Reforms and growth in transition:
Re-examining the evidence

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During transition, a positive correlation between progress in market-oriented reforms and cumulative growth is observed for most countries. However, some less reform-minded countries have grown strongly in recent years. We find empirical evidence to support the robustness of the impact of reforms on growth and we discern important feedback influences from growth to reform. In our econometric results, progress in transition in one period has a significant effect on growth in the subsequent period, which can act as an immediate spur to further reform. We find that the importance of initial conditions as a determinant of growth has declined over time, but that fiscal surpluses remain positively associated with higher growth. Other factors such as output recovery, oil prices, and external growth are found to influence growth to some extent but these do not mitigate the importance of reforms. These results are robust to a dynamic specification that controls for the influence of the current level of output on future growth. Journal of Comparative Economics 34 (3) (2006) 421–445. European Bank for Reconstruction and Development, London EC2A 2JN, United Kingdom.

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1. Introduction

A fundamental concept in transition economies is the link between market-oriented reforms and economic growth. Many countries in transition, especially those that have recently joined the European Union (EU), have made significant advances in reform. In some of these countries, standards have nearly reached those of advanced industrial economies, as the EBRD (2004) reports. On average, these new EU members enjoy higher cumulative real growth than other transition countries since 1989 and also have the highest standards of living in the region. However, the link between reforms and growth in transition is not a simple one. Other factors can outweigh the importance of reforms, at least in the short run, and high growth rates sometimes occur in the least reform-minded countries. Indeed, average growth in the Commonwealth of Independent States (CIS), where reforms are typically least advanced, has outpaced the rest of the transition countries in recent years.

Whether progress in transition enables a country to grow faster and, if it does, whether the benefits are sufficient to outweigh the short-term costs often associated with transition are open questions. In this paper, we first synthesize the existing evidence from the growing literature on this topic and distinguish between areas in which a consensus has been reached and those in which disagreement remains. We then present new evidence based on a range of econometric tests to determine more precisely the influence of reforms on growth and vice versa for transition countries. Our main finding is a positive link between the advance of transition in one year and growth in subsequent years. This result is robust to differences in estimation techniques, time span, and the inclusion of macroeconomic and regional effects. We also find strong, contemporaneous feedback effects from growth to reforms. Therefore, not only are reforms followed by growth, but higher growth in turn encourages further reforms.

One innovation of this paper is that we take account of other factors that may influence growth but have been neglected in many previous studies. We model explicitly the effects of oil prices on growth to capture the benefits to some oil-rich countries of the high prices of recent years. We also incorporate recovery considerations in that the further a country has fallen in terms of real output, the greater its potential for subsequent growth provided that its output capacity has not been damaged severely. Finally, we recognize that transition countries are increasingly integrating into the world economy; therefore, we control for external demand from main trading partners. Our results show that all of these factors matter to some extent but that they do not detract from our basic conclusion about the link between reforms and growth.

The paper proceeds as follows. The next section surveys the empirical literature; we distinguish between the first wave of papers, which tend to support the link between reforms and growth, and the more recent literature, which presents a more ambiguous picture. Section 3 discusses some methodological and measurement issues associated with the data in transition countries. Section 4 presents the results, starting with the most simple single-equation estimates and proceeding to more complex specifications. Section 5 concludes with an interpretation of our results from a policy perspective.

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1 Unless otherwise indicated, the region refers to the 27 transition countries of Central and Eastern Europe and the Baltic states (CEB), South-Eastern Europe (SEE), and the Commonwealth of Independent States (CIS).
2 EBRD (2005) provides a comprehensive overview of macroeconomic and reform developments across the region.
3 Havrylyshyn (2001) is a useful survey of the main literature up to the year 2000.
2. Review of empirical literature

The empirical literature on reforms and growth in transition began around 1996 when econo-
mists thought that they had enough data to test hypotheses formally and to draw substantive
conclusions, rather than merely speculate or rely on anecdotal, country-specific evidence. The
relatively short time span since the beginning of the transition prevents any definitive statement
about what drives long-term growth. However, by the late-1990s, enough years had elapsed
to permit an analysis of the short-term dynamic interactions among reforms and output fluc-
tuations and an investigation of the role of different policies in shaping the paths of these
variables.

A consensus emerged in the early literature that three types of variables are important. First, a
country’s starting point is likely to have a strong effect on subsequent development, at least in the
short-run so that papers focused on constructing a series of potentially relevant initial conditions.
Second, most countries faced an early burst of high inflation coupled with fiscal deficits so that
a credible macroeconomic stabilization program was seen as a necessary condition for growth.
Third, a range of reforms are needed for sustainable growth beginning with early reforms, such
as price and trade liberalization and small-scale privatization, followed by deeper institutional
reforms, such as corporate restructuring, competition policy and financial sector development.
Most papers, e.g., Fischer and Sahay (2000) and De Melo et al. (2001), find that different starting
points are important for economic performance, particularly during the first years of transition.
Moreover, a positive correlation between good initial conditions and overall growth in the tran-
sition is shown in EBRD (2004, Chart 1.4). However, the influence of initial conditions declines
over time. Berg et al. (1999), and De Melo et al. (2001) show that the effect diminishes quite
rapidly and that countries having weak initial conditions are catching up after a delayed recov-
ery. Nonetheless, the continuing link between the starting point and growth suggests that initial
conditions have important indirect effects, possibly through their impact on reform.

A strong consensus arose in the early literature that sound macroeconomic policies are good
for growth. Two common measures of the effectiveness of stabilization policies are the annual
inflation rate and the size of the fiscal balance relative to GDP. Most studies, e.g., Fischer and
Sahay (2004), Fischer et al. (1996) and Loungani and Sheets (1997), find that lower inflation
rates and smaller budget deficits are associated with economic recovery and higher growth rates.
Conversely, high inflation appears to be particularly damaging; Loungani and Sheets (1997) es-
timate that a country having 500 per cent inflation in one year loses about 2 per cent of GDP
in the following year and 4 per cent of GDP in the longer term. However, several papers find a
threshold inflation level in the region of 10–20 per cent, below which any causal link from low
inflation to growth is small.5

Most of the early studies argue that reforms are beneficial to growth. A common finding is that
an increase in a reform indicator has a negative effect on growth at first but, after a year, it has a
positive impact that outweighs the initial decline, as De Melo et al. (2001) conclude. However, no
obvious unique way to measure reform exists. One common division is to distinguish between
initial-phase reforms, such as price and trade liberalization and small-scale privatization, and

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4 The stylized facts of transition are summarized in Campos and Coricelli (2002).
5 Christoffersen and Doyle (2000) find evidence of an inflation-output threshold of 13 per cent in a sample of 22
transition countries between 1990 and 1997. Inflation above that level reduces growth but it does not have a significant
effect when it is below the threshold. Ghosh and Phillips (1998) find a much lower inflation threshold, which they estimate
in the low single digits.
second-phase reforms that address deeper institutional reforms, such as corporate governance, competition policy and reform of financial institutions. Other papers broaden the debate to focus on the quality of institutions and factors affecting the business environment, as in Havrylyshyn and van Rooden (2003). Several papers conclude that the early-stage policies of liberalization and small-scale privatization are the main determinants of growth. Havrylyshyn and van Rooden (2003) show that economic liberalization has a more significant impact on economic performance than do measures of the quality of the institutional environment, although the latter’s importance is increasing over time. In contrast, Stiglitz (2001) reports simple cross-section results indicating that growth is influenced positively by progress in privatization only if it brings improvement in governance.

