THE WILLIAM DAVIDSON INSTITUTE
AT THE UNIVERSITY OF MICHIGAN BUSINESS SCHOOL

Back to the Future: The Growth Prospects of Transition Economies Reconsidered

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Working Paper Number 229
April 1999

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BACK TO THE FUTURE:

THE GROWTH PROSPECTS OF TRANSITION ECONOMIES RECONSIDERED*

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This version: April 1999

Abstract. There are two strands in the empirical literature on economic growth in transition economies. One focuses on the impact of reforms, while the other emphasizes sustainability issues and the growth prospects these economies face. The most common strategy, in the latter, has been to use coefficients from growth regressions, on large samples of developing countries, and impose them on transition economies' data to obtain projected growth rates. We refer to it as the *BLR approach* (because it uses specifications from Barro, and Levine and Renelt). We claim that the reported growth rates are suspiciously similar, painting an overly optimistic picture and yielding few policy lessons. We re-estimate the *BLR* equations for data on transition economies themselves and find that government expenditures have been positively associated and human capital has been negatively associated with output growth. These results contrast sharply with the assumptions and findings from the *BLR approach*, questioning its might and challenging our understanding of the transition process in its key dimension.

Keywords: transition economies, economic growth, growth prospects.

JEL classification: E23, O40, P20, P52.

* I am thankful to Laszlo Csaba, Aurelijus Dabušinskas, Randall Filer, Byeongju Jeong, Ella Kallai, Jan Kmenta, Lubomir Lizal, Jeffrey Nugent, James Robinson, Frantisek Turnovec, Viatcheslav Vinogradov and seminar participants at CERGE-EI, EACES (Varna), IMAD (Bled), and EPCS (Lisbon) Meetings for valuable comments on an earlier draft. The usual disclaimer applies.

Executive summary

The group of former centrally planned economies experienced in 1997 positive growth for the first time since the beginning of the transition process. On this account, interest in the growth prospects facing these countries has started to mount. A question that summarizes the importance of this research is, for instance, how many years would the average transition economy need to reach the income level of the average OECD country? Answering such questions is of obvious policy relevance and the burgeoning literature can not come as a surprise. What does come as a surprise, however, is that the reported estimates of the long-run growth rates are suspiciously similar, painting an overly optimistic picture and yielding few policy lessons.

These trend rate estimates are similar because the literature treats the transition economies as average developing countries, and this is reflected on how these long-run growth rates are calculated. We refer to this method as the Barro-Levine-Renelt (hereafter, *BLR*) approach. It proceeds in two steps: (1) coefficients from growth regressions (on large samples of developing countries) are estimated (or taken from specifications found in Barro, 1991, and/or Levine and Renelt, 1992), and (2) these coefficients are imposed on transition economies' cross-sectional data.

Because the *BLR approach* is omnipresent, the reported long-run growth rates are essentially the same across studies. And because the transition economies are thought of as having much higher stocks of physical and human capital and much lower rates of population growth (compared to the other developing countries), the reported trend rates tend to be quite high, therefore painting an overly optimistic picture.

This paper investigates the determinants of long-run economic growth in transition economies by discussing the limitations of the available methods for assessing the growth prospects these economies face. After taking stock of the existing literature, we present the data set assembled for this paper, and used to re-estimate the various specifications from the literature (the *BLR equations*). We find that government expenditures have been positively and human capital has been negatively associated with output growth during the transition period. These two results contrast sharply with the assumptions and findings from the *BLR approach*, questioning its might and challenging our understanding of the transition process in its key dimension.

1. Introduction

The group of former centrally planned economies experienced in 1997 positive growth for the first time since the beginning of the transition process. On this account, interest in the growth prospects facing these countries has started to mount. A question that summarizes the importance of this research is, for example, how many years would the average transition economy need to reach the income level of the average OECD country? Answering such questions is of obvious policy relevance and the burgeoning literature can not come as a surprise. What does come as a surprise, however, is that the resulting estimates of the long-run growth rates —needed for such "catch-up" simulations— are suspiciously similar, painting an overly optimistic picture and yielding few policy lessons.[1]

These trend rate estimates are similar because the literature treats the transition economies as average developing countries. This reflects in the mechanics of how these long-run growth rates are calculated. We refer to it as the Barro-Levine-Renelt (hereafter, *BLR*) approach. It proceeds in two steps: (1) coefficients from growth regressions (on large samples of developing countries) are estimated (or taken from specifications found in Barro, 1991, and/or Levine and Renelt, 1992), and (2) these coefficients are imposed on transition economies' cross-sectional data.[2]

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[1] Notice that the acceleration of growth in the countries of the Commonwealth of Independent States (CIS) counter-balanced the slowdown in Central and Eastern Europe. The net result for 1997 is that a mere five out of twenty-five countries show negative growth rates. Although these are clearly "good news," they must be kept in perspective: so far, only Poland has surpassed its initial or pre-transition (1989) level of per capita GDP (EBRD, 1998, IMF, 1998).

[2] The mechanics of the *BLR approach* is discussed in detail below (Section 3).

Because the *BLR approach* is omnipresent, the reported long-run growth rates are essentially the same across studies. And because the transition economies are thought of as having much higher stocks of physical and human capital and much lower rates of population growth (compared to the other developing countries), the reported trend rates tend to be quite high, therefore painting an overly optimistic picture. Notwithstanding, these are not the main reservations to the existing literature. We are more concerned by its apparent reluctance to generate policy lessons. We believe that examining the growth prospects of any economy can be useful if it calls attention to issues that would remain unnoticed because their impact is not observable in a short-run frame. In other words, growth prospects are valuable for the sustainability checks and policy lessons they entail. Paradoxically, the uniqueness of the transition experience both justifies and entraps such empirical exercises. It justifies them by appealing to the fact that transition is temporary: after a while, the standard set of growth determinants will take over. On the other hand, the uniqueness of the transition experience entraps these exercises because it questions whether and how fast the transition —as well as the remaining command— features will disappear.[3] There is, finally, a more mundane justification for this choice of empirical strategy. Because these exercises would require at least annual data since 1989, and these are scanty and of questionable quality, using estimates from other samples appears to be an efficient solution.

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[3] Fisher et al. (1996a) point out that "a useful way to think about the current growth prospects of the transition economies is to consider them subject to two sets of forces: those arising from the transition and transformation process, and the basic neoclassical determinants of growth. The further along a country is in the transition process, the less weight on the factors that determine the transitional growth rate, and the greater the weight on the standard determinants of growth" (p. 231).

Yet, what if the long-run growth rates of transition economies are being determined by a somewhat different set of factors? Or much less stringently, what if some of these determinants become more (or less) important over time? What if their relative importance is different in transition vis-à-vis other developing economies?

The objective of this paper is to investigate the determinants of long-run economic growth in transition economies by discussing the limitations of the available methods for assessing the growth prospects these economies face.[4]

The paper is organized as follows. In the next section, we take stock of the existing literature. Because we do not know of any other attempt to gather and comment on the largest possible number of studies on economic growth in transition economies, the review we present is rather detailed. The main conclusion is that the majority of existing studies use the *BLR approach*. Those in agreement with this conclusion may skip this section and proceed to Section 3, which details the mechanics of the *BLR approach* and discusses its limitations. Section 4 presents the data set we assembled to investigate the economic performance of transition economies since 1990. In Section 5, we re-estimate the various specifications from the literature (the *BLR equations*), but now using data from transition economies themselves. We find that government expenditures have been positively and human capital has been negatively associated with output growth during the transition period. These two results contrast sharply with the assumptions and findings from the *BLR approach*, not simply questioning its might but also

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[4] It must be stressed that it is well beyond the scope of this paper to study the effects of economic reforms on the short-term behavior of output. Many studies that analyze such effects also discuss growth prospects (this is one reason why they are reviewed in the next section). Consequently, we will ignore throughout the effects of, for example, inflation (because it is not a *BLR variable*) and will not follow the common practice (in that literature) of using "reform time" instead of "chronological time."

challenging our understanding of the transition process in its key dimension. Section 6 summarizes our main findings and discusses suggestions for future research.

