

# **Is the corruption in the new member states converging with the rest of EU: An empirical investigation**

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## **Abstract**

The paper takes the economic concept of convergence and applies it to corruption in the new member states and their relationship with the rest of the EU. Using the Transparency International Corruption Perception Index, the analysis points to modest convergence in the EU as a whole, with the new member states as a group converging with the old member states at the rate of 0.08 points per year during the 1999-2008 period. The paper also finds that the new member states have corruption levels higher than their per capita income alone would predict and face a significant corruption handicap. However, there are large differences between countries, with Slovenia and Estonia showing no such handicap and the overall picture significantly improving during the last decade.

## **Introduction**

In economics, there is a well-developed concept of convergence between individual countries, which deals with convergence of nominal variables such as prices and convergence of real variables, particularly the per capita income. Neoclassical economic theory would generally imply gradual real convergence between countries. (Barro and Sala-i-Martin 1992) The economically most advanced postsocialist countries, which joined the European Union in 2004 and 2007, have achieved significant steps towards real convergence with the rest of the union, particularly over the last decade. However, there is an absence of retrospective or prospective research into the same issues concerning the corruption. While it is generally agreed that the average corruption levels are significantly higher in the new member states, (Rose-Ackerman and Kornai 2004) there is a lack of dynamic analysis. Are we observing (gradual) convergence of the corruption levels in the new member states with the rest of the union? If yes, how long will take it for the corruption levels to converge? Is there correlation with socioeconomic developments? How does this play out at the level of individual countries?

Using the Transparency International Corruption Perception Index (CPI), the paper examines these questions based on the data from the 1999- 2008 period. The strategy of the paper is to analyze the corruption developments in a non-structural manner – i.e. without positing what structural changes in the political, economic or social environment account for improvements in the corruption performance. In this respect, it is complementary to more theory-driven papers, which, of course, need to be at the forefront of research into corruption. However, a simple, data-driven modeling exercise can provide valuable additional findings, particularly as it has not been attempted before.

The rest of the paper is structured into six sections: it starts with a brief introduction to measurement of convergence in income and proceeds to a discussion of relevant methodological issues when applying the concept to corruption. The empirical sections contain an analysis of convergence in corruption between the old and the new member states as groups and then within the group of the new member states; analysis of the corruption dynamics at the country level when controlling for the level of income; and projections of future convergence prospects. The final section contains a summary of conclusions that can be drawn from the research.

### **Measuring convergence in income**

The concept of convergence can be applied to any set of time series data to determine whether individual units (countries, regions, organizations, individuals) are drawing closer in time or not. However, in economic research, an overwhelming majority of research focuses on convergence of countries (or, in the case of the European Union, also of regions – e.g. Quah 1996) in their levels of per capita income (real convergence) and prices (nominal convergence) as well as on the relationship between the nominal and the real developments.

Over the course of the last two decades, this work has been extended to the countries in transition, particularly to the group of the new member states that joined the European Union in 2004 and 2007. Its focus has generally been on examining real convergence of the acceding/new member states – is it happening and how rapidly are their income levels going to converge with those of the old member states? Earlier

studies were more sceptical as the transition recession of early 1990s and then the second slow-down in late 1990s seemed to confirm divergence or parallel paths rather than convergence (e.g. Wagner and Hlouskova 2001). However, the rapid growth experienced during the last decade has made observers more optimistic. (e.g. Detken et al. 2004) A great deal of attention has also been paid to nominal convergence (i.e. Wolszczak-Derlacz and De Blander 2008) and the interaction between nominal and real convergence (Grauwe and Schnabl 2005, Hein and Truger 2005, Rupprecht et al. 2007, Vintrová and Žďárek 2007).

However, since this paper is not interested in economic, but corruption convergence, let us focus on the convergence as a concept rather than on specifics of real/nominal convergence. There are several approaches to the concept. The concept of unconditional  $\beta$ -convergence is based on neoclassical economics, where countries should gradually converge to the same level of income as long as their basic underlying economic parameters are identical. (Barro and Sala-i-Martin 1992, Sala-i-Martin 1990) The presence of  $\beta$ -convergence is usually tested by looking at the relationship between initial income and the income dynamics, which is expected to be negative. (Baumol 1986). Since this process has frequently not been observed in reality (e.g. Canova and Marcet 1995), a complementary concept of the conditional  $\beta$ -convergence has been developed, where the income levels can converge to different levels if the economies involved have different underlying parameters. (Barro and Sala-i-Martin 1995) Econometrically, this involves controlling for a variety of variables that are seen as influencing the steady-state level of income.

Another way of looking at the issue is to look at the distributional dynamics and study cross-sectional standard deviation of values. (Quah, 1993) In other words, one can observe whether the dispersion of all values is decreasing or increasing in time. If it is decreasing, then we speak of  $\sigma$ -convergence. Both (unconditional and conditional)  $\beta$ -convergence and  $\sigma$ -convergence are valuable and they are also related:  $\beta$ -convergence is a necessary, but not a sufficient condition for  $\sigma$ -convergence to occur. Therefore, if the latter can be demonstrated, the former must also be present. (Wagner and Hlouskova 2001, Abreu et al. 2005)

### **Applying the concept of convergence to corruption**

The use of the concept of convergence and of related econometric methods in case of corruption is a new phenomenon. Only Gunardi (2008) uses methods that to some extent overlap with ours to determine whether there has been a global  $\beta$ -convergence and  $\sigma$ -convergence in corruption during the period 1984-2003 as measured by the International Country Risk Guide data. He finds both types of convergence in his sample, which covers a number of developed and developing countries.