Some early papers recognize that the feedback effect of growth to reforms is likely to be important and take account of this in their estimation procedures. Heybey and Murrell (1999) and Wolf (1999) allow for a feedback of growth to structural reforms. Berg et al. (1999) and Ghosh (1997) also recognize the potential endogeneity of stabilization and control for this in their empirical work by taking an instrumental variables approach. De Melo et al. (2001) estimate the impact of initial conditions on growth in two stages by allowing first for an indirect impact on reforms, as do Krueger and Ciolko (1998). By the start of the new millennium, a consensus emerged on three points. First, macroeconomic stabilization is necessary for recovery and growth. Second, although initial conditions do matter, their influence on growth is declining steadily over time. Third, the impact of structural reforms is strong and robust. The EBRD (2000) notes that both reform momentum and strong growth had returned to much of the region by the year 2000. Clearly, at that time, the two processes were linked so that progress for countries in the region, especially for the laggards, required pushing further ahead with reforms.

Recent econometric research on the link between reforms and growth in transition takes advantage of extra years of data to depict a more nuanced interpretation of the evidence. The agreement that stabilization policies are important and that initial conditions matter in the early years at least but have a declining influence in later years is retained. However, the influence of reforms on growth has become more, rather than less, controversial. Increasing attention has been paid to the endogeneity of reforms, to multicollinearity among different measures of reform, and to the sensitivity of results to the exclusion of the early years of transition.

Focusing on initial reforms, Falcetti et al. (2002) come to the following conclusions. First, a significant feedback effect exists from growth to reforms and, if this effect is taken account of in econometric work, the coefficients on the reform variables in a growth equation change significantly but not necessarily in a consistent way. Therefore, simultaneous equation estimation may be a fruitful approach to identify the interaction between reforms and growth. Second, the results are quite sensitive to small changes in the panel size and specifically to the choice of the starting point for the transition in the CIS, either 1991 or 1992. Third, and most important, the net effect of reforms on growth is unclear. The authors find initial-phase reforms, which are the only type analyzed in this paper, lower the growth rate contemporaneously but raise it one year later, a result that is consistent with De Melo et al. (2001) and Merlevede (2003). Formal statistical tests cannot reject the hypothesis that the sum of the two coefficients is zero. Therefore, the authors conclude that the positive effect of initial reforms on growth is less robust than the earlier literature had suggested.

Some of these themes are addressed in other recent papers. The fragility of the relationship between different types of reforms and growth is discussed in Radulescu and Barlow (2002), Fidrmuc (2003) and Lawson and Wang (2004). Of these, Radulescu and Barlow are the most skeptical about the benefits of reform. Using a variety of equations and taking a simple aver-
age of the EBRD transition indicators, they find no robust evidence of a link. If the indices are reduced to just three, namely, large-scale privatization, governance and enterprise restructuring, and price liberalization, the authors find that, although contemporaneous reforms affect growth negatively and lagged reform positively, the two impacts cancel out. However, the authors argue that liberalization may help to reduce inflation, which is robustly and negatively correlated with growth. Similarly, Lawson and Wang (2004) test the effect of each EBRD indicator, both in levels and first-differences, through partial regressions of growth, one for each transition indicator. These authors claim that the dominant link between transition indicators and growth is negative, especially for price liberalization and enterprise reform. The negative effect of price liberalization in both levels and differences holds even in the early years of transition from 1991 to 1995.

Fidrmuc (2003) and Lysenko (2002) investigate the sensitivity of results to the choice of time period. Fidrmuc uses five-year moving averages and estimates separate cross-section regressions for each period. The most interesting finding is that the liberalization index, which is an average of EBRD indicators, yields positive and significant impacts in the early periods, e.g., 1990 to 1994 or 1991 to 1995, but not in the last period, i.e., 1996 to 2000 in regressions having instruments. Lysenko adopts the specification of Falcetti et al. (2002) but extends the econometric analysis in two ways. First, the panel is divided into two sub-periods in transition time, one for the first four years of transition and the other for the second five years. Second, a dynamic specification with lagged growth on the right-hand side of the equation is estimated. Interestingly, the form of the model used makes little difference but the results change significantly between the first and second period. Initial-phase reforms influence growth significantly in the early years of transition, but not in the later years.

Other recent papers provide a more sanguine view of the influence of reforms on growth. Using a specification similar to that in Falcetti et al. (2002), Merlevede (2003) incorporates a dummy variable to take account of reform reversals, defined as a reduction in the average EBRD index. Reversals are shown to have an immediate and serious negative impact on growth; moreover, reversals have a more harmful effect at higher levels of growth. Based on this evidence, no justification can be given for countries to engage in backtracking. Using a series of robustness checks, Staehr (2005) adds further evidence that a broad-based reform policy is good for growth. This paper is one of the few in the literature to incorporate a dynamic specification with a lagged dependent variable. Several papers support a positive effect of reforms on growth at a regional level, e.g., Loukoianova and Unigovskaya (2004) who focus on a group of low-income CIS countries.

3. Data sources and measurement

The dependent variable in most of the papers in the literature is the annual percentage change in real GDP. An immediate and severe problem arises because annual growth rates in many transition economies are often rough estimates at best, especially in the early years of transition. Not only are the official statistics seriously inaccurate but they are biased downwards systematically in the first few years. Hence, the severity of the transition recession is exaggerated for well-known reasons. For example, Bartholdy (1997) discusses how these measures reflect the practices of weak statistical agencies that overemphasized the existing large industries, many of which reduced output drastically or shut down, and failed to include new businesses in the formal data. In addition, although some countries already had a significant informal sector, the share of these activities as a percentage of GDP increased rapidly in many cases. Schneider
estimates the ratio of the informal sector to GDP and finds it to be much larger in the region than in western countries. Although some statistical agencies try to incorporate estimates of the informal economy in official statistics, the data represent only partially its true size for most countries.

Some researchers attempt to construct alternative estimates of growth based, for example, on estimates of electricity use. Lackó (2000) takes this approach to estimate the size of the informal economy. However, these measures are problematic. Electricity use is driven not only by economic growth but also by increased efficiency, the availability of other sources of energy, price changes, and other factors. Due to the lack of a better alternative, we use GDP data but we test for robustness by dropping the earlier years of transition during which the data were most unreliable. Our main results are reasonably robust to these checks.

Measuring initial conditions is a complicated task. A wide variety of indicators could be used to capture differences across countries at the start of transition. Straightforward measures include the degree of urbanization, the extent of phone penetration, and the distance from a western European capital, such as Brussels. Others conditions are more complicated to measure, for example, repressed inflation and the black market premium. We adopt the approach pioneered by De Melo et al. (2001) and used in Falcetti et al. (2002) and other papers. This strategy involves taking a large list of variables and constructing some composite index or indices using factor analysis to determine the principal components. The advantage of factor analysis is that the weights accorded to each variable are determined endogenously rather than by an ad hoc method. The number of principal components can be determined according to standard criteria but, for simplicity, we focus on the first principal component only because it explains over 50 per cent of the variance in all initial conditions. This component places considerable weight on five factors, namely, the initial level of GDP, the distance to the EU, distortions on the allocation of labor, the length of time spent under central planning, and macroeconomic imbalances. Intuitively, we are measuring the distorting effect of the inherited legacy of central planning.