2. Growth in Transition

The objective of this section is to review the empirical literature on economic growth in transition economies. The emphasis is on cross-country studies and it is justified on the basis that this approach is the relevant source of stylized facts that should ultimately inform the theoretical literature.[5] We divide the empirical literature in two branches: one that stresses the effects of reforms on growth, and another that emphasizes the growth prospects facing these economies.

We should ask, at the outset, what caused the abrupt breakdown of the socialist system. Despite being a daunting task, Stiglitz suggests that technological change is at the very heart of this collapse.[6] Another, related, possibility is that of within block heterogeneity. When growth researchers look up "convergence hypothesis" in the *New Palgrave* (Wiles, 1987) they may be puzzled by the absence of references to such key words as conditional and unconditional, beta and sigma. Instead, they find the convergence entry to be about the expectation that standards of living among members of the ex-communist block would first converge and then surpass that of the most advanced capitalist economies. In a breakthrough paper, Estrin and Urga (1997) convincingly show that none of these "two convergences" took place between 1970 and 1990.

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[5] The theoretical literature is not reviewed here. It focuses mostly on the output fall, and recent contributions include Blanchard (1997) and Roland and Verdier (1997).

[6] Stiglitz notes that "It is these changes [that modern technology has taken, from computer-driven manufacturing to genetic engineering], in the end, that doomed socialism" (1994, p. 205).

Moreover, when they extend the analysis to 1995 they find that "reforms are not yet leading these economies to reverse their long standing economic decline relative to the West" (1997, p. 23).

Estrin and Urga are not alone studying the consequences of economic reforms for macroeconomic performance. If one insists on cross-country empirical analyses of economic growth in transition economies, the list should include Åslund, Boone and Johnson (1996), De Melo, Denizer and Gelb (1996), De Melo and Gelb (1997), Fisher, Sahay and Vegh (1996a, 1996b), Heybey and Murrell (1997), and Berg et al. (1998). All these papers discuss growth performance since 1989, but none of them attempt to quantify growth prospects.

De Melo, Denizer and Gelb (1996) and De Melo and Gelb (1997) map the output decline, construct an index of the extent of liberalization and offer evidence that cumulative liberalization is positively correlated with output growth. Because this liberalization index is used widely, we should note two of its distinguishing features. First, the index is based on the still controversial notion that what accounts for the disparity in economic performance during transition are government policies (1997, pp. 62-63). Second, the index is a weighted-average of three components: liberalization of internal markets, of external markets and of private sector entry (weights are 0.3, 0.3 and 0.4 respectively).

Fisher, Sahay and Vegh (1996a) use this liberalization index in a panel of 20 transition countries (for 1992-1994). They find that growth is positively and statistically significantly associated with fiscal surpluses, foreign aid, and the extent of liberalization, and is negatively and significantly associated with inflation. In subsequent work (1996b), the authors increase the number of countries (from 20 to 25, for 1992-1994) to conclude that growth is negatively and

significantly associated with initial income, and positively and significantly associated with the choice of exchange rates regimes, fiscal surpluses, and the (cumulative) liberalization index.

Åslund, Boone and Johnson (1996) offer some important new results. They find that the above conclusions change dramatically when considering output change (between 1989 and 1995) instead of output level at the end of the period (1995). For the first case, they report that once dummy variables for ruble zone and war-torn countries are included, "there is no robust significant correlation between output change and any measure of reform" (1996, p. 233). However, when they turn their attention to output level in 1995, the extent of liberalization and inflation are found to be statistically significant and have their expected signs.

The last contribution we mention that investigates growth during transition, without discussing growth prospects, is that of Heybey and Murrell (1997). These authors identify a set of problems in the existing literature, notably with respect to the measurement of the speed of reform and the issue of simultaneity. Using a simultaneous equations approach, they conclude that initial conditions are "much more important than policy variables in determining growth performance" (1997, p. 15).

We now turn to studies that, in addition to an understanding of the growth process during the transition period, are also concerned with its sustainability. Because of the impracticable number of individual country studies, in what follows we focus on multi-country studies, in particular, those paying attention not only to Central and Eastern Europe, but also to the Baltic and the CIS countries.[7]

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[7] This criterion excludes many important studies. Borenzstein and Montiel (1992) and Sachs and Warner (1996) both examine only three transition countries. The former uses the Mankiw-Romer-Weil framework to identify long term growth paths, while the latter uses three countries' experience to argue that harmonizing with the European

The first systematic analysis of growth prospects of transition economies, to the best of our knowledge, appeared in the *World Economic Outlook* (IMF, 1996) in the chapter "Long-Term Growth Potential in the Countries in Transition". It uses the *BLR approach* to simulate the effects of lowering the share of public expenditures (except on education) to 15 percent of GDP and of raising investment rates to 30 percent of GDP. Not surprisingly, it finds that this 50 percent increase (over its current 1995 level) in investment would increase growth substantially. Yet, little is said about how these investment rates can be raised or about why those expenditure levels should be lowered. Although this report does not derive policy lessons explicitly from this exercise, it does discuss three policy areas (namely fiscal policy, capital flows and financial system) that reflect the main challenges the IMF perceives to sustainable growth in the region.

Havlik (1996) bypasses the *BLR approach* by just assuming a growth rate differential in real per capita GDP of 3 percent between the CEEC-7[8] and the European Union averages. The question he poses is, given the 1995 actual levels of real per capita GDP, how many years it will require to the CEEC-7 countries to catch-up with the EU or, more likely, with its poorer members? He concludes, "convergence between the two most advanced CEEC countries and Spain (...) could not happen before 2005. For the other CEEC members to converge to the EU average by 2010 would require a growth differential of more than 5 per cent, a highly unrealistic

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Union policy standards will result in lower growth rates than following the policies of the group the authors define as "very fast growing developing economies." One important study excluded here is Barbone and Zalduendo (1997). They modify the *BLR approach* in that they estimate their own theoretical model for a large sample of developing countries and then use the coefficients to discuss accession to the European Union of five Central and Eastern European countries. Finally, we should mention the article by Leamer and Taylor (1994), a careful and original contribution that concludes with a number of hypothetical, although highly relevant scenarios (but no estimates of growth rates for individual countries), and the study by Barta and Url (1996) which examines five Central European transition countries.

[8] CEEC-7 encompasses Hungary, Czech Republic, Poland, Slovak Republic, Slovenia, Bulgaria and Romania.

assumption" (1996, pp.42-44). The simple arithmetic highlights the distance between the two groups of countries in a rather dramatic way.

Denizer (1997) stresses the role of initial conditions and in doing so provides a finer depiction of the determinants of the various "transition patterns" identified in De Melo, Denizer and Gelb (1996). He finds that initial conditions matter, as proxied by distance (in miles) from Vienna and whether the country was independent before socialism. He also departs slightly from the *BLR approach* in that he only uses the Levine-Renelt specification on the basis that it "includes variables that are shown to be robust in various specifications of the growth equation" (1997, p. 13). In addition, Denizer extends previous analyses by considering a broader sample of transition economies (adding Mongolia, China and Vietnam). Finally, as a simulation exercise, he evaluates the impact of raising the investment rate to 30 percent, from its current levels, on the number of years these economies will require to reach current OECD income levels.

One important contribution to this literature is made in the European Bank for Reconstruction and Development's *Transition Report 1997* (EBRD, 1997, chapter 6). This Report contrasts the findings on the transition economies' growth prospects that originate from the Levine-Renelt specification with those from an alternative that includes, *inter alia*, an index of institutional development.[9] This comparison suggests a downward revision of the forecasted long-run growth rates: even for those transition economies with relatively high-quality

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[9] This is a composite index encompassing "expropriation risk", "rule of law", "risk of contract repudiation by the government", "corruption", and "quality of the bureaucracy" (EBRD, 1997, p. 106). The enlarged Levine-Renelt specification includes enrollment rates in primary school, changes in international prices, and growth of labor force (instead of population).

institutions (and for which, institutional data are available), the absence of further institutional change should lower long-term growth rates by 1.5 percentage points.

Fisher, Sahay and Vegh (1997) use coefficients from Barro and from Levine and Renelt, plug in cross-sectional data (for 1994) from 15 transition economies and calculate the forecasted GDP and per capita GDP growth rates. They also conduct two simulation exercises. The first uses the Barro coefficients to investigate the consequences (in terms of the number of years needed to reach current OECD income levels) of lowering government consumption from current levels to 10 percent. The second simulation uses the Levine and Renelt specification to look at the impact on growth of raising the investment rate to 30 percent, from current levels.

