Explaining Divergence in Growth among Post-Communist Countries: A Panel Data Analysis

By Javid Mammadov

Central European University

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Supervisor: Professor Gábor Kőrösi

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Abstract

In this thesis, a set of hypotheses as to explain the divergence in growth among post-Communist states is developed. The predictions are tested on a total of 28 countries situated in the following regions: Central Europe, the Balkans and the post-Soviet republics. The method used is pooled OLS with heteroskedasticity robust standard errors. The results suggest that this divergence is caused primarily by differences in both economic (such as initial economic potential, general and infrastructural reforms, price level growth, and foreign direct investment) and non-economic (such as political stability) factors, and reveal certain problems associated with measuring human capital for the sample countries.

Acknowledgements

I would like to compare this work to a painting, and express my gratitude

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Table of Contents

Introduction

The phenomenon of development (and, in particular, its economic component) remains a vivid, topical issue subject to continuous controversy. A number of international organizations seek, explicitly or not, to grant certain countries opportunities for catching up with other, more advanced ones. Yet, these efforts often fail and it happens quite often that countries with similar initial positions end up having different levels of economic performance. But where are the seeds of this divergence? Is it a discriminative treatment by outside actors? Or bad heritage from old institutional systems? Or factors stemming from country specificity? Or maybe, something else? And if it is a combination of these causes, what is the relationship between them?

This work concentrates on the following regions: Central Europe, the Balkans and the post-Soviet republics. The first years after the collapse of the Communist bloc in these regions witnessed an outburst of optimism about the future of these countries. The Soviet Union, who, in many people's eyes, was conducting a policy of expropriating Communist countries, and the Communist bureaucracy restraining industrial development, were not there anymore. However, despite expanding their political and economical affiliation and attaining, in different periods of time, at different cost and with different success, better life standards, even more developed post-Communist countries still fall behind Western Europe.

Another aspect sometimes remaining in the shade is the differences that arose inside what used to be the Communist bloc. By now, the countries under concern have survived economic and political crises of different gravity and duration. Notwithstanding, some have successfully overcome the transition period and some exhibit very low chances of doing it shortly. So, once again: what makes the difference? Apparently, there must be something more than the

1

bad heritage of the centralized economy, as a number of countries (such as Slovenia, Czech Republic, Estonia) perform quite well in spite of this unfavorable ground. Appendix A is a good example illustrating different dynamics four countries with comparable initial GDP (Ukraine, Bulgaria, Poland, and Kazakhstan) underwent further on.

Various authors suggest various solutions to this set of problems. They agree that the initial conditions are far from being the sole factor that matters, with socioeconomic (inflation, unemployment), policy (government performance indices, openness, reforming activities) and other (geographical location, history, culture) issues mentioned all over (Levine and Renelt (1992) state that a total over 50 variables had been demonstrated by various studies to influence economic growth). However, researchers fail to coincide with respect to the exact set of variables that truly matter, partly because of the widespread tendency of using proxy variables in order to quantify non-numerical or ambiguously quantifiable factors (such as human capital, openness of a country or initial conditions) and causing inevitable distinctions between the model and the reality.

My hypothesis is that the degree of success of a post-Communist country is widely determined by the quality of its adjustment to the challenges associated with the restructuring of the state mechanism. The focus of such adjustment is not reduced to political borders and has to do, among others, with issues like setting up a beneficial system of international collaboration, both economic and non-economic.

The study uses, wherever available, the data of the period of 1991-2008 for the following 28 countries (in alphabetical order): Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Georgia, Hungary, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Macedonia, Moldova, Montenegro, Poland, Romania, Russia, Serbia, Slovakia, Slovenia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan. I refer at

times to indicators of 1990 to proxy for initial conditions. Those seem the only relevant ones,

given the shortness of independent history of quite a portion of the countries of the region.

Chapter One. Literature review

The papers tackling subjects identical or adjacent to the topic of this thesis can be conventionally divided into "pre-transition" and "post-transition" works.

"Pre-transition" works refer to the period preceding the collapse of the Communist bloc. They usually provide some idea about factors that have to do with economic growth and its components in general. Some of these works, however, try to extrapolate previous results to depict the possible future of the emerging markets.

By contrast, "post-transition" works give significantly more consideration to the performance of emerging market economies, tendencies associated with them, the dynamics of their development and factors affecting it, divergence in growth among countries or, more often, regions. "Post-transition" works frequently include some sort of feedback on "pre-transition" ones, which might appear in the form of critical evaluation or comparison of prior predictions to real outcomes.

However, two things have to be mentioned. First, it does not mean that all of these papers make a distinction between transition and non-transition countries or pay special attention to it. Second, the classification into these two groups remains to a high extent conventional, since there is absolutely no clear distinction between them, be it temporal or qualitative.

"Pre-transition" works

Barro (1991) examines a cross section of 98 countries in the period 1960-1985 to find out the factors affecting GDP growth. He runs 14 regressions with various functional forms specified and various variables included, and arrives at the conclusion that the initial (1960) level of GDP per capita is negatively correlated with the final (1985) figure. Instead, the initial human capital stock, proxied for by the 1960 primary and secondary school enrolment rates, is

determined to have a significant positive influence on future GDP growth rate. An attempt of using adult literacy rate as an alternative proxy for initial human capital stock, produces an unexpected and hard-to-explain result stating negative correlation with GDP growth. Such a discrepancy can stem from inconsistent ways of measuring adult literacy across countries. Political instability, proxied for by, in different regressions, the number of revolutions and coups per year and the number of political assasinations, has a significant negative effect. The latter two are interpreted as "adverse influences on property rights, and thereby as negative influences on investment and growth" (Barro, 1991, p. 437). The results generated by differentiation based on economic system (socialist, free enterprise, mixed) expose the negative effect of the socialist organization but should be treated with reserve because there are just 9 socialist countries in the sample.

Levine and Renelt (1992) draw attention to the fact that a big number of variables had been proved to affect growth; yet, not too many of them remain significant once the set of explanatory variables is modified. Such statistically "fragile" factors include fiscal-expenditure variables, political stability indices, indicators embedding exhange rate, trade, taxation, etc. The influence of such variables as initial income level (−), investment share of GDP (+), share of exports in GDP (+), primary- and secondary-school enrolment rates (+), black-market exchange-rate premium (−) is proved to be robust. What has to be emphasized is that in a regression embracing a wide number of indicators (including population growth, school enrolment rates, socialist economy dummy, etc.) the only significant variables are investment to GDP ratio, GDP of 1960 and regional dummies for Africa and Latin America (these are the only continent dummies in the model). Since the continent dummies merely suggest the importance of omitted factors (this conclusion was made also by Barro (1991)), this regression highlights the independent and significant character of the remaining two

variables. The fact that no significant influence of fiscal policy, investment and growth is captured by the model lead the authors to conclude that interactions among these three phenomena are more complicated than a simple linear model can capture. A somewhat surprising result is the absense of robust correlation between monetary variables (most noteably, inflation) and the growth rate. One possible explanation for it is that inflation is not a direct measure of monetary policy and rather embeds, besides it, other policies and external shocks. As for political stability, measured in terms of revolutions and coups her year, it is proved to exhibit a robust negative correlation with the level of investment (this is completely in line with Barro's (1991) interpretation of political instability from the standpoint of property rights). It is worth mentioning that in his study, Denizer (1997) prefers this framework to Barro's one exactly because it suggests a more robust set of variables.