Two measures of stabilization policy are commonly used in the literature, namely the inflation rate, and the size of the general government fiscal balance. Our results change little depending on which variable is used but the inflation measure has some extreme values in the early years of transition. Therefore, we take the fiscal balance to represent the government’s approach to stabilization. Both this variable and the inflation rate are themselves affected by growth rates in that growth is clearly good for stabilization. Any conclusion about the effects of stabilization on growth must be made with this caveat in mind. The hardest conceptual issues concern the definition and measurement of reform. Any attempt to assign numbers to a country’s progress in transition is inherently difficult and involves a high degree of subjectivity. However, cross-country and temporal comparisons require such measures. Faced with these obvious difficulties, economists tried to construct indices that capture, at least crudely, the position of countries in their transition along with the quality and progress of reforms relative to comparator countries.

The full list of variables used in our analysis is available on request.

EBRD (1999, Box 2.1) provides more details on the construction of this index.

Strictly speaking, both of these measures are outcomes of stabilization rather than exogenous policy tools. However, under certain circumstances, they may be used as suitable proxies for the degree of commitment by the authorities to a stabilization program.

The data on fiscal balances in the early years of transition are subject to large margins of error because governments frequently failed to account properly for a number of budgetary items and credits from the central bank.
Every year, the EBRD Transition Report provides numerical scores for a range of reform indicators that vary from 1, which represents little or no change from a planned economy, to 4+, which represents the standard of an advanced market economy. Many studies of the relationship between reforms and growth in transition countries use these EBRD transition indicators, or a subset thereof, as the measure of reform. We follow this lead by constructing the simple average of eight indicators consisting of initial-phase reforms, which include price liberalization, trade and foreign exchange liberalization, and small-scale privatization, and second-phase reforms, which comprise large-scale privatization, governance and enterprise reform, competition policy, banking reform and interest-rate liberalization, and non-bank financial institutions.10

According to these EBRD indicators, the path of reform over the past 15 years varies considerably across countries. Some countries have progressed rapidly, especially in the early years of transition; others, such as Belarus, Turkmenistan and Uzbekistan, remain stuck at a low level of reform.11 In general, countries in Central and Eastern Europe and the Baltic States (CEB) have advanced further in the initial-phase reforms than those in South East Europe (SEE) or the CIS countries and are now at a level similar to that of the old members of the European Union (EU-15). However, even the most advanced countries have considerable progress to make in second-phase reforms before reaching the typical standards in the EU-15. Although transition scores are not available for the latter group, several other measures will illustrate this comparison. First, financial intermediation measured by credit to GDP in the new member states is significantly below that of the EU-15, as shown by Cottarelli et al. (2003) and Schadler et al. (2005). Second, considerable scope for improvement exists in governance and enterprise reform, particularly with respect to the judicial and regulatory framework. In addition, perceptions of corruption also are higher on average in transition countries than in the EU-15.12

A number of issues should be borne in mind before using these indicators in empirical work. First, although every effort is made to ensure that comparability is maintained across countries and time, anomalies can sometimes arise that necessitate the backdating of certain scores.13 Hence, the reliability of the scores may be questioned. More fundamentally, transition scores were presented first in the 1994 Transition Report (EBRD, 1994), which is the first in the series. The series were updated in each year but the first effort to backdate the indicators to 1989 was made only in 2000.14 Hence, the ratings for the early years of transition must be treated with caution, especially because information flows were most limited in these years. This problem can be overcome partially by dropping the early years of transition and examining the sensitivity of the results to this omission.

10 The EBRD also publishes transition indicators for several infrastructure sectors. Since these have not yet been fully backdated to 1989, we do not include them. More details on the transition indicators are provided in Appendix Table A.1 and in EBRD (2004).
11 Turkmenistan is at the bottom of the scale with a score of only 1 in six out of the eight indicators, as presented in EBRD (2005, Table 1.1).
12 The European Commission’s Comprehensive Monitoring Report (European Commission, 2003) for the acceding countries, published in October 2003, documents the need for strengthening the judicial and regulatory frameworks. Regarding corruption perceptions, the annual report by Transparency International published in October 2005 ranks Estonia as the best performer, in 27th place, among the new EU members but places it below all countries of the EU-15 except Greece and Italy.
13 In EBRD (2004), the scores for Albania, Estonia, FYR Macedonia, and Romania are backdated in one dimension each to reflect historical conditions as discussed in Chapter 1, Table 1.1.
14 EBRD (2000, Annex 2.1) has an explanation of this procedure.
A second issue concerns the bounded and ordinal nature of the indicators. When a country reaches 4+, it has achieved the standards in this dimension of a typical advanced industrial economy and no further advances in reform along this dimension can be reflected in the transition score. Although a higher score means more progress in that dimension than a lower score, the difference between a score of 1 and 2 is not necessarily the same as the difference between 2 and 3. In fact, many countries have found it relatively easy to make the first steps but much harder to complete the process. However, in practice, the scores are usually treated to be cardinal numbers. We adopt this approach but we examine the sensitivity of our results to the inclusion of threshold effects by using dummy variables.

A third issue is the high correlation among the different indicators, both cross-sectionally and across time. Clearly, including all indicators in a regression is not appropriate because of multicollinearity so that choice must be made. However, using a simple average assumes implicitly that a score of 3 in one dimension is equivalent to a score of 3 in another dimension. Because some reforms are easier to implement than others, harder-to-implement reforms should arguably have more weight. However, any weighting scheme will be somewhat arbitrary and difficult to justify so that we use an unweighted average in our analysis.15

Finally, the link between reform commitment and the EBRD transition scores is not straightforward. Sometimes far-reaching reforms can be undertaken but they are not reflected immediately in the score. Conversely, a rise in the transition indicator may be recorded in a year in which no particular reform explicitly linked to this indicator is undertaken. While we use the terms reform and transition progress interchangeably, this distinction should be kept in mind. To this point, we have focused on three factors, namely initial conditions, stabilization policies, and reforms that may be important determinants of growth. Other factors are likely to be relevant so that we investigate the roles played by three additional variables, namely, output recovery, oil prices, and trade dependence.

Regarding the first variable, when countries suffer the dramatic output declines that affected many transition countries over the past decade, the recovery is likely to be equally dramatic once the nadir is reached. Other things being equal, the more serious is the transition recession, the greater is the potential for a subsequent period of rapid growth once the recovery is underway. To illustrate this point, consider average growth rates in the years after an economy has suffered a deep, cumulative decline. Figure 1 plots the value of real GDP at its lowest point in the transition relative to its 1989 value on the x-axis and average annual growth since recovery on the y-axis. For most countries that had long and deep recessions, average annual growth rates in the recovery phase are in the range of 6 to 8 per cent or even higher in a few cases. For those countries that had relatively mild recessions, subsequent growth was generally slower. Undoubtedly, some of the high growth rates in recent years in the CIS are attributable to the depth of the initial collapse. In the next section, we investigate the quantitative importance of this factor.

