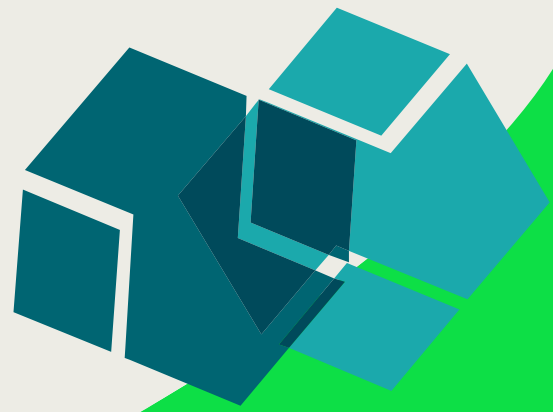




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Institutional Convergence of CEECs and its Connection to Growth and Cohesion

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Institutional Convergence of CEECs and its Connection to Growth and Cohesion

Abstract

The aim of this paper is to provide a unified approach to institutional convergence in Central- and Eastern European countries towards EU norms (related to the *acquis communautaire*) and how it relates to growth. It consists of two complementary parts. First, we conduct a cluster analysis of the institutional settings of the Central and Eastern European states on the basis of transition indicators developed and published by the European Bank for Reconstruction and Development. As institutional variables usually exhibit inertia, our analysis is based on time spans of several years, with the appropriate selection related to the significant changes in institutional settings towards European norms, e.g. dates of association agreements, EU accession dates and the like. Second, attention is especially drawn to the connection between the institutional environment and economic growth that diverges significantly between different CEE countries. For the empirical relation between institutional convergence to EU norms and growth, we make use of non-parametric methods that allow consideration of short time series and comparatively low numbers of countries. We found that apart from the first years of transition there is a little evidence for institutional convergence between CEECs and from 1999 the EBRD transition indicators are not significant for growth.

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Introduction

Few issues in economics have experienced such a grandiose revival as the role of institutions in economic development. The institutional tradition goes back to the writings of Thorstein Veblen in the United States at the end of the nineteenth century and to the German Historical School represented by authors such as Schmoller. The role of institutions was also recognised in the early writings of development economists (Hirschman, 1970). However, North (1990) finally formulated the role of transaction costs, imperfect information and path dependence that was fully integrated into the analytical framework of mainstream economics. Since North's contributions institutional change has become an indispensable part of economic analysis.

One of the most promising terrains for an application of institutional economics has been provided by the transition process in Central and Eastern Europe. Since the beginning of the 1990s Central and Eastern European countries have undergone a radical institutional change. The reconstruction and modernisation of post-communist economies towards sustainable market economies meant a systemic change. The main focus was put on those areas that were considered to fall under the heading of creating market systems, e.g. on price liberalisation, on privatisation and on legal frameworks for business. The general assumption was that development and growth would follow once the objective of installing appropriate institutional framework for market economy had been achieved.

The accession strategy for the EU enlargement has been either built on the formal ex ante harmonisation of institutions. The institutional underpinning of market economies is a "clearly delineated system of property rights, a regulatory apparatus curbing the worst forms of fraud, anti-competitive behaviour, and moral hazard, a moderately cohesive society exhibiting trust and social cooperation, social and political institutions that mitigate risk and manage social conflicts, the rule of law and clean government" (Rodrik 2000, p. 2). Establishing of effective, appropriate, market supporting institutions has been regarded as the necessary condition for an internal common market and it is reflected in the European Union law (*acquis communautaire*). The EU's institutional framework is assumed to be effective in the first place because it enables an internal common market free of distortion and then it might help to foster the trend to further economic integration within the EU. This unified institutional environment, however, has been established in the EU by interjurisdictional bargaining procedure, by informal contracts and cooperation, and a mutual learning process over a long period of time. To this best (praxis proven) coherent combination of effective institutions Central and Eastern European countries also had to converge before the EU accession to ensure macroeconomic stability and to enhance economic growth.

The European Bank of Reconstruction has developed and published the "transition indicators" to monitor the progress of individual countries in building sustainable market economies to create preconditions for the accession to the EU Common Market (similar to *acquis communautaire*). They have proven extremely popular despite a number of questions regarding their validity as a monitoring tool of the progress towards an economic system that can bring growth and prosperity. Instead they should rather be regarded as indicators of progress "along a road to an economic system defined by private ownership and free markets" (Myant/Drahokoupil 2012, p. 74). These different aims could in some cases coincide, but in some others not. Nevertheless, since 1994 the "transition indicators" have become one of the most used sources to analyse economic and social developments in Central and Eastern Europe as well as in the Former Soviet Union. The analysis of institutional convergence is less vulnerable to the criticism of the validity of indicators as it monitors

the progress towards a single institutional scheme. The relation of institutional convergence to growth needs instead a careful interpretation for the reason mentioned above.

The aim of this paper is twofold. First, we conduct an empirical analysis to study ex ante harmonisation in the Central and Eastern European countries, enabling us to see if there is empirical evidence of institutional convergence. Based on those results, in a second step we test the relation between our results of institutional environment in CEEC with GDP growth and some other targets of EU cohesion policy (personal income inequality and inequality of regional GDP per capita) which leads us then back to the initial question, whether the EU aquis communautaire in terms of the EBRD transition indicators has set the stage for a successful integration regarding these indicators of EU cohesion policy.

