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A Comment

By: Tomasz Mickiewicz

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Tomasz Mickiewicz[*]

Abstract

Rzońca and Ciżkowicz (2003) notice that by construction the reform indicators are bound from the above, and the resulting time series characteristics of these variables render estimates of coefficients in growth regressions spurious.

We illustrate this issue further, applying econometric tests. Our main conclusions are the following:

(i)   joint use of contemporaneous and lagged values of reform indicators may lead to spurious results,

(ii)   this is more likely in estimations based on longer time windows, which include 'post transition' years.

Nevertheless, the existing empirical evidence is sufficient to demonstrate:

(iii)   a positive link between the reforms and economic growth, and

(iv)   a lag between the reforms implementation and the positive response in economic growth.

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[*] University College London, CASE and WDI. Address: SSEES UCL, Senate House, London WC1E 7HU, UK. E-mail: t.mickiewicz@ssees.ucl.ac.uk. Phone 00-44-20-7862 8606.

In this paper we discuss the link between the reforms and economic growth. It is organised as follows. Section 1 opens with a discussion of the general results from existing literature on the long-term determinants of economic growth. From there, we move to the discussion of published empirical results on factors affecting long (medium) term growth in transition economies. In Section 2 we turn to existing evidence based on panel data and short term effects. In Section 3 we focus our attention on recent criticism by Rzońca and Ciżkowicz (2003), who show that some reported results may be spurious and offer our own illustration of this issue, supporting their argument. Finally, in Section 4, we present some additional new estimations. Section 5 concludes.

1. Empirical evidence on determinants of long (medium) term growth

By now, the catalogue of long term empirical determinants of economic growth is well known. In particular, a recent thorough meta-study by Sala-I-Martin *et al.* (2004) produces a list of variables, which are most likely to affect growth. It is based on meta analysis, which takes into account a full list of 67 variables, that were ever used to explain long-term growth in reported studies. In particular, two seminal empirical models by Barro (1991) and Levine and Renelt (1992) are embedded.

In light of Sala-I-Martin *et al.* (2004) results, modelling growth using a production function approach is justified, as core variables, which can be interpreted in terms of factor endowment count. Human capital (esp. primary education) is important, and so is human health. Low price of capital goods matters. Rich natural resource endowment has positive impact, contradicting some earlier insights, based on some more restrictive models.

However, growth is driven not only by factor endowment, but also by efficient economic organisation, characterised by low level of market distortions and adequate provision of public goods. Large size of the government results in slower growth. Policies resulting in international openness have positive impact. Interestingly, high transaction cost within the economies may also result from significant ethnolinguistic fractionalisation: growth is slower where people cannot communicate with each other using the same language.

Interestingly, culture seems to be important as well: great Eastern religious traditions (Confucian, Muslim and Buddist) are associated with more growth, when we control for other factors. On the other hand, the Weberian hypothesis of Protestant culture being more conducive to growth than the Catholic is not supported by data, once we control for the legacy of Spanish Crown colonies, a tradition, which has negative impact.

Optimistically, countries will lower GDP per capita grow quicker, converging towards high income economies, albeit location matters. Clusters of economies (especially: East Asia) grow fast together, other remain underdeveloped (Sub-Saharan Africa). In addition, some of locational advantages relate to physical geography. In particular, tropics are not good for growth, and access to the see spurs GDP growth.

How the general results compare with these obtained on transition economies? The differences between the transition countries in output performance are large. Some transition economies experienced J-curve paths of output, others U-shaped paths, with long recessions. On the one hand, countries like Poland, Czech Republic and Hungary emerged from post-Communist crises quickly, on the other, Ukraine and Moldova suffered ten years of recessions. Given relatively similar endowment of those countries in terms of human capital, physical capital and infrastructure, the discussion has been concentrated on comparative significance of macroeconomic policies, liberalisation and institutional reforms and initial distortions, in explaining differences in output performance.

