FOREIGN AID AND GROWTH: DO THE TRANSITION ECONOMIES HAVE A DIFFERENT STORY TO TELL?

by

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Abstract

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The thesis investigates the impact of foreign aid on economic growth in transition economies. Although the question of foreign aid is an old one, it has a special significance in current research in the light of fundamental institutional changes in the recipient countries. In particular, the author tests the hypothesis, which prevails in studies on the effectiveness of foreign aid in developing countries, that the positive impact of foreign aid is conditional on good policy environment. The good policy environment is defined as stable macroeconomic policies: controlled inflation, balanced fiscal budget, and efficient structure of foreign trade. Cross-sectional time-series analysis of growth performance of a subset of 25 transition countries is used to determine the possible effect of aid on economic growth. The results of the study indicate that no consistent link exists between aid and growth in a typical transition country. However, if countries are ranked by the quality of their macroeconomic policy environment, aid appears to have a significant positive effect in countries with good policy environment.

TABLE OF CONTENTS

List of Figures and Tables ii

List of Appendix Figures and Tables iii

Acknowledgements iv

Glossary v

CHAPTER 1. Introduction 1

CHAPTER 2. Studies of Foreign Aid Effectiveness in Developing Countries: A Review. 4

CHAPTER 3: Theoretical Framework for Empirical Models 9
3.1. Introduction of the Model 9
3.2. The Model and Hypothesis 12
3.3. The Model Specification 16

CHAPTER 4: Empirical Analysis 21
4.1. Data Description 21
4.2. The Econometric Methodology 27
4.3. Econometric Analysis of Growth, Aid and Policy Determinants 32
4.4. Econometric Analysis of Growth Impact of Foreign Aid 43

CHAPTER 5: Conclusions and Policy Implications 49

WORKS CITED 51

Appendix 55

LIST OF FIGURES AND TABLES

Number *Page*

Figures

1. Average Annual Aid in Transition Countries 23
2. Average Aid/GDP and Average Annual Per Capita Growth in Transition Countries 23
3. Aid to Ukraine in Transition Time 24

Tables

1. Growth Determinants 20
2. Initial Growth Regressions 33
3. Construction Of The Constant Term For Policy Index 37
4. Aid Regressions 39
5. Policy Regressions 42
6. Growth Regressions with Policy Index and Aid 44
7. Growth Regressions with Aid-Policy Interaction Terms 46

LIST OF APPENDIX FIGURES AND TABLES

Number *Page*

Figures

1.Aid/GDP and Annual Per Capita Growth During Years of Transition.....55
2.Aid in Transition Time.....58

Tables

1. Summary Statistics (Total Sample, Main Variables)……..... ……61
2. Summary Statistics of Growth and Aid by Country.....62
3. Initial Growth Regressions (OLS and Instrumental Variables Regressions)..64
4. Aid Regressions (OLS and Instrumental Variables Regressions) 65
5. Policy Regressions (OLS and Instrumental Variables Regressions).....66
6. Growth Regressions with Policy Index and Aid (OLS and Instrumental Variables Regressions).....67
7. Growth Regressions with Aid-Policy Interaction Terms (OLS and Instrumental Variables Regressions) ..... ……68
8. List of Countries Included in the Sample.....69

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GLOSSARY

Official Aid. Aid flows from official donors to the transition economies of Eastern Europe and the former Soviet Union.

Transition Year. A year in which communist regime of the country collapsed and "the country began to move towards the market economy" (Fischer and Sahay 2000, p.3).

Voracity Effect. An effect that occurs as a result of interaction of powerful groups "via fiscal process that allows open access to aggregate capital stock" (Tornell and Lane 1999, p. 22).

Chapter 1

INTRODUCTION

The last two-three decades in economic literature were marked by overwhelming research into economic growth. Indeed, striking differences in the standard of living of developed countries vis-à-vis developing South African, Asian, Central American, and, most recently, many countries of the former Soviet Union, make it challenging for every economist who thinks globally about the long run prosperity of the world to find a panacea for the economic malady. "If our [economists'] quest were successful, it would be one of humankind's great intellectual triumphs" (Easterly 2001, p. xi). Moreover, the subject has become so much interesting that there have appeared not only research papers but also scholarly books on growth.

In his recent work Easterly investigates possible factors for economic growth ranging from "foreign aid to investment in machines, from fostering education to controlling population growth, from giving loans conditional on reforms to giving debt relief conditional on reforms" (Easterly 2001, p. xi). The issue of foreign aid appears to be one of the most controversial and puzzling questions because, despite massive inflows of aid, some countries remain as poor as before the foreign injections (Boone 1996), while others have managed to foster growth with relatively moderate amount of aid. Traditionally foreign aid impact on growth is investigated on both micro and macro level. However, although on the micro level, at the individual projects level, aid typically works, there is no definite conclusion as to the macroeconomic impact of foreign aid.

The controversy of the research results could be explained by the quality of the data, the specification of the underlying growth model, and the empirical method used. For example, researches that used data set on 56 developing countries, which was first studied by Burnside and Dollar (2000), find controversial results on the growth impact of foreign aid applying different econometric techniques.

In recent studies significant attention is paid to domestic policy environment in the country as an important factor for growth. Consequently, since domestic policies are one of the most important determinants of growth, the further question is whether aid impact on growth is conditional on domestic policies. Although there is no definite answer to this question yet, most recent studies on foreign aid effectiveness in developing countries support the fact that aid impact is conditional.

The issue of the effectiveness of foreign aid is of great interest for scholars as well as for donors. If research supports the fact that foreign aid could foster growth conditional on the presence of stable macroeconomic policies, then the logical outcome is directing aid to countries with good policy environment. On the other hand, if the evidence supports the unconditional positive impact of foreign aid, the implications are considerably more preferable for countries that perform "bad" policies but strive for foreign aid.

Although the issue of foreign aid is hotly debated in the context of developing countries, there could hardly be found the research on foreign aid effectiveness in transition countries. In this thesis we investigate the growth impact of foreign aid in transition countries paying a special attention to the issue of conditionality the growth impact of foreign aid. As an underlying growth specification we use model proposed by Fischer (1993), where the emphasis is placed on the importance of stable macroeconomic environment for sustainable economic

growth. Following Burnside and Dollar (2000), we construct a policy index that would account for institutional policies environment. To overcome criticism on the econometrics ground, we employ both panel data cross-sectional time-series techniques as well as pooled econometrics methods and choose the ones that provide the best fit for the economic data for transition countries and allow capturing country specific and time specific effects.

The remainder of the thesis is organized as follows. In Chapter 2 we provide a review of the recent studies of the growth impact of foreign aid in developing countries. Chapter 3 introduces a theoretical framework for empirical models, where we elaborate on the growth and aid determinants. Next chapter presents the results of our empirical investigation. Finally, we conclude with a brief discussion of the results and policy implications.

C h a p t e r 2

STUDIES OF FOREIGN AID EFFECTIVENESS IN DEVELOPING COUNTRIES: A REVIEW

Foreign aid is as much about
knowledge as it is about money

Assessing Aid.
A World Bank Policy Research Report 1998

Since the late 1940s, the Harrod-Domar model has provided the intellectual bedrock for the impact of aid on growth. However, with the development of new growth theories, the logic of Harrod-Domar model has been brought into question. Despite frequent criticism, the model has been taken as the benchmark theory in the international donor organizations. Easterly (1999) explains such "persistence " in terms of the simplicity of the model as it provides straightforward calculations of the aid needs, and the presence of the "multiple equilibrium model of crime" (since everyone is doing it, it becomes the accepted dogma). As Meier indicates "the dominant characteristic as well as its [the model] ultimate flaw as a theory of growth was the assumption of a strict link between the growth of the capital stock and the consequent growth of the output on the other" (Meier 1995, p.91). In particular, the model assumes: 1) a one-on-one relationship between savings and aid; 2) a fixed linear relationship between growth and investment.

Hence, the model explicitly assumes the existence of the necessary institutions and mechanisms that underpin the positive relationship postulated.

Unfortunately, the assumption of the appropriate institutional framework in the developing countries is hardly justifiable. It is now widely recognized that savings and investments are only necessary but not sufficient condition for growth.

Not surprisingly, the early investigations of the effectiveness of foreign aid that did not take into consideration the possible distortions in the developing economies did not find a consistent link between aid and growth. Modified neoclassical growth theories have been called to account for the distortions in the economy. The theoretical foundation for recent empirical studies of growth relies on dynamic models of inter-temporal optimization. The empirical studies based on the "new growth models" place a considerable emphasis on human capital, policies that promote investments, and institutional factors that may constrain growth (Tsikata 2000). Growth is a function of initial conditions, which are hypothesized to affect the accumulation of physical and human capital, and institutions and policies. Advanced studies also take into account the possibility of endogeneity of aid.

Boone (1995) analyses the importance of the political regime for the effectiveness of aid programs. He shows that "aid does not significantly increase investment and growth, nor benefit the poor as measured by improvements in human development indicators, but it does increase the size of the government". Interestingly, according to the author, the impact of foreign aid remains is invariant to the nature of regime, whether liberal democratic or autocratic.

Recently, a number of studies have incorporated the economic environment of the country as an important factor for output growth (Sachs and Warner 1995; Easterly and Rebello 1993; Fischer 1993). According to Fischer (1993), "… macroeconomic stability is to growth" (p.486). The author considers inflation to be the most important indicator of the macroeconomic stability of the country. He argues that high inflation rates indicate government's inability to manage the

economy. The same argument concerns the overall budget balance. In addition to monetary and fiscal policy, the trade policy conduct in the country is included among the main indicators of the macroeconomic environment. In particular, Durbarry, Gemmell and Greenway (2000) indicate that "openness to trade is hypothesized to raise growth through several channels, such as access to advanced technology from abroad, possibilities of catch up, greater access to a variety of inputs for production, and access to broader markets that raise the efficiency of domestic production through the increased socialization" (p.9).

