6</b>	<b>13.6</b>	<b>16.4</b>	<b>10.8</b>
EPL_DENS	2.9	2.9	2.0	2.3
EPL_BENF	5.3	5.3	4.3	5.4
EPL_BEND	<b>76.2</b>	<b>76.2</b>	<b>60.1</b>	<b>69.5</b>
TAX_DENS	2.7	2.7	3.2	3.1
TAX_BENF	1.1	1.1	1.1	1.1
TAX_BEND	<b>28.5</b>	<b>28.5</b>	<b>17.7</b>	<b>17.8</b>
DENS_BENF	7.9	7.9	6.7	5.7
DENS_BEND	<b>37.0</b>	<b>37.0</b>	<b>18.1</b>	<b>22.0</b>
BENF_BEND	1.2	1.2	1.3	1.6

Notes: Each number in the table corresponds to a separate IV regression and shows the value of the F-statistics from the test for the strength of the instruments. The rule of thumb is  $F > 10$  (Staiger and Stock 1997). The values of the test satisfying “the rule of thumb” are marked bold italic.

## **Appendix II. Details about the construction of the database.<sup>26</sup>**

The database of the IZA Program Area “Labor markets in emerging and transition economies” is a new hand-collected dataset that provides essential information about the evolution of labor markets in the countries of Central Europe and Central Asia. It includes 27 countries of the region and spans 14 years, 1995-2008. The database contains how many 4 variables characterizing labor market outcomes and 6 variables describing labor market institutions. There are 71 observation with complete data on these 10 variables, corresponding to 23 countries. The details about the variables included in the database are shown below.

### **I. Labor market outcomes:**

- Employment to population ratio (ER): number of employed as per cent of population aged 15-59.<sup>27</sup>
- Unemployment rate (UR) – number of unemployed as per cent of labor force; based on labor force surveys and ILO methodology.
- Long-term unemployment rate (LTUR) – number of people which have been unemployed for 12 months or more as per cent of labor force
- Youth unemployment rate (YUR) – number of people aged 15-24 years as per cent of labor force from this age group; based on labor force surveys.

### **II. Labor market institutions and policies:**

- Employment protection legislation (EPL) index is based on version 2 of the OECD (2004) indicator and is a weighted average of 18 cardinal summary indicators of EPL strictness which can be gathered in three main areas: (i) employment protection of regular workers against individual dismissal; (ii) specific requirements for collective dismissals; (iii) regulation of temporary forms of employment.
- Active labor market policies (ALMP) – expenditures on active measures of labor market policies and public employment services as per cent of the country’s GDP.
- Tax wedge on labor (TAX) is defined as the difference between the salary costs of a single “average worker” to their employer and the amount of net income (“take-home-

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<sup>27</sup> This age bracket has been chosen in view of the varying statutory retirement age across the countries of the region.

pay”) that the worker receives. The taxes included are personal income taxes, compulsory social security contributions paid by both employees and employers, as well as payroll taxes for the few countries that have them; no consumption taxes are included.

- Union density (DENS) measures trade union density based on surveys, wherever possible. Where such data were not available, trade union membership and density were calculated using administrative data adjusted for non-active and self-employed members.<sup>28</sup>
- Average unemployment benefit (BENF) – the average benefit as percentage of the average wage. This deviates from the estimates typically used by the OECD because OECD replacement rates are not very meaningful in the transition countries due to the caps on the size of the benefit in many countries.<sup>29</sup>
- Maximum duration of unemployment benefits (BEND) – defined as the period for which a person aged 40 years who has been employed for 22 years prior to unemployment receives unemployment benefits, wherever possible.

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<sup>28</sup> A caveat concerning the quality of the union density data is due. There is a measurement problem in at least some of the selected countries. The World Bank notes, for instance, that “Armenia provides an example of the difficulty of interpreting union density figures in the CIS, with 75 percent union density by official estimates, but 80 percent of workers claiming to “have nothing in common” with trade unions, and half of those claiming to be totally uninformed about unions.” For that reason the World Bank (2005) did not provide any statistics on the coverage rates in the CIS countries. Whenever possible we therefore examined alternative estimates of unionization, especially in the CIS countries.

<sup>29</sup> In most countries of the region, the size of the unemployment benefit is related to past earnings. The rate may be as high as 100% (like in Croatia at the end of the 1990s and in Ukraine in the mid-2000s). The problem is that there is an upper cap on the size of the benefit, which often implies, de facto, a flat rate benefit. For example, in the early 2000s the benefit replacement rate in Croatia was 100% of average salary in the last three months of employment, but the maximum was restricted to 900 Kn. Compared to the average wage of 3600 Kn, the amount is far less than the 100% replacement rate. Similarly, unemployed in Russia can get 75% of their average wage in the last three months of employment, but there is a cap of 4900 RUR (or 110 Euro) as of mid-2009. Relative to the average wage in the economy (17441 RUR as of 1<sup>st</sup> quarter 2009), the unemployment benefit is very low. The minimum benefit is almost negligible, amounting to 850 RUR only. It is essential that the minimum and maximum amounts of unemployment benefits are not set in a law, but are subject to government discretion.



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