The empirical literature on economic growth in transition splits naturally into two parts. Firstly, we have the long-term estimates of economic growth, where, following established methodology, GDP growth is averaged over a number of years to eliminate temporary effects. In studies, where endogeneity of explanatory variables is tackled, it is either by taking the values at the beginning of the period or by instrumenting. Given the enormous policy significance of early transition experience, it is not surprising that a number of studies on determinants of economic growth in transition was produced already in mid decade. Picking up four widely cited studies, those early results were showing the following. First, for 1989-1995 output change, Aslund *et al.* (1996) find significant negative effects of macroeconomic instability (inflation) and of war on economic growth. They also found that countries, which participated in Rubel zone arrangement

suffered in terms of economic growth.[1] Second, for the same period, Sachs (1996) shows a clear positive bivariate link between reforms and growth. Next, Heybey and Murrell (1998) base their estimation on the growth averages for the first four years of transition and find that in this early period, the impact of reforms on growth, while positive, is insignificant and dominated by negative influence of disruption caused by initial exposure to intra-CMEA trade. Finally, Krueger and Ciolko (1998) extend the model using a number of other variables, and a longer time span, i.e. growth average over 1989-1997. The impact of reforms is still positive and significant, and again war hurts economic growth.

Campos (2001) depart from the modelling present in the early studies discussed above, and make an explicit link to general (non-transition) growth models, in particular, as exemplified by the two seminal specifications: Barro (1991) and Levine and Renelt (1992). In line with these general results, he finds that both investment and basic education had positive impact on growth in the transition economies. Interestingly however, the impact of secondary education in transition economies was ambiguous or even negative, which may be in line with perceptions of low quality of this sector inherited from the old system.

Fidrmuc (2003) present the analysis, which demonstrate how the relative importance of general and transition-specific factors shifted over time. Thus, it is unique in its direct account for the fact that the set of factors affecting long (medium) term growth may change during the course of transition. Fidrmuc runs a series of regressions with dependent variables taken to be average growth of five years periods, starting correspondingly from 1990 to 1995 (so that 1990-2000 decade is covered again). War has a significant negative impact in the first part of the decade. Similarly, location, as measured by proximity to the European Union (Brussels) had some (marginally insignificant) impact at the beginning of decade, which vanishes later. In line with previous studies, the impact of liberalisation is strongly significant for most of the period, however, turns to be insignificant in the most recent one. In contrast, a human capital variable (secondary school enrolment) tends to be insignificant in the first period (similarly to Campos (2001), but significant in the later part of the decade.

Based on this, one would be tempted to conclude, that the transition specific set of factors was gradually replaced by a more standard set of explanatory variables, as those economies were becoming more similar to their 'non-transitonal' counterparts. However, this is not confirmed by

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[1] Rubel zone experience is discussed in detail by Gros and Steinherr (2004).

the result on investment, which remains highly insignificant in Fidrmuc's estimations, unlike Campos (2001). However, the former study controls for a larger set of variables. Thus it seems that the quality of allocation dominated quantitative effects of investment in transition economies during the whole period 1990s, which made quantitative effects of investment insignificant.

Another difference between Fidrmuc (2003) and non-transition results is that the size of government (as measured by government expenditure) has no significant impact on growth, while negative effect is standard for non-transition countries (albeit one may notice that the sign changes from positive in the first two periods to expected negative in the last five periods). This pattern may be explained by the fact that the collapse of government spending in some transition economies resulted from lack of tax reform and crisis in tax collection (see Schaffer and Turley (2001)). Thus, small government size in the initial phase of transition may be simply an indicator of the fiscal crisis.

And finally, Fidrmuc (2003) finds some evidence of convergence at the beginning of decade, which ceases in the latter period.

Kronenberg (2004) tests the model explaining the average economic growth in transition countries over 1990-2000. In this long period, basic education turns out to be a significant factor again. On the other hand, in contrast with general findings on economic growth (Sala-I-Matin 2004), for transition economies, the natural resource endowment seems to have negative impact. The explanation of this is that positive direct effect of natural resources is dominated by their negative effects stimulating corruption, which in turn has further strong negative external effects, affecting all economic system. Thus, natural resource endowment is beneficial only if political, cultural and social system of norms is strong enough to prevent conflicts over economic rents to corrupt the business and economic environment. Another disconcerting effect found by Kronenberg is that during the 1990s, again unlike general results on economic growth, in the transition countries region there was no convergence: rich were getting richer, and poor getting poorer, as documented by the positive and consistently significant sign of the initial (1989) GDP per capita.

Overall, the results in literature are consistent. Wars were not good for growth. Liberalisation / reforms, and macroeconomic stabilisation had positive impact. Towards the end of the first decade of transition, standard determinants of growth, human capital in particular gain

in importance, and significance of transition-specific policies decreases. What is worrying however, is that the initial differences in income between the transition countries seem to be growing, instead of expected convergence.