Data and period delineations

The aim of our empirical analysis is to conduct a cluster analysis of institutional settings of the CEE new member states related to the EU accession strategy. As institutional variables usually exhibit inertia, our analysis is based on time spans of several years, the proper choice of which is related to the significant steps towards European integration of the CEECs – EU membership applications, association agreements, opening years of accession negotiations and finally EU accession dates. Years of the dates of the two rounds of enlargement are listed for the CEECs in Table 1.

Table 1. Years of important steps towards EU accession in the CEECs (with exception of Croatia - accession 2013)

	EU membership application	Association agreement	Opening of accession negotiations	Accession
Bulgaria	1995	1995	2000	2007
Czech Republic	1996	1995	1998	2004
Estonia	1995	1998	1998	2004
Hungary	1994	1994	1998	2004
Lithuania	1995	1998	1999	2004
Latvia	1995	1998	2000	2004
Poland	1994	1994	1998	2004
Romania	1995	1995	2000	2007
Slovenia	1996	1999	1998	2004
Slovakia	1995	1995	2000	2004
Median	1995	1995	1998 and 1999	2004

Source: own analysis.

Based on the years of important steps of EU accession in Table 1 the median for those dates was calculated which were then used to delimit 5 periods:

- Period 1991-1994 (4 years) is the period preceding EU membership application in most CEECs. It is also the time immediately following the political change after the breakdown of communist regimes.
- Period 1995-1998 (4 years) is the period in which most CEECs applied for EU membership and association agreements were concluded.

- Period 1999-2003 (5 years) is the period when accession negotiations were opened and concluded for most of the CEECs.
- Period 2004-2006 (3 years) is the period when the first enlargement took place and 8 CEECs became members of the EU.
- Period 2007-2010 (4 years) is the period when also Romania and Bulgaria joined the EU. It is also a time when the financial crisis hit the CEECs.

For those 5 time spans institutional data were taken from the EBRD transition indicator data base which provides expert assessments (in the form of indices) of the institutional framework in a number of areas. In order to avoid possible problems related to the limited number of observations in our subsequent analyses, also transition countries which do not belong to the EU accession group of CEE countries were included in the data base. The latter can be qualified by the similarity of institutional starting conditions in the post-communist countries and their possibility to develop different institutional settings in the transition period, including the convergence to EU norms. The EBRD data base comprises 27 former communist countries from the CEE region, the Balkans, the CIS region and Mongolia.

A number of transition countries are highly dependent on commodity exports which can lead to major shifts in GDP growth and may also result in a lack of political pressure for institutional reforms. For this reason we did not include oil exporting countries of the CIS and Mongolia (which export a number of other commodities) in our data base. Belarus was also not included as it has strongly benefited from the refining and re-exporting of Russian oil and gas, inter alia, through illegal or semi-legal activities (see Balmaceda 2006). Altogether, our data base comprises a selection of CEECs, the Ukraine, Moldavia, Armenia and Georgia (20 countries).

Multivariate methods for measuring institutional convergence in the CEEC region

The EBRD transition indicators are numerically-coded judgements of experts (another example is the Corruption Perception Index of Transparency International). In social research such data are sometimes called 'Likert scales'. In principle, multivariate methods as Principal Component Analysis (PCA) could be applied to measure similarities or dissimilarities in the data and find factors representing them. Country groupings or clusters of institutional configurations could then be detected using an appropriate clustering method. However, there is a possible problem with this approach. The operation with numbers on an interval or rational scale is usually connected to the assumption that the differences between certain values on the scale have the same meaning as long as the difference in magnitude is the same. E.g. the difference between 1 and 2 or between 2 and 3 would be considered the same on a rational scale. However, this analogy of differences cannot generally be assumed for institutional indices such as the ones supplied by the EBRD where a value of "1" stands for "no steps" or almost no steps towards EU norms, "2" for "some" steps in this direction, "3" for "significant progress" and the like. The EBRD transition indicators should be understood rather in a qualitative way or – in other words – they have an ordinal scaling level.

In order to do a multivariate analysis revealing convergence processes in institutional reforms, therefore we have to recognise the qualitative nature of the given data. In principle, there are two ways to do this. First, one might regard the data as truly qualitative in the scaling sense, which means that there is no ordering of measurements. Actually, this assumption is in contrast to the very definition of the ranges of the EBRD transition indicators (1: no steps towards EU norms, 2: some

steps and so on...). Nevertheless, an examination of the data according to this scaling level may make it possible to depict diversity in institutional configurations in our country data base (as compared to the methods available for ordinally scaled data) and therefore it is interesting for our analysis.¹ A suitable method to find factors based on this assumption is Multiple Correspondence Analysis (MCA, a short description is given in the annex).