Fisher, Sahay and Vegh (1998) again use the *BLR approach* but focus on a smaller sample of transition countries to assess their catching-up prospects with the European Union.[10] They carry out two simulation exercises to estimate the number of years it will be needed to these transition economies to converge to the income levels of the three "low-income EU countries" —Greece, Portugal and Spain (assuming that the latter will grow at 2 per cent per annum.) The first simulation exercise uses the Barro specification to investigate the consequences of lowering government consumption from current levels to 10 percent. The second uses the Levine and Renelt specification to look at the impact on growth of raising the investment rate to 30 percent, from its current levels. One innovation this paper brings is a quantification of the income losses incurred during the socialist period: using 1937 data for 6

[10] Their sample of 13 transition economies is formed by Hungary, Czech Republic, Poland, Slovak Republic, Slovenia, Croatia, Latvia, Lithuania, Albania, Estonia, Macedonia, Bulgaria, and Romania.

countries, they estimate that approximately two-thirds of GDP per capita were lost during the socialist experiment.

3. The BLR Approach

As the review in the previous section indicates, most empirical studies on economic use what we have been calling the *BLR approach*. Time seems ripe for a more detailed discussion of this approach, which is the objective of the present section.

The *BLR approach* consists of two steps. First, the coefficients from growth regressions on large samples of developing countries are estimated or, more often, "taken" from Barro (1991) and/or Levine and Renelt (1992). The "Barro equation" (and the ordinary least squares estimates) used in the papers reviewed above is:

$$\hat{GDPGROWTH} = 0.0302 - 0.0075 * Y0 + 0.025 * PRIM + 0.0305 * SEC - 0.119 * GOV,$$

while the "Levine and Renelt equation" (and the ordinary least squares estimates) is:

$$\hat{GDPGROWTH} = -0.83 - 0.35 * Y0 - 0.38\ POP + 3.17\ SEC + 17.5\ INV,$$

where *GDPGROWTH* is per capita real GDP growth, *Y0* is the initial level of per capita income, *PRIM* is the gross primary school enrollment rate, *SEC* is the gross secondary school enrollment rate, *POP* is the rate of population growth, *GOV* is the share of government consumption in GDP, and *INV* is the share of investment in GDP.

The second step in the *BLR approach* is to impose these coefficients on transition economies' data. We should clarify what "impose" means: first, data for a set of transition economies are collected on all *BLR variables* (often for 1994, with the 1989 PPP per capita level

as initial income). Second, these values are, for each country, multiplied by their respective coefficients and summed to the constant term. The result is the estimated long-run growth rate.

Because the *BLR approach* is ubiquitous, these rates are essentially the same throughout the literature and they are quite large, with an average of 4.32 percent, and ranging from 1.8 percent (Bulgaria) to 11.57 percent (Turkmenistan).

The reasons why the reported long-run economic growth rate estimates are so high should now be clear. It is because the transition economies are thought of as having much higher stocks of physical and human capital and much lower rates of population growth vis-à-vis the developing countries (upon which the least squares estimates above are based).

There are, however, some important additional problems with these *BLR* exercises. What the literature calls the "Barro specification" can not be found in Barro's 1991 paper. There is one specification that contains the coefficients shown above (equation 1 in Table 1, pp. 410-11), but this specification contains three additional variables.[11] Although the "Levine and Renelt specification" is in their 1992 paper, this specification does not solely includes variables that are robust in explaining growth. Indeed, the results in Levine and Renelt's Table 1 (1992, p. 947) indicate that population growth is not a "robust" growth determinant.[12]

Finally, the confidence in the *BLR* long-term growth rates estimates seems to come from the belief that recent research has been able to identify a robust set of growth determinants.[13] In

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[11] Namely, the sum of the number of revolutions and coups per year, the number of assassinations per million population per year, and "the magnitude of the deviation of the 1960 PPP value for the investment deflator (U.S.=1) from the sample mean" (Barro, 1992).

[12] The objective of Levine and Renelt (1992) is to identify the set of robust growth determinants according to Leamers' Extreme Bound Analisys method.

[13] Ghosh and Wolf note that "the empirical growth literature now arguably suffers from an embarassment of riches"

particular, this set is assumed to be robust in two ways: first, in the sense that the vector of factors explaining the growth performance of, say, Zambia between 1960 and 1990 is the same that explains the growth performance of, say, Hungary from 1998 onwards. Second, this set of growth determinants is assumed to be robust in the sense that the relative importance of different elements of this vector remains constant across countries as well as over time. To shed light on these assumptions, we assembled the data set we present in the next section.

4. Data set

The data set constructed for this paper contains all the variables in the two equations underlying the *BLR approach*.[14] One of the objectives in assembling this data set was to search for a list of stylized facts of the transition process,[15] the justification being that such a list is an essential input in informing and guiding the theoretical literature.[16] The original intention was to assemble a panel extending from 1990 to 1997 and covering as many countries as possible.[17] Yet, the

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(1998, p. 3). Durlauf and Quah summarize this literature and find that "in addition to the four variables suggested by the augmented Solow-Swan model (initial income and the rates of human capital investment, physical capital investment, and population growth), [different studies have used a total of] 36 different categories of variables and 87 specific examples" (1998, 45).

[14] Namely, initial level of per capita income (PPP), real per capita GDP growth rates, gross domestic investment (as a share of GDP), gross enrollment ratios in primary and secondary school, and general government expenditures and consumption (as a share of GDP).

[15] The limitations imposed by the BLR approach, or more specifically, by its small —for this purpose— set of underlying variables were clear from the outset.

[16] Blanchard (1997) puts forward a set of "stylized facts" based on the evolution of aggregate output and its composition, productivity, (un) employment, and investment (see also Gomulka, 1998). Our analysis differs in that: (a) output per capita is taken as an indication of the country's level of development, (b) attention is restricted to population growth, thus avoiding the many important unemployment issues, (c) we investigate the quality of labor (human capital) as well as (d) the role of government expenditures. Also notice that Blanchard downplays the role of government policies and initial conditions.

[17] We excluded China, Vietnam and Mongolia, because we deem their transition processes to be radically different.

problems with data availability are reflected in the exclusion of Yugoslavia and Bosnia-Herzegovina, and in that many observations are missing for the earlier as well as most recent years. Table 1 gives the basic statistics, sources, coverage, and number of missing observations per series (with 25 countries and eight years, the maximum number of observations is 200). Table 2 shows the list of countries in our sample.

Before examining the individual series, we must raise a caveat about data quality and comparability. These problems are well known and have been discussed in detail by Bartholdy (1997). Since our focus is on inter-country comparisons, we made the costly decision (because it increases the number of missing observations) not to use national sources, in the expectation that effort has been put in ensuring comparability by the international agencies responsible for the collection and publication of these data.

It is only appropriate to start with the initial level of per capita GNP, that for the year 1989 (figures are in 1987 US$, PPP). The series is shown in the first column of Table 2 and is taken from De Melo, Denizer, Gelb, and Tenev (1997). In 1989, most transition economies would be classified as "upper-middle income" countries.[18] Because of the stark differences in economic performance since, these economies are found in 1997 widely spread over the rank of countries (by their level of development). This can be better appreciated if we name the "new neighbors" of the transition economies.[19] Among transition countries, Tajikistan has the lowest

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[18] The World Bank ranks countries by their level of economic development, using as criterion GNP per capita (exchange rates conversion). "The GNP per capita cutoff levels (...) are as follows: low-income: $765 or less in 1995 (forty-nine economies); middle-income: $766 to $9,385 (fifty-eight economies); and high-income: $9,386 or more (twenty-six economies). A further division, at GNP per capita $3,035, is made between lower-middle income and upper-middle income" (World Bank, *1997 World Development Report*, p. 207).