2. Empirical results from panel data; short run effects

A second set of results on economic growth in transition comes from a number of empirical studies, which focus on short term effects utilising panel data techniques. Tables 1 and 2 below summarise results of seven studies published at time of writing. A number of potentially good working papers is excluded; a recent summary of most of these is offered by Rousso (2005). The published studies split naturally into two groups. The first five papers ('first generation' papers) are based on single equations models (Loungani and Sheets (1997), Selovsky and Martin (1997), Christoffersen and Doyle (2000), Radulescu and Barlow (2002), Havrylyshyn and van Rooden (2003)). The next three ('second generation') tackle the problem of endogeneity of policy variables by using system of equations modelling. In this latter group, reforms are instrumented on the set of variables, including indices of political freedom.[2]

The results emerging from all these studies are fairly consistent.

Similarly to long run effects, wars had negative impact on growth.

Macroeconomic destabilisation had clear-cut negative short-term effects on growth, consistent with long-term effects. In the 'first generation' papers, it is approximated by inflation. The 'second generation' papers rely on fiscal balance, a measure, which can be seen as more exogeneous and policy-driven than inflation. Two additional interesting details are offered by Christoffersen and Doyle (2000). Firstly, they found that the effect of inflation is likely to be non-linear. Only inflation above a level of about 13% has negative effect on growth. Second, in countries, where radical disinflation was implemented in the presence of exchange rate pegs, short-term recessionary effects emerged.

Results on liberalisation (reforms) show that the immediate impact of reforms is negative. Subsequently, output recovers and the lagged effects are positive, producing recovery. However, in their contribution, Rzońca and Ciżkowicz (2003) demonstrate that the estimates of reform

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[2] On may also note, that the same approach is also adopted by Fidrmuc (2003) in the context of long (medium) term models of growth, see previous section.

coefficients may be problematic. The issue deserves careful consideration and we will turn to it in the next section.

An interesting addition to the results on the link between the reforms and growth is offered by Merlevede (2003), who notices that earlier estimations do not distinguish between the impact of reforms and reforms reversals. In a number of countries (the two most prominent examples being Belarus and Uzbekistan), the reforms were reversed in mid 1990s, and the standard estimation would imply a positive impact on growth of reform reversal (symmetric to the impact of reform implementation). Merlevede documents that the impact of reversal was in fact negative.[3]

Finally, an interesting set of results relate to external linkages. Christoffersen and Doyle (2000) demonstrate that countries, which were more open initially were affected by developments on their main export markets. These results can be seen as consistent with 'second generation' papers, which use a latent variable representing initial conditions. Within this variable, one of the major components is the initial trade dependence on other Communist countries (a measure parallel to that used by Christoffersen and Doyle (2000)), which has also (implicit) negative impact on growth. In particular, the small former Soviet republics were particularly dependent on trade with Russia and suffered from recession in this largest transition economy. In contrast, Russia itself has been less dependent on trade with other republics, so its recession was more affected by policy choice than by external influences. The advantage of Christoffersen and Doyle (2000) approach is to make the link explicit.

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[3] In addition, Merlevede (2003) argues that his results support the case for gradualism, as it follows that partial reforms are less costly to reverse than full reforms. However, the overall balance of costs and benefits between gradualism and fast reforms (under aggregate uncertainty) is determined by an option value of early reversal, and the cost of delay of reforms, including those resulting from complementarities between the reform elements (Roland 2000, Section 2.4).

There is also one methodological problem with the Merlvede (2003) model with the reform reversals. Namely, unlike the basic reform indicators, reversals are not treated as endogenous. However, we rerun a model similar to Merlevede (2003), treating reversals and endogenous and found that the basic conclusions are not affected: reversals are bad for growth (not reported). Interestingly, political freedom makes reversals less likely and the results is highly significant.

We checked all the reversal points listed by Merlevede (2003) and eliminated two: for Bulgaria in 1995 and for Tajikistan in 1993. In both cases reversals of some reforms occurred indeed, but those were matched by simultaneous progress in some other reforms. In the first case, reversal in price liberalisation was matched by progress in freedom of entry and small-scale privatisation indicator. In the second case, reversal in price liberalisation was matched by improvement in competition policy. We also detected some reversals in additional data we use. Serbia experienced reversal in price and external liberalisation in 1994, and another reversal in price liberalisation in 1998. In 2001, the Turkmenistan government inflicted on itself a reversal in large-scale privatisation, moving up to a third place in ranking of countries with a largest number of reform reversals, after Belarus and Uzbekistan, unchallenged frontrunners in this category.