One of the most influential works in this area is the one by Burnside and Dollar (2000) of World Bank. The authors investigate the hypothesis that aid does affect growth but under conditions of good domestic policies. Their finding is that foreign aid has a positive impact on growth while combined with the environment of good fiscal, monetary and trade policies, and that this effect "goes beyond the direct impact that the policies themselves have on growth" (p.864). In addition, the authors find that there does not exist a consistent evidence of either bilateral or multilateral aid being allocated to the countries with high quality of the economic environment. The authors suggest focusing aid on the countries that are poor and at the same time tend to perform policies conductive to economic growth.

Recent work by Shuang Lu and Ram (2001) casts doubt on the robustness of the estimation procedure used by Burnside and Dollar. With a simple modification, the authors obtained results opposite to those claimed by Burnside and Dollar. "The most significant change occurs in the coefficient of the Aid-Policy interaction term. It changes from substantial and significant positive number into a tiny negative magnitude that lacks statistical significance" (Shuang Lu and Ram 2001, p.21).

One of the important bases for the conflicting results on the effectiveness of foreign aid stems from the econometric methodology used and the size and the composition of the data. While the early studies concentrate on the cross-sectional data or panel data using simple OLS techniques, the recent studies advocate employing more sophisticated panel data approaches to account for the country-specific and time-specific individual effects. In particular, the importance of testing for both one-way and two-way panels effects are emphasized (Trumbull and Wall 1994).

Subsequent studies of the impact of foreign aid endeavor to establish the possible effect of aid on the other aspects of the recipient economies. In particular, while Burnside and Dollar (2000) take the policy environment as not being affected by aid, Knack (2000), investigating the possible link between foreign aid and the quality of governance in the recipient country, indicates that aid dependence can potentially be harmful to the institutional quality because of high probability of increased corruption, weak accountability, and conflict over the control of aid funds. One of the most harmful unintended consequences of aid dependence is the moral hazard problem as aid can dampen the efforts to reform the inefficient policies and institutions.

The view that foreign aid could increase corruption in the recipient country is also supported by Svensson (1998), who models the aid inflows as being a goal of the strategic game. According to Svensson, greater competition among social groups increases dissipation of aid. Using ethnic diversion as a proxy for competition among social groups, he finds that foreign aid worsens corruption in more ethnically diverse nations.

The undermining effect of the competing social groups in the non-stabilized economy has been the focus of the political economy studies of the post-communist transition countries. Tornell and Lane (1999) employ the institutional

environment as a defining factor of economic growth. The authors propose the concept of "the voracity effect". They analyze a vague political-institutional environment "populated by multiple powerful groups" as opposite to strong institutional infrastructure with concentrated power. The voracity effect occurs as a result of interaction of powerful groups "via fiscal process that allows open access to aggregate capital stock" (Tornell and Lane 1999, p. 22).

One of the reasons why aid could potentially worsen the quality of the governance is that aid represents a potential source of rents, and in the country with weak tradition of accountability, struggle for rents encourages the reallocation of talents from productive activities to rent seeking business. The possible remedy to this problem could be tying aid to improvements in governance and strengthening of civil society in the recipient country as well as targeting aid towards particular projects.

Due to the contradictions in economic literature, the impact of foreign aid on growth requires careful study since the results of the investigation can greatly influence the donors' perception about giving aid to the countries in need.

Chapter 3

THEORETICAL FRAMEWORK FOR EMPIRICAL MODELS

This chapter provides a theoretical background for the empirical analysis of foreign aid impact on growth rates in transition economies.

3.1. Introduction of The Model

The main purpose of our empirical work is answering the question: What is the growth impact of foreign aid in transition countries? In addition, we look at the aid, policy and growth determinants.

The way to estimate the growth impact of foreign aid is to build the empirical model, in which growth as a dependent variable is influenced by certain explanatory variables including aid. Empirical study of growth in transition usually begins with inclusion of neoclassical growth factors, takes into account an initial level of GDP, and then adds structural variables that help to account for disequilibria conditions in a typical transition economy. We begin in the similar manner and then incorporate variables to test for the growth impact of aid as described in the preceding theoretical model. Thus the growth equation includes vector of exogenous growth determinants *I;* an aid variable, which reflects foreign aid inflows in a country; a vector of policy variables *P,* which reflect the institutional and policy distortions in a country; and the interaction term of aid and policy that is aimed at capturing the prediction of the theoretical model, according to which aid conditional on good policy environment spurs growth.

The benchmark growth equation is

$$g_{it} = I_{it}' B_{GI} + a_{it} \beta_{Ga} + P_{it}' B_{Gp} + a_{it} P_{it}' B_{Gap} + g_t + e_{it}^g \qquad (3.1)$$

where

g_{it} – GDP per capita growth rate in country *i* during period *t*;

a_{it} – a fraction of foreign aid in GDP in country *i* during period *t*;

I_{it} – a (Ix1) vector of variables that correlate with growth in country *i* during period *t*;

P_{it} – a (Px1) vector of policy variables country *i* during period *t*;

g_t – time period *t* specific effect;

e_{it}^g – a mean zero shock to growth for country *i* during period *t*.

$a_{it}P_{it}$' is an interaction term that designed to capture a growth effect of foreign aid in country *i* during period *t* conditional on the policy environment proxied by variables included in vector P.

The model is constructed for the cross-country panel data; thus, to incorporate the effect of time, we include a time-specific fixed effect for each period, which is called to capture the growth impact of all other variables specific for a period t that are not explicitly included in the model.

As a reader may notice, however, the equation (3.1) might very likely suffer from the endogeneity problem. Specifically, aid variable as well as policy variables maybe endogenous to the rate of growth.

The rationale for the aid endogeneity stems from the fact established in the recent literature on growth. Country's growth rate maybe a factor that influences the amount of aid. Furthermore, the direction of this influence is not clearly defined. On the one hand, donors may direct their aid to countries that suffer from the sluggishness to impulse positive changes, in which case the impact of growth on the amount of aid is positive; on the other hand, donor may in fact direct aid to the country that demonstrates a sign of improving growth rates. According to Burnside and Dollar this possibility is especially feasible when donor country purposes its specific objectives (Burnside and Dollar 2000, p.849).

Consequently, both aid as well as policy variables may be correlated with the error term. In such a case, estimating equation (3.1) by the conventional OLS technique will produce not only biased but inconsistent estimates of the structural parameters. In particular, if, as described in the example above, growth itself causes the amount of aid to rise, the coefficient on aid could be biased upward: by capturing the relation more aid - higher growth, it will also take into account "higher growth - more aid". One of the possible remedies to this situation is instrumenting endogenous variables with appropriate instruments. Good instruments must have been found being significantly correlated with the endogenous variable of interest but not correlated with an error term. In principle, it is just enough to find one instrument for each endogenous variable to get consistent estimates of the structural parameters. However, such "minimalist" approach will not allow to test for the appropriateness of the instruments since by choosing the number of instruments just equal the number of endogenous variables we forced zero-correlation restriction described above to be fulfilled by construction. Thus, it would be appropriate to find a sufficient number of instruments. In addition, we should also not to forget about the interaction term, which could also be endogenous.

Other possibility of dealing with endogeneity arises if we consider the fact that not only aid could have an impact on growth but also that in fact growth might determine aid, and that policy itself could be determined by aid and growth. In such a case it is possible to build a simultaneous structural equations model, consisting of three equations, one for each potentially endogenous variable – a growth variable, an aid variable, and policy variables.

3.2. The Model and The Hypothesis

Considering the probable complex relations among those three variables, we build the equation system:

$$g_{it} = I_{it}' B_{GI} + a_{it}\beta_{Ga} + P_{it}' B_{Gp} + a_{it} P_{it}' B_{Gap} + g_t + e_{it}^g \quad (3.2)$$

$$a_{it} = I_{it}' B_{AI} + P_{it}' B_{Ap} + a_t + e_{it}^a \quad (3.3)$$

$$P_{it} = I_{it}' B_{PI} + a_{it} B_{Pa} + p_t + e_{it}^p , \quad (3.4)$$

where variables are defined as in the equation (3.1), and $\mathbf{B_{PI}}$, a PxI matrix, $\mathbf{B_{GI}}$, $\mathbf{B_{AI}}$, Ix1 vectors, $\mathbf{B_{Gp}}$, $\mathbf{B_{Ap}}$, $\mathbf{B_{Gap}}$, $\mathbf{B_{Pa}}$, Px1 vectors, and β_{Ga}, scalar, are the structural parameters of the model.

Technically speaking, a rationale for the simultaneity in the system of equations (3.2-3.4) arises from the probable correlation of the error terms among themselves in the three regressions.

We formulate our theoretical hypothesis as follows

H I. The growth impact of foreign aid in transition economies is conditional on policy environment in the recipient country

The effect of aid on growth for country *i* at period *t* is measured by

$$\frac{\partial g_{it}}{\partial a_{it}} = \beta_{Ga} + \frac{\partial P_{it}'}{\partial a_{it}} B_{Gap} + \left(P_{it}' + a_{it} \frac{\partial P_{it}'}{\partial a_{it}} \right) B_{Gap} \tag{3.5}$$

$$\frac{\partial g_{it}}{\partial a_{it}} = \beta_{Ga} + B_{Pa}' B_{Gap} + P_{it}' B_{Gap} + a_{it} B_{Pa}' B_{Gap} \tag{3.6}$$

Running ahead, we should say that if the vector of policy variables appears not to be influenced by aid variable, i.e. $\mathbf{B_{Pa}}$ is not statistically significantly different from zero, the system comprises to the two equations (3.2) and (3.3), and the effect of aid on growth for country *i* at period *t* is estimated by:

$$\frac{\partial g_{it}}{\partial a_{it}} = \beta_{Ga} + P_{it}' B_{Gap} \tag{3.7}$$

To test the hypothesis of positive impact of aid on growth given the vector of exogenous policy environment variables is to test H_0: $\beta_{Ga} + P_{it}' B_{Gap} \leq 0$ against the alternative H_1: $\beta_{Ga} + P_{it}' B_{Gap} > 0$ in the range of a vectors P that are defined as a good policy environment. By construction, the hypothesis of interest is supported by the alternative hypothesis.