Regarding the second factor, some countries are impacted strongly by the surge in commodity prices, especially in recent years, and in particular the price of oil. For those countries rich in oil, their improved terms-of-trade have been a boon to their economies. However, for oil importers, the price increases have probably had a significant negative impact on growth.16 This effect is likely to be especially large in the CIS, where several countries are oil-rich and the others may benefit indirectly through trade and other linkages. Figure 2 depicts the strong correlation

15 Fidrmuc and Tichit (2004) construct a weighted average of transition indicators using factor analysis to determine the appropriate weights.
16 Carruth et al. (1998) analyze the effects of oil prices on unemployment and output growth in the United States.
between growth rates in CIS countries and the annual average oil price. The strength of this correlation, especially since 1997, indicates that oil prices should be included in our analysis.
Regarding the third factor, growth may be influenced by external demand. Transition countries have become increasingly integrated into the world economy. Although some evidence indicates that openness is generally good for long-run growth, an increased dependence on trade with the rest of the world may bring short-run benefits if the main trading partners are growing rapidly or short-term costs if these partners are stagnating or in recession. Thus, the prolonged slowdown in the EU-15 in recent years may have had an adverse effect on growth in some of the new EU members, many of whom conduct more than half of their trade with the EU-15. Figure 3 shows that, as the share of exports to the EU-15 as a percentage of GDP has risen steadily over the past ten years, growth rates in CEB move increasingly in step with EU growth, which has fallen in the past three years to less than 2 per cent. In contrast, the recent boom in Russia has had important beneficial spillover effects for growth in a number of other CIS countries.

Before proceeding to the econometric specification and the empirical results, we note that we do not model explicitly some of the conventional determinants of long-term economic growth. Considerable evidence has accumulated on the factors that shape long-term growth around the

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17 Chapter 4 of the 2003 Transition Report (EBRD, 2003) provides an analysis of the extent to which the region is integrated into the world economy.


19 Chart 3.6 of the 2003 Transition Report (EBRD, 2003) provides an illustration of the importance of exports to Russia for CIS countries. Loukoianova and Unigovskaya (2004) suggest that the recent high growth rates in low-income CIS countries are partly attributable to both catch-up effects and increased demand from Russia and other countries.
world. Many studies have confirmed the important role of education, innovation, and good institutions. However, we think that it is inappropriate to include these factors in our empirical analysis for several reasons. First, transition recessions and recoveries typically involve the reallocation of inputs within and across sectors rather than long-run educational or institutional trends that are found in much of the current empirical growth literature. The time span available is not yet long enough to capture the effects of these other variables with any confidence. Second, data on key variables, such as capital investment or education, are either not available or are of doubtful quality. Third, several papers have attempted to include such variables but they find perverse results.

4. Econometric results

We investigate the relationship between reforms and growth using data from the EBRD database, which draws on a variety of sources including national authorities and statistical institutes as well as other international organizations, such as the IMF and World Bank. All transition countries in which the EBRD operates are included with the exception of Bosnia and Herzegovina and Serbia and Montenegro, for which reliable data for some years on key variables are not available. Our data set covers 25 countries in transition and the time period is from 1989 to 2003. However, following the approach in Falcetti et al. (2002), we consider transition time rather than calendar time because the transition process started at different times in different countries. Therefore, some countries are included for a longer time span than are others. More details on the choice of transition time along with the sources and definitions of all variables are included in Appendix Table A.1.

We begin with a simple, single-equation model and move to a simultaneous equation specification that attempts to capture the feedback effect from growth to reforms. Initially, we estimate the following equation:

\[
\frac{\Delta Y}{Y}_{i,t} = \beta_0,i + \beta_1 IC_i \cdot t + \beta_2 IC_i \cdot t^2 + \beta_3 t + \beta_4 t^2 + \beta_5 Ref_{i,t-1} + \beta_6 Fis_{i,t} + \epsilon_{i,t},
\]

where \( Y \) is an index of real output, \( \Delta Y / Y \) is the annual growth of country \( i \) at time \( t \) measured in transition time, IC is the initial conditions index, Ref is an average of the eight EBRD transition indicators, and Fis is the general government balance relative to GDP. Country dummy variables are included to capture fixed effects. The specification is similar to the growth equation estimated in Falcetti et al. (2002). Our goal is to investigate the possible link between reforms in one period and growth in the following period, while allowing for macroeconomic stabilization through the fiscal balance, the changing effect of initial conditions throughout time, and the possibility that

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20 Barro and Sala-i-Martin (1995) find that educational attainment and public spending in education are positively correlated with growth using a large sample of countries from 1965 to 1985. Benhabib and Spiegel (1994) show that this relationship holds only for innovation-based models in which education affects the rate of technological progress, but it is not found in standard growth models using human capital as an input in the production function. Barro and Sala-i-Martin (1995) find a significant negative relationship between political instability and growth.

21 For example, Fidrmuc (2003, p. 590) reports: “[S]ome of the variables that are usually found to be important determinants of growth in market economies are either insignificant (government expenditure) or even appear with the wrong sign (investment).”
Table 1
Determinants of growth: OLS and 2SLS results

<table>
<thead>
<tr>
<th></th>
<th>OLS (1)</th>
<th>OLS (2)</th>
<th>OLS (3)</th>
<th>OLS (4)</th>
<th>OLS (5)</th>
<th>2SLS (6)</th>
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<td>(−3.55)</td>
<td>(−3.53)</td>
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<tr>
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<tr>
<td>(lagged 2 periods)</td>
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<td>(1.91)</td>
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<tr>
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Notes: (i) Columns 1 through 5 report single-equation estimates using Ordinary Least Squares and the associated t-statistics. Column 6 reports a 2-stage Least Squares estimation in which reform is regressed on its lagged value and all other exogenous variables and the fitted value is included in the equation.

(ii) Fixed country effects are included in all six models but they are not reported.

(iii) The R-square statistic indicates the overall significance of the model.

Source: Appendix Table A.1.

a deterministic non-linear time trend captures the uniformity of growth patterns across transition countries.

Before proceeding to the results, we note that we have not followed the approach of several previous papers in the literature that include both current and lagged reform as explanatory variables for growth. EBRD reform indicators are highly autocorrelated so that including both variables can lead to spurious inferences, as demonstrated with a numerical example by Rzońca and Cizkowicz (2003).22 Intuitively, reforms should not have an immediate effect on growth so that lagging the variable appears to be appropriate. This strategy also helps reduce the simultaneity problem, although it does not resolve it completely.23

In the simplest specification reported in column 1 of Table 1, reforms have a positive, and statistically significant at the 1 per cent level, lagged effect on growth. To interpret the coefficient

22 Mickiewicz (2005) derives similar results to reinforce this point.
23 We experimented by substituting current reforms for lagged reforms; the results are broadly similar, although less strong.
on reform, consider a country that is upgraded on a single transition indicator from 3 to 3+, which represents a numerical increase in that indicator of 0.33. Such a change leads to an increase in the average transition indicator for this country of 0.33/8, or just over 0.04. Therefore, an increase in the reform variable in the equation of 0.1 represents approximately two-and-a-half upgrades across the individual transition indicators. According to the coefficient in column 1 of 4.61, such an increase in reforms, ceteris paribus, is associated with an increase in growth in the following year, and in each subsequent year for which the average reform variable maintains its new value, of approximately 0.46 percentage points. Although this may appear to be a modest increase, the impact results in a significant amount of extra output cumulated over a number of years.

With the exception of some of the unreported country dummies, the other variables in column 1 are statistically significant. The time trend captures the general increase in growth throughout the period after the initial declines, with some reductions in growth as transition proceeds, which is reflected in the negative coefficient on the squared term. With regard to the interaction of initial conditions and time, the positive value of the coefficient on this variable suggests that the influence of initial conditions on growth is declining over time. Since the IC index takes a higher negative value, the better are initial conditions, a positive coefficient on the interaction term indicates that the direct negative effect of unfavorable initial conditions on growth declines as transition time proceeds. However, this direct effect cannot be estimated because this variable has no time dimension; therefore, it would be perfectly correlated with country dummy variables.