For our research question, however, there is also a drawback of working with a nominal scaling level. The main reason has already been mentioned: the EBRD measurement in itself is not neutral in that it reflects expert judgements on an ordinal scale ranging from “no steps” in reforms towards standards of “advanced” EU countries to full alignment with these standards. Thus, for the question of overall convergence towards EU norms (or the lack thereof) it is better to consider this data characteristic in the empirical analysis. Appropriate multivariate methods for this developed were developed and made available to applied work following the work of Gifi (1990). Meanwhile, those are known as Non-Linear Principal Component Analysis (NLPCA; see Mair and de Leeuw 2009 and 2010). For our work, both analyses – MCA for nominal data and NLPCA for ordinal data – were undertaken while importance is given here to the analysis of ordinally-scaled data for the reasons previously mentioned (using NLPCA; MCA analyses of nominal data served as a robustness check). In the following we describe briefly how NLPCA works on our given data set. For a short description of MCA in our data context the reader is referred to the annex.

The NLPCA method is a suitable way to find common factors in ordinal data which cannot be treated using standard multivariate techniques such as PCA because data are not given on a rational scale. Data are first transformed into a 0/1 Burt matrix of categories as in the case of MCA (see annex). Subsequently, optimal scaling is applied which is the calculation of category scores, where optimal refers to the optimisation of a target function given the ordering of the variables on an ordinal scale (see Gifi 1990, Mair and de Leeuw 2010). This is done via transformations of the original variables into numerical values. In the literature different objectives of the target function have been discussed where we focus on the sum of first p eigenvalues of the correlation matrix derived from the Burt matrix and variable quantifications. In analogy to PCA, the focus is on finding factors representing as much inertia (a multivariate counterpart of variance) of the data as possible – reflected by the largest eigenvalues of the correlation matrix. Optimisation is done iteratively, e.g. by majorisation (applied in the software package Aspects in the R environment used for subsequent calculations, see Mair and de Leeuw 2010, p. 6) and finishes when convergence (threshold ϵ) is reached.

In principle, for every chosen number of factors p to be extracted NLPCA results in a different data transformation and therefore it is important to choose p in an optimal way. We have used results on the optimal choice of dimensions originally derived in a PCA context to solve this problem. First, as proposed by Peres-Neto et al. (2005, p. 995) for the PCA context, a Bartlett test (Grossman et al. 2011, p. 342) is conducted to determine whether the first component represents a significant correlation in the data structure.² After this test, which was indicative for a correlation structure with

¹ E.g. it can be imagined that institutional reforms for some fields do not follow a general trend while they do in other fields for some of the countries considered.

² The Bartlett test delivers reliable results also in the NLPCA context. We tested this with a Monte Carlo simulation of data having similar characteristics (range and skewness, but no correlation) as the EBRD data. In none out of 20 repetitions

order of at least 1 in the EBRD data, we conducted the Random Average Under Parallel Analysis test strategy which consists of choosing the number of non-trivial axes (representing significant correlations in the data) based on exceeding the average eigenvalues from a Monte Carlo simulation of uncorrelated data with similar characteristics. This test was found to be among the most reliable when the correlation structure covers all of the variables by Peres-Neto et al. (2011, p. 994).

After conducting NLPCA and detecting the number of significant factors we used these data for a cluster analysis to find the similarities or dissimilarities of institutional configurations in the EBRD data set. There is a number of clustering methods available. Examples comprise early developments such as Ward's method (for this and other methods see Husson et al. 2011), where the user can specify at which point clustering stops, starting with all individuals in distinct clusters and then grouping them successively (often using Euclidian distance and minimum within-inertia (multivariate analogue of variance) gain when merging a member/cluster with an and additional member/clusters). We use a similar approach here but let the clustering stop based on an objective criterion. When increasing the number of clusters from a given number $k-1$ to k the increase of between-inertia $\Delta(k)$ is considered. The number of clusters is chosen so, that $\Delta(k)/\Delta(k+1)$ is minimised and k is chosen as the optimum number of clusters (Husson et al. 2010, p. 4). This means the cut-off point is where the increase in the number of clusters does not yield much more difference between them as measured by between-inertia.

Results and their interpretation

Using the methods described above for the CEECs and our additional selection of the CIS (the Ukraine, Moldavia, Armenia and Georgia) we obtained between 3 and 4 country clusters for the periods considered (see Table 2 containing NLPCA results). From 1991 to 1998 we identified 3 and after 1999 4 clusters.³ Despite the effort to speed up the progress of institutional harmonisation in CEECs towards the EU norms in the 1990s we did not find a continuous process of institutional convergence. In the data set included countries have only partly become similar in their institutional settings creating more or less stable convergence clubs. Overall, it seems that from 2007 CEE countries stagnate in relative institutional terms, which might also be the reaction to the worldwide financial crisis that obviously emphasised the conflicts between formal and informal norms and revealed the formal character of the progress of institutional harmonisation.

For the new EU member states the hierarchical clustering shows that these countries are grouped in the first considered period in all three clusters and from 1995 on we find them in two clusters. We draw the conclusion that after the period of institutional convergence during the transition and before the accession to European Union, the CEE countries are recently trapped in diverse stable regional clubs. There is a lack of further convergence as has been also stated by Jeromin Zettelmeyer from the EBRD (2013). Four of the countries – Hungary, Poland, Slovakia and Czech Republic - can be found in each period in the “best” cluster.⁴ The probable reason might be the fact that those

the Bartlett Test was in favour of a deviation of the first eigenvalue from the rest of the eigenvalues while it was so for the original EBRD data.

