Labour market institutions and labour market performance

What can we learn from transition countries?[1]

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Abstract

This paper studies the relationship between labour market institutions and policies and labour 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 labour 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 labour market outcomes,

and that deregulation of labour 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.

1. Introduction

Over the last two decades, the labour economics and macroeconomics literature has seen a lively debate concerning the role of labour market institutions and policies in explaining labour market performance. The initial interest was sparked by the remarkably divergent patterns of unemployment within the group of OECD countries (especially between the USA and continental Europe) observed since the 1970s. In the early 1990s, several theoretical contributions, most notably the seminal work by Layard *et al.* (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 *et al.* (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 labour market as a major means of tackling high unemployment (IMF, 2003; OECD, 1994, 1997).

The early studies, such as Nickell (1997), focused on the role of particular institutions, thus assuming that a great deal of labour market dynamics in 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 labour market aggregates in OECD economies. Consequently, these critics proposed an explanation based on the interaction of institutions with economic shocks (Bertola *et al.*, 2001; Blanchard and Wolfers, 2000).

Although it still remains an open issue whether the model interacting shocks with institutions performs substantially better than the model solely employing institutions (see Nickell *et al.*, 2005), the attention of labour economists has recently shifted to the idea that institutions may interact with each other in a systematic manner (Bassanini and Duval, 2009; Belot and van Ours, 2001; Coe and Snower, 1997). The main issue in this strand of literature is the complementary nature of

labour market institutions and policies, which, if shown to hold, would provide a rationale for the implementation of broad labour market reform packages. In addition, a growing number of recent studies have focused on the role of institutional arrangements beyond the labour market, such as the degree of competition in the product market and the development of the financial market (Amable *et al.*, 2007; Fiori *et al.*, 2007).

Despite such a large interest in the role of institutions and policies in shaping labour 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 a lack of robustness (see, for example, 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. Although most of the studies suggest that institutional rigidities are indeed responsible, at least partially, for the poor performance of labour markets, and thus support a deregulatory view of labour 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 (Bassanini and Duval, 2009; Belot and van Ours, 2001), 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 labour 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 labour market institutions and policies in less-developed economies (Botero *et al.*, 2004; Feldmann, 2008). To a considerable extent, such interest stems from a much larger variation in institutions and labour market policies as well as in labour market outcomes across such an extended list of countries, both in the cross-section and time dimension.[2] In addition, data from less-developed countries, in principle, can help reveal whether the previously obtained conclusions for 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 only very limited availability of data.

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 1995–2008, it offers a first comprehensive study of the evolution of labour market institutions and policies in the transition economies. The paper also revisits the existing evidence concerning the role of labour market institutions and policies in shaping labour market outcomes, using the newly constructed dataset. The

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[2] For example, Djankov and Ramalho (2009, p. 11) state: 'Developing countries present an exciting venue for studying the impact of regulatory reforms, including of labour reforms. A number of countries, especially in Eastern Europe, have recently undergone significant reforms to make labour regulation more flexible.'

paper considers the issue of interactions between institutional variables, and thus provides new evidence on the complementary nature of labour market institutions and policies. We focus on employment protection legislation, union density, the tax wedge on labour, the maximum duration of unemployment benefits, the average replacement ratio and expenditures on active labour market policies (ALMP) – the core set of five labour market institutions and policies identified in the literature (Eichhorst *et al.*, 2008). We consider four labour market outcomes, namely the employment-to-population ratio, the unemployment, youth unemployment and long-term unemployment rates. The literature on OECD countries highlights the large heterogeneity in labour market outcomes even in the presence of very similar labour market institutions. The explanation for this large heterogeneity is often tied to the complementary nature of the interaction of labour market institutions when institutions are simultaneously liberalized (see, for example, Coe and Snower, 1997). By analysing interactions of different institutions and policies, we can provide some additional support for the complementary nature of simultaneous liberalization of various labour market institutions in a rather different economic context.

We believe that our paper provides an important contribution to the ongoing policy debate concerning the role of institutions and policies in shaping labour market outcomes for at 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 labour 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 (Boeri and Lehmann, 1999), thus providing a natural testing ground for the theoretical considerations that link labour market institutions and labour market outcomes.

Being the first comprehensive study of its type in the transition region, the paper should be of interest to labour economists who study transition countries. However, we would like to stress that we are above all interested in providing an analysis that is embedded in the literature on labour market institutions and labour market performance in OECD countries. We, therefore, deliberately start our analysis after the initial transition shock has mainly 'played itself out' in the labour markets of the region. What makes the analysis of the data collected by us particularly valuable for the general literature on the impact of institutions on labour market performance are the observed large changes in the institutional variables between 1995 and 2007 in the transition countries. These changes, which are larger than in mature OECD countries, allow us to convincingly establish a link between institutions and labour market performance.

Like the general literature, we ignore two phenomena that might have an impact on the results of the analysis, inter-country migration and informality. Both these phenomena are more pronounced in transition than in OECD countries, but they have also played an ever more important role in the latter group of countries over the last 10 years. Nickell (1997) in his seminal paper proceeded under the

assumption that '[d]ifferent European countries are effectively different labour markets with the inter-country movement of labour 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 a 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 labour market outcomes in host as well as sender countries. In spite of the importance of migration, the most recent literature on institutions and labour market performance in OECD countries (Bassanini and Duval, 2009; Nickell *et al.*, 2005, among others) does not incorporate migratory flows into its analysis. In order to keep in line with the general literature, we ignore inter-country migration in this paper even though, until the 2008 crisis, international undocumented migration was a widespread phenomenon within the transition region, with Russia taking the brunt of this migration.[3]

The informal sector and informal employment are more dominant in transition countries than in mature OECD countries. However, there are several OECD countries, especially the Southern European countries, where the informal sector and informal employment are larger than in the most advanced transition countries, namely the Visegrad countries and Slovenia (Schneider *et al.*, 2010). Although the recent literature related to OECD countries completely ignores the often substantial informal sector and informal employment in the analysis, we discuss our results with an eye on informal employment. Nevertheless, the issue of informality is not modelled explicitly in our empirical specifications, as collecting reliable time series on the informal sector and informal employment for our set of transition countries is an impossible task for the period under analysis (1995/1996 to 2007/2008). In addition, even informality on a relatively large scale will not affect the variables encapsulating labour market institutions or the functional relationship between labour market institutions and outcomes, this phenomenon might only cause measurement error in our labour market outcome variables, that is, our dependent variables. Under reasonable assumptions (see Bound *et al.*, 2001), measurement error in the dependent variables will lead to a loss of efficiency but not biased coefficient estimates. Hence, results showing significant relationships between labour market institutions and labour market outcomes strike us as particularly credible.