Finally, the fiscal balance is positive and significant, which highlights the important link between stabilization and growth. As will become evident in what follows, this result is robust to virtually any specification of the growth equation. However, we have the obvious concerns about the endogeneity of this variable but this issue is difficult to resolve. One possibility is to use a lagged fiscal variable either as an explanatory variable or as an instrument for the current fiscal balance. We have tested both specifications and the resulting link between growth and fiscal performance is much weaker. One possible explanation for this result is that the fiscal stance is unlikely to affect growth with a lag. Moreover, the fiscal situation of a country in a given year is not necessarily continued into the next year, which would imply a weak correlation between the fiscal variables in two consecutive years and make the lagged fiscal balance a poor instrument for the current fiscal balance.

In columns 2 through 5 of Table 1, we investigate the effect of adding three extra variables, namely, recovery, oil, and external growth. We add each individually to the first regression in columns 2 through 4 and include all three in the regression reported in column 5. Hence, column 5 contains the results of estimating the following equation:

\[
\frac{(\Delta Y/Y)_{i,t}}{\beta_0} = \beta_1 IC_i \cdot t + \beta_2 IC_i \cdot t^2 + \beta_3 t + \beta_4 t^2 + \beta_5 Ref_{i,t-1} + \beta_6 Fis_{i,t} + \beta_7 Recov_{i,t-2} + \beta_8 Oil_{i,t} + \beta_9 Exgrowth_{i,t} + \epsilon_{i,t},
\]

where the definitions of the added variables are explained below. Our objective is to test whether the positive influence of reforms on growth is robust to the inclusion of other variables that can be expected to determine short-term growth.

Column 2 includes an index for economic recovery, for which no obvious unique specification exists. We adopt a simple approach. First, we construct an annual index as a dummy

---

24 This result is similar to one found in Falcetti et al. (2002) and it is only slightly attenuated by the negative coefficient on the interaction between IC and time-squared.
variable that takes the value 1 if a country’s real GDP level is less than 70 per cent of its value in 1989 and 0 otherwise. Second, to avoid including too many observations of countries still in their transition recession and experiencing negative growth, we lag this variable by two years. Hence, we hypothesize that a country that suffers a large drop in income is expected to start growing faster after a suitable period of time. Although this construction and the chosen thresholds are somewhat arbitrary, similar results are obtained if the threshold is set at 50 per cent of the initial value and the dummy variable is lagged only one year. An alternative approach to capturing the impact of recovery is based on explicit dynamic panel methods and presented below. The results in column 2 show a highly significant positive value for the recovery index as expected but a slightly weaker, although still statistically significant, effect of reforms on growth. Therefore, once recovery considerations are included, the positive impact of reforms on growth remains.

To the benchmark regression in column 1, we add the oil balance, defined as exports minus imports of oil divided by GDP, in column 3. In column 4, we add to the benchmark a weighted measure of external growth, defined as the external growth rates of partner countries weighted by export shares to these countries. From the t-statistics in Table 1, the oil balance is highly significant while the external growth variable is marginally significant at only the 10 per cent level. In both cases, the coefficient on reforms remains robustly positive with a value of almost 4. However, when all three variables are included in column 5, the additional variables are all positive and significant at least at the 10 per cent level but the reform variable becomes marginally insignificant. Finally, in column 6, we replace lagged reform by a two-stage least squares (2SLS) procedure in which current reform is regressed initially on lagged reform and all other exogenous variables and the predicted value of reform from this regression, denoted Ref-inst, is included in the growth equation. Compared with the results in column 5, the coefficient on the new measure of reforms is significant as are the three variables added to the benchmark regression. Hence, if feedback effects from growth to reform are taken into account, the conclusion changes.

A simultaneous equation approach has two main advantages over our initial specification. First, we gain insights into the driving forces behind the reform process. Second, we control explicitly for feedback effects that may be biasing the coefficients in the single-equation estimation. We estimate the following simultaneous system:

\[
(\Delta Y/Y)_{i,t} = \beta_{0,i} + \beta_1 IC_i \cdot t + \beta_2 IC_i \cdot t^2 + \beta_3 t + \beta_4 t^2 + \beta_5 Ref_{i,t-1} + \beta_6 Fis_{i,t} \\
+ \beta_7 Recov_{i,t-2} + \beta_8 Oilbal_{i,t} + \beta_9 Exgrowth_{i,t} + \epsilon_{i,t},
\]

\[\text{(3)}\]

\[
Ref_{i,t} = \gamma_{0,i} + \gamma_1 IC_i \cdot t + \gamma_2 IC_i \cdot t^2 + \gamma_3 t + \gamma_4 t^2 + \gamma_5 (\Delta Y/Y)_{i,t} + \gamma_6 (\Delta Y/Y)_{i,t-1} \\
+ \gamma_7 Civlib_{i,t} + \epsilon_{i,t},
\]

\[\text{(4)}\]

where Civlib is the Freedom House index for civil liberties, which ranges from 1 indicating the highest level of freedom to 7 representing the least free. For identification purposes, we follow

---

25 The results are also largely unchanged if the index is defined in transition rather than calendar time, i.e., if it takes the value of 100 either in the first year of a country’s transition or in the year prior to the start of transition.

26 Another way to analyze the recovery effect is to include the lagged level of a country’s real GDP in the equation instead of a dummy variable. The inclusion of the lagged real GDP level creates a dynamic specification, which we estimate later in this section.
Falcetti et al. (2002) and assume that civil liberties affect reforms but not growth but that the fiscal balance and other macroeconomic variables affect growth but not reform. Although somewhat ad hoc, this approach is consistent with that of Fidrmuc (2003), who finds that democracy is highly correlated with liberalization but it has an ambiguous effect on growth. In our data, the simple partial correlation between Civlib and Ref is −0.62, whereas the coefficient between Civlib and growth is only −0.08.  

Equations (3) and (4) are estimated using three-stage least squares and the results are reported in column 1 of Table 2. For brevity, we use the full set of regressors in the growth equation. In the reform equation, two results are noteworthy. First, civil liberties matter for reform. The

<table>
<thead>
<tr>
<th>Table 2</th>
<th>Determinants of growth: System of equations results</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>3SLS full sample</td>
</tr>
<tr>
<td>Reform</td>
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</tr>
<tr>
<td>Constant</td>
<td>2.94</td>
</tr>
<tr>
<td>(10.33)</td>
<td>(12.35)</td>
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<td>Time</td>
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<tr>
<td>(Time)^2</td>
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<td>(0.85)</td>
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<td>Lagged growth</td>
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<td>(−7.19)</td>
<td>(−1.65)</td>
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<td>Time</td>
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<td>(Time)^2</td>
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<td>(4.82)</td>
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<td>IC · (Time)^2</td>
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<td></td>
<td>(−3.79)</td>
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(continued on next page)
results indicate that a one-unit reduction in the Freedom House index, which is equivalent to a one-unit rise in freedom, is associated with an increase in the average value of the reform index of 0.11 or nearly three upgrades of the individual transition indicators. Second, current growth has a strong and statistically significant effect on reform but lagged growth has little or no impact. An additional difference from the single-equation specifications is that lagged reform is positive and significant but the size of the coefficient is reduced considerably. Moreover, the external growth variable also loses significance, perhaps because the inclusion of so many time dummies introduces multicollinearity that complicates the precision.