3. Are the results on the link between reforms and growth spurious?

The starting point of Rzońca and Ciżkowicz (2003) criticism is that the EBRD indicators used as reform proxies are bounded from above by construction. For that reason, implementation of reforms is represented by a decreasing rate of change, with the level of indicators converging over time towards the high-income OECD economies benchmark. A paradoxical implication is that for countries, which implemented the reforms quickly, the correlation between change in reforms and economic growth is spuriously negative, when all subsequent periods are taken into account (where the residual change in reform indicator is very small). As the empirical models discussed above include both contemporaneous and lagged reform indicator (which correspond to first difference), the time series characteristics of the reform indicator resulting from its construction, imply the spurious effect, where the former term is negative and the latter is positive.

Two points may be noted following this.

First, the study by Christoffersen and Doyle (2000) differs from all other in the form the reform indicators are used in estimated models. Namely, it includes both first difference of reform indicator and the reform indicator in level. While the first may capture the effect discussed by Rzońca and Ciżkowicz (2003) and be spurious therefore, given it is included, the coefficient on the reform level is not affected. It is positive and significant.

Second, if the effect described by Rzońca and Ciżkowicz (2003) is important, it should affect the more recent studies more and those based on earlier periods less, as time series characteristics of the reform were better, as upper bound is slack, even for the fast reformers (see Figure 2 in Rzońca and Ciżkowicz (2003)). That implies that in this respect, the results from the first three studies reported in Table 1 (Loungani and Sheets (1997), Selovsky and Martin (1997) and Christoffersen and Doyle (2000)) may be treated with more trust. In the first of these three, based on the 1991-1994 period, a change in reforms results in higher growth. In the next two, we detect a J-curve effect, where the lagged positive effect of reforms clearly outweight the initial negative one.

We intend to investigate the problem in more detail and estimate a series of models, varying the time span of the analysis. We estimate models, which are similar to the 'second

generation' growth-in-transition models, that is, we rely on a system of equation and take account of endogeneity of variables (see Table 2), however, with the few following differences. Firstly, our panel is larger. The sample is extended from 25 to 27 countries, including the data on Serbia and Bosnia, now being available. Also, we include an early period (1987-) to account for the fact that in some countries (including former republics of Yugoslavia, Hungary, Poland), limited reforms were introduced before the end of Communism. That leads us to a more important difference. 'Second generation' models reorder time dimension, shifting time series for particular countries relative to each other, with a starting date defined as the beginning of transition (see Table 2 below). In addition, estimated equations include quadratic time trends (again, counted in 'transition years'). The potential problem with this approach is that by construction, the 'transition time trend' is strongly correlated with reforms.[4] More importantly, also by construction, time specific influences common for all transition economies are not controlled for. For these reasons, we do not shift time dimension in our specifications. All are in real time, with a full set of annual time dummies instead. The advantage of the latter solution is that by not imposing any functional form on time trend, we control for common time specific shocks better.

The second difference is that we do not include any proxies for initial conditions. Instead, in each equation, full set of fixed country effects is included. Falcetti *et al.* (2002) and Merlevende (2003) introduce latent variable representing initial conditions interacted with time in their set of explanatory variables. Because the variable is derived from principal component analysis, analytical interpretation is difficult. More importantly, the measured effects capture only the time-specific effects unaccounted for by the time trend, all other should be already covered by fixed country effects. As we opted for the full set of time controls and fixed country effects, there is no room left for initial condition variables in our specifications.

The third difference is that we introduce inflation into our set of explanatory variable in the growth equation, alongside reform indicators. However, it is instrumented using fiscal balance, index of political rights and reform index.

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[4] The argument here is against shifting individual countries along time dimension, not against defining some threshold level of reforms, seen as equivalent to the beginning of transition. An early application of the latter concept of the transition-reforms-liberalisation threshold in different methodological setting can be found in de Melo and Gelb (1997).

Moving from these general remarks to more detailed comments on specification, we wish to make our set of variables comparable with Radulescu and Barlow (2002), the only paper where the contemporaneous and lagged effects of inflation balance each other, so that the effect of reforms on growth is inconclusive (which triggered response by Rzońca and Ciżkowicz (2003), even if their criticism relate to other papers as well).