Analytical work using the concept of convergence can be both structural and non-structural in the sense of (not) being driven by a model with explicit theoretical foundations. (Abreu et al. 2005) The paper generally takes a non-structural approach and is data-driven. Its objective is not to explain why convergence/divergence happened, but to discover whether it has been happening. It will use concepts of unconditional  $\beta$ -convergence and  $\sigma$ -convergence, with the former primarily used for comparison of means of the new and the old member states and the latter used for analysis within the group of the new member states and for the EU as a whole.

Nonetheless, one needs to answer several methodological questions before proceeding further, related to existence or absence of theoretical foundations for the expectation of corruption convergence, the effect of per capita income and whether it is useful to use the past to predict the future in this particular case. There is also the issue of the use of the Transparency International Corruption Index as the source of data for the quantitative analysis.

In terms of theory, there is the question of whether convergence in corruption should be expected at all within the European Union, particularly between the new member states and the rest? Based on literature, the level of corruption is positively influenced by many factors, three of which can be applied to the new member states: economic development, economic openness and long exposure to democracy. (Treisman 2000) In other words, passage of time brings increases in longevity in exposure to democracy in the new member states, which improves corruption prospects. Additionally, as long as we expect the real convergence and we also expect the EU membership to stimulate trade integration, there are grounds to believe in the corruption convergence. There are other specific reasons to believe that the EU accession and membership have additional beneficial effects on corruption levels, particularly with regard to the rule of law. However, there are reasons to believe that some of the positive effects are related to EU accession rather than EU membership as such (Schimmelfennig et al. 2003, Haughton 2007) though there are conflicting views on the continuing influence of the EU after the accession. (Pridham 2007)

This leads us to the issue of whether the recent past is a good guide to the future of corruption developments in the enlarged European Union. The answer depends on whether the convergence of the last decade, which will be demonstrated in the empirical section of the paper, has been primarily related to the long-term trends associated with economic development, openness and consolidating democracy, or more with one-time accession effects. From a theoretical point of view, one cannot give an *a priori* answer and, empirically, not enough time has passed since the accession to be able to distinguish which of the explanations is valid. As the empirical part of the paper will show, the gap between the old and the new member states has continued to decrease since the accession, but the period is relatively short.

The paper also tries to disentangle the effects of economic development from other factors. A crucial question for any research looking into corruption convergence in the enlarged EU is: To what extent is the higher level of corruption in the new member states about their relative poverty and can be expected to largely disappear as the per capita incomes converge? To answer the question, the paper uses a simple model of corruption that strips away the effect of income levels, using panel data analysis. It should also be noted that the correlation between per capita incomes and corruption does not imply causality or determine which way it goes. The point of the model is not to try to explain corruption in terms of its relation with wealth. By isolating the effect of income, it allows us to determine the size and dynamics of the other factors rather than to try to explain them.

The last methodological issue is the use of the Corruption Perception Index, published annually by Transparency International. The period for the analysis is years 1999-

2008, for which the CPI data are available for all countries but Cyprus and Malta. For this reason, the European Union in the paper means EU without Cyprus and Malta.

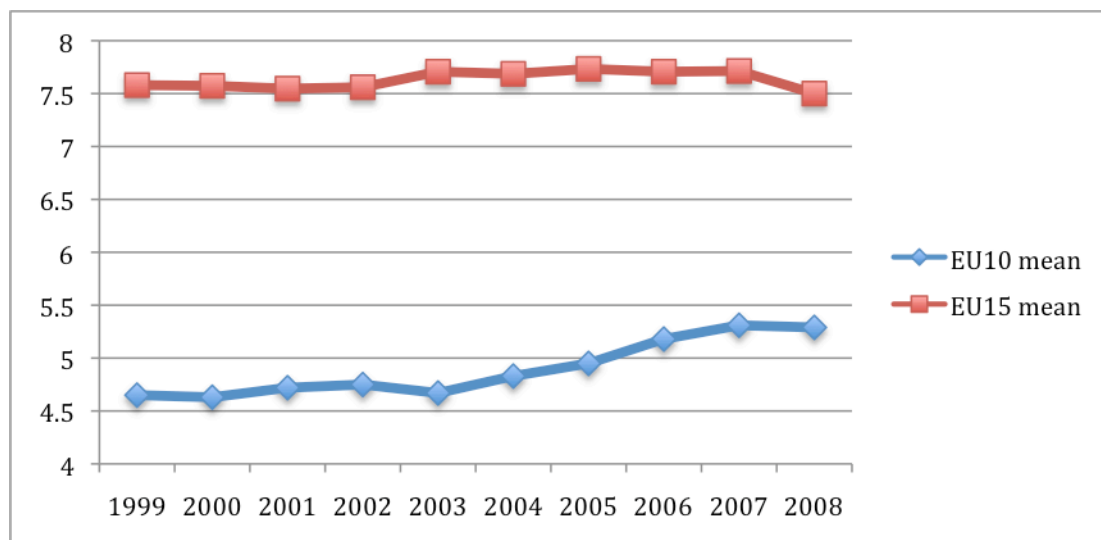
Use of CPI has both strengths and weaknesses (Hindess 2004, Lambsdorff 1998). The chief weakness is that of any perception-based indicator: there is no direct relationship to the “objective” incidence of corruption. However, there is no available dataset, which would measure corruption in the EU states in an “objective” way. Warner (2002) documents why a comparative attempt to measure corruption levels in individual EU countries through objective measures – ranging from reports of EU-level institutions to national prosecutions or discoveries of irregularities in utilization of EU funding - is largely futile.