The remainder of the paper has the following structure. In Section 2, we provide a brief overview of the development of labour 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 chal-

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[3] As the literature looks at macro effects and, in most European OECD countries, net migration is even now small relative to the overall flows between labour market states, migration might be ignorable. With the exception of very few countries, the same will roughly hold for transition countries so that our macro results should not be biased in a major way. Incorporating migration into a standard macro model of the labour market (such as Layard *et al.*, 1991) and checking how predictions deviate from the standard results produced in the empirical literature on institutions and labour market performance are interesting tasks, which cannot be pursued with the available data.

lenges and pitfalls of data collection in the region. The section concludes with a descriptive analysis of the data. This analysis shows a fairly modest level of institutional rigidities in the labour 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 ALMP. In contrast, the countries of the former Soviet Union have considerably liberalized their employment protection legislation and reduced the tax wedge on labour during the last 15 years, thus establishing the least stringent regulation of the labour market in the whole transition region. Section 4 describes our research strategy and the econometric specifications we use, and Section 5 discusses the econometric results. These results relating institutions and policies to labour market outcomes are generally consistent with the view that institutions matter and that deregulation of the labour market can improve its performance. There is also evidence, albeit weak, that institutions interact with each other, which is consistent with the idea of reform complementarities, thus providing some support for broad labour market reform packages. Our results also suggest important advantages of focusing on a broader set of labour market outcomes, and not only the unemployment rate, which until now has been the main approach in the empirical literature. In Section 6, we draw some conclusions.

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

Several scholars have already attempted to describe the evolution of labour market institutions and policies in the transition countries of Eastern Europe and Central Asia as well as to analyse links between these institutions and policies and the performance of labour markets (Boeri and Terrell, 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 (Boeri and Lehmann, 1999; Svejnar, 1999). Indeed, post-communist countries started with pretty similar initial conditions in terms of the performance of their labour markets. The latter were characterized by shortages of labour, no open unemployment, very high levels of unionization and no employment protection.[4] Imposing market forces on the economies shaped by central planning with simultaneous creation, essentially from scratch, of labour market institutions can therefore be regarded as a quasi-natural experiment that may be useful in testing economic theories (see, for

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[4] 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 made up the Yugoslav Federation) suffered from double-digit unemployment rates as early as the late 1970s.

example, Muravyev, 2008). Moreover, research focusing on the region can benefit from the enormous fluctuations of key economic 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 labour market outcomes, revealed great differences, often comparable with the differences between the USA and Western European labour markets (Rutkowski, 1996).[5] One important point that the data in Tables A1 and A2 seem to suggest is that the divergent labour market outcomes in transition countries cannot be attributed to economic shocks only.[6] Institutions and policies, whether taken separately or in interactions, should be seriously considered as potential explanations for this divergence.

The few existing studies that use data from transition countries have documented a number of trends in the evolution of labour market institutions and policies (for example, Svejnar, 2004). At the onset of transition, most countries started developing previously missing institutions and policies to ensure an effective functioning of labour markets. At that time, even if substantial unemployment rates were foreseen, the governments, especially in Central Europe, adopted fairly generous unemployment benefits schemes mainly for political reasons.[7] These were subject to cuts, sometimes dramatic, in the 1990s (Riboud *et al.*, 2003) as the governments struggled to keep budget discipline against the background of a considerable and largely unanticipated decline in output (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).[8] The countries of the region introduced a number of tax reforms:

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[5] Although 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.

[6] The data show, for example, that the initial recession lasted only 2 years in Poland with GDP exceeding the pre-transition level already in the mid-1990s, whereas the neighbouring Ukraine did not start recovering until 2000, after having lost almost 60 percent of its pre-transition GDP level. Interestingly, despite this difference in the magnitude and length of the transition shock, the LFS-based unemployment rate in Poland has persistently remained much higher than in Ukraine, 19.0 percent against 8.6 percent in 2004, as shown in Table 2.

[7] For example, in Poland, the strong political position of 'Solidarity' allowed the Mazowiecki government in December 1989 to introduce layoffs in labour 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.

[8] 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.

for instance, 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 labour has remained rather high in Central Europe, although not in most of the other transition countries (World Bank, 2007). Although active labour market programmes 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 (SEE) 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 labour market institutions and policies among the Central Eastern Europe (CEE) countries in the last 20 years.[9]

Despite the potential benefits from exploring these large variations in labour 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 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 OECD economies or EU member states (see Cazes and Nesporova, 2003b; Ederveen and Thissen, 2007; and Fialova and Schneider, 2009). Although there are potential benefits of combining data from established market economies with those from transition countries, it may require more careful econometric modelling 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 labour market outcomes in transition countries is very limited, hinting at the importance of at least some of the labour market institutions in the countries of the region. Looking at specific institutions, several studies suggest that employment protection may indeed affect labour market outcomes in the transition countries (for example, Cazes and Nesporova, 2003a) as may ALMP (Rovelli and Bruno, 2010). The study by Fialova and Schneider (2009) suggests a role played by the tax wedge, but the sample combines transition and OECD countries, whereas the study by Behar

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[9] In the year 2000, Estonia scored 2.4 on the OECD index of employment protection legislation that ranges from 0 to 6, spent <0.1 percent of its GDP on ALMP 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.