[19] The source is the *1997 World Development Report*. A slightly different ordering of developing and transition countries entails if conversion is based on PPP, instead of exchange rates. We decided not to report the PPP ranks

GNP per capita in 1995 (followed by Georgia and Azerbaijan, respectively), while Slovenia has the highest (followed by Hungary and the Czech Republic, respectively). The country immediately below Tajikistan, in per capita GNP, is Gambia and the one immediately above is the Central African Republic. The country immediately below Georgia is Angola, while the one immediately above is Pakistan. The "median" transition economy is Romania, neighbored by the Dominican Republic (below) and Jamaica (above). At the other extreme, the country immediately above Slovenia is Greece, and the one immediately below is Argentina. Hungary is "surrounded" by Chile and Malaysia, while the Czech Republic is ranked between Malaysia and Trinidad and Tobago. The dispersion in the transition group has increased substantially since 1989 and this list of countries in close positions is to dramatize this change, in that it was definitely not all for the best.[20]

Dispersion increased because of the very different economic performances. Table 2 shows annual GDP growth rates from the *EBRD Transition Report Update 1998*. A few remarks are in order. First, the countries of Eastern Europe experienced output falls that turned out to be much smaller than the ones observed, at a *later* date, among the CIS economies. Second, there is the "Baltic puzzle": although Estonia, Latvia and Lithuania all had output contractions comparable to other CIS countries, their recovery was and has been much faster and pronounced.

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because data are not available for up to a fifth of the sample.

[20] In terms of development levels, one can argue that income per capita alone does not do justice to the years of attentive effort to improve social conditions (e.g., education and health) that characterized the socialist regimes. UNDP (1998) ranks 174 countries according to their "human development index" (which reflects, in addition to income, life expectancy and education attainment.) Our sample of 25 transition economies stretches from the 37th (Slovenia, immediately preceded by Argentina and followed by Uruguay) to the 118th place (Tajikistan, immediately preceded by Cape Verde and followed by Honduras). The median country is Macedonia (in 80th place), immediately preceded by Lithuania and followed by Syria.

And finally, as it can be seen from the last column, so far (1997), only Poland has surpassed its initial level of per capita GDP.

What can explain these different performances? We expect that at least part of the answer can be found in the variables underlying the *BLR approach*, namely in investment rates, population growth, enrollment ratios, and government expenditures. Notice that this set of variables does not fully or directly capture policy differences or initial conditions, at least not as commonly understood in the literature reviewed above. On the other hand, they are certainly informative with respect to the sustainability aspects, or the long-run prospects these economies face, our main interest in this paper.

We begin by studying investment rates, measured as gross domestic fixed investment as a percentage of GDP.[21] From Figure 1, notice first that the Balkans have much lower investment rates than all of our other four groups.[22] They have also been joined, more recently (1995), by the countries of the ASIA group. There are two additional observations worth making. First, it is only in the Baltic countries and in the countries of the ASIA group where these rates declined sharply in the early 1990s (thus feeding into the Baltic puzzle mentioned above). Second, only for the Visegrad and Balkan countries there is thus far a clear upward trend (after 1993-94).

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[21] Gross domestic fixed investment comprises all outlays (purchases and own-account production) on additions of new and imported durable goods to the stocks of fixed assets, less the proceeds of net sales (sales less purchases) of similar secondhand and scrapped goods. Outlays by general government on durable goods primarily for military purposes are excluded. According to the UN System of National Accounts, these outlays are treated as current consumption and classified under government consumption.

[22] For exposition purposes, we divided the sample in five groups. The transition countries in Asia (ASIA in the Figures' legend) are Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyztan, Tajikistan, Turkmenistan and Uzbekistan. The BALKAN countries are Albania, Bulgaria, Croatia, Macedonia, Moldova and Romania. The BALTIC countries are Estonia, Latvia and Lithuania. The group called BUR comprises Belarus, Ukraine and Russia. The VISEGRAD countries are the Czech Republic, Hungary, Poland, Slovakia and Slovenia.

These investment rates range from 14 to 28 percent of GDP, and for 1996 three out of our five groups have averages above 20 percent.[23] The often heard concern about these figures being too low is echoed here (and particularly so regarding the countries in the BALKAN and ASIA groups.) In 1995, the same rates for low-income economies averaged 30 percent, for lower-middle economies they averaged 25 percent, for upper-middle economies they averaged 21 percent, and for the high-income economies they averaged 20 percent.[24] Given the current level of development of most transition economies, these rates are low indeed.

Because it is included in the *BLR equations*, we also collected data on population growth (Table 3.)[25] The conventional wisdom, that these economies have quite low rates of population growth, is confirmed. The average annual population growth rate (1990-1996) across transition economies is 0.21 percent.[26] The same average for low-income economies in 1990-1995 is between 1.7 and 2.4 percent, for lower middle-income economies is 1.4, for upper middle-income economies is 1.7, and for high-income economies is 0.7 percent.[27] Although average population growth is indeed low, there are some interesting exceptions: Turkmenistan, Uzbekistan, and Tajikistan —basically Islamic countries and agricultural economies— all show

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[23] These figures, of course, do not reveal anything about the underlying private-public composition. We believe this to be a crucial element during the transition process but, due to the fact that this distinction is foreign to the *BLR approach* and to data unavailability, it is left for future work.

[24] Source is World Bank, *1997 World Development Report*, Table 13, pp. 238-239.

[25] The appropriate variable would be the actual labor force. Across transition economies there are sizable differences (e.g., in participation rates) that are not taken into account in the variable used in the *BLR approach*.

[26] These low rates also reflect the demographic situation in the transition economies, where the increasing dependency ratios are usually thought of as having negative fiscal consequences. For a discussion, see Coricelli (1997).

[27] Source is World Bank, *1997 World Development Report*, Table 4, pp. 220-221.

average annual population growth rates well above 2 percent (Armenia follows with a 1.29 percent average).

Let us turn to the human capital data. Although years of schooling would clearly be the appropriate measure, it is not available for most countries. In addition, the proxy for human capital in the *BLR approach* is the gross enrollment ratio.[28] Examining these ratios, in Figure 2, reveals a discomfiting trend: secondary school gross enrollment ratios not only show considerable variation, but also in many countries seem to have *declined* since 1990. In particular, the range of these ratios went down by five percentage points in five years, from 75-95 to 70-90. Yet, only the ASIA group shows decline throughout. Although these latter figures are still high by international standards,[29] such a contraction is unheard of. One possible reason would be that an over-accumulation of human capital took place under communism, paralleling that of physical capital. Indirect evidence for such is found among the inputs of the "education production function": under communism, relative teacher's salaries declined since the early 1960s, and grade repetition rates were virtually zero for as long as there are data.[30]

The last variable underlying the *BLR approach* is the share of government consumption in GDP.[31] The study of the effects of government size on economic growth is highly

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[28] Gross enrollment ratio is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education at hand. Primary level provides the basic elements of education at elementary or primary school, while secondary provides general or specialized instruction at middle, secondary, or high schools, teacher training schools, vocational or technical schools. The latter is based on at least four years of instruction at the first level.

[29] The *1997 World Development Report* reports that, in 1993, this ratio for middle-income economies was 63, and 97 for high-income economies (Table 7, pp. 226-227).

[30] For a discussion see Campos (1998).

[31] Because coverage is less than satisfactory, data were also collected on general government expenditures. The latter includes capital expenditures, interest payments and social expenditures.

controversial, to say the least, and consensus is being built upon the notion that different types of expenditures have different effects on economic growth.[32] In the *BLR approach*, and in the "Barro specification" in particular, this dimension enters with a negative sign, indicating that larger governments are associated with slower rates of economic growth. Figure 3 shows the evolution of government consumption in transition economies between 1990 and 1996. There seems to be no clear trends, with one exception: in the Baltic countries, government consumption as a share of GDP is *increasing* throughout the period, reinforcing the possibility of a "Baltic puzzle" identified above. It should also be noted that these levels of government consumption are high in comparative perspective (except for the ASIA countries). In 1995, government consumption in low-income economies averaged 13 percent of GDP, in lower-middle income countries it averaged 14 percent, in upper-middle income countries 15 percent, and in high-income countries it averaged 15 percent of GDP.[33]

Summing up, the vast majority of the countries in our sample would be classified as "upper-middle income" economies in 1989, while today a mere four are in this category,[34] and none as a high-income economy. The sizable output falls are to blame, although they were relatively smaller and occurred earlier in Eastern Europe than in the CIS countries. Our examination of the variables underlying the *BLR approach*, to our bewilderment, shows very few clear trends. Investment and population growth rates are low, in comparative perspective, but

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[32] See Alesina and Perotti (1996), Devarajan, Swaroop and Zou (1996), Miller and Russek (1997), Baffes and Shah (1998), and references therein. Analyses focusing on transition economies include, e.g., Chu and Schwartz (1994), Kornai (1995), Coricelli (1997), Dabrowski (1997), and Farkin and de Crombrugghe (1997).