The Policy Index

At first sight the system (3.2-3.4) may look simpler than it is. The trick here is that a vector of policy variables **P** contains *p* policy variables; hence, in fact, it is not a system of 3 equations but a system of *2+p* equations.

There is no definite conclusion in the growth literature on which policy variables influence growth. The question arises which variables should be included in the vector of policy variables P. Here we will follow the policy index technique suggested by Burnside and Dollar (2000). The innovative idea of the authors is to calculate index as a single scalar that would reflect the whole vector of policy variables P. They suggest estimation of the benchmark growth equation like (3.1) without aid terms and then construction of a policy index based on the estimates of the parameters of the vector B_{Gp},. As the authors indicate, "the key feature of our policy index is that it weights the policy variables according to their correlation with growth" (Burnside and Dollar 2000, p.851).

The purely technical rationale for constructing a single measure of policy index for econometric analysis lies in the fact that the equations we are going to estimate suffer from endogeneity problem. Thus if we decide to deal with the vector of *p* policy variables, we should instrument each policy variable as well as each aid-policy variable interaction term in the vector $\mathbf{a_{it}P_{it}'}$. It is very likely that such a procedure will produce questionable results due to the possible multicolinearity problems. Hence, we adhere to the procedure suggested by Burnside and Dollar; although, in contrast, we suggest the estimation that accounts for the possible endogeneity of the policy variables, which will be discussed below.

Summarizing, to construct a policy index we run the following regression

$$g_{it} = I_{it}' B_{GI} + P_{it}' B_{Gp} + g_t + e_{it}^g \qquad (3.8)$$

A policy index for each country is constructed according to

$$p_{it} = P_{it}' \hat{B}_{Gp} \qquad (3.9)$$

where p_{it} is a policy index for country *i* at period *t*, $\hat{\mathbf{B}}_{Gp}$ is a vector of estimates of the parameters $\mathbf{B}_{\mathbf{Gp}}$.

Hence we rewrite the system (3.2-3.4), incorporating the policy index:

$$g_{it} = I_{it}' B_{GI} + a_{it}\beta_{Ga} + p_{it}\beta_{Gp} + a_{it}p_{it}\beta_{Gap} + g_t + e_{it}^g \qquad (3.10)$$

$$a_{it} = I_{it}' B_{AI} + p_{it}\beta_{Ap} + a_t + e_{it}^a \qquad (3.11)$$

$$p_{it} = I_{it}' B_{PI} + a_{it}\beta_{Pa} + p_t + e_{it}^p , \qquad (3.12)$$

where now $\beta_{\mathbf{Gp}}$, $\beta_{\mathbf{Gpa}}$, $\beta_{\mathbf{Ap}}$, $\beta_{\mathbf{Pa}}$ are scalars.

To answer the question of positive growth effect of aid conditional on policy, in addition to the hypothesis specified earlier, we should test H_0: $\beta_{Gap}<=0$ against H_1: $\beta_{Gap}>0$, where the hypothesis of interest is an alternative one. And the earlier hypothesis of positive impact of aid on growth given the vector of exogenous policy environment variables becomes: H_0: $\beta_{Ga} + p_{it}\beta_{Gap} \le 0$ against the alternative H_1: $\beta_{Ga} + p_{it}\beta_{Gap} > 0$, in the range of "good policy environment" (by construction, here again we are interested in the alternative hypothesis).

If we take the system (3.10-3.12) to be the simultaneous-equations system, which portrays the structure of probable growth-aid-policy relationship, we should look at the identification issue. In order to estimate the system the model specification should allow the parameters in the model to be identified. In our case the system includes four endogenous variables (growth, aid and policy variables plus aid-policy interaction term), time-specific constants, and a set of exogenous variables I. Clearly, if we do not impose any restrictions on vector I and the set of variables in I is identical for each of the three equations in the system, the model is

underidentified. Underidentified system cannot be estimated properly since estimates of the parameters do not answer the question what equation out of three a researcher has estimated. Some additional information that explains the dependent variables is needed in order to estimate all three structural equations. Such identification is obtained by imposing restriction on the set of variables in vector I that enter each of the equations. However, running ahead, we should notice hear that as a result of our empirical investigation, which is presented in the next chapter, we have found that system (3.10-3.12) does not exhibit simultaneity and each estimation could be estimated separately without loss of any information.

3.3. The Model Specification

The Growth Equation

As we already specified above, the growth equation contains 1) set of growth determinants; 2) set of policy variables; 3) aid variable of interest. Our primary purpose in this section is to specify the growth determinants for transition economies.

The basic idea is to find proxies for the economic phenomena that were the most important catalysts or inhibitors for growth in those countries, while controlling for countries' specific effects. For our analysis we consider 25 countries in transition, of which 10 are from Central and Eastern Europe, and 15 – republics of the former Soviet Union (including Baltic countries).

Although transition countries have faced similar economic problems during the transition from command to market economy, there were significant differences in the initial conditions in those countries at the beginning of the transition

period. The basic differences stem from the fact that some countries were closer to the market-oriented economies, while others have a long history of the communist regime. Thus, to begin with it is suggested to group the countries in three groups: 10 Central and Eastern Europe (CEE) countries are Albania, Bulgaria, Croatia, Czech Republic, Hungary, Macedonia, Poland, Romania, Slovak Republic and Slovenia; 3 Baltic countries are Estonia, Latvia and Lithuania; and other republics of the former Soviet Union (OFSU). The rationale behind considering Baltics as a separate group is that three Baltic counties had shorter history under the communist regime and by geographic location were closer to the countries with developed market economy. In general, OFSU countries were characterized by the abundant natural resources, and some of them had highly unbalanced production structure in terms of industrial and agricultural production.

Also at the beginning of the transition period, countries differed significantly by the per capita output. For example, PPP adjusted GDP per capita in 1989 prices in Slovenia was almost 6.5 times higher then in Tajikistan. Thus controlling for the initial per capita output is supposed to capture the convergence effect.

Fischer and Sahay consider seven main variables that can be used to control for initial conditions at the beginning of transition period: the share of agriculture in GDP, the natural resource endowment index, the number of years under communism, secondary school enrollment ratio, trade dependency, an index of overidustrialization, and distance of the capital from Dusseldorf (Fischer and Sahay 2000, p.10). They found that the most important for explaining growth performance are secondary school enrollment, which is assumed to proxy the human capital in the country, and years under communism, which is assumed to reflect the duration of the distortions in the country. Hence, we should expect

secondary enrollment ratio to have a positive impact on growth, while years under communism – a negative.

We also include the ratio of broad money over GDP to reflect the development of the financial system. Considering the possible endogeneity of this variable we lag it one period. In addition, some researches have found government consumption and industry as a share of value added in GDP.

In addition to the initial conditions, the factors that reflect the macroeconomic situation in the country played an important role in the growth process. In particular, inflation stabilization is considered to be one of the major contributors to growth in those countries. Other determinant of growth in those countries is fiscal balance (Fischer and Sahay 2000). One problem with inclusion inflation in the growth equation is the fact that inflation is endogenous to growth (Barro 1997, p.101). One reason for this is the possibility of omitted variable that correlates both with growth and inflation, thereby making impossible interpretation of the coefficient on inflation in the growth equation as the growth effect. For example, as Barro (1997) indicates, better enforcement of property rights could foster investment and thereby growth, while at the same time it could constrain the monetary authorities in their ability to increase inflation. In this case, using ordinary least squares procedures we will get a negative effect of inflation on growth while this effect does not necessary reflect the true relationship. To instrument inflation we should find variables that highly correlated with inflation but are not correlated with growth. According to the growth literature such variables are inflation lagged one period and regional dummies. Lagged inflation has an important explanatory power for the contemporaneous inflation due to high inflationary expectations in transition countries.

The third variable included in the growth equation, which is supposed to reflect the macroeconomic policy environment in addition to monetary and fiscal policy, is trade policy. We measure trade policy by the ratio of country's exports plus imports to GDP. On the one hand, this ratio is supposed to reflect the trade openness of the country; however, on the other hand, due to distortionary structure of international trade in transition countries we suspect that the impact of this variable on growth could be negative.

To capture the impact of policy environment in the country we also have considered EBRD transition indices that reflect the macroeconomic development in the countries, in particular, the progress of liberalization, privatization, infrastructure development, and financial institutions development. Initially, we include index of trade liberalization, index of large-scale privatization, index of competition policy, and index of banking sector reform. However, we have found high correlation between those indices and direct measures of policy environment. As a result, we drop those indices from our growth regression.

The growth equation also contains our variable of interest – foreign aid as a share of GDP. The specification developed so far is a benchmark specification of the growth equation. Main growth determinants are presented in Table 1.

The Aid Equation and The Policy Equation

The aid-allocation criteria fall into two main categories: factors that reflect recipient-country specific characteristics and factors that reflect donor-strategic interests. According to the literature on foreign aid allocation, the most important recipient-country factor that determines aid allocation is population. The variables that capture donor interests are regional dummies (Burnside and Dollar 2000, p.851). As suggested by Burnside and Dollar, we also control for the initial per capita income.