(2009) finds some, albeit weak, evidence that tax wedges and the duration of unemployment benefits are associated with poor labour 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 labour market outcomes and institutions

This paper uses a novel and unique hand-collected database of labour 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 labour 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 labour, namely the tax wedge on labour 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.[10] 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, first, are the OECD and EUROSTAT databases for the countries that during the 2000s became members of the European Union; second, World Bank and IMF statistics; and third, 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 SEE and the Commonwealth of Independent States (CIS), 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, policy reports, country reports published by other institutions (such as the ILO and national research centres) as well as academic working papers and articles (Eamets and Masso, 2004; Cazes and Nesporova, 2006; Muravyev, 2010, among others).

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[10] The list contains the core set of five labour market institutions and policies identified in the literature (Eichhorst *et al.*, 2008).

The database covers a 14-year 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. As the theory underlying our empirical analysis suggests that labour 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 labour market institutions and policies on the one hand and labour market outcomes on the other.[11]

We had to drop several countries (Belarus, Tajikistan, Turkmenistan and Uzbekistan) from the final sample because of severe data problems.[12] 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 standard mode of analysis typical of free market economies cannot be directly applied to this set of countries.

Equipped with our database, we now turn to a discussion of the general trends in the evolution of labour 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.[13] 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 labour market outcome aggregates from 4 years covering mid- and late transition: 1996, 2000, 2004 and 2008. The labour market institutions and policies are also presented for 4 years, however, with a 1-year lag, that is, from 1995 to 2007. For expositional ease, we also classify the countries into three major groups,

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[11] 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 *et al.* (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.

[12] 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).

[13] Such previous analyses include Cazes and Nesporova (2003b), Eamets and Masso (2004), World Bank (2005), and Cazes and Nesporova (2006), among others.

which are typically used in literature studying the region: CEE (embracing the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovak Republic, Slovenia), SEE (which includes Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Macedonia, Montenegro, Romania and Serbia) and the CIS (which until recently included 12 of 15 constituent republics of the former USSR, namely Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, the 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. Finally, for comparison purposes, we will also provide respective statistics for the USA and the old member states of the European Union (the EU-15).

Figures 1 and 2 show some striking patterns of labour market outcomes and labour market institutions regarding the three groups of transition countries, the EU-15 and the USA. The employment-to-population ratio[14] is substantially smaller

Figure 1. Labour market outcomes by region

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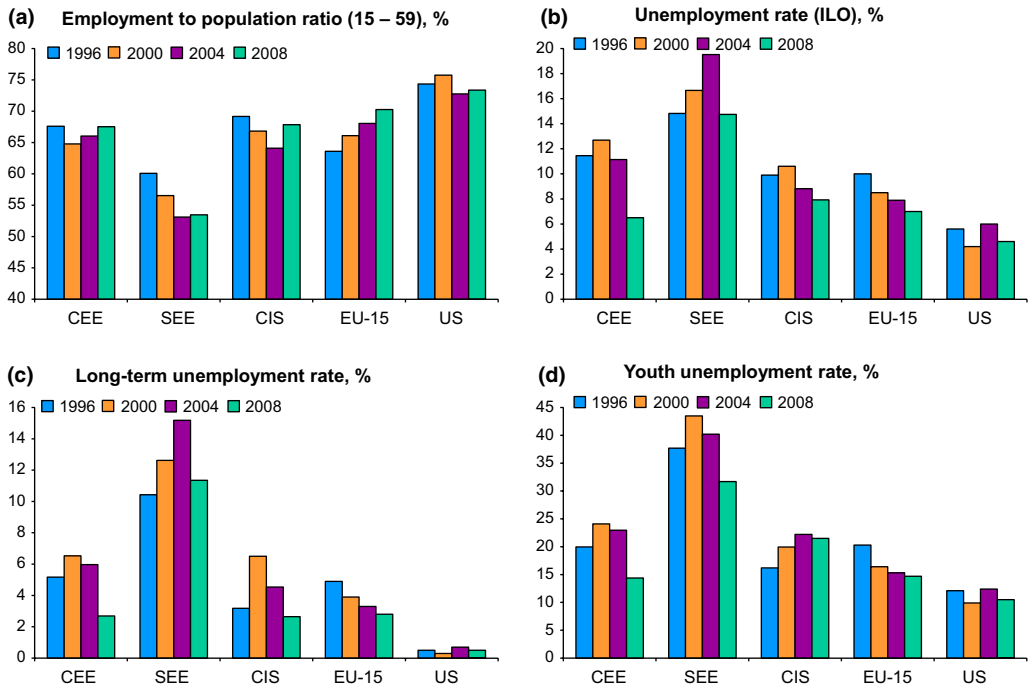
[14] As statutory retirement varies across the five regions shown in Figure 2, we present the ratios for the population aged between 15 and 59.

in SEE than in the other two transition regions. It is U-shaped for CEE and the CIS, indicating an upturn in labour demand in the later part of transition, whereas in SEE it shows a strong downward trend until 2004. Unsurprisingly, the highest ratio is found in the USA, whereas 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 greater 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 USA.[15] 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.[16]

Turning to measures representing labour 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 employment protection legislation (EPL) index falls substantially in SEE and the CIS, and in the latter the labour 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 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 USA, 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 USA 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, labour markets in all transition regions became substantially more flexible than labour markets in the EU-15.

The last three charts deal with active and passive labour market policies and should be looked at together. The EU-15 on average spends roughly 1 percent of GDP on ALMP whereas all transition regions spend far less. The CIS spends especially little on such policies. The USA, on the other hand, has the shortest maximum duration of benefits combined, however, with a relatively high replacement rate.