Correspondingly, we estimate the following model:

(1)

$$(\Delta Y / Y)_{i,t} = \alpha_0 + \alpha_i + \alpha_t + \alpha_1 RI_{i,t} + \alpha_2 RI_{i,t-1} + \alpha_3 (\Delta P / P)_{i,t} + \varepsilon_{i,t}$$

$$(\Delta P / P)_{i,t} = \beta_0 + \beta_i + \beta_t + \beta_1 Fis_{i,t-1} + \beta_2 RI_{i,t-1} + \beta_3 Polit_{i,t} + \eta_{i,t}$$

$$RI_{i,t} = \gamma_0 + \gamma_i + \gamma_t + \gamma_1 (\Delta Y / Y)_{i,t} + \gamma_2 (\Delta Y / Y)_{i,t-1} + \gamma Polit_{i,t} + \nu_{i,t}$$

Following the existing research tradition, our reform measure is a simple average of the three key liberalisation indicators (price liberalisation, external liberalisation, freedom of entry and small-scale privatisation).

The results of the estimations are presented in Table 3. We report the first equation only. In the next section, we will present the results based on a full model, however with a different specification, alleviating the problem detected by Rzońca and Ciżkowicz (2003).

Table 3 results are consistent with our expectations. For the period of analysis, for which the upper bound of the reform index is not binding (roughly until 1997), we can see that the lagged positive effect dominate over negative and insignificant contemporaneous effect of reforms. In the latter periods, the importance of spurious effects detected by Rzońca and Ciżkowicz (2003) prevail.

4. Additional new results

To eliminate the effect discussed above, we estimate a model, where the reform indicator is included only once in the growth equation. Namely:

(2)

$$(\Delta Y / Y)_{i,t} = \alpha_0 + \alpha_i + \alpha_t + \alpha_1 RI_{i,t-1} + \alpha_2 (\Delta P / P)_{i,t} + +\alpha_3 (\Delta P / P)_{i,t-1} + \varepsilon_{i,t}$$

$$(\Delta P / P)_{i,t} = \beta_0 + \beta_i + \beta_t + \beta_1 Fis_{i,t-1} + \beta_2 Polit_{i,t} + \eta_{i,t}$$

$$RI_{i,t} = \gamma_0 + \gamma_i + \gamma_t + \gamma_1 (\Delta Y / Y)_{i,t} + \gamma_2 Polit_{i,t} + v_{i,t}$$

Another variant of this model is where is allow for effects of reforms on inflation, that is:

(3)

$$(\Delta Y / Y)_{i,t} = \alpha_0 + \alpha_i + \alpha_t + \alpha_1 RI_{i,t-1} + \alpha_2 (\Delta P / P)_{i,t} + +\alpha_3 (\Delta P / P)_{i,t-1} + \varepsilon_{i,t}$$

$$(\Delta P / P)_{i,t} = \beta_0 + \beta_i + \beta_t + \beta_1 Fis_{i,t-1} + \beta_2 RI_{i,t-1} + \eta_{i,t}$$

$$RI_{i,t} = \gamma_0 + \gamma_i + \gamma_t + \gamma_1 (\Delta Y / Y)_{i,t} + \gamma_2 (\Delta Y / Y)_{i,t-1} + \gamma_3 Polit_{i,t} + v_{i,t}$$

The results are reported in Tables 4-6. There are largely consistent with those obtained earlier by other authors.

First, there is a consistent link between political freedom and reforms[5]. Less freedom implies slower reforms, as documented by signs and significance of corresponding coefficients.

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[5] A diligent reader may notice an insignificant effect reported in Table 4. Just. The exact level of significance was 10.3%.

Second, democracy is also good for macroeconomic stability (Table 4). The results is consistent with De Melo *et al.* (2001, Table 8). From the political economy point of view, inflation may be a sign that conflicting claims on government cannot be efficiently coordinated, resulting in inflationary financing of public expenditure.

Third, inflation has an unambiguous effect on economic growth in transition economies. Both contemporary and lagged effects are negative (with relative significance varying, depending on specification).

And finally, reforms have very significant effect on inflation. With one year lag, liberalisation brings in a slowdown of inflation. This last result is important as it suggest that where both inflation and reforms are included in the set of explanatory variables for growth (without instrumenting), we may expect a multicollinearity problem, with estimates of reform effects weakened.