Although recent research on aid allocation have not found support for the proposition that aid allocated to the countries with good policy environment, we decide to include in the aid equation policy variables as well policy variables lagged one period. The intuition behind inclusion the lagged policy indicators lies in the fact that aid could be allocated as a result of the certain policy action in the recipient country.

The policy equation includes almost all variables from growth equation, with the exception of lagged growth, which we include to reflect the possible causality.

Table 1. Growth Determinants

Structural and Institutional Variables	
Log of real per capita GDP	To capture the convergence effect
Years under communism	Initial conditions important in transition economies (Fischer and Sahay 2000)
Secondary school enrolment in pre-transition year	Initial conditions important in transition economies (Fischer and Sahay 2000)
Broad money over GDP	Proxy for the development of financial system (King and Levine 1993)
Policy Variables	
Inflation	To measure monetary policy (Fischer 1993)
General government budget balance (as a share of GDP)	To measure fiscal policy (Easterly and Rebello 1993)
Trade (exports plus imports as a share of GDP)	Sachs and Warner 1995

Chapter 4

EMPIRICAL ANALYSIS

4.1. Data Description

The data we use in the empirical analysis is obtained from the World Bank Development Group databases and European Bank for Reconstruction and Development Transition Report. Data on initial conditions in transition economies are taken from Fischer and Sahay (2000).

We use the unbalanced panel, which consists of 25 cross sections and from 8 to 10 time periods. In our sample we include 25 transition countries: 10 countries of Central and Eastern Europe, 3 Baltic countries and 12 other countries of the former Soviet Union.

The idea of unbalanced panel is borrowed from Fischer and Sahay (2000), where they suggest starting the investigation of the transition economies from the year of transition. The transition year is defined as the year in which communist regime of the country collapsed and "the country began to move towards the market economy" (Fischer and Sahay 2000, p.3).

The summary statistics of the main variables are presented in the Appendix, Table 1 and Table 2. Here we would like to concentrate on the summary statistics of our main variable – foreign aid.

Data on Aid

The data on aid has been obtained from the World Bank Development database. In our study, following the conventional measures of aid (Burnside and Dollar 2000; Durbarry, Gemmell and Greenaway 1998), we work with aid as a share of GDP.

According to Development Assistance Committee (DAC) of the Organization for Economic Cooperation and Development and World Bank, official aid refers to aid flows from official donors to the transition economies of Eastern Europe and the former Soviet Union. The most commonly used measure of aid consists of "net disbursements of loans and grants made on concessional terms by official agencies of the members of DAC and certain Arab countries to promote economic development and welfare in recipient economies" (Organization for Economic Co-operation and Development 2002). Loans with a grant element of more than 25 percent as well as technical cooperation and assistance are also included in the measure of aid.

According to the data, the average official aid to transition countries starting from the year of transition to year 1999 is about 3% of GDP, in per capita terms it amounts to $20.00 (Figure 1). However, for Ukraine this figure is much more smaller and does not exceed 1.6% of GDP (Figure 2).

As could be seen from the Figure 3, a visual inspect of the cross-country growth-aid (averaged through the transition years) scattergram does not provide a consistent evidence about the relationship between these variables. However, at this stage the visual inspect cannot be in any way conclusive since the structure of the panel data allows a researcher to elaborate on the relationship between the variables both in cross-sectional and time-series dimensions

Figure 1. Average Annual Aid in Transition Countries

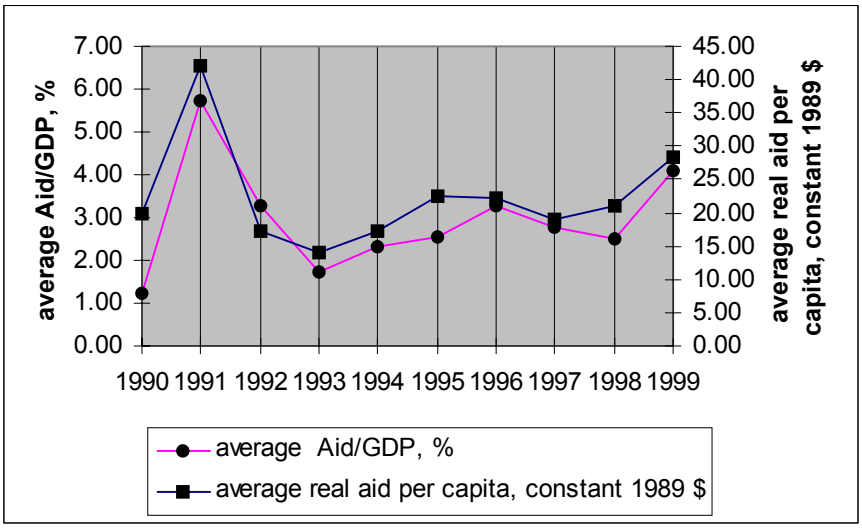


Figure 2. Aid to Ukraine during Transition Time (AID over GDP)

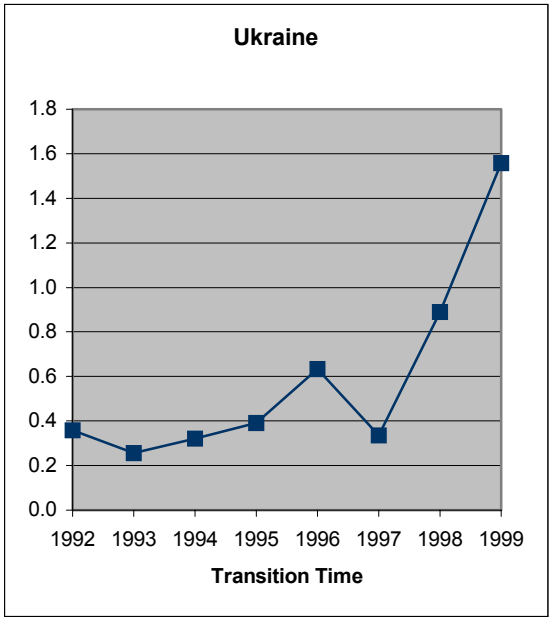
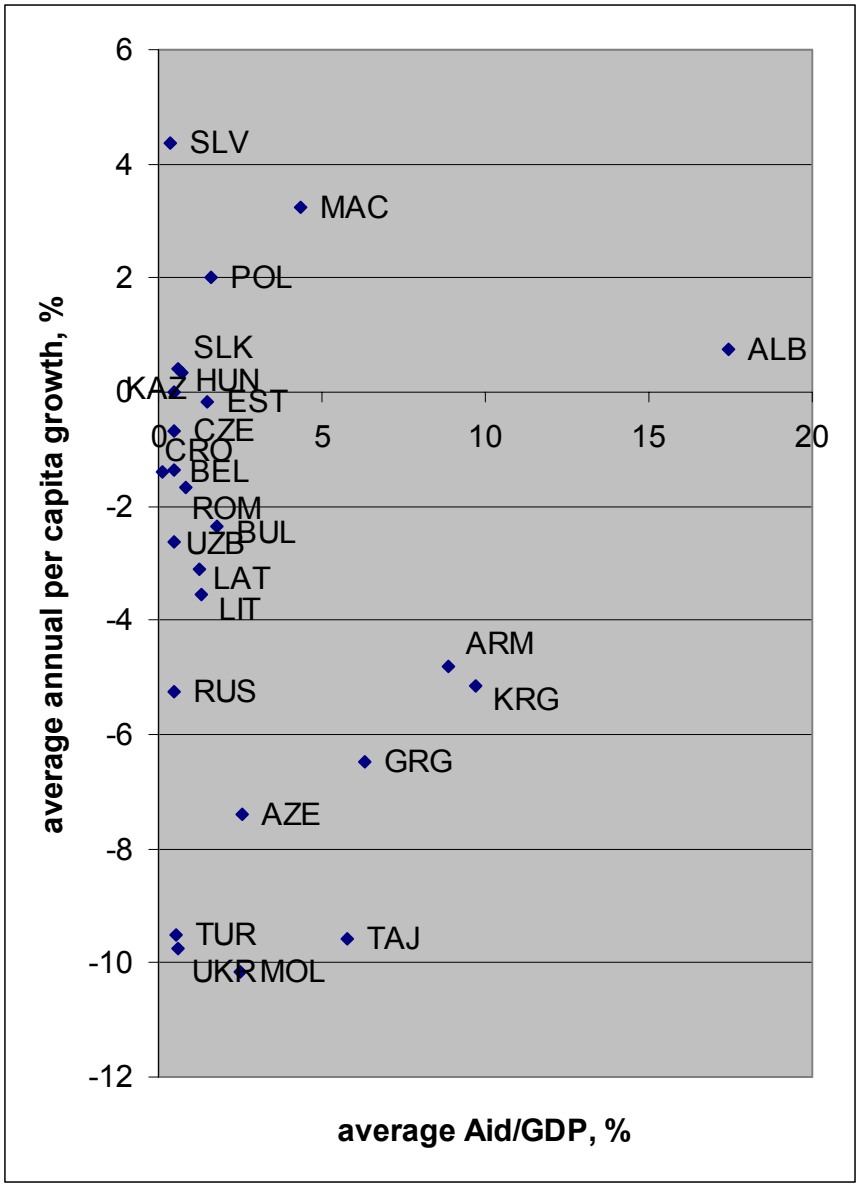


Figure 3. **Average Aid/GDP and Average Annual Per Capita Growth in Transition Countries**



The Special Features of Panel Data

We have decided to employ the panel data in our study of the growth impact of foreign aid because the rich structure of the panel data offers us more insightful information on the economic conditions and phenomena in the set of 25 transition countries than simple cross-section or time-series analysis. The main advantages of the panel data are the following:

1. Panel data allows controlling for individual country heterogeneity. For example, in our study the countries' growth rates are modeled as affected by the structural and policy variables, which vary with countries and time. However, there are a lot of variables affecting growth that maybe country-invariant or time-invariant. For instance, the international interest rates, or the general conditions in the international financial markets, or the world commodity prices could have a country-invariant time-specific effect on the dependent variable. On the other hand, country-specific climatic conditions or political instability could be important factors for output growth rates. Often the information on these variables is either difficult to measure or hard to obtain; consequently, the explicit inclusion of them in the model is impossible. However, the omission of these variables could lead to biased and inconsistent estimates of the model parameters. The time-series or cross-country studies cannot account for both time-specific and cross unit-specific characteristics due to the one-dimensional space of the observations. By contrast, panel data controls for these variables by, for example, differencing across cross-sections, thereby eliminating either not observable or not included effects.