Column 2 reports the results of the base specification with the time trend and its square in both equations replaced with year dummies. Several differences are noteworthy. In the reform equation, the contemporaneous effect of growth is no longer significant. In the growth equation, the effect of lagged reform remains positive and significant but the size of the coefficient is reduced considerably. Moreover, the external growth variable also loses significance, perhaps because the inclusion of so many time dummies introduces multicollinearity that complicates the precision.

Table 2 (continued)

<table>
<thead>
<tr>
<th></th>
<th>3SLS full sample</th>
<th>3SLS full sample</th>
<th>3SLS initial-phase reforms</th>
<th>3SLS second-phase reforms</th>
<th>3SLS excluding first five years</th>
<th>3SLS CEB and SEE</th>
<th>3SLS CIS</th>
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<tr>
<td>Ref (lagged 1 period)</td>
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<td>(5.93)</td>
<td>(4.67)</td>
<td>(4.79)</td>
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<tr>
<td>Fis (lagged 2 periods)</td>
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<td>0.40</td>
<td>0.40</td>
<td>0.44</td>
<td>0.58</td>
<td>0.50</td>
<td>0.38</td>
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<tr>
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<td>(4.19)</td>
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<td>(5.29)</td>
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<td>0.17</td>
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<td>Exgrowth (lagged 1 period)</td>
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<tr>
<td>(2.63)</td>
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Notes: (i) The results in all columns are derived using standard three-stage least squares estimation methods.
(ii) The results in column 1 are derived by defining reforms as the simple average of eight EBRD transition indicators.
(iii) In column 2, we replace the time trend and its square with year dummies.
(iv) In column 3, we use the initial-phase reforms only, calculated as a simple average of the EBRD transition indicators for price and trade liberalization and small-scale privatization.
(v) In column 4, we use the second-phase reforms only, calculated as a simple average of the EBRD transition indicators for large-scale privatization, governance and enterprise restructuring, competition policy, banking and the non-bank financial sector.
(vi) In column 5, we drop the first five years of transition for each country.
(vii) Column 6 presents estimates for CEB and SEE only.
(viii) Column 7 presents estimates for the CIS only.
Source: Appendix Table A.1.
of these estimates. Therefore, for the remainder of the paper, we use the more parsimonious specification without time dummies.

In columns 3 through 7 in Table 2, we investigate three further issues, namely, the relative importance of initial-phase and second-phase reforms on growth, the effects of dropping the early years of transition from the analysis, and differences in the results in the two major regions. Columns 3 and 4 report results linking growth with only initial-phase reforms and second-phase reforms, respectively. As can be observed, the coefficients are virtually the same in both cases and they replicate the earlier results using an overall average of reforms. However, the estimated impact of initial-phase reforms on growth is slightly higher than that of second-phase reforms.

To investigate the robustness of the results, we consider the possibility that the early years of transition during which output declines were severe and data limitations were more serious may affect unduly the measures of growth and the reform index. In column 5, we eliminate the first five years of transition from the sample so that the analysis begins at a point when the economy is growing for almost all transition countries. We note several interesting changes. First, civil liberties no longer influence reforms. Most of the variation in this indicator occurs in the early years of transition so that this result may be due to the relative uniformity of the index in later years. Second, the correlation between fiscal stabilization and growth is even stronger with a coefficient of 0.58 compared to 0.44 in column 1. Third, the recovery, oil balance, and external growth variables are no longer significant in the growth regression. However, the beneficial effects of lagged reforms on growth remain strong.

Further insights into the relationship between initial conditions, reforms, and growth can be derived by splitting the countries according to two regions. The last two columns of Table 2 compare the baseline results for the countries of CEB and SEE in column 6 to those of the CIS in column 7. The main difference is that political factors, as measured by the extent of civil liberties, have a significant impact on the degree of reforms in the CIS but not in CEB and SEE. We also find some evidence that the effect of initial conditions on reforms changes more quickly in CEB and SEE than in the CIS. Otherwise the results are similar enough to conclude that reforms have an approximately equal effect on growth in the two regions.

Because recovery considerations are likely to influence growth to an important degree in the later years of transition, we consider dynamic panel methods to be a superior way to capture this effect than our dummy variable threshold approach, which is somewhat ad hoc. However, including lagged output or growth directly in the growth equation raises important econometric issues. Formulations of the growth equation in a dynamic panel framework are found in the empirical growth literature, e.g., Islam (1995), Caselli et al. (1996), Dollar and Kraay (2003) and Bond et al. (2001). To date, few examples of this approach exist in the transition literature, although Lysenko (2002) and Staehr (2005) are exceptions. Clearly, the short time-span available does not lend itself to a detailed analysis of convergence and long-term trends. Nonetheless, we attempt to capture these effects and test whether the impact of reform on growth is retained in a dynamic specification. Moreover, Bond et al. (2001) and Dollar and Kraay (2003) employ dynamic panel techniques to address issues of measurement error, endogeneity, and omitted variables, all of which are relevant for transition countries.

28 In other words, the sample is restricted to start from 1994 for countries that started transition in 1989 and to 1995 for countries that began transition in 1990 and so on.

29 One possible explanation for the disappearance of the oil balance effect is the relative lack of variation in the data across time in the later years.
The standard model with panel dynamics takes the following form:

\[ y_{i,t} = \alpha y_{i,t-1} + \beta' X_{i,t} + \mu_i + \varepsilon_{i,t}, \quad i = 1, \ldots, 25, \]  

where \( y_{i,t} \) is the log of the level of GDP (usually in per capita terms) of country \( i \) in year \( t \), \( y_{i,t-1} \) is its lagged value, \( X_{i,t} \) is a set of explanatory variables, \( \mu_i \) is an unobservable country-specific effect, and \( \varepsilon_{i,t} \) is an error term. Equation (5) can be rewritten as:

\[ y_{i,t} - y_{i,t-1} = \delta y_{i,t-1} + \beta' X_{i,t} + \mu_i + \varepsilon_{i,t}, \]

where \( \delta \equiv \alpha - 1 \). In this form, the dependent variable is the difference in log levels of real GDP, which is a good approximation to the growth rate at low levels of growth. However, we take Eq. (5) and include all the explanatory variables, except the recovery index, so that we have:

\[ y_{i,t} = \alpha y_{i,t-1} + \beta_0 + \beta_1 IC_{i,t} + \beta_2 IC_{i,t}^2 + \beta_3 t + \beta_4 t^2 + \beta_5 Ref_{i,t-1} + \beta_6 Fis_{i,t} + \beta_7 Oilbal_{i,t} + \beta_8 Exgrowth_{i,t} + \varepsilon_{i,t}, \]

(7) to estimate using several techniques.\(^{30}\) The dependent variable, \( y_{i,t} \), is the log of an index of real GDP in country \( i \) at time \( t \), which takes the value 100 in 1989.\(^{31}\)

In column 1 of Table 3, we report the coefficients of a simple OLS regression with fixed effects, which is equivalent to within-groups estimation. The coefficient on the lagged dependent variable is 0.72, suggesting a fairly high degree of persistence in output. Importantly, the coefficient on reform is still positive and significant at the 5 per cent level, although the size of the coefficient at 2.49 is somewhat lower than in most of the previous specifications. The oil balance and external growth variables remain positive and significant but the fiscal balance loses significance unexpectedly. The time variables and their interaction with the index of initial conditions add little of significance to the regression.