Bergson (1991) makes an attempt to shed the light on the reasons explaining why by 1991 the consumption per capita in the USSR barely matched the lower margin of OECD countries. He concludes that the low level of consumption is induced by a fairly large amount of military expenditures (that was, however, partly compensated by extremely high participation rates). Another reason was a quite low value of output per worker. One guess as to what causes the latter fact are political and ideological limitations on economic practice. From the point of view of my research, these corollaries constitute comments on the initial conditions of post-Soviet countries.

This table summarizes, in general terms, the findings of the above-quoted "pre-transition" works:

Author(s)	Main findings
Barro (1991)	− For a given time span initial level of income is negatively correlated with the final figure. − Initial human is positively correlated with GDP

6

Author(s)	Main findings
	– growth.
	– Political instability has a significant negative influence to GDP growth.
Levine and Renelt (1992)	– Investment share of GDP, share of export in GDP, school enrolment rates are the only factors that affect growth positively in a robust and significant way.
	– Initial income level and black-market exchange-rate premium are the only factors that affect growth negatively in a robust and significant way.
	– The significance of regional (continent) dummies is a signal of some essential variables being omitted.
Bergson (1991)	– Low consumption per capita in the USSR was caused mainly by inefficient resource allocation favoring military expenditures.

Source: Developed by the author.

"Post-transition" works

Berg, Eduardo, Sahay and Zettelmeyer (1999) use a sample of 26 countries to discover the relative roles of various factors in the divergence in growth that had emerged by the time the paper was written at. They notice that the measures of macroeconomic policy (no matter direct ones or proxies) are endogenous in the sense that they often depend on output and growth. With an objective analogous to that of Levine and Renel (1992) (discovering, from a wide set of potentially relevant variables, those with a robust effect), they corroborate the statement that none of the policy variables has a robust influence for various functional form specification; however, it was proven senseless to exclude all of them at once. Furthermore, some of the policy variables are considerably more robust than other ones. As regards the attempts of explaining the dynamics of output figures, the fall in it is primarily due to initial conditions (most notably prior trade dependency and over-industrialization), whereas the recovery from it was caused in the first place by a wide and dynamic process of reforming.

7

Temple (1999) concentrates on studying certain questions arising from previous studies of economic growth and cross-country income disparities. While most of his concerns are in line with what is suggested by other works (and often even quoted in my present research), I would like to concentrate on the sections called "Problems" and "Wider Influences on Growth". One problem is parameter heterogeneity, a concern which prejudices that all the countries can fall on a common surface, given the variety of their socioeconomic characteristics. Another is the presence of outliers (in our sample Russia can be a candidate). The so-called model uncertainty is the focus of the above-described study of Levine and Renelt. Measurement errors and regional spillovers can also be an issue (in fact, Temple challenges the generally neglecting treatment of regional dummies as he points at common shocks like climate changes whose effect can be captured by them) but probably most importantly, endogeneity seems to be the most ubiquous caveat as well as the most difficult one to cope with. Many potential regressands (for example, FDI flow) are, at least to an extent, affected by explained variables. As for wider influences on (economic) growth, these are variables that exhibit some kind of correlation with growth but (usually not without a reason) remain apart from studies. For instance, population growth is very likely to cause endogeneity in the model because decisions on having children are often made conditional on socioeconomic development or expectations about it in the future. Another relevant conclusion is that the literature on the subject does not provide a clear idea about which methods of the policy are more important ones.

One way of dealing with the endogeneity problem is using instrumental variables. In particular, Barro (1997) applies three-stage least squares methodology with earlier values of some of the variables in question used as instrumental variables. This paper is, to an extent, a review of Barro (1991). Furthermore, a guess about non-linear relationship between economic

development and political freedom is made. On the other hand, the feedback correlation is demonstrated: high standards of living, as well as a group of other factors (natural resource endowment, country size, colonial history, etc.) very often go together with political freedom. As for "monetary policy – growth" relationship, some linkage between inflation and growth is established. It is negative but considerable only at relatively high levels of inflation.

Campos (2001) uses a set of data (initial per capita income, real annual GDP growth rates, population growth, enrollment ratios, etc.) for the years from 1989 to 1998 and calibrates it to the framework developed by Barro (1991) and Levine and Renelt (1992) in order to check whether their tools are significant for transition data. The results, however, show that they are not, which makes them "inappropriate for analyzing short- to medium-term output fluctuations in transition economies" (Campos, 2001, p. 674)

The work by Campos and Coricelli (2002) is of special importance as it addresses virtually the same scope of issues and virtually from the same point of view as this research does. This study, at first, points out the problem with the measurement errors with respect to the data provided by Socialist governments and the change that appeared after their fall. In particular, Socialist statistical officers were not well-equipped enough as to deal properly with politically sensitive terms such as price changes and unemployment. On the other hand, the switch to market economy gave certain new incentives, such as underreporting outputs (in order to evade taxation) rather than overreporting them (the latter argument had also been mentioned by Koen (1994)). It is to be emphasized that many factors that are thought to cause divergence in growth can be measured in various ways. For instance, initial conditions include the degree of over-industrialization; physical distance from Western European market; the time span spent under centralized planning; dependence on CMEA trade etc. Later on, the authors move to tendencies occurring during the transition period (among which they mention that the

output fell, the capital shrank, the labor moved, the trade reoriented, the structure changed, the institutions collapsed and the transition costs were high, especially in terms of welfare) and, wherever relevant, discuss possible ways of measuring them.

In the particular, FDI is mentioned as a good tool of setting off the gap between voluntary savings and investment demand, however, not without caveats. First, FDI can be measured in several ways: total, per capita, as a proportion of GDP. Second, FDI flow is often conditional on natural resource endowment (or at least it was at some initial stage), which explains high flow of foreign capital to generally less developed countries of South Caucasus and Central Asia (most noteably oil-rich Azerbaijan). To address the issue of initial human capital (expressed in the same terms as by Barro, 1991), the common belief about an advantage held in it is put under doubt as the excessive specialization, which was peculiar to the education system under Communism, complicates labor mobility. The collapse of CMEA increased, though not immediately, the openness of the economies of transition countries, measured in terms of trade-to-GDP ratio. As regards the issue of institutions, the author quotes a World Bank working paper stating that "persistent disparity between progress in liberalization and privatization, on one hand, and in the development of institutions that support markets and private enterprise …, on the other" (Campos and Coricelli, 2002, p. 812). The authors use a combination of several "rule of the law" indicators suggested by various authors, to demonstrate different dynamics of the institutional setting (which includes factors, such as the government influence over judicial system, property and human rights, reforms in the codes of the country, etc.) in different regions[1]. The high transition costs mentioned in the previous paragraph include, but are not limited to significant increase in poverty rate and stratification

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[1] The research distinguishes among the following regions: Asia (South Caucasus and Central Asia), Balkan countries (Albania, Bulgaria, Croatia, Macedonia, Moldova, Romania), Baltic countries (Latvia, Lithuania, Estonia), BUR countries (Belarus, Ukraine, Russia), and Visegrad countries (all the remaining countries from our sample).

with respect to level of wealth, as well as deterioration of social indicators, most noteably, life expectancy and school enrolment rates. Further on, the authors provide a review of related studies, both theoretical and empirical, and then make suggestions as regards future research. Their suggestions include validating available datasets, augmenting the study of the institutional factor of development, providing more meaningful measures for initial conditions and putting more emphasis to understand how economic reforms contribute to the path of the transition process.