2. As outlined by Baltagi (2001, p.6), "panel data gives more informative data, more variability, less collinearity among the variables, more degrees of freedom and more efficiency". The multicolinearity, which often arises

in the time-series data, is less of the problem in panel data due to cross-sectional variation; the variance of the variable could be decomposed into the within and between cross-section components. The sufficient degree of variation both in regressors and regressand is important prerequisite for the quality of the estimation precision.

3. Panel data provides an insight into the dynamics of the economic phenomena, which cannot be rigorously modeled in the cross-section study. For example, the inclusion of the time-specific constants in the growth equation provides information on the dynamic changes of the growth rates during the transition period.

Besides the advantages of panel data, which we have just outlined, there are some problems associated with collecting and pooling the data. The understanding of these problems has helped us either to eliminate completely or to alleviate the possible negative impact of these problems on the quality of the data. Among the first such problems is the design of the data. For the panel data to be poolable, it is important that the variables be measured using the same techniques either in time-series or cross-sectional dimensions. Individual countries may employ different approaches to calculating their economic indicators; thus, we decided to obtain the data from international organizations, which employ the same techniques to all set of countries. In addition, since organizations also may change their methodology along the time, we work with the most recently designed data sets. The second problem with the data is its short time dimension. This implies that asymptotic properties of the estimators crucially depend on the number of cross-sectional dimensions. However, we decide not to exaggerate this aspect in our data since, firstly, after at most a dozen years of independence we cannot get longer annual time periods; secondly, the problem is more serious in the studies with the limited dependent variables (Baltagi 2001).

4.2. The Econometric Methodology

In our study we use a panel data; thus, it is necessary to employ econometric methodology that would allow full exploration of the rich time-series and cross-sectional properties of the data to describe economic phenomena. In our work we use different estimation techniques and discriminate among them based on the standard econometric tests to find the model that would provide good fit for our data.

Static Panel Data Models

For the econometric analysis in this work we employ the static panel data econometric modeling suggested by Greene (2000) and Verbeek (2000). The basic framework of the panel data modeling starts from the following equation:

$$y_{it} = \alpha_i + \beta' x_{it} + \varepsilon_{it}, \qquad (4.1)$$

where y_{it} is an actual value of the dependent variable for country *i* at time *t*; x_{it} is a vector of explanatory variables, not including constant term; β is a vector of the slope coefficients; ε_{it} is an error component for cross-unit *i* at time *t*. α_I is called an individual effect of the cross-sectional unit. The individual component is assumed to be constant for each cross-section unit across all time periods.

If we have sufficient theoretical and econometric rationale to assume that there is no difference across cross-sectional units, and that the individual effects could be ignored, then the ordinary least squares technique will provide consistent and efficient estimation of the parameters of the model (Greene 2000, p.560). However, if the individual effects cannot be ignored then the panel data techniques provide higher precision of the estimates and reduce bias due to the unobserved heterogeneity.

There exist two main approaches to model the individual-specific effects in the static panel data. According to the fixed effects approach, the difference across cross-units could be captured by differences in the constant term. The fixed effects estimator is derived as an OLS estimator of the parameter differences from the mean. Since it is based on OLS techniques, fixed effects estimation requires strict exogeneity of the regressors. The fixed effects approach has good theoretical justification if the sample includes a full set of cross-section unit with some specific characteristics, which allow for assuming that differences across cross-sections are well captured by the shifts in the intercepts.

According to the random effects approach, the individual-specific effects randomly vary across cross-sections. In this case, the individual effect is modeled as the country specific error term plus the conventional disturbance ε_{it} as defined above. Random effects estimator employs both within and between cross-sections information and produces consistent and efficient estimation of the parameters in large samples.

In our econometric analysis we first determine whether the data contains sufficient information on the individual-effects across countries. This is done by F-test, which test the significance of the individual effects. Under the null hypothesis of common intercept the pooled OLS estimation is an efficient estimator. If the null hypothesis cannot be rejected we proceed with pooled OLS estimation, alternatively we work with techniques for panel data.

In case, we are not interested in the explicitly modelling individual effects, we may employ the random effects. To test the appropriateness of the random effects we employ Breusch and Pagan (1980) Lagrange multiplier test for random effects. Under the null hypothesis the individual specific disturbance does not vary across cross-sections; thus, the random effects is not appropriate in this case.

The discrimination between fixed and random effect could be justified on the theoretical ground by the characteristic of the sample. According to Verbeek (2000, p.319), "the first reason why one may prefer the fixed effects estimator is that some interest lies in α_i, which makes sense if the number of units is relatively small and of specific nature".

However, there may occur a situation when fixed effects should be applied despite the theoretical considerations. It happens when the individual effect is correlated with the explanatory variables. In this case, the fixed effects provide consistent estimates while random effects – biased and inconsistent. Hausman specification test (1978) is contrived to test the orthogonality of the random individual effects and the regressors. The essence of the Hausman test lies in the comparison of two estimators: one of which is consistent under both the null and the alternative hypothesis (fixed effects) and the other is consistent and efficient only under the null (random effects). A significant difference between the two estimators indicates that the null hypothesis is unlikely to hold.

The Problem of Endogeneity of Regressors

Whether we employ pooled OLS techniques or panel data models, a situation may occur when one regressor or some subset of regressors is endogenous to the model. In this case the conventional estimation does not produce consistent estimates of the pure effect of the regressor on the dependent variable due to the possibility of backward influence; the instrumental variables techniques are necessary. An appropriate instrumental variable should be correlated with the potentially endogenous variable and uncorrelated with the error term. In addition to the intuitive understanding, the appropriateness of the instrumental variables approach should be tested rigorously. Hence, having decided on either pooled OLS or one of the panel data techniques and having found a set of regressors subject to endogeneity, we proceed as follows: first, we perform the F-test of the

validity of the instruments; second, if the instruments are appropriate, we estimate the model using instrumental variables approach; third, we test for the overidentifying restrictions; fourth, if the OIR test does not reject the moment conditions, we perform Hausman test on instrumental variables (sometimes referred to as Wu-Hausman test).

In brief, the consistency and asymptotic properties of the instrumental variables estimator depends on the assumption of model being correctly specified. The F-test answers the question whether instruments are correlated with instrumented variable. F-test consists in regressing instrumented variable on the potential instruments and testing the joint significance of the explanatory variables. If joint significance is rejected, then the variation in instrumented variable is not explained by the variation in suggested instruments but by the random forces represented by the error term. Thus if F-test reject H_0, one of the conditions of validity of instruments (correlation with the explanatory variable) is established.

The second step in checking the validity of instruments is testing the orthogonality of the moment conditions. If the number of instruments is exactly equal to the number of instrumented variables than the sample moments are forced to be equal 0 by construction (because number of equations equals the number of parameters) regardless whether the population moment conditions actually holds. Thus, to test for the model specification we should have more instruments than instrumented variables. In this case, all sample conditions must be as close as possible to 0 if the population conditions of zero correlation between instruments and error term hold. The overidentified restrictions (Verbeek 2000) test answers the question whether we could in some statistically significant way not to reject the case that the population conditions are actually equal to zero.

Further Aspects of the Panel Data

Having discussed the basic algorithm of our econometric analysis, we would like to briefly highlight the peculiarities of our data.

In our study the panel data set is more oriented towards cross-section analysis then towards time-series component. Consequently, to capture time-specific effects, we explicitly model different time periods in our equations, assuming that the difference across time periods could be captured by the differences in the intercepts:

$$y_{it} = \alpha_i + \lambda_t + \beta' x_{it} + \varepsilon_{it}, \qquad (4.2)$$

where λ_t is a time specific constant. Since our panel is unbalanced, we model only those time-specific constants that are common for all cross-section units, that is from year 1992 to year 1999. However, to avoid the possibility of multicolinearity with the constant term for those countries that have their time series lasting from 1992 to 1999, we exclude time-specific constant for year 1992. Summarizing, we have 7 time-specific constants.

Another important aspect of each panel data is heterogeneity across cross sectional units. In the pooled OLS approach, the heterogeneity is established by the Breusch and Pagan test; and the standard errors are corrected using Huber/White correction. If we use fixed effects or random effects model, the fact that our panel is unbalanced is the additional source of the groupwise heteroscedasticity. In the random effects approach we explicitly control for heteroscedasticity using Generalized Least Squares approach. In the case of fixed effects estimation, the useful simplification for solving the groupwise heteroscedasticity problem occurs when we assume that the disturbance variance is constant within the cross-section units. According to Greene (2000, p.579), "If

the groupwise model is correct, then it [conventional estimator that uses OLS residuals] and the White estimator will converge to the same matrix".

Having discussed the basics of the econometric methodology, we are ready to proceed with econometric estimation itself.

4.3. Econometric Analysis of Growth, Aid and Policy Determinants

This section presents the results of the empirical estimation of growth, aid and policy determinants. The estimated aid-allocation criteria and policy determinants then will be incorporated into the specification of the growth equation that we model in this section.