[33] Source is World Bank, *1997 World Development Report*, Table 13, pp. 238-239.

[34] These are Slovenia, Hungary, Czech Republic, and Croatia.

show no trend. Government consumption is high, given the level of development of the countries in our sample, but again we could not distinguish trends. Indeed, the one trend we identify is regarding gross secondary enrollment ratios. Yet these are found to be *declining* throughout the transition period. On a more positive note, we find evidence of a "Baltic puzzle": Estonia, Latvia and Lithuania all had output contractions comparable to other CIS countries, but their recovery has been much faster and pronounced. When we turn to our set of variables for explanations, the puzzle is enlarged. In the Baltics, investment rates decline dramatically in the early 1990s (vis-à-vis the other transition economies), and this is the only group for which the share of government consumption in GDP is rising throughout the transition period. The inconclusiveness of this analysis cast doubts on the optimistic predictions emanating from the BLR approach. In the next section, we proceed in our search for a set of stylized facts by re-estimating the *BLR equations* and exploiting the data set in its cross-sectional and panel dimensions.

5. Back to the Future

The objective of this section is to estimate the equations underlying the *BLR approach* using the data set presented in the last section. Two warnings should be kept in mind. First, the results that follow do not seem extremely robust: the exclusion of certain countries in some runs, or the inclusion of some variables in certain specifications, alters the statistical significance levels of many coefficients. Therefore, we found it important to report in addition to the "original BLR equations," results for a number of stripped as well as enlarged versions of these equations to allow some latitude in judgement. Second, there is no pretension that the results presented below

are any more couched in a theoretical framework than the ones from studies based on the *BLR approach*. Yet, an effort is made to relate them to standard growth frameworks.

We start by exploring the cross-sectional dimension of our data set, for the case of the "Barro specification" (Table 4a.) We follow Barro (1991) and report ordinary least squares estimates on simple averages of all variables over the period 1990-1997. Reading the table from top to bottom, notice the absence of statistically significant coefficients, until the bold lines (which distinguish the complete Barro's specification). This is rather surprising because, after all, these variables have been identified as long-run (growth) determinants and one would expect that they would play a role, at least in a cross-sectional frame. Examining the individual columns (variables), notice that the sign of the initial income coefficient is positive (although not statistically significant) in five out of six specifications. Also worth mentioning is that it is only after we include a CIS dummy variable (which assumes the value of 1 for CIS countries, and zero otherwise) that the sign on initial income turns negative (although the coefficient is never statistically significant). This result is in clear contrast with theory and with the findings from the studies reviewed in Section 2. Convergence seems to be conditional, but upon CIS membership. The most important result from Table 4a is that the coefficient on government expenditures is found to be statistically significant, and positive (instead of negative as in Barro's original specification.[35]) This result remains after the introduction of the CIS dummy variable, a step known to quiver most of the results in the literature.[36]

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[35] It is important to reiterate that in the original Barro's specification (discussed in section 3 above) this dimension is proxied by government consumption. As noted, data on government expenditures was collected due to the many availability problems surrounding the government consumption series.

[36] Notice also that it is only after we control for government expenditures and the CIS countries that the coefficient

Table 4b shows our results for the cross-sectional dimension of the "Levine and Renelt specification." Once again, the lines in bold contain the original equation, the ones above subtract from it, while the ones below add. The lack of statistically significant coefficients is obvious: the one exception is the CIS dummy, in the very last row. Notice also that the coefficient on enrollment in secondary school is negative (although not statistically significant.) Another somewhat surprising result is that the coefficient on investment is never statistically significant (although it is positive throughout.)

Because the results above vigorously contradict the lessons from the experience of developing countries over the last thirty years, we thought it would be valuable to give the data another chance. We do so by exploring its panel dimension in order to investigate whether in a shorter-run frame the *BLR results* would appear. The explicit cost of this choice is that the theoretical underpinnings that were guiding the previous findings simply do not hold anymore. The theory focuses on the determinants of long-run economic growth and has very little to say about short-term fluctuations. In other words, the findings to be discussed from now on are exploratory.

In order to allow comparisons to the specifications discussed above, we use a simple pooled ordinary least squares approach on annual data, where the only fixed effect control (if any) is given by the dummy variable for the CIS countries. Starting with the "Barro specification" (Table 5a), the first noteworthy result is that the coefficient on initial income is always positive and (in two equations) statistically significant. Moreover, if instead of government consumption we use government expenditures, the coefficient on secondary school

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on secondary school becomes positive and statistically significant, respectively.

enrollment ratios becomes statistically significant, and negative (which is exactly the opposite we observe in the cross-sectional dimension of the data.) In this sequence, controlling for the CIS countries generates some large "benefits": it removes the statistical significance from two unexpected results, namely from the positive effect of initial income and from the negative effect of education. In our view, this qualifies the possibility of existence of problems surrounding human capital accumulation in transition economies, in that these would be truly severe in the CIS countries.

Finally, Table 5b shows our results for the panel dimension of the "Levine and Renelt specification." There are three unexpected results. First, the coefficient on initial income is positive and statistically significant until the inclusion of the CIS dummy. Second, although the coefficient on population growth is positive in three of the four equations (which collide with theoretical predictions), it becomes statistically significant after we include the CIS dummy. Third, and finally, although they are never statistically significant, the coefficients on investment and education are negative throughout.

We opened this section with some cautioning words about robustness. With them in mind, there are two findings that we believe are worth further exploration. One is that government expenditures as a share of GDP have been positively associated with economic growth in transition economies. Although the second finding (that education has been negatively associated with output growth during the transition) clearly requires many qualifications, we must keep in mind the finding from the previous section. It is this combination that leads us to point it out as an issue deserving additional research.

6. Concluding Remarks

The objective of this paper was to discuss economic growth in transition economies, with emphasis on its sustainability aspects. We critically surveyed the empirical literature and pointed out deserving issues and areas. We also discussed the data set assembled for this paper and re-estimated the BLR specifications, now using data from transition economies themselves.

Our comparative analysis revealed the existence of a "Baltic puzzle." Although it was clearly beyond our scope to explore it in detail, we like to think we characterized it as fully as our data set allowed. We are convinced that there are important lessons waiting there, in particular with respect to the role of fiscal policy during the transition period. The type of questions we have in mind to shed some light on this puzzle is, for instance, "were the Baltics able to take-off because the government invested early on in, say, needed infrastructure?"

Our two main empirical findings are that government expenditures have been positively associated and human capital has been negatively associated with output growth during the transition period. Surprisingly, the former can be best seen in the cross-sectional dimension of our data set, while the latter in its panel dimension.

It must be noted that we do *not* read the correlation between government expenditures and output growth during the transition as a reason for "big government." The interpretation we favor is that those countries that paid equal attention to the level *and* to the composition of government expenditures are the ones showing superior results throughout the transition process. The argument for reducing government expenditures at any cost should be placed at least on equal foot with the concern for an appropriate prioritization of those expenditures.

Notwithstanding, our results, in general, and these latter two, in particular, vigorously question the validity of the *BLR approach* to the experience of the transition economies. Although the set of determinants may well be appropriate, it seems clear that their relative importance and role should be carefully re-examined.

There are mainly two research directions we would like to pursue. First, it was clear from the outset that the results would loose strength without the benefit of a supporting theoretical framework. One quite natural extension would be to estimate a stochastic version of the Solow model as elaborated, for instance, in Cellini (1997). Another possibility, opened by the comparative development perspective, would be to assess how the Lewis model (Basu, 997) would fare facing the transition experience. A third and last example of a guiding theoretical approach is the full incorporation of political economy factors (Dewatripont and Roland, 1997.) These are suggestions that serve only one purpose: to emphasize the point that the most needed research is the one that bridges theoretical and empirical analyses of the transition experience. It is not only the case that theory is still very much in search of a set of stylized facts, it is also true that thus far there seems to be no empirical study on growth prospects of transition economies where this bridge can be found.