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[15] 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 (new member states). However, as labour 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).

[16] Again, part of this large drop is the result of increased migration after accession of the NMS.

Figure 2. Labour market institutions by region

(a) Employment protection legislation (OECD methodology)

(b) Union density, %

(c) Tax wedge on labour, %

(d) Expenditures on active labour market policies, % of GDP

(e) Duration of unemployment benefit, months

(f) Average replacement ratio
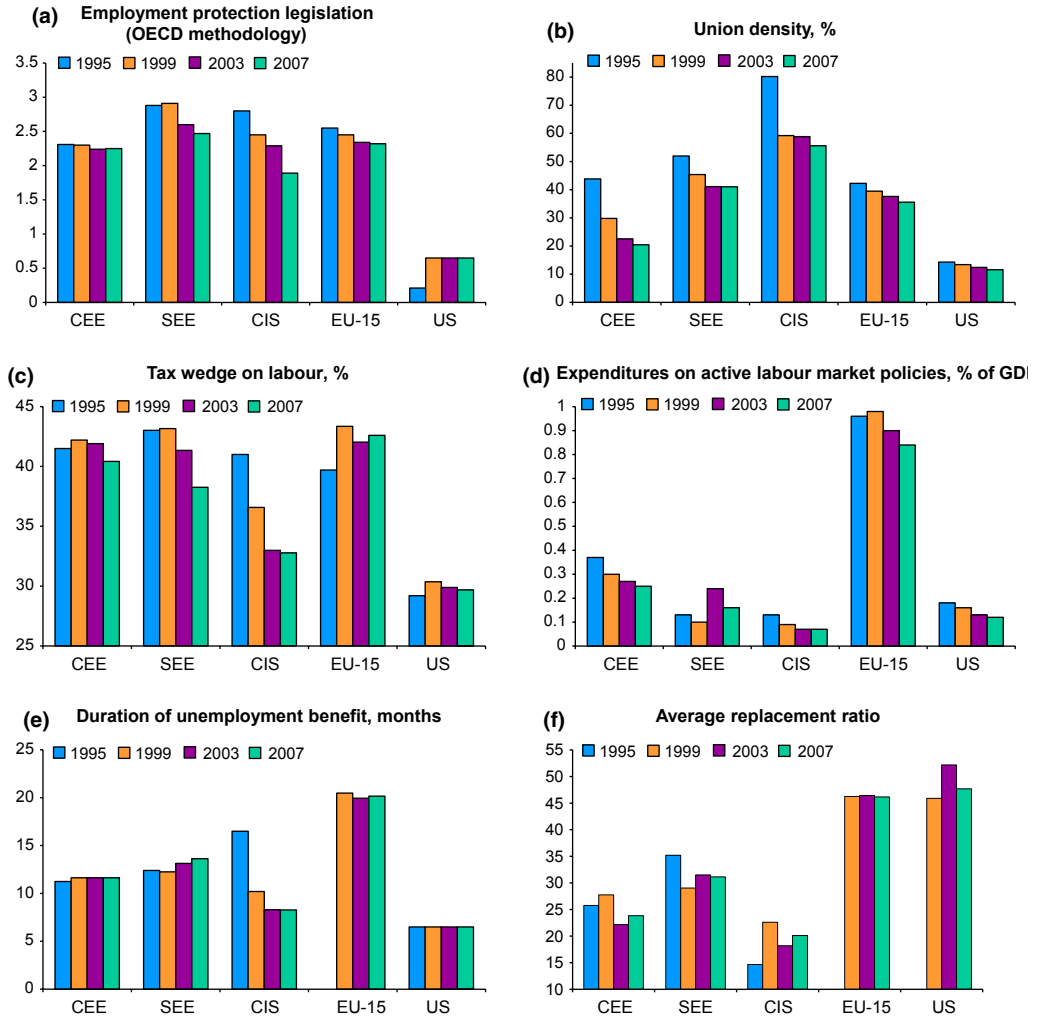
Sources: For transition countries: Data Base of IZA Program Area 'Labor markets in emerging and transition economies'; OECD and Eurostat for other countries.

The EU-15 combines long maximum duration with relatively generous unemployment benefit levels, which might in part explain the relatively high long-term unemployment rates. CEE and SEE have maximum durations of roughly 1 year, whereas the CIS exhibits the shortest durations after the USA as of 1999. Compared

with the EU-15 and the USA, replacement rates are very ungenerous in CEE and the CIS, whereas SEE has somewhat higher rates.

Overall, Figures 1 and 2 show large differences across transition regions and over time with regard to labour market outcomes as well as labour 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 labour market outcomes on the one hand and labour market institutions and policies on the other draws heavily on the model proposed in the seminal study by Nickell (1997). In that study, labour 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 labour market outcomes are measured).[17] 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)[18] 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 labour market outcomes (see the discussion in Section 5), 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, although labour market outcomes are measured in 1996, 2000, 2004 and 2008, data on institutions and policies come from the years 1995, 1999, 2003 and 2007.

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[17] 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 even after the initial recession of the late 1980s–early 1990s.

[18] We have also considered several additional control variables, such as proxies for the enforcement of institutions, which are 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, as in Pistor *et al.* (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.

Similar to most other studies, we control for omitted factors (including unobserved characteristics of countries) by using fixed-effects specifications of our regression model. These are necessary as the small number of degrees of freedom does not allow the inclusion of many potentially relevant explanatory variables. Hence, the baseline regression equation can be written in the following way:

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\begin{aligned}
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}
\end{aligned}
, \quad (1)
$$

where index i represents country i and index t denotes the time, $t \in \{1996, 2000, 2004, 2008\}$; LMO stands for labour 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 labour policies as a percentage of GDP; TAX is the tax wedge on labour; $DENS$ 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 $t - 1$; ΔGDP is the cumulative growth of GDP in years $t - 3$, $t - 2$ and $t - 1$; γ is a time effect; c is a country fixed effect; and ε is a white noise disturbance.[19] Like many of the previous studies, we do not apply logarithmic transformation to the dependent variables in the model.[20]

As can be seen from the specification of Equation (1), we only employ one variable measuring the role of trade unions, as 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 data on the bargaining type is not only a problem of measurement, but also a problem of how to interpret these data 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).[21] At any rate, we believe that we capture the essential aspects of wage setting

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[19] The construction of the labour market outcome and institutions and policy variables is presented in detail in Appendix II.