The Growth Equation

As described in the preceding chapter, we estimate growth regression using pooled OLS and panel data techniques. F-test rejects the hypothesis of the common intercept, thus we proceed with estimating the panel data models. Breusch and Pagan Lagrange Multiplier test for random effects rejects the hypothesis of zero variance of the individual effects disturbance term; hence, we run both fixed effects and random effects regressions and employ Hausman test to discriminate between them. Hausman test does not reject the hypothesis of random effects being consistent and efficient, thus we keep random effects model as being more appropriate for the data at hand.

Table 2. Initial Growth Regressions

Dependent Variable: growth of real GDP per capita

Explanatory variable	Panel Regression 1 (Fixed Effects)	Panel Regression 2 (Random Effects, GLS)	Panel Regression 3 (FGLS*)
Structural variables			
Initial GDP per capita (log)	-	-2.792 (0.138)	-0.171 (0.886)
Years under communism	-	-0.116 (0.148)	-0.084 (0.091)
Secondary school enrollment (initial)	-	0.177 (0.069)	0.146 (0.006)
Rate of population growth	-1.086 (0.269)	-0.647 (0.407)	0.220 (0.631)
Financial depth (M2/GDP, lagged)	-0.031 (0.628)	-0.009 (0.839)	-0.007 (0.776)
Government consumption	0.120 (0.462)	0.024 (0.875)	-0.033 (0.745)
Industry share in GDP	0.026 (0.847)	-0.019 (0.855)	-0.189 (0.016)
Policy Variables			
Inflation (log)	**-1.226 (0.041)**	**-1.825 (0.000)**	**-1.673 (0.000)**
Budget Balance	**-0.058 (0.206)**	**-0.0381 (0.124)**	**-0.046 (0.002)**
Trade (share of GDP)	**0.394 (0.001)**	**0.350 (0.002)**	**0.428 (0.000)**
Time-specific constants			
1993	7.230 (0.009)	4.902 (0.047)	3.263 (0.035)
1994	5.439 (0.051)	3.468 (0.139)	3.911 (0.011)
1995	8.629 (0.003)	6.464 (0.007)	4.810 (0.003)
1996	9.813 (0.001)	7.115 (0.003)	5.281 (0.001)
1997	10.098 (0.002)	7.031 (0.004)	5.050 (0.002)
1998	7.542 (0.023)	4.319 (0.088)	3.004 (0.081)
1999	7.211 (0.039)	3.648 (0.168)	1.231 (0.506)
Number of observations	133	133	133
R^2/Log-likelihood	0.462**	0.682**	-378.7
F/ Wald-statistics	F(14, 96) = 6.29 (0.000)	χ^2 (17) = 113.41 (0.000)	χ^2 (17) = 179.52 (0.000)
F test for common intercept	F(22, 96) = 2.17 (0.005)	-	-
Breusch-Pagan LM test for random effects	-	χ^2 (1) = 4.49(0.034)	-
Hausman test	χ^2 (14) = 11.93 (0.612)		-

Note: p-values are in parentheses. All regressions are run with constant. *Panels-heteroscedastic regression **R^2 between is reported

Following the findings by Barro (1997) about endogeneity of inflation, we run random effects instrumental variables regression, where inflation is instrumented with lagged inflation and regional dummy variables. Wu-Hausman test does not reject the null hypothesis of no difference between simple random effects and instrumented random effects. We conclude that simple random effects should be used because, although both methods are consistent, simple random effects method is more efficient. We also run Generalized Least Squares time-series cross-sectional regression to explicitly control for groupwise heteroscedasticity. The results of the estimation of the benchmark growth equation are presented in Table 2 (OLS and TSLS regressions are presented in the Appendix Table 3).

It can be seen that in general all models perform well, explaining around 50% of the variation in country growth rates. The policy variables, which are of particular interest in our regression, are correctly signed in all five specifications. Although trade policy variable does not preserve its significance through all five specifications, it is significant at 1% level in our GLS regression where we control for heteroscedasticity. Inflation and budget balance variables are highly significant in all models. In general, our results on policy variables support the findings of Fischer (1993). Lower inflation rates and higher budget surpluses are conductive to growth. Negative sign on trade variable supports the concept of "trade openness paradox". Although, according to classical views of international trade, foreign trade liberalization should be beneficial to countries' welfare, in transition countries the distorted structure of the foreign trade prevails. Their export-oriented policy could lead to impoverishing of output growth rates due to inefficient structure of foreign trade, which is usually characterized by the large share of raw materials and semifinished goods in the exports. We should also note that the magnitudes of the growth impact of the three policy variables are different: the budget balance growth impact is approximately ten times lower

than inflation one, and trade policy impact is ten times lower than the impact of fiscal policy.

Analyzing the GLS regression (Panel Regression 3 in Table 2), we see that among the initial conditions, the initial secondary school enrolment and number of years under communism appear to be statistically significant, which confirms the findings by Fischer and Sahay (2000) on transition economies. According to all five models, the higher the secondary school enrolment ratio in the pre-transition period, the higher the country's growth rates; and the longer had country been exposed to the communist regime, the deeper its potential for growth was distorted.

The coefficient on the initial GDP per capita, although insignificant, has a negative sign, which indicates the possibility of convergence effect among transition countries. Financial depth, government consumption, and industry value added share in GDP do not appear to be statistically significantly different from zero in the regressions; however, we would not suggest to disregard them from the specification since they serve as control variables. The insignificance of the coefficients could be explained by the insufficient size of the sample and missing data on some observations.

The subset of the time-specific constants appear to be statistically significant at a 1% level with the high level of significance of the individual time specific effects, indicating the importance of the evolution along the transition period in the factors not explicitly included in the model. Specifically, the time-specific positive effect increases till year 1997 and then slightly declines.

Summarizing our estimation of the benchmark growth equation, we suggest the importance of the macroeconomic policy environment for growth in transition countries.

The Construction of Policy Index

As we have described in the previous chapter, it is more convenient to work with a single indicator of macroeconomic policy environment in the country. On the one hand, the single indicator allows easy and quick comparison of the macroeconomic policies across countries; on the other hand, it significantly simplifies the estimation of the joint impact of foreign aid and policy on the growth without loss of generality. (In the latter case we compute a single interaction term and economize on the degrees of freedom).

The policy index is constructed as a weighted average of the three policy variables, where the weights are the estimated coefficients on policy variables from the benchmark growth regression. Intuitively, these weights reflect the estimated importance of each policy variable for growth.

Policy index includes three basic policy variables – inflation, budget balance and trade, which proxy monetary, fiscal and trade policy, respectively.

$$Policy_{i\,c} = a + b1*Log(Infl)_i + b2*Fiscal_i + b3*Trade_{i,} \qquad (4.3)$$

where subscript *i* indicates the i-th country , *i* runs from 1 to 25.

The constant *a* is calculated in such a way that policy index reflects predicted country's growth rate given its policy indicators not including the time-specific effect, provided that it has the value of all other growth determinants on their sample means. The calculation of the constant term is presented in the Table 3.

Table 3. Construction Of The Constant Term For Policy Index

Variable	Sample mean	Coefficient from the benchmark growth equation
Constant term from benchmark regression	-	9.537
Initial GDP per capita (log)	8.320	-0.171
Years under communism	57.149	-0.084
Secondary school enrollment (initial)	87.191	0.146
Rate of population growth	0.17	0.220
Financial depth (M2/GDP, lagged)	32.751	-0.007
Government consumption	17.997	-0.033
Industry share in GDP	34.054	-0.189
Constant term (sum of the products)	0.5960518	

Using parameters estimates from time-series cross-sectional GLS model we compute policy index according to the following formulae:

$$Policy_{i\,c} = 0.5960518 - 1.673376*Log\,(Infl)_i + 0.427759*Fiscal_i - 0.045913*Trade_{i,}$$

In the sample the mean value of the newly created index is –4.677, standard deviation 5.400. The minimum value of –33.291 is attributed to Armenia in 1993 with inflation of 3732, budget deficit over GDP of 54.7 and real growth rate of –16.03%. The maximum value of 4.501 corresponds to Bulgaria in 1999 with inflation of 0.7, budget deficit over GDP –1.2 and growth rate 3.01%.

From now on we use the constructed policy index to proxy for country's macroeconomic policy (we refer to it as Policy Index).

The Aid Equation

By running the aid-allocation equation we pursue three main objectives: first, we determine the factors that appear to significantly influence aid allocation towards specific countries; second, we determine the possible instruments for aid in case we want to check for the endogeneity of aid in the growth equation; third, we establish whether policy has been among the aid-allocation criteria in transition countries.

We estimate the aid-allocation criteria model including all aid determinants described in the previous chapter and newly constructed Policy Index. Since F-test for common effects rejects the null hypothesis, we proceed with panel data models. Breusch and Pagan Lagrange Multiplier test and then Hausman test point out in favor of in favor of the random effects model. Thus, we estimate random effects GLS regression as well as time-series cross-sectional GLS explicitly controlled for heteroscedasticity. The results of the estimation are presented in Table 4.

We consider the possibility of endogeneity of Policy Index: on the one hand, policy could well be among the factors that attracts aid into a country; on the other hand, aid could itself dictate some aspects of policy environment in the recipient country. Thus, we instrument policy with dummy for war and lagged growth, which appear to influence policy (this fact is established in the next section). However, as the Wu-Hausman test indicates, the Policy Index appears to be exogenous to aid (see Appendix Table 4 for OLS and instrumental variables regressions). Moreover, according to the results of our estimation, neither contemporaneous policy environment nor the lagged policy environment seems to be among the foreign aid allocation criteria in transition countries.