Angelopoulos, Philippopoulos and Tsionas (2008) study the relationship between fiscal size and economic growth on a sample of 64 countries, both developed and developing, in the period from 1980 to 2000. An important regressand is public sector efficiency (PSE) measuring the cost-effectiveness of a government and expressed in terms of ratio of public sector output (performance indicators) to public sector input (cost of maintaining it) in four fields: administration, stabilization, infrastructure and education. The model controls not only for government size but also for government size - PSE product. It turns out that for only small group of countries public sectors affect economic growth positively; for the others it is not. The model also reveals the positive effect of investment and openness and the negative one of fertility. Once government expenditure is included into the model, neither the coefficient at it, nor the one at the interaction term, results significant. The authors suggest that it is hard to determine the influence of the fiscal size on economic growth unless the efficiency of public sector is included into the model.

It is worth mentioned that attempts of explaining the divergence of growth in the light of non-economic factors were undertaken as well.

In particular, Katchanovski (2000) explains the difference primarily from the cultural and historical point of view. According to him, the prevailing religion and the historical

11

experience influence the institutional setting, which, in turn, affects factors such as economic reforming and corruption. He introduces what he calls Western culture index, that represents a scale embedding, for instance, the civil society index, religious background (Catholics and Protestants versus Orthodox Christians and Muslims), the former historical affiliation (Austro-Hungary and Germany versus the Russian Empire, the Ottoman Empire and China), etc. This variable turns out to have a statistically significant (at 5% and 10% level, depending on model specification) effect. Moreover, this influence results stronger than that of any of the other regressands of the model (GDP per capita in 1989, repressed inflation, corruption, ethnicity, war, etc.).

This is well in line with the findings of La Porta, Lopez de Silanes, Shleifer and Vishny (1999), who determine that poor performing governments often have in common one or more of these features: small distance to equator, ethnolinguistical variety, French law system. They also detect positive correlation of the size of the government with its quality and highlight the importance of historical and cultural factors (in particular, they "unfavor" Catholics and Muslims, unlike Katchanovski who "rejected" Muslims and Orthodox Christians). The latter difference stems, most likely, from the fact that the research concerned studies the countries of the whole world.

Nordhaus (2006) develops a framework controlling for a number of geographical variables. According to him, there are following reasons why geographical factors (both invariant like location and variant like climate or the quality of soils) are usually disregarded by macroeconomic theory. Firstly, the growth theory is concerned primarily about endogenous growth. Secondly, it is difficult for economic theory to capture certain geographical factors that do not change over time. The study introduces the concept of gross cell product (GCP), while a cell is bounded by one-degree longitude and one-degree latitude contour. The

methodology varies because of the variety in qualitaty among data from different countries and reveals a very sharp positive gradient between output and temperature. Another regression finds out the temperature which maximizes output density per cell. Furthermore, he addresses the economic difficulties of African countries and discovers that geography explains 20% of the difference in per capita income between Africa and industrial regions.

However, I abstain from using a non-economic approach for the following reasons. Firstly, I find it complicated (if at all possible) to quantify cultural or historical factors in an objective and appropriate way. Secondly and more importantly, explaining differences in levels of socioeconomic indicators through non-social and non-economic factors is a somewhat fatalist approach "spelling the death" of economies of countries with "irrelevant" indicators. After all, several decades ago the economies of Japan or Four Asian Tigers (Hong Kong, Singapore, South Korea, and Taiwan) could be "doomed" to limited opportunities of development in a similar way.

This table summarizes, in general features, the findings of the above-quoted "post-transition" works:

Author(s)	Main findings
Barro (1997)	– A previous value of a variable can be used as an instrumental for its present value. – The negative effect of inflation on growth is notable only for the high levels of former.
Berg, Eduardo, Sahay and Zettelmeyer (1999)	– The effect of macroeconomic variables is strong but none of them is robust enough separately. – The fall in output in 1990s was caused by unsatisfactory initial conditions, and the recovery was due to appropriate reforming.
Temple (1999)	– Parameter heterogeneity, possible outliers, model uncertainty, endogeneity and others might be a major problem is constructing growth models.

Author(s)	Main findings
	– Factors like population growth or favorable trade regime can affect growth but for various reasons including them into a model can result problematic.
Campos (2001)	– The toolset developed by Barro and Levine and Renelt is irrelevant for analyzing short- to medium-term output fluctions in the sample countries.
Campos and Coricelli (2002)	– The tendencies peculiar to the sample countries in the transition period include output fall, capital shrinking, labor movement, trade reorientation, change in structure of the economy, institutions collapse and high transition costs. – Institutional factor should be paid more attention in future studies. – More meaningful measures for initial conditions have to be developed. – More effort should be put to understand how economic reforms contribute to the path of the transition process.
Angelopoulos, Philippopoulos and Tsionas (2008)	– Only small group of countries public sectors affect economic growth positively. – Investment and openness affect economic growth positively, fertility affects it negatively.
Katchanovski (2000)	– Cultural and historical factors have a statistically and economically significant influence on the growth in the countries from our sample.
La Porta, Lopez de Silanes, Shleifer and Vishny (1999)	– The performance of the government can be explained through geographical, historical and demographic factors.
Nordhaus (2006)	– Geographic factors, that are underestimated by traditional economic theory, are quite powerful tools of explaining cross-country income disparities.

Source: Developed by the author.

Chapter Two. Econometric Model

Data Description and Summary

The data I use for my analysis is obtained from such organizations as World Bank, United Nations Conference on Trade and Development, European Bank for Reconstruction and Development, Central Investigation Agency.

The variable this thesis uses to express development is GDP per capita, as indicated in the Global Development Finance (GDF) by the World Bank. Temple (1999) argues that comparison using exchange rates tends to overestimate the magnitude of income disparities, so the values I use are adjusted for PPP and expressed in 2005 dollars. Using GDP for this purpose is by no means revolutionary or surprising, as this practice is followed by all the studies reviewed in connection with this topic. It also often exhibits positive correlation with standard of living (Sullivan and Sheffrin, 1996), which makes us suspect that this indicator is relevant not only for explaining economic phenomena.

As for explanatory variables, I use the four-group classification suggested by McMahon and Squire (2003). Summary statistics and data sources for all variables included are indicated in in the Appendix B.

Exogenous variables include initial conditions and political stability.

In spite of a relatively homogenous institutional setting, the sample countries had various initial conditions that began to matter after they became independent. The latter might include the level of dependence on CMEA trade, geographical location or natural resource endowment. The set of variables addressing the initial conditions includes GDP per capita of 1990 (*gdp90*) and regional dummies (*balt, bur, casia, cauc, ceur, ebal* – see Appendix C for

the description of how the countries are classified into regions). It has to be emphasized that we do not expect regional dummies to have a significant effect, so they serve rather to verify how good the model is. This approach was suggested, in particular, by Barro, who used regional dummies for Africa and Latin America but observed that "the influence of being in Africa is already held constant by the other explanatory variables" (1991, p. 435).