Lambsdorff (1998), Lancaster and Montinola (1997) and Lancaster and Montinola (2001) make a convincing argument why CPI is successful in overcoming most of the problems related to perception-based indices. They point to use of respondents (such as international businessmen and risk analysts), who have an explicitly comparative perspective in their assessments. For the EU member states, the index utilizes several uniform sources of data available for all countries analysed in the paper: Economist Intelligence Unit; Freedom House, Nations in Transit; Country Risk Ratings by Global Insights (formerly World Markets Research Centre); World Competitiveness Report of the Institute for Management Development; Grey Area Dynamics Ratings by Merchant International Group; and Global Competitiveness Report of the World Economic Forum. Therefore, the composite indicator should filter out problems of individual indicators in a consistent way. Most of the indices are highly correlated, indicating their robustness in measuring the underlying problem.

## Corruption dynamics at a group level: old vs. new member states

This section focuses on answering the question: have the two groups of the EU member states (excluding Cyprus and Malta) been converging in their levels of corruption over the last decade or not? Since the question is posed at a group level, it is answered by comparison of two variables – mean Corruption Perception Index for the old member states (abbreviated here as EU15) and the mean value for the new member states except for Cyprus and Malta (abbreviated here as EU10). To compare the two average values, it is not appropriate to use methods usually utilized for large samples of individual countries to measure  $\beta$ -convergence and  $\sigma$ -convergence, i.e. a regression of corruption dynamics on initial corruption and the standard deviation of corruption across units over time. Instead, the methodology is based on comparison of trends in both values over time.

Figure 1: The mean Corruption Perception Index, EU15 vs. EU10, 1999-2008

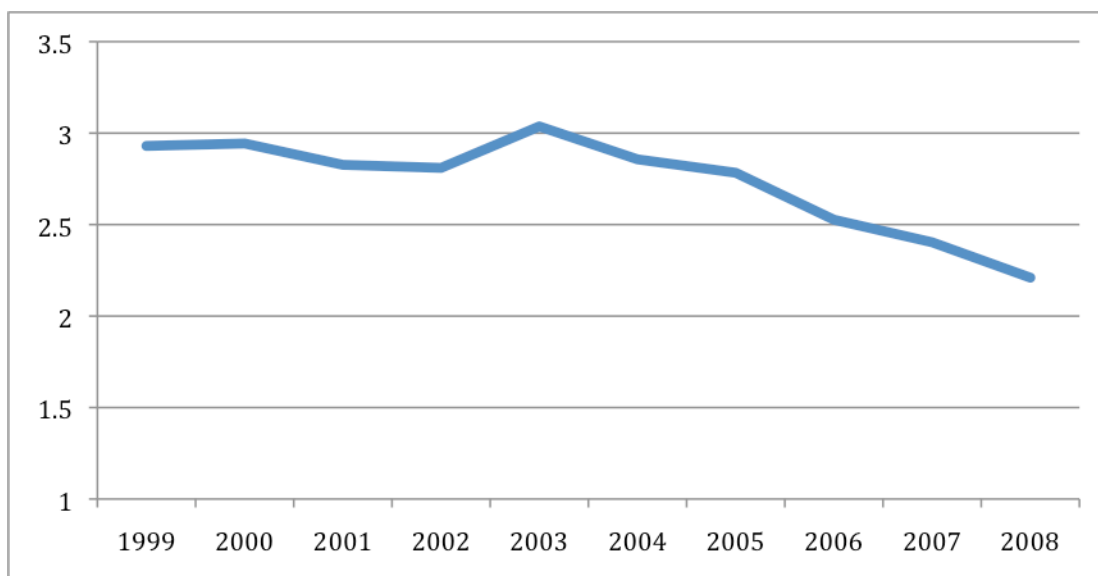


Source: author based on Transparency International data

Before conducting a more sophisticated econometric analysis, we start with simple descriptive statistics. Visual inspection based on Figure 1 suggests that the average performance of the old member states has apparently been stable over the period, while the new member states experienced a sustained improvement in their corruption performance. This view is boosted by Figure 2 that shows difference between the mean CPI of the EU15 and the EU10, which dropped from the approximately 3 points at the beginning of the decade to 2.2 in more recent years. Visually speaking, there seems to be a convergence albeit an uneven one.

It should be noted though that the decrease in the gap between the two groups occurred in two steps – a small improvement between 2000 and 2002, which was fully reversed in 2003 and then a sustained convergence between 2003 and 2008. It is equally worth noting that until 2006, the convergence was driven by improvements in the score for the new member states. During years 2007 and 2008, the source of the convergence was the worsening of the corruption perception in the EU15 countries rather than improvement in the new member states

Figure 2: Difference between the EU15 and EU10 mean of perceived corruption, 1999-2008



Source: Author based on Transparency International data

The paper uses a regression of corruption developments on a time trend to test these visual findings more rigorously. If there is a time trend in one or both mean values, the trends can be compared to establish whether there has been convergence or divergence.