On the empirical front, we think four areas should be pursued to reinforce and complement our results. First, growth accounting exercises would be of great use as shown, for example, in De Broeck and Kostial (1998). Second, providing a proper understanding of the role of fiscal policy in the transition process, as well as of the contours and severity of the human capital problem in the different groups of transition economies seems imperative. Third, a concerted effort should be made to assure data comparability across transition economies and

over time. And fourth, and finally, empirical studies should try to incorporate institutional variables. Although this last suggestion would certainly enlarge the number of issues we have to be attentive to, it not only can be done well, as demonstrated by Adelman and Vujovic (1998), but the insights it generates are simply vital given the institutional gist of the transition process itself.

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Table 1.
Basic statistics, sources, and coverage

Variable name	*Period**	*Mean*	*Standard Deviation*	*Minimum*	*Maximun*	*No. Missing*	*Source (s)*
GNP per capita PPP, US$	1989	5593	2074.3	1400	9200	0	De Melo, Denizer, Gelb, and Tenev, (1997)
GDP per capita, PPP, US$	1992-1996	3846.2	2292.9	920	10954	24	EBRD (1997)
GDP growth, annual, %	1990-1997	-5.4	10.4	-52.6	10.5	0	EBRD (1997, 1998)
Gross primary school enrollment	1990-1995	94.8	9.1	76	118	69	UNESCO (1997)
Gross secondary school enrollment	1990-1995	80.8	12.9	35	102	59	UNESCO (1997)
Gross fixed investment, % GDP	1990-1996	18.9	6.5	4	36.6	38	EBRD (1995, 1997, 1998), World Bank [WDI, WDR]
Population growth, annual, %	1990-1996	0.3	1.2	-2.1	7.2	40	World Bank [1995, 1996, WDR, WDI]
Government expenditure, % GDP	1990-1997	39.2	12.1	7.3	65.9	25	EBRD Transition Report, 1997, Update
Government consumption, % GDP	1990-1996	17.6	5.6	5.9	32.9	41	World Bank [WDR, WDI]

*Period ranges vary with countries

Table 2
Sample of transition countries, initial (1989) PPP GNP level and growth rates

	1989 PPP level	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*	*Estimated level of real GDP in 1997 (1989=100)*
Albania	1400	-10.0	-27.7	-7.2	9.6	9.4	8.9	9.1	-8.0	79
Bulgaria	5000	-9.1	-11.7	-7.3	-1.5	1.8	2.1	-10.9	-7.4	63
Croatia	6171	-6.9	-20.6	-11.7	-0.9	0.6	1.7	4.3	5.5	73
Czech Republic	8600	-1.2	-11.5	-3.3	0.6	3.2	6.4	3.9	1.0	98
Estonia	8900	-8.1	-7.9	-14.2	-8.5	-1.8	4.3	4.0	10.0	78
Macedonia	3394	-9.9	-12.1	-21.1	-8.4	-4.0	-1.4	1.1	1.0	55
Hungary	6810	-3.5	-11.9	-3.1	-0.6	2.9	1.5	1.3	4.3	90
Latvia	8590	2.9	-10.4	-34.9	-14.9	0.6	-0.8	2.8	6.0	56
Lithuania	6430	-5.0	-13.4	-37.7	-17.1	-11.3	2.3	5.1	5.7	43
Poland	5150	-11.6	-7.0	2.6	3.8	5.2	7.0	6.1	6.9	112
Romania	3470	-5.6	-12.9	-8.7	1.5	3.9	7.1	4.1	-6.6	82
Slovakia	7600	-2.5	-14.6	-6.5	-3.7	4.9	6.8	6.9	6.5	96
Slovenia	9200	-4.7	-8.9	-5.5	2.8	5.3	4.1	3.1	3.3	98
Eastern Europe and Baltic States				**-4.1**	**0.7**	**3.5**	**5.3**	**4.2**	**3.5**	**95**
Armenia	5530	-7.4	-17.1	-52.6	-14.8	5.4	6.9	5.8	3.3	38
Azerbaijan	4620	-11.7	-0.7	-22.6	-23.1	-18.1	-11.0	1.3	5.0	40
Belarus	7010	-3.0	-1.2	-9.6	-7.6	-12.6	-10.4	2.6	10.0	71
Georgia	5590	-12.4	-20.6	-44.8	-25.4	-11.4	2.4	10.5	10.0	32
Kazakhstan	5130	-0.4	-13.0	-2.9	-10.4	-17.8	-8.9	1.1	1.8	58
Kyrgyztan	3180	3.0	-5.0	-19.0	-16.0	-20.0	-5.4	5.6	10.4	59
Moldova	4670	-2.4	-17.5	-29.1	-1.2	-31.2	-3.0	-8.0	1.3	35
Russia	7720	-3.6	-5.0	-14.5	-8.7	-12.6	-4.0	-4.9	0.4	57
Tajikistan	3010	-1.6	-7.1	-29.0	-11.0	-18.9	-12.5	-4.4	2.2	40
Turkmenistan	4230	2.0	-4.7	-5.3	-10.0	-18.8	-8.2	-8.0	-25.0	43
Ukraine	5680	-3.4	-11.6	-13.7	-14.2	-23.0	-12.2	-10.0	-3.2	37
Uzbekistan	2740	1.6	-0.5	-11.1	-2.3	-4.2	-0.9	1.6	2.4	87
C I S				**-14.3**	**-9.3**	**-13.5**	**-4.9**	**-4.6**	**0.5**	**56**
ALL				**-10.5**	**-5.5**	**-7.1**	**-1.1**	**-1.3**	**1.6**	**71**

Table 3
Annual rates of population growth (%)

	1990	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	*Averages*
Albania	1.61	-0.67	-2.15	-0.69	1.07	1.81	.	*0.16*
Armenia	1.81	1.83	1.86	1.50	0.43	0.32	.	*1.29*
Azerbaijan	1.06	1.16	1.24	0.98	0.74	0.68	.	*0.98*
Belarus	0.30	0.11	0.41	0.43	-0.01	-0.16	.	*0.18*
Bulgaria	-1.79	-0.99	-1.07	-0.80	-0.44	-0.31	-0.50	*-0.84*
Croatia	0.23	0.12	-0.03	-0.07	-0.02	0.00	0.50	*0.10*
Czech Republic	0.01	-0.52	0.09	0.13	0.05	-0.04	-0.20	*-0.07*
Estonia	-0.44	-0.32	-1.40	-1.81	-1.12	-0.80	.	*-0.98*
Macedonia	0.50	0.54	0.83	1.31	0.80	0.92	.	*0.82*
Georgia	0.21	0.06	-0.16	-0.30	-0.38	-0.33	.	*-0.15*
Hungary	-0.32	-0.18	-0.21	-0.29	-0.32	-0.31	-0.37	*-0.29*
Kazakhstan	0.77	0.82	0.57	-0.06	-0.90	-1.22	.	*0.00*
Kyrgyztan	1.55	1.32	0.90	-0.22	-0.22	0.94	.	*0.71*
Latvia	-0.50	-0.31	-1.16	-1.73	-1.49	-1.23	.	*-1.07*
Lithuania	0.84	0.54	0.00	-0.32	-0.24	-0.16	.	*0.11*
Moldova	0.32	-0.02	-0.24	-0.05	0.00	-0.14	.	*-0.02*
Poland	0.41	0.33	0.31	0.25	0.22	0.18	0.10	*0.26*
Romania	0.24	-0.09	-1.71	-0.15	-0.11	-0.17	-0.30	*-0.33*
Russia	0.45	0.22	0.04	-0.10	-0.13	-0.10	-0.30	*0.01*
Slovakia	-0.27	0.00	0.44	0.34	0.43	0.41	0.20	*0.22*
Slovenia	-0.07	0.18	-0.25	-1.49	1.12	0.16	0.20	*-0.02*
Tajikistan	2.41	3.04	1.96	1.20	2.00	1.48	.	*2.02*
Turkmenistan	2.52	2.56	7.18	6.85	2.27	2.32	.	*3.95*
Ukraine	0.23	0.21	0.29	0.06	-0.49	-0.71	-0.80	*-0.18*
Uzbekistan	2.63	2.16	2.37	2.30	1.96	1.76	.	*2.20*
Averages	*0.59*	*0.48*	*0.40*	*0.29*	*0.21*	*0.21*	*-0.15*	*0.36*

Table 4 a
Cross sectional dimension, Barro specification
Dependent variable is GDP growth.