Table 4. Aid Regressions

Dependent Variable: Aid as a share of GDP

Explanatory variable	Panel Regression 1 (Fixed Effects)	Panel Regression 2 (Random Effects, GLS)	Panel Regression 4 (FGLS)
Initial GDP per capita (log)	-	-6.891 (0.000)	-4.998 (0.000)
Population (log)	7.052 (0.709)	-0.944 (0.042)	-0.757 (0.000)
Infant mortality rate	-0.087 (0.615)	-0.170 (0.023)	-0.136 (0.000)
Years under communism	-	0.093 (0.129)	0.037 (0.086)
Dummy for CEE	0.053 (0.989)	3.451 (0.030)	1.332 (0.014)
Policy index	**-0.201 (0.076)**	**-0.271 (0.013)**	**-0.039 (0.471)**
Policy index (lagged)	0.037 (0.744)	0.037 (0.738)	-0.013 (0.804)
1993	-8.0239 (0.000)	-4.588 (0.004)	-0.756 (0.225)
1994	-6.982 (0.000)	-3.288 (0.0.37)	-0.500 (0.418)
1995	-6.642 (0.000)	-2.740 (0.065)	-0.263 (0.659)
1996	-5.590 (0.003)	-1.866 (0.207)	-0.035 (0.952)
1997	-6.048 (0.002)	-2.288 (0.126)	-0.169 (0.775)
1998	-5.801 (0.005)	-2.155 (0.175)	-0.249 (0.685)
1999	-4.826 (0.019)	-1.163 (0.465)	-0.208 (0.737)
Constant	-103.084 (0.733)	72.830 (0.000)	55.529 (0.000)
Number of observations	162	162	162
R^2/Log-likelihood	0.114*	0.764**	-306.15
F/ Wald-statistics	F (12, 125) = 2.11 (0.021)	χ^2 (14) = 86.39 (0.000)	χ^2 (14) = 108.63 (0.000)
F test for common intercept	F(24, 125) = 2.17 (0.003)	-	-
Breusch-Pagan LM test for random effects	-	χ^2 (1) = 4.00 (0.045)	-
Hausman test	χ^2 (12) = 17.02 (0.149)		-
		χ^2 (14) = 4.53 (0.991)	

Note: p-values are in parentheses.

*R^2 between is reported; ** R^2 overall is reported

As the results of the estimation indicate, all models, except the fixed effects, explain the aid allocation criteria reasonably well. Initial GDP per capita is significantly negatively correlated with aid, indicating that, on average, the richer the country was at the beginning of the transition period, the less foreign aid it has been likely to receive. Other important aid allocation criteria are the demographic characteristics of the recipient country: population and infant mortality rates. Our finding confirms the results of the previous researches that donors are biased toward countries with smaller population, and that high infant mortality rates tend to discourage foreign aid inflows. We have also found that the longer the country was exposed to the communist regime, the more aid it is likely to receive. At the same time, the countries of the Central and Eastern Europe tend to receive foreign aid 1.3% higher (calculated as share of GDP) than countries of the former Soviet Union, which reflects donors-specific interest towards CEE countries.

The statistically insignificant time-specific constants indicate that the timing of the aid has not been exposed to some particular pattern. However, for the sake of the argument we should note that in all specifications the time-specific constants also insignificant are negatively signed. In addition, the constant term appears to be highly statistically and numerically significant, indicating that there are other factors not explicitly included in the model that influences aid allocation among transition countries.

The Policy Equation

The basic rationale behind estimating the policy equation is determining whether foreign aid influences policy in the recipient country in any statistically significant way. The results of the estimation of policy equation are presented in Table 5. The econometric tests point out in favor of fixed effects panel regression (column 2 in Table 5). As can be seen from the estimation results, in all models

aid appears not to affect the policy environment in the recipient country. In our view, this finding reasonably reflects not very large amounts of aid in the average transition country. The financial depth, war dummy, and lagged growth are good predictors of the macroeconomic policy conduct in the country. The impact of time-specific factors not explicitly included in the model tends to be not significant except for years 1993 and 1994.

Having estimated aid and policy equation, we establish that aid and policy do not influence each other in any statistically significant way. It means that in our three-equation model developed in the previous chapter the problem of simultaneity does not arise. Hence, we can proceed by estimating the growth equation with aid and aid-policy interaction terms.

Table 5. Policy Regressions

Dependent Variable: Policy index

Explanatory variable	Panel Regression 1 (Fixed Effects)	Panel Regression 2 (Random Effects, GLS)
Initial GDP per capita (log)	-	0.684 (0426)
Secondary school enrollment (initial)	-	-0.051 (274)
Years under communism	-	-0.093 (0.010)
Rate of population growth	-0.814 (0.113)	-0.012 (0.974)
Financial depth (M2/GDP, lagged)	-0.119 (0.000)	-0.071 (0.001)
War dummy	-2.695 (0.030)	-1.623 (0.084)
Growth (lagged)	0.246 (0.000)	0.244 (0.000)
Aid (share of GDP)	**0.105 (0.514)**	**4.665 (0.814)**
1993	-2.3773 (0.056)	-2.450 (0.045)
1994	-3.153 (0.029)	-2.413 (0.038)
1995	-1.015 (0.475)	-0.187 (0.869)
1996	-2.223 (0.127)	-0.792 (0.492)
1997	-2.077 (0.164)	-0.854 (0.460)
1998	-1.425 (0.336)	-0.053 (0.964)
1999	-1.261 (0.387)	0.219 (0.851)
Number of observations	158	158
R^2/Log-likelihood	0.376	0.623
F/ Wald-statistics	F(12, 121) = 19.72 (0.000)	$\chi^2(15) = 245.33$ (0.000)
F test for common intercept	F(24, 121) = 2.37 (0.001)	-
Breusch-Pagan LM test for random effects	-	χ^2 (1) = 0.99 (0.320)
Hausman test	χ^2 (12) = 22.72 (0.030)	

Note: p-values are in parentheses. All regressions are run with constant.

4.4. Econometric Analysis Of The Growth Impact of Foreign Aid

In this section we present the estimation results of the growth regressions with aid and aid-policy interaction terms.

F-test rejects the null hypothesis of common intercept at 2% significance level. Thus, we proceed with panel data models (see Appendix Table 6 for OLS regression). With the help of the Hausman test we discriminate between fixed effects and random effects in favor of the latter. The results of the estimation are reported in the Table 6. To check the possible endogeneity of aid and policy, which were discussed in the previous chapter, we employ the instrumental variables random effects Generalized Two Stage Least Squares technique, where we instrumented aid and policy variables with the instruments that have been found important in determining these variables in the proceeding section: logarithm of population, infant mortality rate, growth lagged, dummy for war, and dummy for Central European countries (see Appendix Table 6 for instrumental variables regression). Since we have more instruments than potentially endogenous variables we perform the overidentified restriction test to check the validity of the instruments. The overidentified restrictions test does not reject the null hypothesis of orthogonality of instruments and error term (a p-value of the null being 0.98). Thus we can proceed with Wu-Hausman test to determine whether aid and policy could be regarded as endogenous to growth. The Wu-Hausman test produces a very high p-value of the null hypothesis, indicating that although random effects Generalized Two Stage Least Squares model is consistent, the simple random effects model is both consistent and efficient. Thus the random effects G2SLS is superfluous.

Table 6. Growth Regressions with Aid

Dependent Variable: growth of real GDP per capita

Explanatory variable	Panel Regression 1 (Fixed Effects)	Panel Regression 2 (Random Effects, GLS)
Initial GDP per capita (log)	-	-2.023 (0.388)
Years under communism	-	-0.132 (0.119)
Secondary school enrollment (initial)	-	0.162 (0.126)
Rate of population growth	-1.323 (0.212)	-1.029 (0.210)
Financial depth (M2/GDP, lagged)	0.000 (0.994)	0.002 (0.957)
Government consumption	0.283 (0.292)	0.128 (0.428)
Industry share in GDP	-0.001 (0.992)	-0.001 (0.989)
Policy Index	**0.858 (0.000)**	**0.893 (0.000)**
Aid	**0.333 (0.401)**	**0.421 (0.107)**
1993	8.026 (0.008)	5.492 (0.036)
1994	5.673 (0.061)	3.286 (0.188)
1995	9.873 (0.002)	7.505 (0.003)
1996	10.556 (0.001)	7.986 (0.001)
1997	10.950 (0.001)	8.295 (0.001)
1998	8.329 (0.011)	5.707 (0.028)
1999	7.725 (0.022)	2.549 (0.365)
Number of observations	127	123
R^2/Log-likelihood	0.557*	0.733
F/ Wald-statistics	F(13, 91) = 6.81 (0.000)	χ^2 (16) = 103.19 (0.000)
F test for common intercept	F(22, 91) = 1.99 (0.013)	-
Overidentified restrictions test	-	χ^2 (5) =0.652 (0.985)
Hausman test	χ^2 (13) = 6.78 (0.913)	

Note: p-values are in parentheses. All regressions are run with constant.
*R^2 between is reported

The main variables of interest in the regression are Policy index and aid. As could be seen from Table 6, in all models, Policy index is found to statistically significantly influence growth. At the same time aid has not influenced growth in transition countries in statistically significant way in panel regressions. This confirms our hypothesis that aid has not raised growth in typical transition country if the impact is not conditional. This result goes in line with the previous studies on foreign aid effectiveness on developing countries (Burnside and Dollar 2000; Collier and Dollar 1998).

To test whether the growth impact of foreign aid could be enhanced in the good macroeconomic policy environment, we estimate regression with aid-policy interaction term. Considering the possibility of non-linear relationship between aid and growth we included aid squared interacted with policy index.

In the Table 7 we present estimation of panel data models. On the basis of tests we regard fixed effects as being superior model for our data. However, as it could be seen from the Table 7, all panel data models provide consistent results: the magnitudes and the signs of the coefficients are comparable across all models, as well as the statistical significance of the effects. To test for the robustness of the results, we estimate regressions both with and without time-specific effects.