Let us start with the EU10 mean. The stationarity tests are negative using all three possible test configurations (see Table 1). This suggests that the mean CPI of the new member states is not a mean-reverting process, but can either follow a random walk or have a time trend or a combination thereof.

Table 1: ADF stationarity tests for the EU10 mean, 1999-2008

	Test statistic	Asymptotic p-value
Without constant	1.46926	0.9654
With constant	-0.376922	0.9108

With constant and trend	-1.54514	0.8141
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Source: author

Since the visual inspection suggests a trend over time, we regress the EU10 mean on a constant and a time trend. Estimation starts with a standard OLS regression. The results (see Table 2) confirm presence of a strong time trend in the data, where each year corresponds to approximately 0.08 improvement in the CPI. The equation explains more than 86% of the variation in the EU10 mean. However, the estimate exhibits strong autocorrelation of residuals since the Durbin-Watson statistic value is 0.90361, so the results may not be unbiased.

Introducing an autoregressive component into the equation estimates corrects the problem through the use of the Cochrane-Orcutt estimates. The Durbin-Watson values increase to fully acceptable 1.76061 and the new regression has slightly higher explanatory value - 0.918, but at the expense of decreasing N from 10 to 9 by excluding the first year (necessary to establish the measurement of the autocorrelation term). This also has impact on the estimate of the time trend, which increases to 0.103 points per year. In a small sample, this is not surprising, particularly given that the years 1999 and 2000 were unusual in the sample because there was no improvement in CPI between the two years. However, the rest of the paper uses the 0.08 estimate despite its flaws because it takes into account the longer period and is also consistent with back-of-the-envelope calculations of the size of the time trend calculated by division of the improvement in CPI during the 1999-2008 period by the number of years.

Table 2: Regression of the mean EU10 corruption level on constant and time trend, OLS and Cochrane-Orcutt, 1999-2008

	Ordinary least squares		Cohrane-Orcutt, AR=1	
	Constant	Time trend	Constant	Time trend
Coefficient	4.44533	0.0823030	4.27618	0.103363
Standard error	0.0725866	0.0116984	0.148885	0.0201956
p-value	<0.00001	0.00011	<0.00001	0.00137
R-squared	0.860863		0.918749	
Durbin-Watson	0.90361		1.76061	
Autocorrelation coefficient	0.465129		0.0729317	

Source: author

We also test residuals from both regressions for stationarity. In case of the first regression, ADF test without constant results in test statistic -1.84952 and the asymptotic p-value 0.06138, confirming stationarity of the residuals at the 10% confidence interval, but not at the 5% interval. For the second regression where the autoregressive term is included, the test statistic is -2.41535 and the asymptotic p-value is 0.01521, confirming stationarity of the residuals at the 5% interval.

For the old member states, the results are different and indicate that the time trend is not a significant variable in explaining changes in the perception of corruption. Stationarity tests for the EU15 mean corruption variable are negative (see Table 3), but the regression of the mean EU15 value on constant and a time trend produces insignificant variable for the time trend. Therefore, the regression does not confirm

any, even a small trend over time. Rather, the combination with non-stationarity of the data suggests that the EU15 mean follows a random walk without any trend.

Table 3: ADF stationarity tests for the EU15 mean, 1999-2008

	Test statistic	Asymptotic p-value
Without constant	-0.175072	0.6233
With constant	-1.269	0.6462
With constant and trend	-0.113167	0.9947

Source: author

To conclude, at the level of two groups, the last decade has indeed witnessed a convergence of corruption levels, with the new member states catching up at a rate of 0.08-0.10 points annually, with the lower value probably closer to reality. The convergence has been achieved by the improvements in the mean for the new member states, with the mean for the old member states stagnating for the period as a whole.

### **Distribution dynamics of corruption values**

The previous section looked at the mean corruption values for each group. The mean value provides only limited information and does not allow a richer, more nuanced analysis of the corruption developments. This section complements the analysis of convergence of means by analysis of the distribution dynamics of corruption values. This is measured here through the  $\sigma$ -convergence and the so-called ordering plots.

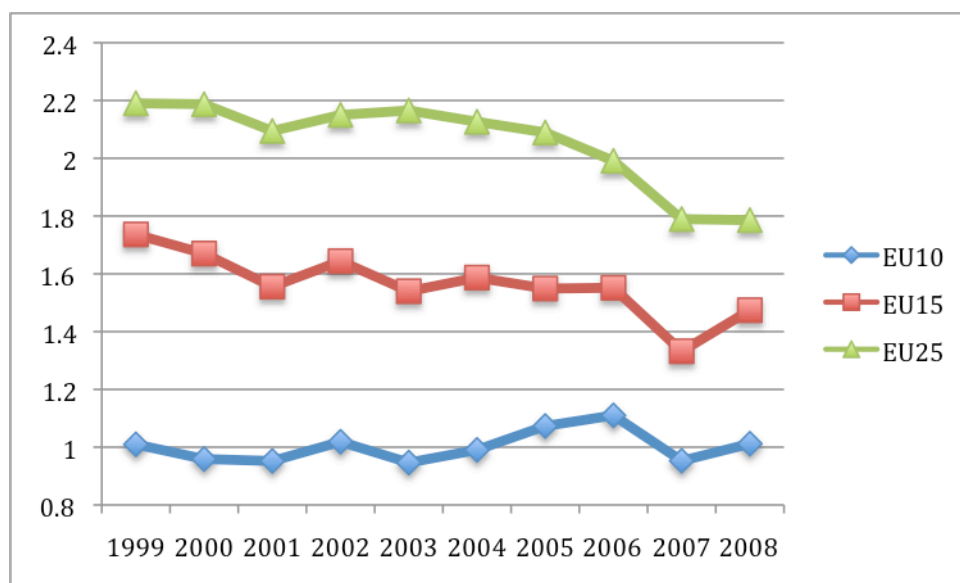
The measurement of  $\sigma$ -convergence is shown in Figure 3, which depicts changes in standard deviation of the Corruption Perception Index during the last ten years for the following groups: new member states as a group, old member states as a group and the whole EU. The dynamic analysis of standard deviation, by telling us how widely spread the values in the data set have been over time, tells us whether the countries in each group have been coming closer together or not.