The negative effects of political stability are not only intuitive but also well described and proven by many authors, including some of those mentioned in the literature review. Since quite a portion of sample countries (most notably, Caucasian and ex-Yugoslavian ones) had the misfortune to be in war, I choose the number of battle related deaths, in thousands based on GDF indicators (*bat*), as a proxy for political stability (or rather, instability). An alternative measure of political instability is a dummy taking the value of one for periods with non-zero battle-caused deaths and zero otherwise. Both of these variables are referred to in this research. The data is drawn from GDF.

Immediate inputs are represented by initial human capital stock, which is, as in many other studies, proxied for by primary- (*prm*) and secondary-school (*scnd*) enrolment rate as of 1990. Unfortunately, about one quarter of sample countries lack this series for the year specified, which will cause tangible problems further on. A partial solution was to take 1991 values, wherever available (which holds only for Georgia and Tajikistan), as I do not expect the values to change significantly between those two years. For the remaining countries, series on primary-school enrolment are available from 1994 on, and I do not believe that its value had not been affected by the problems of the transition. Therefore, I abstain from including them into the model and equations involving these series count with data from only 19 countries. The situation is absolutely analogous for secondary-school enrolment. In both cases, the data is drawn from GDF.

Policy variables can be broken down into measures of macroeconomic stability and openness.

The two variables often used to proxy for macroeconomic stability are inflation rate and consumer price index. I follow the approach of Katchanovski (2000), who uses log of price level as a proxy for macroeconomic stability, even more so because CPI is calculated with respect to 2005, which is also the base year for GDP per capita. CPI will appear in regressions in the form log (*CPI*/100), so that it equals 0 for 2005. This variable is also used for normalizing series unavailable in real terms. CPI data is drawn from GDF.

The measure of openness used in this thesis is the amount of FDI received in the year <u>prior</u> to the one the GDP of which is concerned. The benefit of FDI inflow has already been discussed earlier in the text, hence this indicator is expected to contribute positively to the GDP per capita. The annual data on FDI is drawn from UNCTAD statistic and is measured in gross terms in millions of USD. For each year, FDI appears divided by the corresponding value of CPI, since the initial data is nominal. Moreover, since FDI needs some time to pay off, it is more appropriate to use its lags rather than contemporaneous values, and I make an assumption that one year is enough for paying off.

Finally, the **institutional variables** are represented by two reform indices, overall transition reform index and infrastructure reform index. They are is obtained by summing up the following figures (so-called transition indicators) provided by EBRD. For overall transition reform index (*refoverall*) I sum up the indicators referring to large- and small-scale privatisation, enterprise restructuring, price liberalization, trade and foreign exchange system, competition policy, banking reform and interest rate liberalisation, securities markets and non-bank financial institutions; and for the infrastructure reform index (*refinfrastr*), overall infrastructure reform, telecommunication, electric power, roads, water and waste water (data

17

for railways is incomplete and therefore excluded from the analysis). The rule of calculating the components of the scores is described in Appendix D. I did not introduce this information as a single variable for the following reason. The positive effect of market reforming is something straightforward and intuitive (as and also demonstrated by many studies, for instance, by Denizer, 1997), and by breaking it down into two variables I am trying to compare the strength of the effects different groups of factors have. Overall, these indicators include such a range of information that it is virtually redundant to include other variables measuring the quality of the institutional setting or even some adjacent fields. In particular, the information about WTO affiliation (which I used to use for measuring openness) is included into the indicator of trade and foreign exchange system (see Appendix D).

To conclude this section, I mention variables I used in earlier specifications of the model but eventually excluded them, and explain why.

The *llock* dummy, equal to one if the country is landlocked and zero otherwise, initially was one of the variables classified as exogenous but it produced insignificant results. It is in a sense expected. The landlocked states of Czech Republic, Slovakia and Hungary are among the most developed economies in the sample region, so their indicators partly neutralize the effect that being landlocked has on poorer coutries like Tajikistan, Armenia or Moldova. This variable could still be qualified the same way as regional dummies but, as far as the latter remain in the model, I do not see reasons to overcomplicate the model by adding an unnecessary regressand.

Corruption perceptions index (CI) calculated by Transparency International was another variable measuring the quality of the institutions but I preferred EBRD reform scores. It was assumed that CI accumulates all sort of influences the corruption might have on economic performance. However, there was quite a high level of correlation between the two variables

(around 0.44), and I find the reform score more relevant (since it is more comprehensive and more economics oriented). Moreover, the data on CI appears only from 1996.

Model Specification

For studying the research question, I resort to panel data analysis as this tool "allows to control for omitted variables that are persistent over time" (Temple, 1999, p. 131). I start with the simplest hypothesis that it is only the set initial conditions (1990 GDP and region) affecting GDP per capita of subsequent periods. The model (1a) and (1b) are thus the following ones:

$$gdp_{it} = \beta_0 * gdp90_i + \beta_1 * balt_i + \beta_2 * bur_i + \beta_3 * casia_i + \beta_4 * cauc_i + \beta_5 * ceur_i + \beta_6 * ebal_i +$$
$$\beta_7 * dateid_i + u_{it},$$

$$\log(gdp_{it}) = \beta_0 * \log(gdp90_i) + \beta_1 * balt_i + \beta_2 * bur_i + \beta_3 * casia_i + \beta_4 * cauc_i + \beta_5 * ceur_i +$$
$$\beta_6 * ebal_i + \beta_7 * dateid_i + u_{it},$$

where *dateid* stands for the time trend, *u* stands for the unobservables, and the West Balkan region is the base one since there is no dummy for it the equations.

I presume that variance in GDP can be caused, inter alia, by the cultural or historical background of the country (as argued by Katchanovski, 2000), which we cannot observe. Therefore I use heteroskedasticity robust standard errors. OLS regressions yield the following coefficients:

Variable	(1a)	(1b)
Explained variable	GDP_t	$\log(GDP_t)$
Intersect	-598733.4*** (94571.59)	-997.9656*** (216.6168)

19

Variable	(1a)	(1b)
GDP90	0.718945*** (0.025820)	–
log (GDP90)	–	0.645900*** (0.028493)
BALT	1359.221*** (429.7490)	0.071111** (0.033073)
BUR	-829.5178*** (236.6016)	-0.198778** (0.038052)
CASIA	-1235.762*** (213.3197)	-0.627172*** (0.061279)
CAUC	-1589.934*** (204.4621)	-0.604787*** (0.055357)
CEUR	4025.781*** (390.5926)	0.235765** (0.096857)
EBAL	-39.32989 (165.1946)	-0.199378*** (0.038838)
DATEID	0.822324*** (0.129438)	–
log (DATEID)	–	74.15246*** (16.05295)
White standard errors	Yes	Yes
Observations included	494	494
Time span	1991-2008	1991-2008
R-squared	0.858591	0.661270
Adjusted R-squared	0.856258	0.655682

Variable	(1a)	(1b)
F-statistic	368.0957	118.3521
p-value of *F*-statistic	0.000000	0.000000

Note: Here and further, standard errors appear in parentheses. * Significant at 0.10; ** significant at 0.05; *** significant at 0.01.

All the coefficients in these two regressions are significant at 1% or 5% confidence level, except for the one for *ebal* in the regression (1a), which is highly insignificant. The generally high level of significance of regional dummies means that the model is far from explaining anything. A positive feature, however, is that all the regional dummies have expected signs: in comparison with the West Balkans, Baltic and Central European countries are on average more developed economically, South Caucasus and Central Asia are on average poorer, and it is hard to make predictions for East Balkans because of different levels of developments its countries (Bulgaria and Romania on one hand and Moldova on the other) represent. The truthfulness of the latest statement, which can be checked through statistical data, demonstrates that the model is not that hopeless.