5. Conclusion

Arguably, more attention should be paid to long (medium) term estimates than to short term estimates based on panel data. From all available long-term estimates, we know that reforms are positively associated with growth. And apart from one study based on early period, all reported results are significant.

The problem with panel techniques, as applied in existing research, may be that a longer lag structure is difficult to evaluate, as additional lags are insignificant and the sample size is reduced resulting in loosing of some important information. What is going on is that positive impact of reform is spread over a long period of time, and thus is difficult to estimate with specification, which relies on short run response. This is an additional, equally important problem, in addition to the one reported by Rzońca and Ciżkowicz (2003).

Possibly, the most interesting result in our estimations is the significance of macroeconomic stabilisation. Unambiguously, short term effects of inflation on economic growth in transition economies are negative, and the result is established controlling for endogeneity in the spirit of the 'second generation' transition models. We could not detect any positive, demand driven response of output to inflationary impulses. It may indicate that demand based explanations of recessions and output paths in transition may be lacking empirical support.

Instead, with some caveats, the explanations of the 'transitional recessions' based on disorganisation (as best represented by Blanchard and Kremer (1997)) seem to be passing the test of time well.

Table 1. GDP Growth determinants: single equation models

Authors	Loungani & Sheets (1997)	Selowsky & Martin (1997)	Christoffersen & Doyle (2000)	Radulescu & Barlow (2002)	Havrylyshyn & van Rooden (2003)
Estimator	Regression with annual effects; lag dependent included	Pooled regression	Regression with country fixed effect and annual effects	Regression	GLS
Countries and time	EBRD countries 1991-94	EBRD countries 1990-1995	EBRD countries 1991-1997	EBRD countries 1991-1999	EBRD countries 1991-1998
Explanatory variables:					
Inflation	Negative Significant		Negative Significant [a]	Negative Significant	Negative Significant
Strong Disinflation & Exchange Rate Pegs			Negative Significant		
Dummy for fixed exchange rate regime				Positive Significant	
Fiscal balance	Negative Significant				
Change in the index of reform	Positive Significant		Negative Significant		
Index of reform		Negative Significant	Positive Significant	Negative Significant	Negative Significant
Index of reform lagged (-1)		Positive Significant		Positive Significant	Positive Significant
Index of reform lagged (-2)		Positive Significant			Positive Significant
Political freedom					Ambiguous
Export market growth adjusted for Export/GDP			Positive Significant		
War dummy	Negative Significant	Negative Significant	Negative Significant		
Latent variable 1: initial macro distortions, trade dependence on other Communist countries, time spent under Communism				Negative, Significant	Negative, Significant
As above, interacted with time					Negative, Significant[b]
Latent variable 2: initial GDPpc, urbanisation, the difference between actual & predicted share of industry in GDP					Negative, Significant
As above, interacted with time					Negative, Significant[b]
Initial level of GDP per capita				Negative, significant	

Footnotes:

[a] Nonlinear effects for inflation: only inflation above a threshold level of around 10%-15% has negative effect on growth.

[b] In specifications, where a variable is interacted with time, the same variable with no interaction is also included.

Table 2. GDP Growth determinants: systems of equations

Authors	De Melo et al. (2001)	Falcetti et al. (2002)	Merlevede (2003)
Estimator	2SLS; four equations: reforms, growth, inflation, freedom	3SLS; two equations: reforms,growth; fixed country effects &quadratic time trend	3SLS; two equations: reforms, growth; fixed country effects &quadratic time trend
Countries and time	'transition time' instead of real time: - fSU 1992-96, - other EBRD & Mongolia '90-4, - China 1979-83, - Vietnam 87-91	'transition time' instead of real time: - fSU &Alb 1991-99, - Bul, Cz R, Slk R, f. Yugoslavia '90-98, - Hun, Pol: 1989-97 (alternatively: fSU 1992-)	'transition time' instead of real time: - fSU 1992-02, - Alb, Bul, Cz R, Slk R 1991-01, - Hun, Pol., f.Yugoslavia 1990-00
Explanatory variables:			
Fiscal balance		Positive Significant	Positive Significant
Index of reform	Negative Significant	Negative Insignificant	Negative Insignificant
Index of reform lagged (-1)	Positive Significant	Positive Significant	Positive Significant
Reform reversal			Negative Significant
Reform reversal interacted with the index of reform			Negative Significant
Political freedom	Positive Significant		
Latent variable 1: initial macro distortions, trade dependence on other Communist countries, time spent under Communism	Negative, Significant		
As above, interacted with time		Positive, Significant	Positive Significant
Latent variable 2: initial GDPpc, urbanisation, the difference between actual & predicted share of industry in GDP	Negative, Insignificant		
As above, interacted with time			Positive Insignificant