³ Results of MCA, which serve as a robustness check, are shown in the annex. They are similar to NLPCA results and do not deviate qualitatively.

⁴ In the last period the Czech Republic dropped out of the EBRD data base of “Transition indicators” as being particularly well progressed in terms of institutional harmonisation.

countries started to transform their institutions towards a market economy at an earlier stage compared to others. Hence, the institutional development of these countries after 1990 is rather homogeneous. Other countries had instead a “cold start” from very different institutional settings. Those countries also have frequently changed clusters over the whole period considered. It is also striking to see that Romania has always been in the weakest cluster among the new EU member states, although Romania has made institutional progress in relative terms. From 2004 on, four of the eleven countries – Romania, Bulgaria, Slovenia and Croatia (which opened accession negotiations in 2005) – seem to be trapped in the same regional club.

Table 2: Results of NLPCA and criterion-based k-means clustering; Blue: leading group; Red: lagging group in terms of institutional convergence

	1991-1994	1995-1998	1999-2003	2004-2006	2007-2010
ALBANIA	3	2	2	3	3
ARMENIA	3	2	2	3	3
BOSNIA AND HERZEGOVINA	3	3	3	4	4
BULGARIA	2	2	1	2	2
CROATIA	2	1	1	2	2
Czech Republic	1	1	1	1	-
ESTONIA	2	1	1	1	1
FYR MACEDONIA	2	2	2	3	3
GEORGIA	3	2	2	3	3
HUNGARY	1	1	1	1	1
LATVIA	2	1	1	1	1
LITHUANIA	2	1	1	1	1
MOLDAVIA	3	2	2	3	4
MONTENEGRO	-	-	-	-	4
POLAND	1	1	1	1	1
ROMANIA	3	2	2	2	2
SERBIA	3	3	4	4	4
SLOVAKIA	1	1	1	1	1
SLOVENIA	2	1	1	2	2
UKRAINE	3	2	2	3	4
Number of Clusters	3	3	4	4	4

Source: own analysis

Overall, the development of clusters suggests that a strong leap forward in institutional compliance with the EU norms - reflected in the EBRD transition indicators - was made from 1995 to 2003 in all new EU member states. From 2004 on, this dynamics has slowed down. The following Table 3 illustrates the development of different indicators as average per period and per cluster.

Table 3: Development of institutional indicators (EBRD transition indicators) as average per period and per cluster.

2007-2010	Large scale privatisation	Small scale privatisation	Enterprise restructuring	Price liberalisation	Trade & Forex system	Banking reform & interest rate liberalisation	Securities markets & non-bank financial institutions	Competition Policy
all countries	3.5	4.0	2.7	4.2	4.2	3.3	2.7	2.7
Cluster 1 (EE, LV, LT, HU, PL, SK)	3.8	4.3	3.4	4.3	4.3	3.8	3.4	3.4
Cluster 2 (BG, HR, RO, SI)	3.5	4.1	2.8	4.2	4.3	3.6	2.9	2.8

Cluster 3	3.6	4.0	2.4	4.3	4.3	2.8	2.0	2.2
Cluster 4	3.0	3.7	2.1	4.0	4.0	3.0	2.0	2.1

2004-2006	Large scale privatisation	Small scale privatisation	Enterprise restructuring	Price liberalisation	Trade & Forex system	Banking reform & interest rate liberalisation	Securities markets & non-bank financial institutions	Competition Policy
All countries	3.4	4.0	2.7	4.2	4.2	3.2	2.5	2.4
Cluster 1 (PL,HU,CZ,EE,LT,LV,SK)	3.8	4.3	3.4	4.3	4.3	3.8	3.3	3.2
Cluster 2 (BG,HR,RO,SI)	3.5	4.0	2.8	4.2	4.3	3.5	2.6	2.5
Cluster 3	3.2	3.9	2.2	4.2	4.2	2.7	2.0	2.1
Cluster 4	2.6	3.2	2.1	4.0	3.4	2.6	1.8	1.2

1999-2003	Large scale privatisation	Small scale privatisation	Enterprise restructuring	Price liberalisation	Trade & Forex system	Banking reform & interest rate liberalisation	Securities markets & non-bank financial institutions	Competition Policy
All countries	3.1	3.8	2.4	4.1	4.0	2.8	2.3	2.2
Cluster 1 (BG,HR,CZ,EE,LV,LT,HU,PL,SK,SI)	3.5	4.3	3.0	4.2	4.3	3.4	2.9	2.7
Cluster 2 (RO)	3.0	3.8	2.0	4.1	4.0	2.4	1.8	2.0
Cluster 3	2.2	2.6	1.7	4.0	3.1	2.3	1.3	1.0
Cluster 4	1.5	3.0	1.4	3.3	2.1	1.5	1.3	1.0