From the point of view of the paper, the most important finding is that there has been  $\sigma$ -convergence for the EU as a whole (again, excluding Cyprus and Malta). The standard deviation of corruption values within the whole European Union decreased by 19% in a decade, so the result is quite robust. This has been accompanied also by similar developments within the group of old member states (decrease in standard deviation of 15%), but not for the new member states (where the minuscule increase of 0.2% is essentially a stagnation). As already mentioned,  $\beta$ -convergence is a necessary condition for  $\sigma$ -convergence, so  $\sigma$ -convergence confirms presence of  $\beta$ -convergence. Therefore, one can conclude that there has also been  $\beta$ -convergence within the group of the EU as a whole, i.e. for all member states. Based on these findings, the corruption in the EU as a whole has also been converging when measured through corruption at the individual country level. However, the new member states, even as they were catching up with the rest of the EU as a group, were not becoming internally more cohesive, since their internal variation remained at the same level.

It should also be noted that the values of the standard deviations for the three groups are not comparable because of differing size of sample for each group. When they are

normalized by a number of countries in each group, the standard deviation for the old and the new member states is roughly the same at the end of the period, with the old member states initially having much higher dispersion. This also seems to suggest that the new member states are internally as diverse with regard to corruption levels as the old member states.

Figure 3:  $\sigma$ -convergence in corruption in the three groups of EU states, 1999-2008



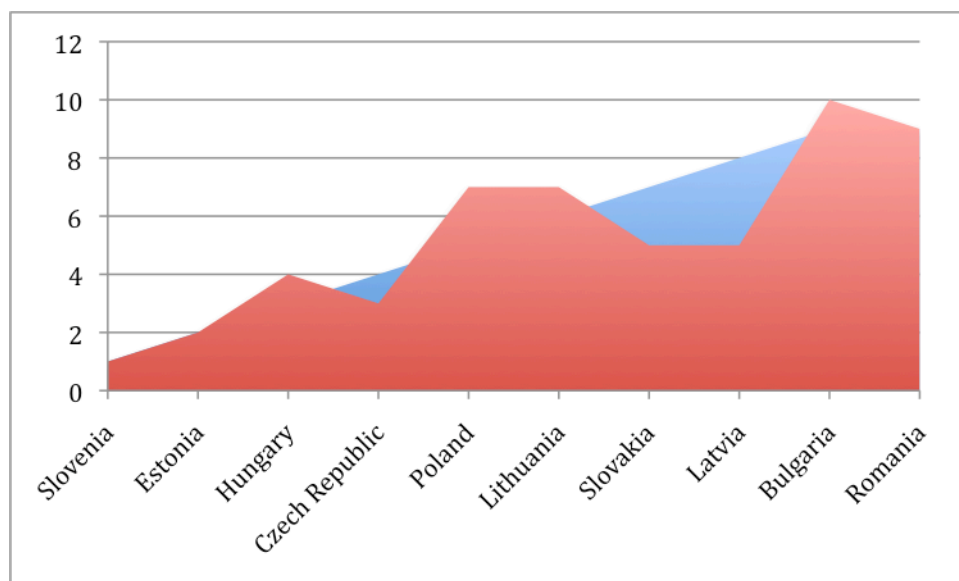
Source: author

The other approach is to look at the so-called ordering plot. (Dolado et al. 1992) The ordering plot is based on ordering of all countries according to the value of the variable in the initial period and then contrasting it with their ordering in a later period. More the two orderings vary, more the individual countries changed places in the overall ranking between the two periods. The ordering plots are complementary to the measures of  $\sigma$ -convergence presented above. The  $\sigma$ -convergence measures changes in dispersion of values for individual countries, but if two countries

“exchange” their corruption statistics, there is no change in  $\sigma$ -convergence. However, the ordering plot captures the development.

Figure 4 shows the ordering plot comparing years 1999 and 2008 for the EU10 group. 7 out of 10 countries changed their position during the recent decade and for 3 of them, the change was of 2 places or more. When put together with the stagnating  $\sigma$ -convergence values for the new member states, it indicates even more strongly that there is a quite a lot of dynamism in the level of corruption, but that dynamism does not lead to internal convergence within the EU10 group.