The regression (1a) has a higher value of R-squared (both ordinary and adjusted) and F-statistic. Furthermore, it has one "bad" coefficient for a regional dummy. Thus, in the subsequent specifications I give preference to the level form of *gdp$_t$,* *gdp90* and *dateid*.

From now on, all the regressions I will run will appear in two forms, one ordinary and one involving regional dummies. If the latter result significant, it will mean that the model needs further elaboration.

At the next stage, I add the remaining exogenous variables (*war* and *bat*) and the proxies for initial human capital (*prm* and *scnd*). Here are the results (the explained variable is gdp_t):

Variable	(2a)	(2b)	(3a)	(3b)
Intersect	-595019.5*** (96466.93)	-623754.8*** (98321.14)	-592794.5*** (93551.30)	-615683.3*** (98727.52)
GDP90	1.119662*** (0.057052)	0.836214*** (0.033818)	1.128854*** (0.055741)	0.853557*** (0.034541)
PRM	15.24593*** (5.826595)	21.29760*** (4.144909)	12.26121* (6.525941)	26.56479*** (4.875781)
SCND	-45.40617*** (9.346339)	87.47111*** (9.593298)	-45.47739*** (9.357654)	80.33464*** (9.718028)
WAR	-1390.043*** (365.1902)	377.8664* (200.6611)	—	—
BAT	—	—	-175.4971*** (56.13536)	-45.95329 (35.36503)
BALT	—	-321.3614 (315.6520)	—	-334.4069 (311.7876)
BUR	—	-2311.493*** (316.2402)	—	-2147.485*** (321.5024)
CASIA	—	-2541.866*** (320.8214)	—	-2341.608*** (339.4110)
CAUC	—	-2804.478*** (245.9678)	—	-2701.686*** (273.6809)
CEUR	—	2994.114*** (295.6933)	—	2836.333*** (316.8607)
EBAL	—	-488.5981*** (154.5987)	—	-477.5973*** (160.7267)
DATEID	0.817638*** (0.131834)	0.842740*** (0.133726)	0.814800*** (0.128173)	0.831744*** (0.134276)

22

Variable	(2a)	(2b)	(3a)	(3b)
White standard errors	Yes	Yes	Yes	Yes
Observations included	359	359	359	359
Time span	1991-2008	1991-2008	1991-2008	1991-2008
R-squared	0.835411	0.881170	0.835593	0.881188
Adjusted R-squared	0.833080	0.877403	0.833265	0.877421
F-statistic	358.3477	233.9213	358.8232	233.9615
p-value of *F*-statistic	0.000000	0.000000	0.000000	0.000000

This set of regressions provides the first ground for interpretation and discussion.

First of all, it confirms the existence of an upward time trend.

Secondly, the adverse effect of political instability gets its corroboration. What might be surprising is that the dummy variable *war* is, in terms of statistical significance, superior to *bat*, whereas the contrary was expected. This discrepancy can be explained through the bias in figures on battle caused deaths in some of the countries. In particular, Armenia is mentioned to have no battle related deaths at all, in spite of being at war with Azerbaijan from 1991 till 1994. Such figures can be explained from the political standpoint: whether Armenian armed forces participated in the above mentioned war remains subject to controversy at the international level, so I suppose that the World Bank (from whose database these series were drawn) preferred not to get involved into a political dispute. Another room for doubt is data

23

for Serbia and Montenegro. These countries are also reported to have no battle caused deaths, although Yugoslavia (which they used to constitute) was at war in early and late 1990s. This argument is supported by the fact that when I calibrated random non-zero values for corresponding countries in corresponding years, the significance of *bat* slightly improved. However, for ethical reasons I abstain from mentioning my guesses or results they yielded. The fact that the significance of *war* and *bat* decreases (or disappears) when regional dummies are added, indicates the presence of correlation between the instability variables and certain regions. In particular, it is negative for Central Europe and Baltic States (who did not suffer casualties, at least according to the database).

Surprisingly, in regressions (2a) and (3a) the enrolment variables appear to affect the development negatively in a significant way (even if there is a positive coefficient at *prm*, the coefficient at *scnd* is higher, which, combined with the fact that completing primary education is a pre-requisite for secondary, constitute an overall negative effect), whereas the effect of *gdp90* is positive and also highly significant. At least two explanations can be brought forward in this respect. First of all, the sub-sample that lacks data on enrolment makes up around its quarter, which considerably shrinks the size of the whole sample. Secondly, I qualify it as an unlucky coincidence that the very high enrolment rates for that period of time were registered in Central Asian region which became the poorest one (under the classification used by the present study).

Which of the two specifications, (2) or (3), should we keep for the next stage? It might be tempting to opt for the one with a dummy since the coefficients from its results are slightly more significant. However, by abusing Ockham's razor we risk to miss a specification whose effectiveness will reveal itself at a later stage; for this reason, we keep both.

Finally, I introduce the log of CPI-adjusted first lag of FDI (i.e. the log of FDI_{t-1}/CPI_{t-1}) and EBRD reform index:

Variable	(4a)	(4b)	(5a)	(5b)
Intersect	-969017.4*** (98377.52)	-1134805*** (63736.51)	-909796.4*** (106515.6)	-1134346*** (65718.02)
GDP90	1.235960*** (0.065793)	1.089589*** (0.060079)	1.200444*** (0.065311)	1.056282*** (0.050547)
PRM	104.1744*** (9.645813)	78.17183*** (14.61032)	76.13068*** (11.20280)	64.73508*** (13.77371)
SCND	-82.43492*** (10.10436)	31.25694*** (9.207324)	-84.19407*** (9.579512)	42.59430*** (9.250791)
log (CPI/100)	-1019.361*** (165.4837)	-602.1060*** (67.13073)	-1137.128*** (192.3395)	-613.7240*** (69.56814)
log (FDI_{t-1}/CPI_{t-1})	-169.8991*** (62.77807)	85.09148 (56.28318)	-261.4654*** (80.95100)	69.38439 (55.42461)
REFOVERALL	176.1502*** (31.43587)	-124.0935*** (38.50168)	225.5757*** (31.80890)	-132.0771*** (40.18085)
REFINFRASTR	94.87434*** (7.927180)	65.43048*** (10.31972)	98.82955*** (9.219114)	62.12307*** (9.987723)
WAR	-4049.802*** (341.6223)	-1481.843*** (344.1755)	—	—
BAT	—	—	-236.7977*** (65.73021)	-69.25257* (37.41592)
BALT	—	-689.4268* (399.2930)	—	-594.6256 (406.2192)
BUR	—	-4668.013*** (216.2922)	—	-4858.445*** (254.3313)
CASIA	—	-3424.319*** (230.8542)	—	-3923.396*** (227.8786)