1995-1998	Large scale privatisation	Small scale privatisation	Enterprise restructuring	Price liberalisation	Trade & Forex system	Banking reform & interest rate liberalisation	Securities markets & non-bank financial institutions	Competition Policy
All countries	2.7	3.6	2.2	3.8	3.5	2.4	2.0	1.9
Cluster 1 (HR,CZ,EE,LV,LT,HU,PL,SK,SI)	3.4	4.2	2.8	4.1	4.1	3.0	2.6	2.4
Cluster 2 (BG,RO)	2.6	3.4	2.0	3.8	3.7	2.3	1.6	1.7
Cluster 3	1.1	2.5	1.1	2.7	1.5	1.2	1.0	1.0

1991-1994	Large scale privatisation	Small scale privatisation	Enterprise restructuring	Price liberalisation	Trade & Forex system	Banking reform & interest rate liberalisation	Securities markets & non-bank financial institutions	Competition Policy
all countries	1.6	2.6	1.6	3.4	2.7	1.7	1.3	1.5
Cluster 1 (SK,PL,HU,CZ)	2.4	3.4	2.6	4.1	3.8	2.6	1.8	2.3
Cluster 2 (SI,LT,LV,EE,BG,HR)	1.7	2.8	1.6	3.8	3.0	1.8	1.3	1.5
Cluster 3 (RO)	1.2	2.0	1.1	2.7	1.9	1.1	1.1	1.2

Source: own analysis

A closer look at these numbers makes it apparent that larger steps were made immediately after the beginning of the transition process in institutional settings such as price liberalisation, small scale

privatisation and trade & forex system. Table 4 below shows institutional indicators with the weakest institutional progress towards EU norms in the period 1991-2010 in the new EU member states.

Table 4: Development of singular institutional indicators 1991-2010 in the new EU member states

	The weakest cluster	The strongest cluster
Enterprise restructuring	From 1.1 to 2.8	From 2.6 to 3.4
Securities markets & non-bank financial institutions	From 1.1 to 2.9	From 1.8 to 3.4
Competition policy	From 1.2 to 2.9	From 2.3 to 3.4

Source: own compilation.

A closer look at the “weakest” and “strongest” cluster over all five periods demonstrates that the new EU member states have made some progress, but they are still far away from the benchmark of 4.3. It is apparent that these institutions are necessary for contestable and well-functioning markets and growth. Recently they have been the drivers or obstacles of further institutional convergence.

In the following tables we present some results for the first factor of NLPCA analysis, which was the only significant factor extracted (see Table 5). In order to give a concentrated overview on this factor as a measure of institutional convergence, it is actually sufficient to list correlations of the factor with the EBRD institutional data (we use the transformed data from NLPCA). Those correlation coefficients are listed in Table 5 and are high (significantly different from 0) for all periods considered.⁵ Generally, there is the impression that the EBRD institutional data strongly co-move. Co-movements in either direction can be seen as depicting institutional convergence towards EU norms (movements in the positive direction of factor 1) or divergence from these norms.

Table 5: Correlations of factor 1 with EBRD indicators

	1991-1994	1995-1998	1999-2003	2004-2006	2007-2010
Large scale privatisation	0.92	0.98	0.99	0.91	0.81
Small scale privatisation	0.85	0.87	0.95	0.91	0.87
Enterprise restructuring	0.99	0.99	1.00	0.94	0.95
Price liberalisation	0.81	0.93	0.89	0.63	0.67
Trade & Forex system	0.97	0.98	0.96	0.74	0.76
Banking reform & interest rate liberalisation	0.99	0.98	0.92	0.91	0.92
Securities markets & non-bank financial institutions	0.92	0.90	0.95	0.91	0.93
Competition Policy	0.97	0.81	0.95	0.96	0.94

Source: own calculations.

In Table 6 this process of institutional convergence is depicted for the clusters derived from our analysis described above. In order to judge significant deviations of the convergence-bearing factor 1 of the institutional data, a normal distribution-based test statistic (Husson et al. 2010) was applied. It is apparent that factor 1 is significantly different from the overall country mean on the 1% error level in cluster 1 in each period. Positive values of the test statistic indicate that factor 1 is higher in this country group compared to the average of all countries. In other words, countries in cluster 1 are showing progress towards EU norms. In the weakest clusters the test statistic for factor 1 has

⁵ To make correlation coefficients comparable, the factor 1 variable was standardised so that it points in the positive direction when resulting from high values of transformed EBRD data (in the factor decomposition the direction of factors is not fixed to follow this ordering). The same holds for the values shown in Table 4.

negative values. Thus, their measure for institutional convergence is significantly lower than the measure of all countries. Countries in the intermediate clusters do not show significant (on the 5% error level criterion) deviations from the overall country mean in their institutional settings.

Table 6: Test statistics for significant deviations of the first factor (measuring institutional convergence) from overall mean of all countries; *, **, * significance levels 10%, 5%, 1%; n.s.: not significant**

Cluster	1991-1994	1995-1998	1999-2003	2004-2006	2007-2010
1	4.1***	2.8***	3.6***	3.3***	3.5***
2	n.s.	n.s.	n.s.	n.s.	n.s.
3	-2.7***	-3.8***	n.s.	-2.0**	n.s.
4	-	-	-2.2**	-2.9***	-3.2***

Source: own calculations.