Figure 4: Ordering plot of CPI in EU10, 1999 vs. 2008



Source: author

### **Disaggregating corruption data in the new member states**

This section tries to disentangle the effects of economic development on corruption from other factors. It does this through building a simple panel-based model of

relationship between the per capita incomes and corruption levels and using the results generated by the model to make predictions. In the literature, income tends to have a very strong relationship with corruption, even if the direction of the causal relationship tends to be hotly disputed. (Treisman 2000, Lambsdorff 2006) Therefore, a simple model relating corruption to income would have several advantages.

The relevance of the model is that it allows us to see how strong the relationship is in case of the EU. If it were strong, this would indicate that continuing economic convergence between the new and the old member states will likely be accompanied by a continuing corruption convergence. Secondly, it would allow us to disentangle the improvements in the corruption score in the new member states into “income effect” related to economic convergence and “corruption premium” indicating whether the new member states have higher or lower corruption levels than their wealth would suggest. The corruption premium can be further disaggregated between the EU10 premium and the difference for individual countries. Thirdly, it would allow us to make a more sophisticated prediction of convergence prospects for individual member states based on a combination of economic and corruption factors.

We test three specifications of the model (see Table 4). The simplest one regresses CPI on constant, GDP per capita and the EU10 dummy variable. Analysis of this regression shows that two additional groups of countries stand out – Nordic ones - which have significantly better corruption performance than their already high income alone would predict; and Greece and Italy (and to a much lesser extent, Portugal and Spain), which have significantly worse corruption performance than could be expected based on their economic performance. Therefore, two additional

specifications – both containing a Nordic and a Southern dummy – are used, with differences in how “South” is defined.

For regression, we use generalized least squares with random effects as OLS is unlikely to produce the best linear unbiased estimators in this case and the use of dummies prevents GLS with fixed effects. Breusch-Pagan and Hausman tests indicate that this is an appropriate choice for all specifications.

Table 4: Relationship between corruption and income and the EU10 corruption “premium”, 1999-2008

	No South or North dummy	South = Greece, Italy, Portugal, Spain	South = Greece, Italy
Constant	5.23199	5.52756	5.39682
GDP per capita	0.0192545	0.0168327	0.0172659
EU10 dummy	-1.76664	-1.92955	-1.82255
North dummy	-	1.89882	1.97661
South dummy	-	-1.40111	-2.34317
Breusch-Pagan test: test statistic	936.466	732.766	650.975
P-value	1.16094e-205	2.24258e-161	1.37096e-143
Hausman test: test statistics	0.0259011	1.66447	0.848775
P-value	0.872142	0.197	0.356899

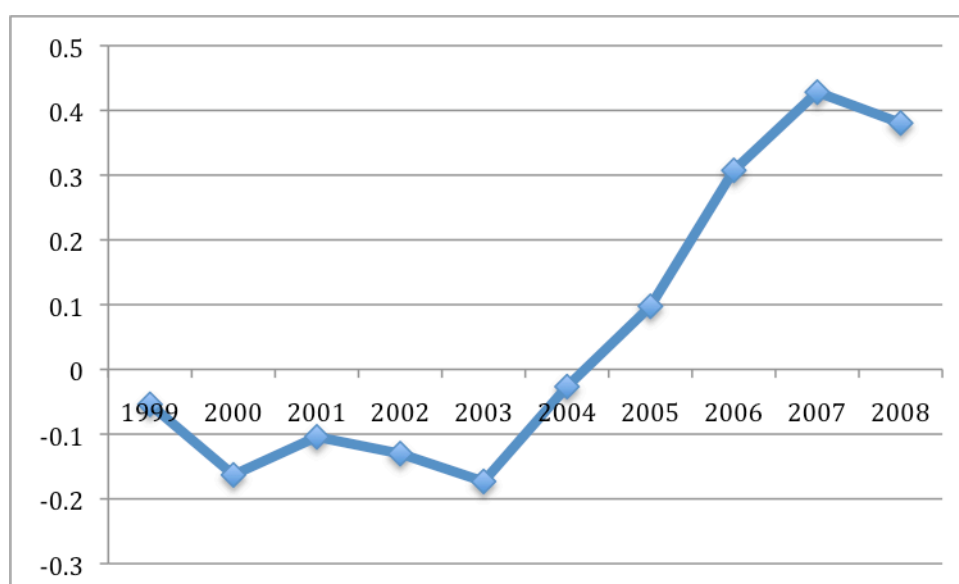
Source: author

Looking at the results of the regressions, we see that there is a EU10 corruption “premium” of -1.77 to -1.93 for the period as a whole, depending on the specification.

In other words, the new member states have a significantly higher corruption than their poverty alone would predict. This result on its own does not bode well for the future corruption convergence – even if the new member states economically close with the others, their corruption would remain significantly higher.

However, from a dynamic point of view, the picture is not so bleak. Figure 5 shows development of the EU10 corruption premium in time by measuring the sum of residuals in the regression for all EU10 countries in individual years. We can see that the average corruption premium for this group steadily improved during the last decade and is now better by 0.4 than the average result over the period. This would lead to the corruption premium for the average EU10 country of -1.4 to -1.5 compared to the EU average by 2007-8. As a group, they have by 2008 become similar to the “extended” Southern group of EU state in the size of the corruption premium.

Figure 5: Sum of EU10 residuals – changes in the corruption premium over time



Source: author

There is also significant difference between countries both in static and dynamic terms as shown in Table 5. Estonia and Slovenia have the best performance and have essentially eliminated the corruption premium of being a new member state. In other words, both countries essentially have a corruption level that reflects their level of economic development. By the same token Bulgaria and Romania exhibit negative corruption premium of -0.5 to 0.65 even compared to the EU10 corruption handicap. What this means that they have corruption perception index worse by -2.3 to -2.5 points than would commensurate to their development.