Constant	Y0	PRIM	SEC	GCONS	GEXP	CIS	R2	n
-8.17756 **	0.0004942						0.0651	25
(-3.384)	(0.200)							
-14.4674	.0003828	.0748524					0.0806	24
(-1.443)	(1.025)	(0.707)						
-14.06185	.0003929	.0746687	-.0055094				0.0808	24
(-1.362)	(0.951)	(0.692)	(-0.064)					
-14.17136	**.0003486**	**.0570617**	**-.0367093**	**.2574992**			**0.1484**	**24**
(-1.393)	**(0.862)**	**(0.580)**	**(-0.390)**	**(0.216)**				
-26.2301 **	.0000403	.0527123	.0690114		.2554616 **		0.3069	24
(-2.646)	(0.097)	(0.505)	(0.486)		(3.447)			
-25.6206 **	-.000442	.054615	.1654723 **		.1721145 **	-5.5308 **	0.6168	24
(-4.874)	(-1.292)	(1.118)	(2.554)		(2.136)	(-3.916)		

Notes: ** denotes statistically significant at the 5% level, * denotes statistically significant at the 10% level. In the first rows are the coefficients, and below are *t*-values (corrected for heteroskedasticity).

Table 4 b
Cross sectional dimension, Levine and Renelt specification
Dependent variable is GDP growth.

Constant	Y0	POPGRO	SEC	INV	CIS	R2	n
-6.952243 **	.0003196	- .6866224				0.0901	25
(-2.480)	(0.747)	(-1.007)					
-7.365	.0004078	- .1892802	-.0016277			0.0555	24
(-1.106)	(0.737)	(-0.138)	(-0.018)				
-9.626187	.0000961	-.5444761	- .0121977	.2487235		0.1318	24
(-1.370)	(0.167)	(-0.449)	(-0.121)	(0.193)			
-12.668 **	-.0002036	.751854	.098308	.173523	-6.5013 **	0.5572	24
(-2.561)	(-0.528)	(0.818)	(0.131)	(0.200)	(-4.177)		

Notes: ** denotes statistically significant at the 5% level, * denotes statistically significant at the 10% level. In the first rows are the coefficients, and below are *t*-values (corrected for heteroskedasticity).

Table 5 a
Panel dimension, Barro specification
Dependent variable is GDP growth.

Constant	Y0	PRIM	SEC	GCONS	GEXP	CIS	R2	n
-7.1269 **	.000377						0.0054	176
(-4.244)	(1.168)							
-8.712172	.0007686	-.0186068					0.0232	112
(-0.940)	(1.629)	(-0.183)						
-2.604547	.0009618 **	-.0160645	-.089626				0.0355	112
(-0.242)	(2.151)	(-0.158)	(-1.052)					
-6.639448	**.0006585**	**.0042718**	**-.0730317**	**.1571764**			**0.0253**	**105**
(-0.600)	**(1.388)**	**(0.039)**	**(-0.786)**	**(0.843)**				
11.31079	.001629 **	-.0661982	-.15446 *		-.1530664		0.0828	103
(0.872)	(3.128)	(-0.660)	(-1.717)		(-1.414)			
6.989247	.0007117	-.0607579	-.0187423		-.1536471	-7.44937 **	0.1741	103
(0.582)	(1.458)	(-0.645)	(-0.225)		(-1.404)	(-3.657)		

Notes: ** denotes statistically significant at the 5% level, * denotes statistically significant at the 10% level. In the first rows are the coefficients, and below are *t*-values (corrected for heteroskedasticity).

Table 5 b
Panel dimension, Levine and Renelt specification
Dependent variable is GDP growth.

Constant	Y0	POPGRO	SEC	INV	CIS	R2	n
-11.3655 **	.00083 **	-.1679644				0.0267	136
(-5.328)	(2.125)	(-0.283)					
-2.225396	.00099 **	.9637931	-.1257302			0.0387	119
(-0.335)	(2.328)	(1.029)	(-1.479)				
-2.130519	**.001007 ** **	**1.077994**	**-.1225618**	**-.0171085**		**0.0387**	**116**
(-0.305)	**(2.182)**	**(1.121)**	**(-1.422)**	**(-0.080)**			
-4.971016	.0002638	2.16138 **	-.0003486	-.0279797	-8.5019 **	0.1516	116
(-0.784)	(0.521)	(2.260)	(-0.005)	(-0.126)	(-4.231)		

Notes: ** denotes statistically significant at the 5% level, * denotes statistically significant at the 10% level. In the first rows are the coefficients, and below are *t*-values (corrected for heteroskedasticity).