[20] 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.

[21] This also suggests that the union density measures in the former Soviet Union need to be taken *cum grano salis*.

with our union density variable as it is regarded as the most important of the related factors (Eichhorst *et al.*, 2008).[22]

It is vital not only to analyse institutions in isolation but also to look at the complementary nature of institutions as they interact with each other. There is convincing evidence in OECD countries, debated at length in the literature, which shows that countries with similar single institutions might experience very different labour market outcomes because these single institutions are interacted with other single institutions, which in turn differ from country to country. A classic example of the importance of institutional complementarities is shown in Nickell (1997) when discussing the level of unemployment benefits. *Ceteris paribus*, a high level of unemployment benefits should imply a higher unemployment rate, but when interacted with a short duration of these benefits and large expenditures on ALMP, generous unemployment benefits might result in better labour market performance.

Therefore, as a next step, pairwise interactions of labour market institutions and policies are added to the baseline specification for the full sample of transition countries. 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:

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

(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 the variables *TAX* and *BENF*, respectively. In our complex case, where we have more than one labour market outcome, the sign of β_7 implying complementarity depends on which outcome we analyse and whether we have an institution/policy whose strengthening has a deleterious or beneficial effect on labour market outcomes. When *LMO* is an element of the set {*UR*, *LTUR*, *YUR*} and when the two explanatory variables presumably have a dele-

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[22] As a robustness check of our results, we extended the specification of Equation (1) for a subset of the transition countries, the new member states of the EU, by adding a measure of the extent of wage coordination as this variable is available for these countries in the ICTWSS database (Visser, 2009). However, this check turned out to be futile as the measure of wage coordination was time-invariant for all countries but one, rendering the coefficient estimate on the wage coordination variable within a fixed-effects regression framework rather meaningless. In addition, a fixed-effects regression that includes this essentially time-invariant measure of wage coordination cannot really establish whether this inclusion attenuates omitted variable bias. Consequently, we use the full sample of transition countries in our estimation and restrict ourselves to the trade union density variable.

terious effect on the performance of the labour market (for example, an increase in the variables *TAX* and *BENF* is supposed to increase unemployment), then a negative and statistically significant coefficient β_7 implies complementarity. In the case of labour market outcome *ER*, a *positive* and statistically significant coefficient β_7 implies reform complementarity. As these relationships are only touched in passing in the literature, it might be useful to show them 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:

$$\frac{\partial UR_{it}}{\partial Tax_{it-1}} = \beta_3 + \beta_7(Benf_{it-1} - \overline{Benf}). \tag{3}$$

The direct partial (β_3) should be positive, that is, 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, that is, will augment the direct positive partial, only if β_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:

$$\frac{\partial ER_{it}}{\partial Tax_{it}} = \beta_3 + \beta_7(Benf_{it-1} - \overline{Benf}). \tag{4}$$

The direct partial is now negative, that is, 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 β_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 labour market performance. For example, when we include ALMP as the primary variable, the reasoning has to be altered as an increase in the expenditures on ALMP supposedly improves the performance of the labour market, namely, it increases *ER* and decreases *UR*. So, when $LMO = ER$ a negative, β_7 implies complementarity, whereas a positive β_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.[23]

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):

$$LMO_{it} = \sum_j \beta_j Inst^j_{it-1} + \sum_k \left(\gamma_k \left(Inst^k_{it-1} - \overline{Inst}^k \right) \left(\sum_j \beta_j \left(Inst^j_{it-1} - \overline{Inst}^j \right) \right) \right),$$

$$+ \beta_7 \Delta Inflation_{it-1} + \beta_8 \Delta GDP_{it-1} + \gamma_t + c_i + \varepsilon_{it} \qquad (5)$$

where β_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 γ_k indicates the strength of interaction between $Inst^k$ and the overall institutional environment, the latter being captured by the third summation term in Equation (5). 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 β_j, the direct effect, is positive for these institutions) whereas higher values of employment-friendly institutions (such as ALMP) would imply a decrease in this term (as β_j is negative). When $LMO = ER$, the opposite occurs. We thus have an interpretation of the γ_ks in Equation (5) that is equivalent to the interpretation of β_7 in Equation (2), depending on the labour market outcome analysed and on whether higher values of an institution have a deleterious or beneficial effect on labour market performance. Again, $t \in \{1996, 2000, 2004, 2008\}$. We estimate model (5) using nonlinear 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 labour 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.

These latter control variables are correlated with some of the labour market institution measures as the bivariate raw correlations in Table A3 of Lehmann and Muravyev (2010) demonstrate. Inspection of this table also shows 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 labour market outcomes, whereas the replacement rate and ALMP are weakly correlated with long-term and youth unemployment rates, respectively.

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[23] A formal proof of the validity of such instruments is given in the appendix of Bassanini and Duval (2009). From this proof, we cannot conclude that in all cases these instruments are valid.

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

Variable	Short description	Observation	Mean	SD	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 labour, %	75	39.63	4.75	23.00	48.27
ALMP	Expenditures on active labour market policies, % GDP	75	0.20	0.18	0.01	0.83
BENF	Unemployment 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
ΔInflation	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
ΔGDP_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'.