From a dynamic perspective, Latvia and Slovakia have managed to decrease the corruption handicap most strongly during the last decade, but it is worth noting that this has essentially brought them to the EU10 average – so they are cases of laggards catching up rather than leaders. Nonetheless, the improvement is particularly impressive if one considers that it was also achieved in a period of high economic growth for both countries, which raised the baseline value rapidly.

Overall, this disaggregated analysis, together with the findings of the previous sections, raises the issue of how valuable it is to group the new member states into group for analytical purposes in the future. The difference in the corruption premium between Slovenia and Estonia on one hand and Bulgaria and Romania on the other is equal to the ones between Ireland and Italy.

Table 5: The individual country corruption premium compared to the EU10 average

	Country corruption premium	EU10	Country

	compared to the EU10 average in the 1999-2008 period			corruption premium (1999-2008 average)	corruption premium vis-à- vis EU-25 in 2008
	1999	2008	Change		
Bulgaria	-0.74	-0.65	0.09	-1.77	-2.42
Czech Republic	-0.18	0.2	0.38	-1.77	-1.57
Estonia	1.39	1.79	0.39	-1.77	0.02
Hungary	0.7	0.44	-0.26	-1.77	-1.33
Latvia	-0.8	0.41	1.21	-1.77	-1.36
Lithuania	-0.44	-0.05	0.39	-1.77	-1.82
Poland	-0.22	0.08	0.29	-1.77	-1.69
Romania	-0.72	-0.5	0.22	-1.77	-2.27
Slovakia	-0.75	0.2	0.95	-1.77	-1.57
Slovenia	1.05	1.58	0.53	-1.77	-0.19

Source: author

### **Predicting future convergence**

In this section, the paper looks at prospects for future convergence in corruption between the new member states and the rest of Europe. It does so in two different, but complementary ways. Both are based on looking beyond the average values for the EU10 countries and utilization of individual country developments. Before moving on

to actual analysis, it is worth repeating that the value of this exercise depends on the likelihood that for corruption developments in the new member states, recent past is a good guide to the future. Its relevance is in creation of scenarios of various plausibility for future convergence, rather than in asserting plausibility of one particular scenario.

The simplest way of predicting future developments would be, of course, to forecast developments in the mean CPI for the new and the older member states based on the past 10 years. As we saw in the previous section, between 1999 and 2008, the EU10 mean increased by 0.08 annually while the EU15 mean did not increase. This would imply that if developments continued in the same manner, it would take 30 years until the mean for the groups equalizes. However, the single baseline figure does not make a full use of the rich data on the past period. Therefore, a preferable approach is based on examining frequency of improvements of different magnitude in the Corruption Perception Index. The results are presented in Table 6. The table is based on an analysis of convergence in corruption with the EU15 mean in individual countries during overlapping 5-year periods. There have been 50 such episodes between 1999 and 2008 (5 in each country – 1999-2004, 2000-2005, 2001-2006, 2002-2007, 2003-2008). We measure the frequency of 5-year episodes with the annual rate of convergence equal or higher than one of the four benchmark values. One is 0 or no convergence; the second is 0.08, the average convergence rate; and then there are two benchmarks for accelerated convergence - double (0.16 per annum) or triple (0.24 per annum) the average convergence rate. These can be seen as representing optimistic scenarios of even more rapid closing of gaps between the old and the new member states.

Examining episodes of faster convergence, we see that over the 1999-2008 period, there was an 80% probability that in a 5-year period, a country would experience some convergence vis-à-vis the old member states. There was 56% probability that it would experience convergence of at least 0.08 points annually, which would imply 30 years or less to full convergence if the trend remained. Concerning faster convergence, in the past 10 years there was a 42% probability that the convergence would be at least 0.16 points annually – if the future developed like the past, there would be the same chance for a convergence in 15 years or less. And finally, there was a 12% probability that the convergence would be at least 0.24 points annually, implying a convergence not longer than 10 years for the future. This probabilistic distribution shows that while some convergence was very likely over a 5-year period, a very rapid convergence (0.24) was equally unlikely. Interestingly, the probability of a quite rapid convergence (0.16) was not much lower than that of a moderate one, pointing to a relatively high frequency of rapid improvements in the corruption index.

Table 6: Frequency of episodes of faster or slower convergence, EU10 countries, 1999-20008

Rate of convergence	Number of 5-year episodes with an annual rate of convergence of at least:			
	0.24	0.16	0.08	0
Bulgaria	0	1	2	4
Czech Republic	2	3	3	4

Estonia	0	3	4	5
Hungary	0	0	1	2
Latvia	2	4	5	5
Lithuania	0	1	2	4
Poland	0	1	1	2
Romania	0	2	2	4
Slovakia	2	4	4	5
Slovenia	0	2	4	5
Sum	6	21	28	40
% of all episodes	12	42	56	80
Years to convergence	10	15	30	-