Interpreting growth properties of clusters

In the preceding section we have looked at the state of institutional convergence and partly also divergence of CEECs. Based on this mapping of the institutional settings in the CEECs we are also interested in the question of whether anything can be said about possible influences of institutional convergence (or the lack thereof) on economic growth. In our analysis we use results of NLPCA clustering which were described above. In order to make a judgement of possible effects of institutional convergence/divergence on growth, we can characterise those clusters by values of longer term economic growth (calculated with a Hodrick-Prescott filter applied to EBRD GDP data) in each considered period. Significant deviations of the growth performance of clusters from all countries in the period can then be judged using appropriate statistical test statistics which are briefly described in the following.

We apply two methods of testing for possible relations between economic growth and institutional convergence. The first method is the calculation of correlation coefficients of factor 1 (institutional convergence measure from the NLPCA) and growth.⁶ Results are shown in Table 7.

Table 7: Correlation coefficients of institutional convergence (NLPCA factor 1) and economic growth; *, **, * significance levels 10%, 5%, 1%**

	1991-1994	1995-1998	1999-2003	2004-2006	2007-2010
Correlation	0.65***	-0.29	0.05	-0.15	-0.41*
p value	0.00	0.23	0.83	0.53	0.09
Correlation coefficients without countries affected by former Yugoslav wars					
	1991-1994	1995-1998	1999-2003	2004-2006	2007-2010
Correlation	0.66***	0.46**	-0.36		
p value	0.00	0.05	0.13		

Source: own analysis.

What can be seen in this table is that only in the first period did the countries on the track towards institutional convergence have higher growth compared to other countries. This also holds when

⁶ In order to judge the strength of correlations, a usual rule of thumb says that correlation coefficients below .5 are rather low. Also the number of cases plays a role and so we also look at the significance of correlations. One way to do this is again to introduce the assumption of normal distribution in the considered variables and then to look at the standard t Test for the correlation coefficient ($t = r(n-2)^{0.5} / (1-r^2)^{0.5}$).

possible disturbances due to war in the former Yugoslav countries are removed⁷ – in this case a tapering off of higher growth in institutionally converging countries can be seen (after the first period still somewhat higher growth in the period 1995-1998). In the last period from 2007-2010 institutionally converging countries were falling back in term of growth, albeit this correlation is barely significant.

A second approach to the question of growth differentials between countries, which we have chosen as a robustness check, is testing growth values of countries in clusters using the Kruskal-Wallis test. As compared to the correlations described above, the Kruskal-Wallis test has the advantage that it does not rely on a specific assumption on the distribution of growth in the overall country sample. Its test statistic has an asymptotic chi-squared distribution. For small group sizes it has been shown that the Kruskal-Wallis test statistic deviates considerably from the chi-squared distribution and in such cases it can therefore be more appropriate to calculate exact critical values for the test statistic.⁸ The chi-squared approximation of the distribution we used is a conservative test as compared to the exact test statistic in such cases. We checked this and did not find big problems for our sample sizes because the deviations are not large. As an additional precaution we calculated test statistics for merged clusters when sample sizes were too uneven following the results of Meyer and Seaman (2013), as in 2004-2006 and 1999-2003, but that did not change results (see Table 8).

Table 8: Clusters and Kruskal-Wallis Test; *, **, * significance levels 10%, 5%, 1%**

	Mean of Growth				Kruskal-Wallis Test p values
	Cluster 1	Cluster 2	Cluster 3	Cluster 4	
2007-2010	1.5%	1.5%	4.0%	2.7%	p=0.11
n	6	4	4	5	
2004-2006	5.7%	5.1%	6.9%	5.5%	p=0.52 (2 clusters: 0.51)
n	7	4	6	2	
1999-2003	5.0%	5.6%	8.6%	(Yugosl. war)	p=0.32 (2 clusters: 0.32)
n	10	7	1		
1995-1998	3.3%	-0.9%	(Yugosl. war)		p=0.04**
n	9	8			
1991-1994	-1.5%	-7.1%	-11.8%		p=0.03**
n	4	6	6		

Source: own calculations. Grey/Blue: aggregation of clusters with more or less convergence towards EU *acquis* norms.

Overall, results of Kruskal-Wallis tests confirm our results for sample distribution means described above. Table 8 illustrates that p values for the sample mean test including all distinct clusters below the 5% error level can be found only in the first two periods from 1991 to 1998. As with the correlation tests, significant downward-deviations of growth rates can be found for countries which showed a low convergence towards EU community *acquis* norms in this time span.⁹ There is a moderate connection in the last period 2007 to 2010 that is, however, not significant. This result is in line with our earlier result of the correlation analysis which also showed a correlation with growth on a low significance level in this period.

⁷ Those include: Croatia for 1991-1998 (war ended 1995), Serbia 1991-2003 (last war ended 1999) and Bosnia and Herzegovina 1991-1998 (war ended 1995).

⁸ See Meyer and Seaman (2013).

⁹ We left out the countries participating in Balkan wars and which formed the third cluster in those tests in the periods from 1995-2003.