5. Results

The fixed-effects estimates of the baseline specification (Equation 1) are reported in Table 2, demonstrating that labour 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

Table 2. Labour market performance, institutions and policies: baseline regression results using fixed-effects estimation

	Employment rate	Unemployment rate	Long-term unemployment rate	Youth unemployment rate
EPL	−**4.166**** (1.473)	0.882 (0.965)	0.965 (0.940)	**3.866*** (1.912)
ALMP	2.287 (3.327)	−3.138 (2.448)	−1.536 (1.957)	−**10.408**** (3.735)
TAX	−**0.332*** (0.179)	0.020 (0.147)	0.053 (0.116)	0.159 (0.324)
DENS	−0.080 (0.056)	0.047 (0.032)	0.020 (0.029)	−0.014 (0.064)
BEND	−0.230 (0.210)	−0.016 (0.161)	0.017 (0.123)	−0.102 (0.263)
BENF	0.068 (0.118)	0.013 (0.095)	−0.004 (0.061)	−0.150 (0.189)
Δ*Inflation*	−0.007 (0.026)	0.002 (0.015)	0.005 (0.015)	−0.027 (0.030)
Δ*GDP_3Y*	−5.513 (3.670)	−8.553** (3.107)	−8.699*** (2.040)	−11.799* (6.195)
Y2000	−2.647 (1.908)	3.065** (1.385)	2.496** (1.132)	5.291** (2.490)
Y2004	−4.947** (2.155)	3.117 (1.902)	3.385* (1.678)	4.126 (2.747)
Y2008	−4.395* (2.540)	0.053 (1.829)	0.725 (1.666)	−1.920 (2.822)
Intercept	98.823*** (9.734)	15.918* (9.149)	10.806 (7.611)	30.731* (16.842)
R^2	0.38	0.58	0.58	0.62
N	75	75	71	74

Notes: Dependent variables: employment rate (*ER*), unemployment rate (*UR*), long-term unemployment rate (*LTUR*) and youth unemployment rate (*YUR*). The results are obtained using fixed-effects estimators with cluster-robust standard errors (clustering by country). Standard errors are reported in parentheses. Asterisks denote significance levels at: ***1 percent, **5 percent and *10 percent. R^2 refers to the within variation in the data. Coefficients with corresponding t-statistics >1 in absolute value are marked in bold.

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 labour 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 (for example, Bertola, 1990), can also be inferred from the result that overall unemployment is unaffected. So, a high level of employment protection in transition countries might on average prevent workers' job loss even in the face of enforcement problems while it might make firms hesitant to create new jobs. Expenditures on ALMP do not affect the employment rate confirming our priors, but they strongly impact on the youth unemployment rate. For example, an increase of ALMP expenditures of one-tenth of a percentage point of GDP will lower the youth unemployment rate by a bit more than 1 percentage point. Increased expenditures on ALMP also depress the overall and the long-term unemployment rates, these effects are, however, not significant at conventional levels.

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.

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 are actually looking 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 at the national level is not very likely given the particularly severe budget constraints and the very low levels of ALMP expenditures.[24] 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 also the results themselves that strengthen our conviction that we are capturing causal effects in Table 2.[25] The found beneficial impact of ALMP is consistent with several micro studies of ALMP in transition countries, suggesting positive effects of some programmes, especially those involving job brokerage and training and retraining schemes (see Lehmann and Kluve, 2010).

Our results might also be interpreted with one other important facet of labour markets in transition economies in mind, namely informal employment. As mentioned previously, informality is a wide-spread phenomenon in transition countries (Schneider *et al.*, 2010). We can suggest that some labour market institutions and policies might have an impact on the size of informal employment and of the informal sector. Perhaps our most interesting result in this context 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 labour demand via the channel of reduced hiring of young workers. But having no impact on the overall unemployment rate, it might additionally

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[24] Although transition countries will have difficulties in increasing total ALMP expenditures in reaction to a nationwide rise in unemployment given their severe budget constraints, they might be willing to redistribute expenditures across regions to those regions that are particularly hard hit by unemployment. This redistribution can lead to endogeneity problems when regional data are the observational unit. As we use national data, we avoid such problems. For a recent discussion of these endogeneity issues in a transition context, see Lehmann and Kluve (2010).

[25] As we only have four data points over 4-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, as a rigorous 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.

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 labour 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 labour further the incidence of informal work in transition countries.

In OECD (2008), higher values of the two mentioned institutions, EPL and taxes on labour, are indeed found to boost informal employment in the Visegrad countries and in Slovenia. Although there is strong and unequivocal evidence that taxes on labour have a deleterious effect on formal employment, the evidence on the impact of EPL is more mixed as 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 dataset, but an imprecise measure of its complement, our results produced for the largest set of transition countries to date seem to suggest that more rigid labour market institutions and higher costs on labour encourage informal employment.[26]

We now turn to the regression analysis that deals with the interactions of institutions. As already mentioned, we introduce one interaction at a time into the regression model. As we have six institutional variables, there are 15 possible interactions. Table 3 shows the results of estimating model (2) for the four dependent variables and 15 pairwise 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.[27] 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 labour market performance, implies complementarity, whereas 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 and employment protection legislation in all regressions except for the one with employment-to-population ratio. Overall, these results may be interpreted as suggesting that active labour market programmes are more effective in tackling unemployment in an economy with lower taxes, lower unionization or lower employment protection.

The other major interesting result shown in 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 coefficients, thus suggesting complementarity between policies aimed at reducing the tax wedge and policies aimed at restricting the duration of unemploy-

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[26] Even if there is measurement error in *ER* regarding the capturing of formal employment, as long as this error is not correlated with ε_{it}, our results are consistent even though they are not efficient.
[27] These separate regressions are not shown here but are available upon request.