Figure 1. Investment rates in transition economies, 1990-1996

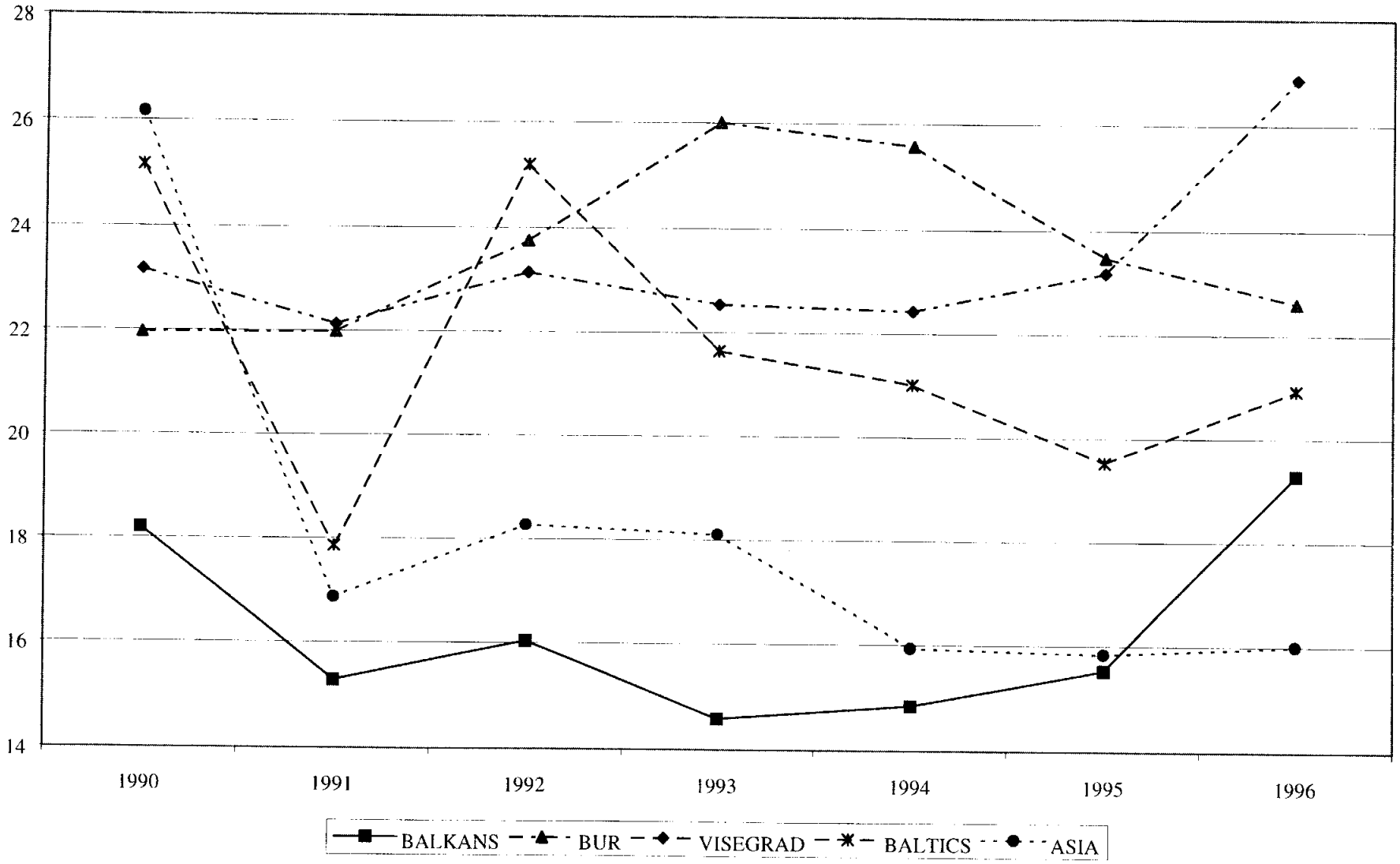


Figure 2. Gross secondary enrollment ratios in transition economies, 1990-1995

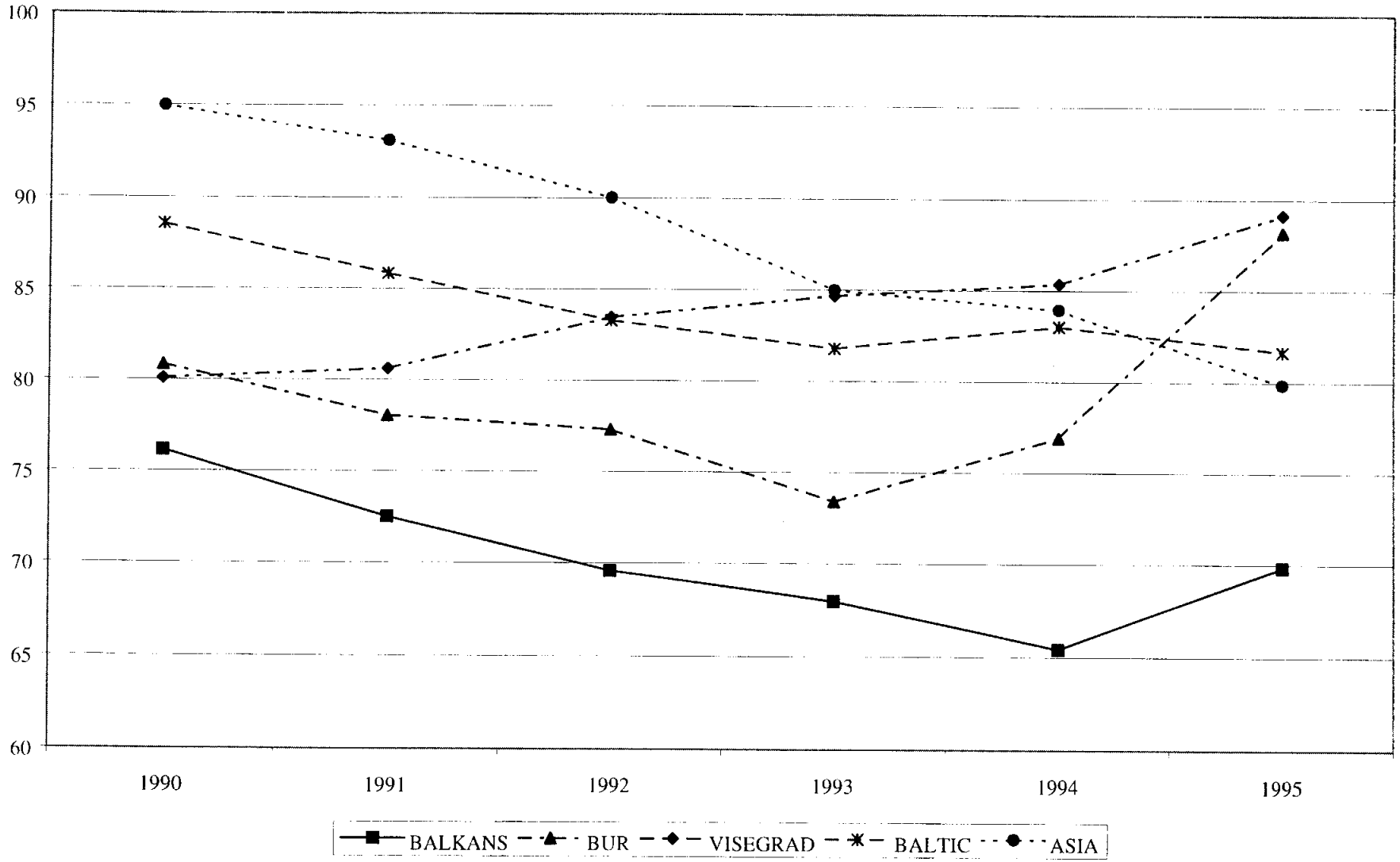
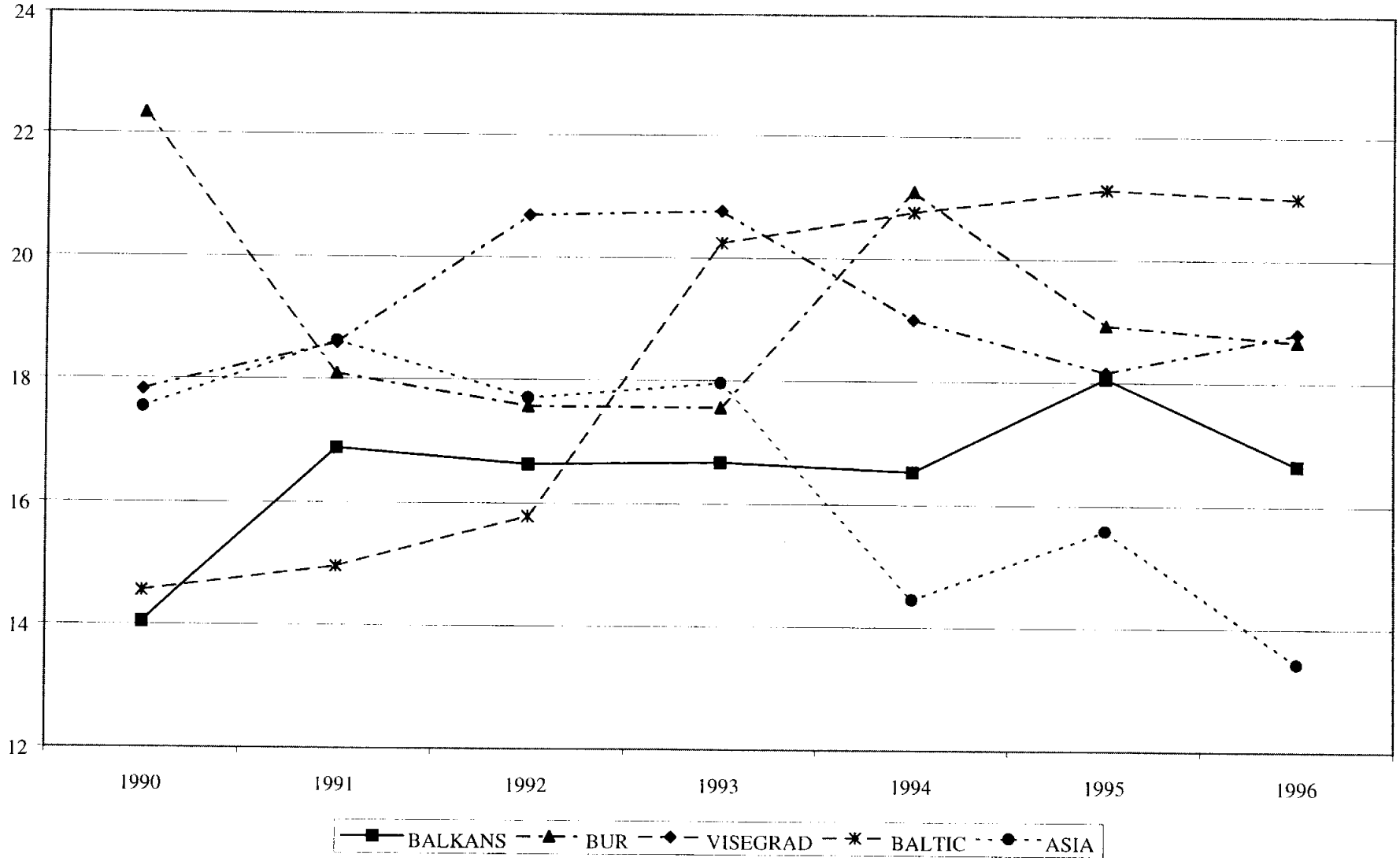


Figure 3. Government consumption as a percentage of GDP in transition economies, 1990-1996



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