As is well known, including a lagged dependent variable in a panel framework is problematic and the simple within-groups estimator is biased because of the correlation between the lagged dependent variable and the error term.\(^{32}\) Therefore in columns 2 and 3, we report the results from alternative techniques. First, we use the procedure developed by Arellano and Bond (1991) in which Eq. (7) is estimated in first-differences using lagged by two or more periods levels of the dependent variable, log GDP, as instruments for the lagged changes in growth. Basically, we estimate the first-differenced version of Eq. (5) or:

\[ y_{i,t} - y_{i,t-1} = \alpha(y_{i,t-1} - y_{i,t-2}) + \beta'(X_{i,t} - X_{i,t-1}) + \varepsilon_{i,t} - \varepsilon_{i,t-1}. \]

The results in column 2 indicate two important differences from those in column 1. First, the coefficient on reform, at 5.83, is more than double its comparator. Second, the fiscal balance returns to statistical significance. Interestingly, the coefficient on the lagged dependent variables is virtually unchanged, suggesting that the potential bias is fairly small, as Nickell (1981) discusses.

In column 3, we report the results of an alternative system-estimator technique due to Arellano and Bover (1995). This approach is recommended if the time series of output is persistent so

\(^{30}\) In this section, we return to single-equation estimations because the dynamic panel systems estimation is beyond the scope of this paper.

\(^{31}\) Similar to our previous results, no substantial changes occur if we base the index on transition rather than calendar time.

\(^{32}\) Nickell (1981) discusses this point; however, the size of this bias declines as the number of years in the panel increases.
Table 3
Determinants of growth: Dynamic specification

<table>
<thead>
<tr>
<th></th>
<th>Log level of GDP index or GDP per capita in PPP terms</th>
<th>Log level of GDP index (lagged 1 year)</th>
<th>Log level of GDP per capita in PPP terms (lagged 1 year)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Within group (1)</td>
<td>Arellano–Bond (2)</td>
<td>Arellano–Bover (3)</td>
</tr>
<tr>
<td>Log level of GDP index or GDP per capita in PPP terms</td>
<td>0.72</td>
<td>0.75</td>
<td>0.97</td>
</tr>
<tr>
<td>Log level of GDP index (lagged 1 year)</td>
<td>0.22</td>
<td>−1.28</td>
<td>−0.80</td>
</tr>
<tr>
<td>Log level of GDP per capita in PPP terms (lagged 1 year)</td>
<td>0.07</td>
<td>0.13</td>
<td>0.03</td>
</tr>
<tr>
<td>Time</td>
<td>(0.29)</td>
<td>(−1.60)</td>
<td>(−0.83)</td>
</tr>
<tr>
<td>(Time)²</td>
<td>(1.55)</td>
<td>(2.77)</td>
<td>(0.67)</td>
</tr>
<tr>
<td>IC · Time</td>
<td>0.13</td>
<td>0.01</td>
<td>−0.18</td>
</tr>
<tr>
<td>IC · (Time)²</td>
<td>(0.61)</td>
<td>(0.07)</td>
<td>(−1.55)</td>
</tr>
<tr>
<td>Ref (lagged one period)</td>
<td>2.49</td>
<td>5.83</td>
<td>7.62</td>
</tr>
<tr>
<td>Fis</td>
<td>0.08</td>
<td>0.35</td>
<td>0.73</td>
</tr>
<tr>
<td>Oilbal</td>
<td>(0.80)</td>
<td>(2.25)</td>
<td>(3.28)</td>
</tr>
<tr>
<td>Exgrowth</td>
<td>0.26</td>
<td>0.22</td>
<td>0.33</td>
</tr>
<tr>
<td></td>
<td>(4.62)</td>
<td>(2.88)</td>
<td>(3.99)</td>
</tr>
<tr>
<td></td>
<td>0.33</td>
<td>0.45</td>
<td>0.87</td>
</tr>
<tr>
<td></td>
<td>(2.26)</td>
<td>(2.83)</td>
<td>(4.26)</td>
</tr>
<tr>
<td>Number of observations</td>
<td>251</td>
<td>227</td>
<td>251</td>
</tr>
</tbody>
</table>

Notes: (i) In columns 1 through 3, we use the log level of the GDP index with 1989 equal to 100 as the dependent variable. In columns 4 through 6, we use the log of GDP per capita in PPP terms.

(ii) In columns 1 and 4, we derive the results by estimating Eq. (7) using simple OLS with fixed effects, which is equivalent to within group estimation.

(iii) In columns 2 and 5, we derive Arellano–Bond estimates by first-differencing Eq. (5) and using the lagged GDP levels by two or more periods of the dependent variable, log GDP, as instruments for the lagged changes in growth.

(iv) In columns 3 and 6, we derive first-step estimation results using the Arellano–Bover technique, which implies estimating a system of equations in first differences and levels, using as instruments lagged values of GDP in levels and first differences, respectively.

Source: Appendix Table A.1.

that the lagged levels of the dependent variable are weak instruments for the first-difference variables, as discussed by Bond et al. (2001). This procedure contains both a one-step and a two-step estimation; we focus on the former because the simulation results of Blundell and Bond (1998) indicate that it provides more reliable results. The results in column 3 show that the use of this estimator makes little difference as the coefficients in columns 2 and 3 are broadly similar. Nonetheless, the effect of lagged reforms on growth is even stronger as the coefficient is 7.62.

Finally, in columns 4 through 6, we repeat the estimations in columns 1 through 3, respectively, replacing the GDP index with real GDP per capita in purchasing power parity (PPP) terms.

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33 The tests on the first-differenced residuals of model (2) reject the hypothesis of significant serial correlation.

34 The size of this coefficient is larger than in column (5) of Table 1 at 7.62 versus 2.11 because of the inclusion of the recovery index in the earlier specification.
from the World Bank’s *World Development Indicators*. The choice of an output index relative to 1989, or the start of transition, assumes that countries are converging to their old level of output as if it is the equilibrium. However, this is unlikely to be the case. Therefore, we adopt the approach taken in much of the literature and use a PPP-adjusted measure of real GDP, rather than an arbitrarily chosen index. Overall, the results are broadly similar to those with the GDP index. However, the effect of lagged reforms on growth is slightly less robust. Specifically, the within-group coefficient is on the border of significance at the 10 per cent level and it falls outside of the conventional range when the Arellano–Bond (1991) method is used. Nonetheless, this coefficient returns to strong significance when the Arellano–Bover (1995) technique is used.

In addition, we carried out a number of sensitivity tests and we comment briefly on them. We explored three issues, namely, the possibility that reforms affect growth in a non-linear way, the potential complementarity of initial-phase and second-phase reforms, and the sensitivity of results to the exclusion of early years of transition. Regarding non-linearity, some reform steps may yield higher benefits than others. By dividing the reform index into six separate dummy variables and including these in a single regression, we test this hypothesis. Our results identify a clear and substantial growth dividend from moving out of the lowest and into the second lowest category of reform but we find considerably lower rewards from progressing further with reforms, which is consistent with Falcetti et al. (2002).

Regarding complementarity, second-phase reforms may work only if first-phase reforms are advanced. To test this hypothesis, we include an interaction term between the two variables as well as second-phase reform by itself in the growth regression. Although we find a positive coefficient on the interaction term, the size of the relevant coefficients varies considerably depending on whether we estimate the regression by OLS or 3SLS. Nevertheless, complementarities between different types of reform are likely to be important. Finally, we re-consider the issue of excluding the early years of transition by re-estimating the system model and dropping consecutively the first year, the first two years, the first three years, and so on up to the first seven years. In all cases, the reform variable stays positive and statistically significant. However, some of the additional explanatory variables are not robust to the exclusion of early years. If we drop the first seven years, the recovery index, oil balance, and external growth are all insignificant but this may be due to the small sample size.