Table 3. The impact of the time dimension on the estimates of reforms coefficients in growth equations

Time period used	1987-1994	1987-1995	1987-1996	1987-1997	1987-1998	1987-1999	1987-2000	1987-2001	1987-2002
RI_t	8.18	-3.21	-15.18	-1.41	-8.97	-22.22†	-35.5*	-48.16**	-61.8**
RI_{t-1}	6.62*	8.4***	12.12**	8.96†	11.48	17.24*	24.11**	31.15**	38.5**
$(\Delta P/P)_t$	0.003	0.000	0.000	-0.000	-0.002†	-0.004**	-0.006***	-0.008***	-0.011***
No of observ.	91	116	142	168	194	220	246	273	300

(1) Estimator: 3SLS. Only coefficients from the first equation of Model 1 (see text) reported.
(2) Data sources: EBRD, Transition Reports 1995-2004; World Bank, World Development Indicators, 2004
(3) Inflation: GDP deflator (more data points available than for CPI)
(4) Time effects (annual dummies) and country fixed effects included in each equation but not reported.
(5) *** significant at 0.001; ** significant at 0.01; * significant at 0.05; † significant at 0.1.

Table 4. 3SLS estimates of model (2).
Reform index = average of 3 EBRD liberalisation indices

Dependent variable	GDP growth ($\Delta Y/Y$)	Reform index (RI)	Inflation ($\Delta P/P$)
Reform index, lagged	4.66 (1.05)***		
Inflation	-0.0006 (0.0005)		
Inflation, lagged	-0.0003 (0.001)*		
GDP growth rate		0.12 (0.03)***	
GDP growth rate, lagged			
Index of political rights		-0.04 (0.02)	131.03 (74.38)†
Government balance, lagged			-60.79 (9.48)***
χ^2	342.51***	342.51***	180.72***
Number of observations	294	294	294

Table 5. 3SLS estimates of model (3).
Reform index = average of 3 EBRD liberalisation indicators

Dependent variable	GDP growth ($\Delta Y/Y$)	Reform index (RI)	Inflation ($\Delta P/P$)
Reform index			
Reform index, lagged	4.34 (1.20)***		-0.94 (0.10)***
Inflation	-1.772 (1.015)†		
Inflation, lagged	-0.376 (0.588)		
GDP growth rate		0.09 (0.02)***	
GDP growth rate, lagged		-0.004 (0.009)	
Index of political rights		-0.054 (0.03)†	
Government balance, lagged			-0.05 (0.01)***
χ^2	440.94***	596.89***	1222.84***
Number of observations	294	294	294

Table 6. 3SLS estimates of model (3).
Reform index = liberalisation (principal component)

Dependent variable	GDP growth ($\Delta Y/Y$)	Reform index (RI)	Inflation ($\Delta P/P$)
Reform index, lagged	3.25 (1.18)**		-0.83 (0.09)***
Inflation	-2.51 (1.16)*		
Inflation, lagged	-0.05 (0.63)		
GDP growth rate		0.10 (0.02)***	
GDP growth rate, lagged		-0.01 (0.01)	
Index of political rights		-0.06 (0.03)†	
Government balance, lagged			-0.05 (0.01)***
χ^2	450.44***	509.75***	1250.90***
Number of observations	294	294	294

Notes to Tables 4-6:

(1) Alternative specification in Table 6 relies on principal component analysis of eight EBRD indicators, where the corresponding 'liberalisation' factor has the following loadings: price liberalisation – 1.01, trade and exchange rate liberalisation – 0.78, free entry and small scale privatisation – 0.65, banking reforms – 0.42. Further details available on request.
(2) Estimations based on all available data points for 27 transition economies, 1987-2002.
(3) Data sources: EBRD, Transition Reports 1995-2004; Freedom House; World Bank, World Development Indicators, 2004
(4) Lower value of the index of political rights corresponds to more political freedom
(5) Inflation: GDP deflator (more data points available than for CPI)
(6) Standard errors in parentheses
(7) Time effects (annual dummies) and country fixed effects included in each equation but not reported.
(8) *** significant at 0.001; ** significant at 0.01; * significant at 0.05; † significant at 0.1.

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