Table 3. Pairwise interactions between different institutions and policies: OLS regressions

	ER	UR	LTUR	YUR
ALMP_TAX	−1.136 (0.913)	1.755** (0.740)	1.705** (0.733)	1.561 (1.108)
ALMP_DENS	−0.165 (0.211)	0.41** (0.193)	0.318* (0.165)	0.623** (0.300)
ALMP_BENF	−0.4 (0.331)	0.125 (0.270)	0.219 (0.182)	0.575 (0.435)
ALMP_BEND	−1.041** (0.458)	0.212 (0.431)	0.150 (0.368)	0.241 (0.702)
ALMP_EPL	−1.792 (4.271)	6.569* (3.261)	6.107* (3.039)	9.68** (4.421)
EPL_TAX	0.029 (0.219)	0.358* (0.203)	0.319 (0.193)	0.541 (0.370)
EPL_DENS	0.043 (0.063)	0.003 (0.048)	0.003 (0.032)	−0.076 (0.093)
EPL_BENF	−0.115 (0.076)	0.001 (0.091)	−0.002 (0.085)	0.132 (0.178)
EPL_BEND	−0.035 (0.128)	−0.058 (0.153)	−0.070 (0.154)	−0.279 (0.360)
TAX_DENS	−0.001 (0.006)	0.003 (0.006)	0.007 (0.006)	−0.009 (0.009)
TAX_BENF	0.018 (0.016)	−0.016 (0.014)	−0.005 (0.011)	−0.025 (0.027)
TAX_BEND	−0.009 (0.035)	−0.042 (0.026)	−0.050** (0.023)	−0.141*** (0.038)
DENS_BENF	−0.002 (0.004)	−0.002 (0.003)	0.001 (0.003)	0.002 (0.006)
DENS_BEND	−0.010* (0.005)	−0.001 (0.006)	−0.001 (0.006)	−0.005 (0.012)
BENF_BEND	−0.033 (0.022)	−0.003 (0.015)	0.001 (0.011)	0.014 (0.028)

Notes: Dependent variables: *ER*, *UR*, *LTUR* and *YUR*. 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 fixed-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 at: ***1 percent, **5 percent and *10 percent.

ment benefits. So, for example, shortening the duration of benefits in tandem with a reduction in the tax on labour will reduce long-term and youth unemployment more than if the tax on labour is reduced in isolation. The point estimates also imply that reducing the costs of labour helps young job seekers more than the long-term unemployed when benefit duration is simultaneously shortened.

The results related to ALMP do not survive if we instrument the interactions (Table 4). This, however, does not necessarily imply that all the OLS estimates are spurious as the used instruments turn out to be very weak in the case of four interactions involving ALMP. Only when ALMP is interacted with EPL do we have strong instruments but insignificant coefficients on the interactions regarding the regressions on long-term and youth unemployment.[28] It is noteworthy, though, that

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[28] For the interactions of ALMP with tax, density, benefit level and benefit duration, respectively, we get *F*-statistics in the first-stage regressions that never exceed 2.5, no matter what the labour market outcome. For the interaction of ALMP with EPL, we get *F*-statistics of 19.3 and 13.1, respectively, when long-term and youth unemployment are the regressands. The rule of thumb for a strong instrument is that the associated *F*-value >10 (Staiger and Stock, 1997).

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

	ER	UR	LTUR	YUR
ALMP_TAX	−6.385 (6.748)	−0.691 (4.039)	−3.724 (5.518)	3.937 (7.215)
ALMP_DENS	−0.302 (0.591)	0.333 (0.400)	0.17 (0.332)	0.213 (0.762)
ALMP_BENF	−0.543 (2.061)	−0.881 (1.673)	−0.164 (1.555)	−1.034 (2.967)
ALMP_BEND	−3.89 (4.655)	4.818 (4.755)	2.716 (3.111)	10.826 (10.227)
EPL_ALMP	−55.757 (88.888)	45.354 (63.235)	14.079 (28.19)	107.996 (156.449)
EPL_TAX	3.896 (4.315)	−0.657 (1.560)	0.928 (0.952)	−2.903 (3.630)
EPL_DENS	0.048 (0.146)	0.038 (0.106)	0.031 (0.069)	0.133 (0.195)
EPL_BENF	−0.032 (0.235)	−0.059 (0.171)	−0.136 (0.150)	0.017 (0.314)
EPL_BEND	−0.413 (0.502)	−0.33 (0.360)	−0.348 (0.289)	−0.897 (0.667)
TAX_DENS	0.065 (0.085)	−0.038 (0.057)	−0.015 (0.163)	−0.342 (1.209)
TAX_BENF	0.033 (0.028)	−0.007 (0.020)	0.004 (0.020)	−0.008 (0.037)
TAX_BEND	−0.031 (0.063)	−0.063 (0.044)	−0.059* (0.033)	−0.147** (0.073)
DENS_BENF	0.004 (0.013)	−0.019 (0.012)	−0.005 (0.008)	−0.021 (0.019)
DENS_BEND	0.006 (0.016)	−0.014 (0.012)	−0.014 (0.009)	−0.045** (0.022)
BENF_BEND	−0.07 (0.222)	−0.23 (0.389)	−0.625 (4.050)	−0.447 (0.831)

Notes: Dependent variables: *ER, UR, LTUR* and *YUR*. Each coefficient in the table is taken from a separate regression (the baseline specification augmented with a single interaction). The results are obtained using fixed-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 percent, ** significant at 5 percent and * significant at 10 percent.

we get very similar and significant point estimates of the coefficients on the interaction of the tax wedge and benefit duration whether we perform OLS or IV regressions on the long-term and youth unemployment rates. Hence, the complementarity of lowering taxes on labour and reducing the duration of benefits seems a very robust result especially as the used instruments seem to be strong.[29] We should also stress that with this interaction 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 labour will result in larger 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 (β_j) as well as six coefficients (γ_k)

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[29] The first-stage regressions with the tax wedge and benefit duration as the interaction term produce *F*-statistics between 17.7 and 28.5 no matter which labour market outcome is looked at.