5. Conclusion

The link between reform and growth in transition countries is complex. Many factors influence a country’s growth rate in a given year, including market-oriented reforms. Other factors, such as recovery, trade interdependence, and oil prices, play important roles that complicate the identification. In this paper, we disentangle the relative contributions of these different variables and test the robustness of the results. Our main finding is a robust, positive link between reforms in one period and subsequent growth across all transition countries. Although this result appears in much of the literature, some papers cast doubt on this link. We conclude that this skepticism is due to improper model specification, in particular, the inclusion of different measures of reform leading to problems with multicollinearity. To avoid this problem, we include lagged reform only

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35 Some observations are missing in earlier years for this series.
36 We are grateful to an anonymous referee for suggesting this approach and for providing the rationale for using it.
37 Detailed results of these tests are available upon request from the corresponding author.
along with other factors, such as oil balances, external demand, and output recovery, and isolate the influence of reforms.

Although reassuring to those who promoted the virtues of reforms, the result also serves as a warning of the dangers that arise when reform fatigue sets in, as it appears to have done in parts of the region according to EBRD (2004). Of equal importance, we find evidence that higher growth in turn is associated with further reform efforts. Although strong statements about causation cannot be made on the basis of these correlations, our results suggest the possibility of a virtuous circle of reforms and growth proceeding in tandem.\(^{38}\) Our econometric estimates also indicate that fiscal discipline, recovery, oil prices, trade links, and initial conditions are important determinants of a country’s growth performance, with the correlation less robust in some cases. Moreover, some or all of these factors may explain the high growth witnessed recently in countries that have been somewhat reluctant to reform.

We cannot draw firm conclusions about the course of future growth in transition economies from these findings because we do not have a clear understanding of the long-term potential of these economies, of their equilibrium growth paths, or of the complexities of the interactions of different types of reform. Moreover, reforms that work in some countries may not be equally successful in countries that start from a different level of development or that face more fundamental challenges of stability and poverty reduction. As the transition proceeds, these topics will continue to be fruitful areas of research and analysis.

Acknowledgments

In this paper, we expand the analysis of reforms and growth in transition presented in Chapter 1 of the EBRD Transition Report 2004 (EBRD, 2004). We are grateful to two anonymous referees, to colleagues at the EBRD, including Willem Buiter, Libor Krkoska and Utku Teksoz, to Laza Kekic, Colin Lawson, Martin Raiser, Karsten Staehr, Haifeng Wang and to seminar participants at Brunel University, Belgrade University and a workshop on “Managing Economic Transition” at London Metropolitan University for comments and suggestions. The views expressed in this paper are those of the authors only and not necessarily of the EBRD. Funding for this research by the Japan-Europe Cooperation Fund is acknowledged gratefully.

Appendix Table A.1

<table>
<thead>
<tr>
<th>Variable name</th>
<th>Source</th>
<th>Definition</th>
<th>Descriptive statistics</th>
</tr>
</thead>
</table>
| GDP growth    | EBRD database; based on official publications, IMF, World Bank, and specialized statistical institutions. See Transition Reports for details on each country. | Annual growth rate of GDP in country \(i\) and year \(t\), in per cent | Mean = \(-0.15\)  
Standard Deviation = 9.39 |

\(^{38}\) Kim and Pirttilä (2003) present empirical evidence supporting a positive influence of past macroeconomic performance on reforms in transition countries and also find a strong link between support for reform and the subsequent reform outcome.
### Appendix Table A.1 (continued)

<table>
<thead>
<tr>
<th>Variable name</th>
<th>Source</th>
<th>Definition</th>
<th>Descriptive statistics</th>
</tr>
</thead>
</table>
| Reform (Ref)        | EBRD rating from 1 (no reform) to 4+ (standards typical of market economies). For the purposes of this paper all “−” and “+” were converted into decimal points by subtracting or adding 0.33 points. | Ref is the simple average of reform ratings for the following eight indicators: price liberalization, trade liberalization, small-scale privatization, large-scale privatization, corporate governance and enterprise reform, competition policy, banking reform and interest rate liberalization, and securities markets and other non-bank financial institutions. See Transition Report 2004, Table 1.1 (EBRD, 2004) for details on thresholds for each category. Data prior to 1994 were backdated using all available information, including the World Bank's liberalization indices. | Mean = 2.60  
Standard Deviation = 0.75 |
| Initial conditions (IC) | EBRD staff calculations based on data in De Melo et al. (2001) updated and slightly modified. See Transition Report 1999, Box 2.1 (EBRD, 1999) for details. | Country score calculated from the first principal component of a factor analysis over 11 indicators (GDP per capita in 1989; pre-transition growth rate; trade dependence on CMEA; degree of over industrialization; urbanization rate; natural resources dummy; years spent under central planning; distance to EU; dummy for pre-transition existence as a sovereign state; repressed inflation; black market premium). The country score is calculated by multiplying each variable with a factor loading. It is normalized to have a mean of zero. | Mean = −0.17  
Standard Deviation = 2.31 |
| Fiscal balance (Fis) | EBRD database, based on official publications, IMF, World Bank, and specialized statistical institutions. See Transition Reports for details on each country. | Consolidated balance of the general government, in per cent of GDP. Note that this variable is negative if the balance is in deficit. | Mean = −4.88  
Standard Deviation = 6.03 |
| Civil liberties (CivLib) | Freedom House                                                             | Index ranging from 1 (free) to 7 (not free). Index gives weight to freedom of expression and assembly. | Mean = 3.64  
Standard Deviation = 1.55 |
| Recovery (Recov)    | EBRD database; based on official publications, IMF, World Bank, and specialized statistical institutions. See Transition Reports for details on each country. | Dummy variable = 1 if real output is less than 70 per cent of value in 1989, and 0 otherwise. | Mean = 0.43  
Standard Deviation = 0.50 |
| Oil balances (Oilbal) | EBRD database; based on official publications, IMF World Economic Outlook, World Bank, and specialized statistical institutions. See Transition Reports for details on each country. | Annual net exports of oil, divided by GDP. | Mean = −2.03  
Standard Deviation = 8.30 |

(continued on next page)
<table>
<thead>
<tr>
<th>Variable name</th>
<th>Source</th>
<th>Definition</th>
<th>Descriptive statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>External growth</td>
<td>EBRD database; based on official publications, IMF Direction of Trade Statistics, World Bank, and specialized statistical institutions. See Transition Reports for details on each country.</td>
<td>A weighted average of Real GDP growth in partner trading countries, where the weights are the share of total exports to each country.</td>
<td>Mean = 1.54 Standard Deviation = 3.26</td>
</tr>
<tr>
<td>Time (t)</td>
<td>Transition time is defined as beginning in 1989 for Poland and Hungary, 1990 for other central and south-eastern European countries (except Albania), 1991 for Albania and the Baltic states, and 1992 for CIS countries.</td>
<td>Mean = 7.02 Standard Deviation = 3.81</td>
<td></td>
</tr>
<tr>
<td>Real GDP per capita in PPP terms</td>
<td>World Bank (2005), World Development Indicators</td>
<td>GDP per capita in US dollars adjusted for inflation and for differences in purchasing power parity.</td>
<td>Mean = 6147 Standard Deviation = 3925</td>
</tr>
</tbody>
</table>

Note. All indicators are available year-on-year for most years since 1989.

References

World Bank, 2005. World Development Indicators. World Bank, Washington, DC.