Source: author

The second approach utilizes disaggregation of the corruption performance into economic and non-economic elements. The logic of this method is the following. The expected time of convergence is a function of the future per capita income and future corruption premium. The future per capita income can be estimated as a function of the current income level and the expected dynamics of growth. The same is also true for the corruption premium. Therefore, a composite index of the four variables is constructed to assess the expected time of convergence for individual new member states. In the model, the expected dynamics of economic growth and corruption is

proxied by the past dynamics of these variables. As a result, the calculation is based on consideration of four variables:

- per capita income (2008)
- economic dynamism (1999-2008 average of real GDP growth)
- corruption premium/handicap compared to the EU10 average (2008)
- dynamics of corruption premium (2008-1999 difference)

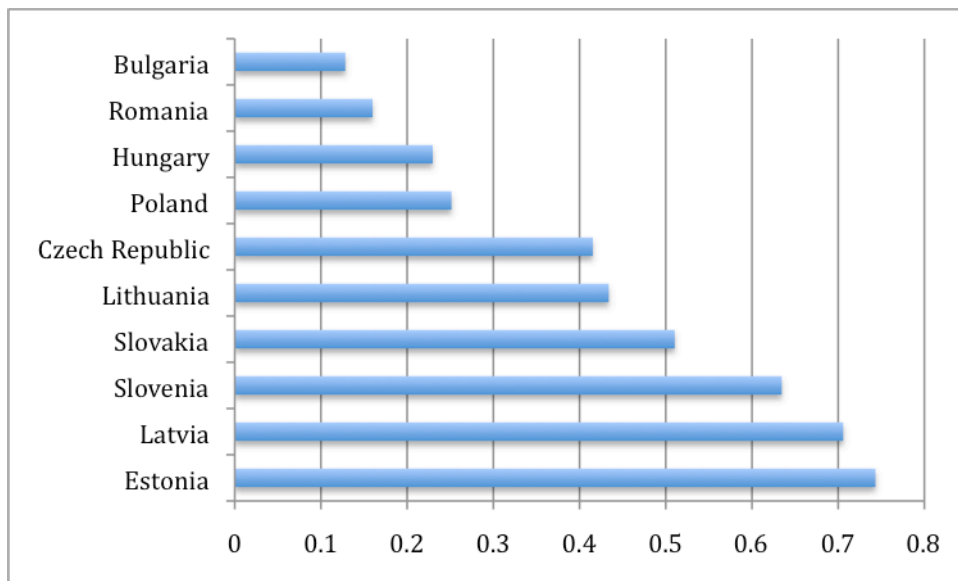
To be able to compare them, each of the four variables was normalized to 0-1 range, with 1 being the best performance. An unweighted average of the four variables is the final index, depicted in Figure 6.

We can see that this methodology would predict fastest convergence for Estonia, Latvia, Slovenia and Slovakia, with Lithuania and the Czech Republic in the middle and Poland, Hungary, Romania and Bulgaria as the laggards. For Latvia and Slovakia, this reflects the recent dynamism in economic growth, but also in improvements of the corruption premium when controlling for the effect of economic growth. For Estonia and Slovenia, it reflects the achievement of relatively low levels of corruption mixed with either economic dynamism (Estonia) or a high level of income (Slovenia).

Among the laggards, the last two places for Bulgaria and Romania are not surprising given the fact that their absolute corruption levels are the worst from among the new member states and that their relative poverty plays only a small role in explaining this. Rather, it is the fact that even controlling for low income, their corruption performance is the worst in the sample and the recent years have not seen much of an improvement. What seems more surprising at first is the low ranking of Hungary,

which traditionally belonged to more affluent and less corrupt countries of Central and Eastern Europe. However, both its economic and corruption performance stagnated during the last decade, leading to the conclusion that if such trends continued, it would fall further some of its more dynamic neighbours.

Figure 6: The expected speed of convergence, EU10 countries



Source: author

Overall, the section has introduced ways of predicting future corruption performance that are fairly nuanced, but still based on the past corruption/economic performance data rather than a rigorous theory of corruption dynamics. Nonetheless, the exercise can be instructive in showing that while it is very likely that the new member states will continue to converge, the speed will be quite uneven between individual countries.

## Conclusions

The paper used the Transparency International Corruption Perception Index (CPI) to examine convergence of corruption levels in the new member states with the European Union as a whole. It utilised and further developed techniques designed to examine convergence in income levels between countries. The examination of the data points to a modest rate of convergence in the EU as a whole, with the new member states as a group converging with the old member states at the rate of 0.08 per year during the 1999-2008 period.

The paper also analysed corruption developments at the individual country level, controlling for the influence of per capita income. The model reveals that the new member states have corruption levels higher than their per capita income would predict and face a significant corruption handicap. However, there are large differences between countries, with Slovenia and Estonia showing no such handicap and Latvia and Slovakia managing to make most significant improvements in theirs.

Based on the analysis, the paper constructs baseline predictions of future developments. For the new member states as a group, the analysis predicts 80% of some further convergence, with 56% probability of convergence at the past speed and a 42% probability of convergence that would be twice as fast as the average until now. Using a combination of static and dynamic, economic and corruption data, Estonia, Latvia, Slovakia and Slovenia are predicted to converge the fastest with the EU average in corruption if the previous performance was the basis for future. At the same time, Bulgaria, Hungary and Romania can be expected to be the slowest in terms of convergence.

Overall, the paper raises the issue of the use of „new member states“ as a means of distinction with regard to corruption. It shows that, when controlling for income, the distance between the best performing and the worst performing new member states is nearly as large as the one between Northern and Southern Europe.

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