Table 5. Systemic interactions across institutions, nonlinear OLS estimates

	ER	UR	LTUR	YUR
β: Direct effect of institutions				
EPL	**−2.028** (1.624)	0.205 (0.550)	0.240 (0.437)	**3.448*** (1.743)
ALMP	0.189 (2.766)	−0.589 (1.592)	−0.155 (0.425)	−2.820 (3.228)
TAX	**−0.382*** (0.192)	0.132 (0.134)	0.102 (0.141)	0.018 (0.166)
DENS	**−0.147** (0.097)	**0.042** (0.034)	0.003 (0.015)	−0.042 (0.042)
BEND	**−0.254** (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)
γ: 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	**1.237** (1.207)	**8.789** (8.707)	16.950 (24.339)	3.259 (4.054)
TAX	**−0.027** (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)	**−0.040** (0.034)
BEND	**0.060** (0.045)	**−0.092** (0.090)	−0.064 (0.107)	**−0.207** (0.191)
BENF	0.009 (0.015)	−0.091 (0.113)	−0.096 (0.185)	0.057 (0.068)
Other variables				
ΔInflation	−0.001 (0.042)	−0.005 (0.015)	0.003 (0.012)	−0.029 (0.044)
ΔGDP_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^2	0.99	0.98	0.99	0.99
N	75	75	71	74

Notes: Dependent variables: *ER*, *UR*, *LTUR* and *YUR*. The results are obtained using a nonlinear OLS estimator with cluster-robust standard errors (clustering by country). Standard errors are reported in parentheses. Asterisks denote significance levels at: ***1 percent, **5 percent and *10 percent. Coefficients with corresponding *t*-statistics >1 in absolute value are marked in bold.

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, as this typically allows inferences to be made 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 7 of 24 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.[30] For example, the sign of coefficient *γ* on the 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 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 favour of the hypothesis on institutional complementarities.

We would like to stress that our analysis is only a first attempt at linking labour market outcomes and institutions in transition countries as, apart from the two caveats mentioned in the introduction, there is potential for refining the estimates as soon as more data from the transition region become available.[31]

6. Conclusions

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

The descriptive analysis shows that there are large differences regarding labour market outcomes across the three regions and over time. The general picture

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[30] The two coefficients that are wrongly signed are those on variables *ALMP* and *TAX* in the *ER* equation.
[31] For example, OECD has recently expanded its EPL database by adding retrospective data for a number of transition countries.

regarding the evolution of labour market institutions points to a liberalization of labour 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 labour market institutions in the determination of labour market outcomes and is in line with the idea that the deregulation of labour markets improves their performance. In our baseline estimations, we use the fixed-effects estimator and lag the institutions and policies by one period. Because of this estimation strategy and because labour market institutions evolve slowly over time, we think of these correlations as pointing to causal effects that run from institutions to labour market outcomes. Importantly, we find that not all of the institutions and policies matter and, when they do, it is 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, whereas ALMP do not affect employment but strongly affect 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 labour costs push workers into informal employment. The other institutions do not seem to determine labour market outcomes in a significant way. The results from these baseline regressions alone show that we can learn from analysing labour market outcomes in addition to 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, ALMP, which have no impact on employment, are more effective in tackling the three types of unemployment in an economy where taxes on labour 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 labour will decrease long-term and youth unemployment more when benefit duration is shortened. This implies a clear interaction of labour demand and labour 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 >1 as we thus can establish the sign of the interaction. The results should be thus taken with some caution; nevertheless, 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 labour market institution.

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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

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

Country	1992	1996	2000	2004	2008
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, percent

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

Table A2. (cont) Unemployment rates in the transition countries, percent

Country	1992	1996	2000	2004	2008
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*

Notes: 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.
Sources: ILO, World Bank, EBRD and TransMonee database.

Appendix II. Details about the construction of the database[32]

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 labour 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 four key variables characterizing labour market outcomes and six key variables describing labour market institutions. There are 71 observations with complete data on these 10 variables, corresponding to 23 countries. The details about the variables included in the database are shown below.

1. Labour market outcomes:

- Employment-to-population ratio (*ER*): number of employed as percent of population aged 15–59.[33]
- Unemployment rate (*UR*) – number of unemployed as percent of labour force; based on labour force surveys and ILO methodology.
- Long-term unemployment rate (*LTUR*) – number of people who have been unemployed for 12 months or more as percent of labour force.

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[33] This age bracket has been chosen in view of the varying statutory retirement age across the countries of the region.

- Youth unemployment rate (*YUR*) – number of people aged 15–24 years as percent of labour force from this age group; based on labour force surveys.

The sources of these data are TRANSMONEE database (main source), ILO, World Bank, EBRD as well as national statistical offices.

2. *Labour 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 that can be gathered in three main areas: (i) employment protection of regular workers against individual dismissal; (ii) specific requirements for collective dismissals; and (iii) regulation of temporary forms of employment.
- Active labour market policies (*ALMP*) – expenditures on active measures of labour market policies and public employment services as percent of the country's GDP.
- Tax wedge on labour (*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-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.[34]

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[34] 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.

- 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.[35]
- 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.

The data were assembled from OECD, Eurostat, World Bank, ICTWSS database (Visser, 2009, online at http://www.uva-aias.net/208), SSPTW database (Social Security Administration 2010, online at http://www.ssa.gov/policy/docs/progdesc/ssptw/), and other international and national sources. Own estimates of *EPL* are used for a number of countries from the FSU (see Muravyev, 2010).

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[35] 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 percent (as 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 percent of average salary in the last 3 months of employment, but the maximum was restricted to 900 Kn. Compared with the average wage of 3,600 Kn, the amount is far less than the 100 percent replacement rate. Similarly, the unemployed in Russia can get 75 percent of their average wage in the last 3 months of employment, but there is a cap of 4,900 RUR (or 110 Euro) as of mid-2009. Relative to the average wage in the economy (17,441 RUR as of first quarter 2009), the unemployment benefit is very low. And 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.