Institutional convergence and other dimensions of EU cohesion policy

As a last step, we examine the possible relations of institutional convergence (measured by the first factor of our NLPCA analysis) and other dimensions of EU cohesion policy. We focus on the Gini coefficient of net per capita (and net equivalised household members) income as a measure of social cohesion within the countries and the MLD for regional income per capita as a measure of regional economic convergence at the country level. Thus, both statistics are measured at national levels. For the analysis of relations between institutional convergence and cohesion policy indicators we then calculate correlation coefficients for those indicators and the factor measuring institutional convergence, where the single observations are (averaged over the years of the observation period, in the case of cohesion policy indicators) values of the indicators/factors per country and observed period.

The Gini coefficients were taken from the Transmonee 2008 data base and the UNU-WIDER data base for the time span 1991-1998 and from the EU Commission for the time span 1999-2010. While for the first time span we had to use Gini coefficients based on net income per capita, figures for the second period are based on the more widely used so-called new OECD equivalence scale where economies of scale in households are allowed for. For the period 1991-1998 most data stem from Transmonee 2008. For Latvia and the Former Yugoslav Republic of Macedonia additional values were taken from the UNU-WIDER data base, based on the assessment of data quality which can be found there.¹⁰ Some missing data (up to 2 data points in a row) were interpolated using linear approximation. In order to have a data set on inequality for the period 1999-2003, data for the year 1999 was approximated using the EU Commission data on income inequality in 2000 (first year of availability of net equivalised income Gini coefficients) and the Transmonee data for 1999 and 2000 assuming that the inequality of equivalised net income per household member moved in the same factor as did inequality of net household per capita income.

Table 9: Correlations of institutional convergence with Social Cohesion (Gini coefficients) ; * significance level 10%

	1991-1994	1995-1998	1999-2003	2004-2006	2007-2010
Correlations	-0.51	-0.55*	0.17	0.27	0.02
number of countries	7	11	8	11	11
p values	0.24	0.08	0.69	0.43	0.95

Source: own calculations.

The figures in Table 9 which are mostly based on figures for a selection of CEECs (plus Ukraine 1995-1998, FYR Macedonia 1991-1998 and Croatia 2004-2010) demonstrate that at the beginning of the transformation period there was a significant correlation of institutional convergence and social inequality. Converging countries had lower social inequality (lower Gini coefficients) in the time span from 1991-1998. In the first period 1991-1994 this relation is not significant given the low number of observations (7) in this case (nevertheless, correlation coefficients of the magnitude +/-0.5 are often considered as notable). After the first two periods this relation vanished, meaning that there is no significant relation of institutional convergence with social inequality any more, at least in the country selection of CEECs including Croatia.

¹⁰ For Latvia 1995-1998 these data stem from the studies (data bases) of Milanovic 1998, Deininger & Squire, World Bank 2004, Transmonee 2004, Transmonee 2005, Transmonee 2007 referred to in the UNU-WIDER data base, for the Former Yugoslav Republic of Macedonia 1991-1993 data stem from Transmonee 2004.

Table 10: Correlations of institutional convergence with regional convergence

	1995-1998	1999-2003	2004-2006	2007-2010
Correlation	0.17	0.05	0.12	0.17
number of countries	8	11	11	11
p value	0.70	0.88	0.72	0.61

Source: own calculations

As opposed to the findings for economic growth and social cohesion, results shown in Table 10 indicate that there was no significant correlation between regional disparities measured by the MLD (calculated for Eurostat NUTS3 data on regional per capita GDP in purchasing power parities). This holds both for the p values and for the size of calculated correlation coefficients which are well below 0.5. Thus, it seems likely that institutional convergence has not given rise to enlarged regional disparities in the CEEC region, for which the coefficients were calculated (also including data for Croatia and FYR Macedonia). On the other hand, it also did not contribute to lower values of regional disparities, which were on the rise throughout the region during the period considered.

Conclusions

In our paper we tested the hypothesis that there is one best (praxis proven) coherent combination of effective institutions for all Central- and Eastern European countries that ensure macroeconomic stability, enhance economic growth and contribute to regional as well as to social cohesion. In accordance with the liberal model of the mainstream economics an early institutional set-up through ex ante harmonisation (required by aquis communautaire) should ensure that the new EU member states converge to the European institutional framework. In this way they would be enabled to draw best benefits of the European Common market. The results of our empirical tests do not support this hypothesis. First, we found that overall institutional convergence of the CEE countries proceeded until 2003 (just before the first round of EU accessions in 2004). Since then, the convergence process has slowed down sharply and in all countries we observe a trend of stagnation in relative terms of institutional convergence. Second, we found that the countries are trapped in the regional clubs (clusters) and there are few signs of changes between clusters (for example Bulgaria and Romania). Third, the results of our analysis suggest that the drivers of recent institutional convergence are institutions such as competition policy, enterprise restructuring, securities markets & non-bank financial institutions. All of them are necessary for contestable and well-functioning markets within the EU, and thus for growth. In a second analysis, we tested the connection between a) clusters and growth, b) clusters and social cohesion, and c) clusters and regional cohesion in the EU. Our results of growth tests do not reflect a strong connection between clubs of institutional convergence and growth apart from a very initial period of transition (until 1995). It seems that the progress of institutional convergence does not affect growth significantly. Our results of social and regional cohesion tests do not reflect any connection at all. This outcome, however, might be caused by the problems regarding the validity of the EBRD transition indicators. As stated above, the transition indicators reflect the progress towards an economic system defined by private ownership and free markets and not necessarily towards an economic system that brings about growth and prosperity. Hence, the EBRD transitions indicators might be a wrong tool to study the connection between institutional convergence and growth. But still, they are valid measures to reflect the dynamics of institutional convergence and illustrate that countries have been trapped in regional clubs (clusters). Overall, our empirical evidence for the new EU member states of a) existence of regional clubs, b) a weak connection between institutional convergence and growth and c) no significant correlation between institutional clusters and both tested dimensions of cohesion might also lead to a further assumption that fast ex ante institutional harmonisation possibly hampers or impedes growth at