Variable	(4a)	(4b)	(5a)	(5b)
CAUC	—	-3840.094*** (226.2444)	—	-3549.536*** (267.3954)
CEUR	—	1175.074*** (386.3072)	—	1575.590*** (321.8862)
EBAL	—	-1339.799*** (156.9542)	—	-1327.004*** (162.3914)
DATEID	1.313866*** (0.132904)	1.542755*** (0.086267)	1.235604*** (0.143974)	1.543064*** (0.089246)
White standard errors	Yes	Yes	Yes	Yes
Observations included	277	277	277	277
Time span	1991-2008	1991-2008	1991-2008	1991-2008
R-squared	0.872626	0.913018	0.859439	0.911535
Adjusted R-squared	0.868332	0.908019	0.854701	0.906451
F-statistic	203.2430	182.6413	181.3930	179.2882
p-value of F-statistic	0.000000	0.000000	0.000000	0.000000

To start with the problems of the model, the effect of the proxy of human capital is reverse to what is expected. I do not tend to think that the results I obtain here disprove earlier findings on this subject for the following reason. As far as we have a bigger coefficient for *prm* than for *scnd*, it means that the dropout rate is positively correlated with GDP growth (I proved this statement by substituting the two enrolment rates for their difference, (*prm–scnd*), and the

latter really had a significant positive effect), which is not intuitive at all. Such a glaring discrepancy can be explained at least by three reasons. Firstly and most importantly, school enrolment rates were the best proxy for human capital <u>given the existing database</u>, which does not mean that this decision was efficient generally. For a country like USSR (and hence, all the post-Soviet countries, at least in the very first years of independence) enrolment rates were traditionally very high. Yet, this tendency was mostly conditional on political reasons and did not have too much to do with economic factors. Secondly, the problem or its part can stem from the fact that the sample for 1990 and 1991 is not big enough. Thirdly, technical factors emerging from cross-country differences in the educational system can also come into play. The significance of regional dummies in (4b) and (5b) can exactly compensate for the influence of human capital, which we lose due to the imperfection of the existing data. I tend to explain many of the hard-to-explain results of the model exactly by this discrepancy as a large variety of authors assign human capital an important role in the development in general and that of the institutional system in particular (see, for example Glaeser, La Porta, Lopez-de-Silante and Shleifer, 2004).

The effect of 1990 GDP level, the time trend and the adverse effect of political instability remain strong and significant, which highlights the high importance of the exogenous factors, adjusted for the problem with immediate inputs. There is not much of a difference whether we measure the effect of political instability through the particular number of victims it caused or merely through the fact of its occurrence. The latter finding can be explained through the similar nature of the destructive chain reaction a disturbance produces in a country's socioeconomic structure (the more so because there are no big differences in the size or population of countries affected by war, except for Russia).

27

The importance of policy and institutional variables bursts upon the eye. Although a part of the measurement is conventional, all the effects are significant, both statistically and economically.

I tend to explain the strange result for FDI in (4a) and (5a), namely its negative coefficient, also through the bias caused by the inappropriate measure of human capital. There is at least one reason that can support this guess: the more prior lags of CPI-adjusted FDI are included into the model, the less its significance. In this respect, I am inclined to establish linkage with the complementary character of foreign investment and human capital discussed, for instance, by Tanna and Topaiboul (2005). This statement finds its further support in (4b) and (5b) regression, where, as I assume, the regional dummies absorb the variations in the level of human capital, so that the coefficient of log (fdi_{t-1}/cpi_{t-1}) becomes negative, even though it loses its statistical significance in (5b), where its *p*-value is above 20%.

The reform indices result to affect cross-country divergence in growth. Due to the conventional and ordinal (rather than cardinal) nature of EBRD ranking, it is impossible to establish a quantitative linkage between reforms and economic growth. Yet, my model suggests that the importance of overall transition indicators is approximately twice as big as the one of infrastructure reforms. To wider extent, we can combine this outcome with the restructuring of external trade mentioned by Campos and Coricelli (2002) and advance a guess that the intensiveness of the reforms reflected in EBRD data partly refers to the intensiveness of the restructuring of foreign trade policy.

What remains very unclear are the negative coefficients at *refoverall* in regressions featuring regional dummies. The minimal score EBRD assigns to a country is one, so according to these results, a country loses a portion of its GDP both if the reforms are greatly progressing, and if there are no reforms at all, which does not seem to make sense. Instead, the same

28

coefficients are positive and significant for regressions without dummies (moreover, the estimation suggests that the effect of overall reform is around 100% as much as that of the infrastructure reform).

I explain the drastic change that emerges once regional dummies are included, by the fact that certain regions were especially successful in conducting reform and some, by contrast, are not. This guess is supported by the level of correlation between *refoverall* (which is in our case the "problematic" variable) and regional dummies: it is very high for Central Europe (0.42), high for Baltic States (0.27) and negative for all the remaining regions, except for East Balkans. The problem with the latter is, as already mentioned, the differences between Bulgaria and Romania on one hand and Moldova on the other.

As for the relatively weak but robust effect of the infrastructure reform index, it is well in line with Easterly and Rebelo (1993), who reveal the robust correlation between growth on one hand and public investment in communication and transport on the other.

Conclusion

This modest analysis revealed the following reasons to cause the divergence in growth among the countries in the sample.

The 1990 level of GDP per capita result is highly significant. Thus, this variable proves to be a good proxy for the initial conditions of the country expressed, first of all, in terms of economic potential and institutional setting. The strong adverse effect of political instability, intuitional in itself and demonstrated by many previous studies, got its further confirmation in my research as well.

The major shortcoming of the whole research is that the effect of human capital was not proved. This seems to result from a poor dataset: the information on tertiary education (which would be a much better proxy) was scarce, and the effects that primary- and secondary-school enrolment rates produce according to the model look highly doubtful. I presume that a better dataset would cause this discrepancy shrink or even vanish.

The effect of price growth is proven to be significantly negative, whereas that of foreign direct investment results of marginal insignificance. The latter shortcoming can be explained through the complementary nature of human capital (which is not properly measured) and FDI.

Last but not the least, the effect of infrastructure reforms (especially its part that has to do with general factors, such as privatization or antitrust policy) is demonstrated to be significant. I tend to extend this influence to the foreign trade policy. Unfortunately, the ordinal nature of the scaling used for these variables makes it in fact impossible to explain its effect in quantitative terms.

Except for measurement problems, the model suffers from positive serial correlation. This fact prejudices the quality of the research and the causality of the results obtained from it.

Appendices

Appendix A

GDP per capita (PPP, thousands of current international USD) for post-Communist states from different regions (Eastern Europe; South Eastern Europe; Central Europe; Central Asia) with a comparable initial level. This illustrates different patterns of GDP dynamics across different states. *Source: World Bank's Data Catalog.*
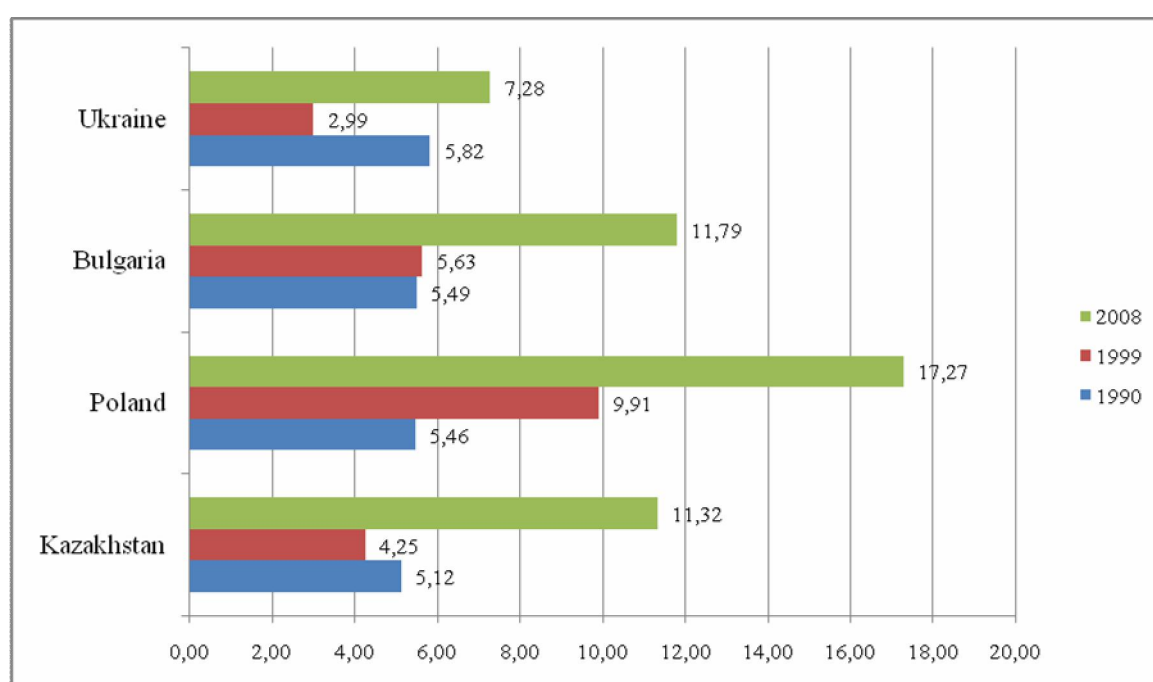
Appendix B

Short summary and descriptive statistics of variables used in models

Variable	Mean	St. dev.	Minimum value	Maximum value	Description
GDP	7555.975	5241.064	878.1710	27181.87	GDP per capita (PPP adjusted) measured in constant 2005 USD Source: GDF
GDP1990	7747.071	4275.816	1223.926	16401.11	GDP per capita of 1990[2] (adjusted for PPP), measured in constant 2005 USD Source: GDF
BALT	0.107143	0.309586	0	1	Dummy variable, equals one for Baltic states and zero for the others (for classification see Appendix C)
BUR	0.107143	0.309586	0	1	Dummy variable, equals one for the countries of BUR regions and zero for the others (for classification see Appendix C)
CASIA	0.178571	0.383354	0	1	Dummy variable, equals one for Central Asian countries and zero for the others (for classification see Appendix C)
CAUC	0.107143	0.309586	0	1	Dummy variable, equals one for the countries of South Caucasus and zero for the others (for classification see Appendix C)
CEUR	0.107143	0.309586	0	1	Dummy variable, equals one for Central European countries and zero for the others (for classification see Appendix C)
EBAL	0.107143	0.309586	0	1	Dummy variable, equals one

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[2] For the countries whose GDP per capita of 1990 is unavailable, the value is taken equal to the earliest one available (1992 for Moldova, 1994 for Bosnia and Herzegovina, 1997 for Montenegro).

Variable	Mean	St. dev.	Minimum value	Maximum value	Description
					for East Balkan countries and zero for the others (for classification see Appendix C)
BATTLE	0.3926	2.400	0	30	Number of battle caused deaths, measured in thousands of people Source: GDF
WAR	0.089286	0.285439	0	1	Dummy variable, equals zero if *battle* (see the cell above) is zero, and one otherwise Source: GDF
CPI	70.74568	37.57491	0.000235	193.8979	Consumer price index (2005 = 100) Source: GDF
FDI	9839.520	27848.48	1.00E-05	324065.4	Gross FDI, measured in millions of USD Source: Inward FDI stock, by Host Region and Economy, 1980-2007, UNCTAD
PRM	95.61216	7.321637	81.11418	109.6730	Primary-school enrolment rate, as of 1990 Source: GDF
SCND	94.44462	6.376698	81.26085	103.6037	Secondary-school enrolment rate, as of 1990 Source: GDF
REFOVERALL	21.02840	6.312044	8.000000	32.00000	The sum of EBRD indices regarding overall reforming process Source: EBRD web site
REFINFRASTR	11.11709	5.245916	5.000000	40.64000	The sum of EBRD indices regarding infrastructure reforming process Source: EBRD web site

Appendix C

Distribution of sample countries among regions.

Region (number of countries)	Countries
Baltic states (3)	Estonia, Latvia, Lithuania
BUR (3)	Belarus, Russia, Ukraine
Central Asia (5)	Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan
Central Europe (5)	Czech Republic, Hungary, Poland, Slovakia, Slovenia
East Balkan (3)	Bulgaria, Moldova, Romania
South Caucasus (3)	Armenia, Azerbaijan, Georgia
West Balkan (6)	Albania, Bosnia and Herzegovina, Croatia, Macedonia, Montenegro, Serbia

Appendix D

EBRD transition indicators methodology.

Indicator	Score	Criteria
Overall transition indicators		
Large-scale privatization	1	Little private ownership
	2	Comprehensive scheme almost ready for implementation; some sales completed
	3	More than 25 per cent of large-scale enterprise assets in private hands or in the process of being privatized (with the process having reached a stage at which the state has effectively ceded its ownership rights), but possibly with major unresolved issues regarding corporate governance
	4	More than 50 per cent of state-owned enterprise and farm assets in private ownership and significant progress with corporate governance of these enterprises
	4+	Standards and performance typical of advanced industrial economies: more than 75 per cent of enterprise assets in private ownership with effective corporate governance
Small-scale privatization	1	Little progress
	2	Substantial share privatized
	3	Comprehensive programme almost ready for implementation
	4	Complete privatization of small companies with tradable ownership rights
	4+	Standards and performance typical of advanced industrial economies: no state ownership of small enterprises; effective tradability of land
Governance and enterprise restructuring	1	Soft budget constraints (lax credit and subsidy policies weakening financial discipline at the enterprise level); few other reforms to promote corporate governance
	2	Moderately tight credit and subsidy policy, but weak enforcement of bankruptcy legislation and little action taken to strengthen competition and corporate governance
	3	Significant and sustained actions to harden budget constraints and to promote corporate governance effectively (for example, privatization combined with tight credit and subsidy policies and/or enforcement of bankruptcy legislation)

Indicator	Score	Criteria
	4	Substantial improvement in corporate governance and significant new investment at the enterprise level, including minority holdings by financial investors
	4+	Standards and performance typical of advanced industrial economies: effective corporate control exercised through domestic financial institutions and markets, fostering market-driven restructuring
Price liberalization	1	Most prices formally controlled by the government
	2	Some lifting of price administration; state procurement at non-market prices for the majority of product categories
	3	Significant progress on price liberalization, but state procurement at non-market prices remains substantial
	4	Comprehensive price liberalization; state procurement at non-market prices largely phased out; only a small number of administered prices remain
	4+	Standards and performance typical of advanced industrial economies: complete price liberalization with no price control outside housing, transport and natural monopolies
Trade and foreign exchange system	1	Widespread import and/or export controls or very limited legitimate access to foreign exchange
	2	Some liberalization of import and/or export controls; almost full current account convertibility in principle, but with a foreign exchange regime that is not fully transparent (possibly with multiple exchange rates)
	3	Removal of almost all quantitative and administrative import and export restrictions; almost full current account convertibility
	4	Removal of all quantitative and administrative import and export restrictions (apart from agriculture) and all significant export tariffs; insignificant direct involvement in exports and imports by ministries and state-owned trading companies; no major non-uniformity of customs duties for non-agricultural goods and services; full and current account convertibility
	4+	Standards and performance norms of advanced industrial economies: removal of most tariff barriers; membership in WTO
Competition policy	1	No competition legislation and institutions
	2	Competition policy legislation and institutions set up; some reduction of entry restrictions or enforcement action on dominant firms