least in some countries. Hence, taking into account national peculiarities (path dependence), different regional clubs might need different institutional solutions and/or different pace of institutional set-up to progress along the road to growth and prosperity. These final assumptions require further tests as they might lead to a strong modification of the prevailing model of economic growth and development.

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Annex 1: Multiple Correspondence Analysis (MCA) of institutional data

In order to perform an MCA on our data, as a first step we have to group the institutional data into ranges such as “low”, “medium” and “large” extents of institutional reforms towards EU norms. The reason for this is that otherwise we get too many categories of institutional variables and hardly any correlations among them. On the other hand, the grouping of these indices into ranges is not arbitrary in our case because the EBRD has supplied the data with such delineation. We have used the broad classification of the EBRD transition indices which ranges from 1 to 4.3 (except for the deficit variable, see below). As mentioned above, “1” stands for (almost) no steps towards EU norms while “2” is interpreted as some progress of institutional reforms towards EU norms. “3” is the code for significant progress and “4” stands for substantial improvement in the considered institutional field. Values of up to 4.3 signal standards of typical advanced industrial economies.

In the EBRD database the overall indicator range is from 1.0 to 4.3 and there are many intermediate values. We have decided to classify the data into ranges of equal length. Thus, variables in the range from 1.0 to 1.9 represent a rather “low” state of institutional transition; variables in the range from 2.0 to 2.9 represent a “medium” state; variables in the range from 3.0 to 3.9 represent a “high” and variables in the range from 4.0 to 4.3 represent a “very high” state of progress towards EU norms. As a result, our classification follows the EBRD classification systematic.

Based on our classification of data for individual countries and institutional fields into certain categories (“low”, “medium”, “high” and “very high”) we apply Multiple Correspondence Analysis (MCA) which is the appropriate method to find factors in qualitative data sets. After that, k-means clustering is applied to delimit clusters. MCA is the qualitative data analogue to the continuous data method PCA. As with PCA, MCA is used to find a new vector base for the data which represents the observed inertia (variance) in a descending order. In order to arrive at this representation, the data are recoded in an Indicator Matrix Z (which is just another way of tabulating the categories of the data with k 0/1 or dummy variables). Based on this data representation the so-called Burt Matrix $Z^T Z$ is calculated.¹¹ Subsequent Correspondence Analysis (CA) of this matrix results in eigenvalues in a descending order and a related new vector representation. The first dimension is based on the characteristic that a projection from the original data set generates the largest possible variance in one dimension of the new vector base. The second dimension is a vector with a similar characteristic – the projection of the original data on this vector is variance maximising conditional on the characteristic that it is orthogonal to the first dimension, and so on... As a result of this procedure, in the ideal case structures in the data can be detected in a way that a limited number of dimensions represent a large part of observed variance in the data. This can enable an interpretation of otherwise difficult to understand multidimensional data. It can also help in formulating hypothesis which can subsequently be studied with other methods.

¹¹ See Lebart et al (1984). For a short introduction in connection with an R implementation see Husson et al. (2011, chapter 3).

Annex 2: Clustering based on MCA results

	1991-1994	1995-1998	1999-2003	2004-2006	2007-2010
ALBANIA	6	2	2	2	2
ARMENIA	8	2	2	2	2
BOSNIA.AND.HERZEGOVINA	7	3	3	4	3
BULGARIA	4	2	2	2	2
CROATIA	5	2	2	2	1
Czech Republic	2	1	1	1	-
ESTONIA	3	1	1	1	1
FYR.MACEDONIA	5	2	2	2	2
GEORGIA	8	2	2	2	2
HUNGARY	1	1	1	1	1
LATVIA	5	2	2	1	1
LITHUANIA	5	1	2	1	1
MOLDOVA	8	2	2	3	2
MONTENEGRO	-	-	-	-	3
POLAND	2	1	1	1	1
ROMANIA	7	2	2	2	2
SERBIA	6	3	4	4	3
SLOVAK.REPUBLIC	2	2	1	1	1
SLOVENIA	3	2	2	2	2
UKRAINE	8	2	2	2	2
Number of clusters	8	3	4	4	3
Dimensions kept	1	3	3	3	1