Indicator	Score	Criteria
	3	Some enforcement actions to reduce abuse of market power and to promote a competitive environment, including break-ups of dominant conglomerates; substantial reduction of entry restrictions
	4	Significant enforcement actions to reduce abuse of market power and to promote a competitive environment
	4+	Standards and performance typical of advanced industrial economies: effective enforcement of competition policy; unrestricted entry to most markets
Banking reform and interest rate liberalization	1	Little progress beyond establishment of a two-tier system
	2	Significant liberalization of interest rates and credit allocation; limited use of directed credit or interest rate ceilings
	3	Substantial progress in establishment of bank solvency and of a framework for prudential supervision and regulation; full interest rate liberalization with little preferential access to cheap refinancing; significant lending to private enterprises and significant presence of private banks
	4	Significant movement of banking laws and regulations towards BIS standards; well-functioning banking competition and effective prudential supervision; significant term lending to private enterprises; substantial financial deepening
	4+	Standards and performance norms of advanced industrial economies: full convergence of banking laws and regulations with BIS standards; provision of full set of competitive banking services
Securities markets and non-bank financial institutions	1	Little progress
	2	Formation of securities exchanges, market-makers and brokers; some trading in government paper and/or securities; rudimentary legal and regulatory framework for the issuance and trading of securities
	3	Substantial issuance of securities by private enterprises; establishment of independent share registries, secure clearance and settlement procedures, and some protection of minority shareholders; emergence of non-bank financial institutions (for example, investment funds, private insurance and pension funds, leasing companies) and associated regulatory framework
	4	Securities laws and regulations approaching IOSCO standards; substantial market liquidity and capitalization; well-functioning non-bank financial institutions and effective regulation
	4+	Standards and performance norms of advanced industrial economies: full convergence of securities laws and regulations

38

Indicator	Score	Criteria
		with IOSCO standards; fully developed non-bank intermediation
Infrastructure reform		
Electric power	1	Power sector operates as government department with few commercial freedoms or pressures. Average prices well below costs, with extensive cross-subsidies. Monolithic structure, with no separation of different parts of the business
	2	Power company distanced from government, but there is still political interference. Some attempt to harden budget constraints, but effective tariffs are low. Weak management incentives for efficient performance. Little institutional reform and minimal, if any, private sector involvement
	3	Law passed providing for full-scale restructuring of industry, including vertical unbundling through account separation and set-up of regulator. Some tariff reform and improvements in revenue collection. Some private sector involvement
	4	Separation of generation, transmission and distribution. Independent regulator set up. Rules for cost-reflective tariff-setting formulated and implemented. Substantial private sector involvement in distribution and/or generation. Some degree of liberalization
	4+	Tariffs cost-reflective and provide adequate incentives for efficiency improvements. Large-scale private sector involvement in the unbundled and well-regulated sector. Fully liberalized sector with well-functioning arrangements for network access and full competition in generation
Roads	1	Minimal degree of decentralization and no commercialization. All regulatory, road management and resource allocation functions centralized at ministerial level. New investments and road maintenance financing dependent on central budget allocations. Road user charges not based on the cost of road use. Road construction and maintenance undertaken by public construction units. No public consultation in the preparation of road projects
	2	Moderate degree of decentralization and initial steps in commercialization. Road/highway agency created. Improvements in resource allocation and public procurement. Road user charges based on vehicle and fuel taxes, but not linked to road use. Road fund established, but dependent on central budget. Road construction and maintenance undertaken primarily by corporatized public entities, with some private sector participation. Minimal public consultation/participation on road projects
	3	Fair degree of decentralization and commercialization. Regulation and resource allocation functions separated from road

Indicator	Score	Criteria
		maintenance and operations. Level of vehicle and fuel taxes related to road use. Private companies able to provide and operate roads under negotiated commercial contracts. Private sector participation in road maintenance and/or through concessions to finance, operate and maintain parts of highway network. Limited public consultation/participation and accountability on road projects
	4	Large degree of decentralization. Transparent methodology used to allocate road expenditures. Track record in competitive procurement of road design, construction, maintenance and operations. Large-scale private sector participation in construction, operations and maintenance directly and through public-private partnerships. Substantial public consultation/participation and accountability on road projects
	4+	Fully decentralized road administration. Commercialized road maintenance operations competitively awarded to private companies. Road user charges reflect the full costs of road use and associated factors, such as congestion, accidents and pollution. Widespread private sector participation in all aspects of road provision. Full public consultation on new road projects
Telecommunications	1	Little progress in commercialization and regulation. Minimal private sector involvement and strong political interference in management decisions. Low tariffs, with extensive cross-subsidization. Liberalization not envisaged, even for mobile telephony and value-added services
	2	Modest progress in commercialization. Corporatization of dominant operator and some separation from public sector governance, but tariffs are still politically set
	3	Substantial progress in commercialization and regulation. Telecommunications and postal services fully separated; cross-subsidies reduced. Considerable liberalization in the mobile segment and in value-added services
	4	Complete commercialization, including privatization of the dominant operator; comprehensive regulatory and institutional reforms. Extensive liberalization of entry
	4+	Effective regulation through an independent entity. Coherent regulatory and institutional framework to deal with tariffs, interconnection rules, licensing, concession fees and spectrum allocation. Consumer ombudsman function
Water and waste water	1	Minimal degree of decentralization; no commercialization. Services operated as vertically integrated natural monopolies by government ministry or municipal departments. No financial autonomy and/or management capacity at municipal level. Low

Indicator	Score	Criteria
		tariffs, low cash collection rates and high cross-subsidies
	2	Moderate degree of decentralization; initial steps towards commercialization. Services provided by municipally owned companies. Partial cost recovery through tariffs; initial steps to reduce cross-subsidies. General public guidelines exist regarding tariff-setting and service quality, but both under ministerial control. Some private sector participation through service or management contacts, or competition to provide ancillary services
	3	Fair degree of decentralization and commercialization. Water utilities operate with managerial and accounting independence from municipalities, using international accounting standards and management information systems. Operating costs recovered through tariffs, with a minimum level of cross-subsidies. More detailed rules drawn up in contract documents, specifying tariff review formulae and performance standards. Private sector participation through the full concession of a major service in at least one city
	4	Large degree of decentralization and commercialization. Water utilities managerially independent, with cash flows – net of municipal budget transfers – that ensure financial viability. No cross-subsidies. Semi-autonomous regulatory agency able to advise and enforce tariffs and service quality. Substantial private sector participation through build-operator-transfer concessions, management contacts or asset sales in several cities
	4+	Water utilities fully decentralized and commercialized. Fully autonomous regulator exists with complete authority to review and enforce tariff levels and quality standards. Widespread private sector participation via service/ management/lease contracts. High-powered incentives, full concessions and/or divestiture of water and waste-water services in major urban areas

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