According to our analysis, the policy environment in the recipient country has had a great influence on growth: an improvement in policy index by one unit is associated with the rise in the growth rate of output by 0.892 percentage points.

Table 7. Growth Regressions with Aid/Policy Interaction Terms

Dependent Variable: growth of real GDP per capita

Explanatory variable	Panel Regression 1 (Fixed Effects)*	Panel Regression 2 (Random Effects, GLS)	Regressions without time-specific constants	
			Panel Regression 3 (Fixed Effects)*	Panel Regression 4 (Random Effects, GLS)
1	2	3	4	5
Initial GDP per capita (log)	-	-2.264 (0.289)	-	-1.105 (0.612)
Years under communism	-	-0.087 (0.256)	-	-0.060 (0.470)
Secondary school enrollment (initial)	-	0.155 (0.091)	-	0.154 (0.139)
Rate of population growth	-1.361 (0.000)	-1.483 (0.065)	-1.136 (0.015)	-1.165 (0.160)
Financial depth (M2/GDP, lagged)	0.029 (0.523)	0.031 (0.487)	0.022 (0.531)	0.031 (0.492)
Government consumption	0.385 (0.066)	0.083 (0.585)	-0.125 (0.286)	0.010 (0.948)
Industry share in GDP	-0.002 (0.984)	0.059 (0.567)	-0.208 (0.023)	-0.046 (0.645)

Table 7 (continued). Growth Regressions with Aid/Policy Interaction Terms

Dependent Variable: growth of real GDP per capita

1	2	3	4	5
Policy Index	**0.892 (0.000)**	**0.946 (0.000)**	**0.897 (0.000)**	**1.028 (0.000)**
Aid	**0.321 (0.336)**	**0.435 (0.080)**	**0.227 (0.391)**	**0.406 (0.120)**
Aid*Policy Index	**0.254 (0.018)**	**0.339 (0.017)**	**0.243 (0.024)**	**0.398 (0.004)**
Aid²*Policy Index	**-0.034 (0.005)**	**-0.038 (0.025)**	**-0.038 (0.002)**	**-0.047 (0.005)**
1993	5.548 (0.000)	3.579 (0.165)	-	-
1994	7.965 (0.000)	3.493 (0.148)	-	-
1995	9.752 (0.000)	7.000 (0.005)	-	-
1996	9.742 (0.000)	6.401 (0.009)	-	-
1997	10.425 (0.000)	7.064 (0.004)	-	-
1998	8.103 (0.000)	4.455 (0.076)	-	-
1999	6.414 (0.001)	3.474 (0.180)	-	-
Number of observations	124	124	124	124
R^2/Log-likelihood	0.670	0.752***	0.594	0.761
F/ Wald-statistics	F(15, 86) = 5.74 (0.000)	χ^2 (18) = 115.08 (0.000)	-	χ^2 (11) = 92.45 (0.000)
Durbin-Watson statistics	2.075	-	1.886	
F test for common intercept	F(22, 86) = 1.62 (0.060)	-	-	-
Breusch-Pagan LM test for random effects	-	χ^2 (1) =0.76 (0.382)	-	χ^2 (1) =0.05 (0.882)

Note: p-values are in parentheses. All regressions are run with constant. *White-Heteroscedasticity-Consistent Standard Errors and Covariance. **Ramsey-RESET test for omitted variables using powers of the independent variables. ***R2 overall is reported

Our finding on aid goes in line with the results of the previous regression – aid has not had a significant impact on growth if not combined with good policy environment. In particular, in all panel data models we have found the coefficient on aid being statistically insignificant, although positive. For the sake of the argument we should point out that in the panel random effect GLS regression the coefficient is marginally significant at 8%; however, this effects is not robust to exclusion of time-specific effects. In the pooled OLS regression the coefficient on aid is significant (see Appendix Table 7); however, we do not consider this model to be an appropriate representation of our data due to the presence of the individual country effects.

As it was expected, the coefficient on aid interacted with policy index is statistically significant in all models. The positive sign of the coefficient indicates that aid has a positive impact on growth in the good policy environment. On the other hand, the positive coefficient on the interaction term indicates that in the typical transition country the positive impact of policy on growth is enhanced by the presence of foreign aid.

In addition, we have found the statistically significant negative effect of quadratic term of the aid interacted with policy index. The magnitude of the coefficient is approximately ten times lower than that of the interaction term. This finding indicates that the growth impact of foreign aid conditional on good policy environment is diminishing.

Summarizing, the results of our empirical analysis of transition countries confirm the recent findings on the growth impact of foreign aid in developing countries (Burnside and Dollar 2000; Durbarry, Gemmell and Greenway 2000).

Chapter 5

CONCLUSIONS AND POLICY IMPLICATIONS

The previous studies on the aid in developing countries have not found a consistent relationship between aid and growth. However, if countries are ranked by the quality of their macroeconomic policy environment, aid appears to have a significant positive effect in countries with good policy environment.

The challenge of this work has been the investigation of the growth impact of foreign aid in transition countries. In particular, we have raised the question: do the transition countries have a different story on foreign aid effectiveness than the developing ones?

Based on our study, we cannot reject the maintained hypothesis on growth impact of foreign aid. In particular, we have found that

1) No consistent evidence from transition economies that foreign aid has raised growth rates in a typical transition economy exists.

2) On average, the growth impact of foreign aid is conditional on good policy environment.

By good policy environment we mean sound macroeconomic policies conducive for growth. In particular, we have found that by controlling inflation, balancing government budget, and improving the efficiency of the trade policy, a country could create a stable macroeconomic environment, which enhances the growth impact of foreign aid.

On the basis of our study, we would suggest the following policy implications:

- stable macroeconomic environment is one of the important steps toward economic development. Thus governments in transition countries should aim at coping with problems of inflation and considerable fiscal deficits;

- foreign aid is conductive to growth in a good policy environment. Thus countries conducting sound macroeconomic policies create environment that could enhance growth through the additional channel – foreign aid.

For further research we suggest investigating the impact of foreign aid on growth channeled through investments. In addition, it would be of interest to include into the analysis environmental factors exogenous to the country such as terms of trade shocks and natural resources endowment. The additional insight into the question of the growth impact of foreign aid could be gained by improving the specification of the policy index by inclusion the indicators of institutional quality of the recipient economy.

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APPENDIX

Figure 1.

Aid/GDP and Annual Per Capita Growth During Years of Transition

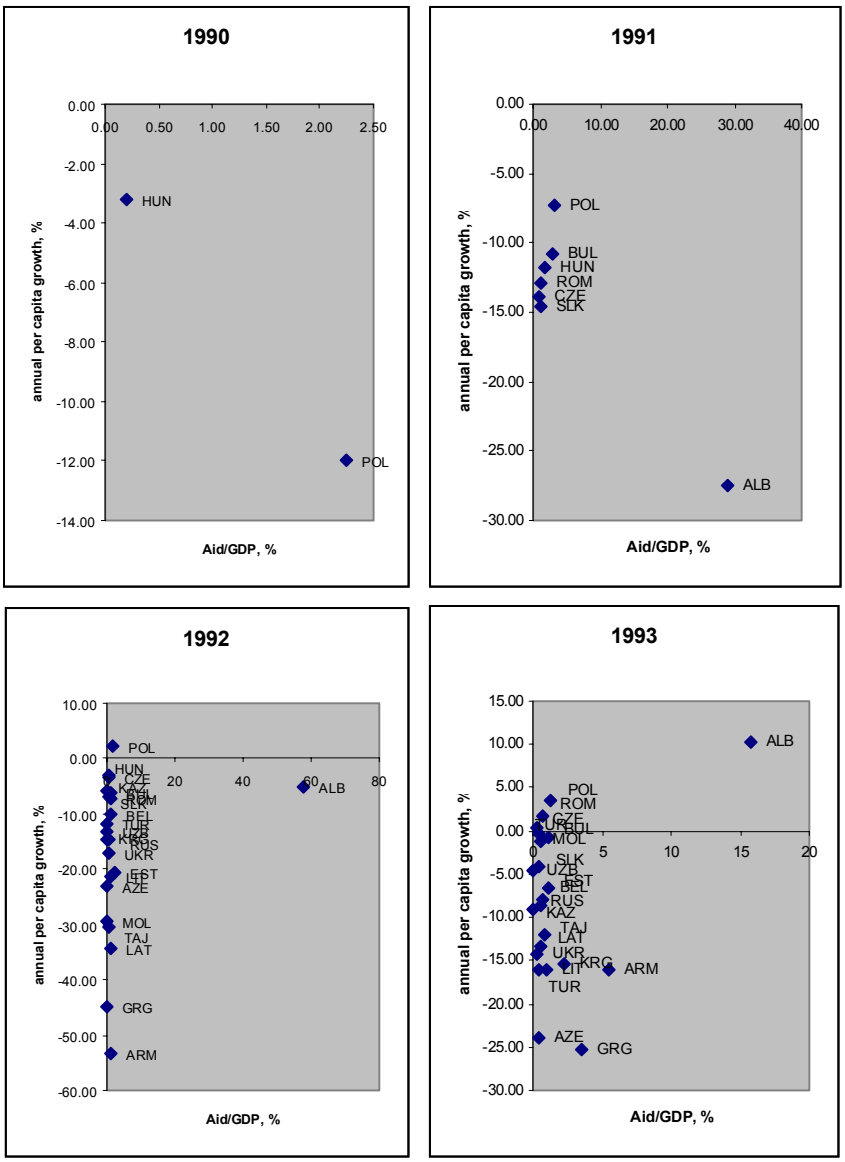

Figure 1 (continued).

Aid/GDP and Annual Per Capita Growth During Years of Transition

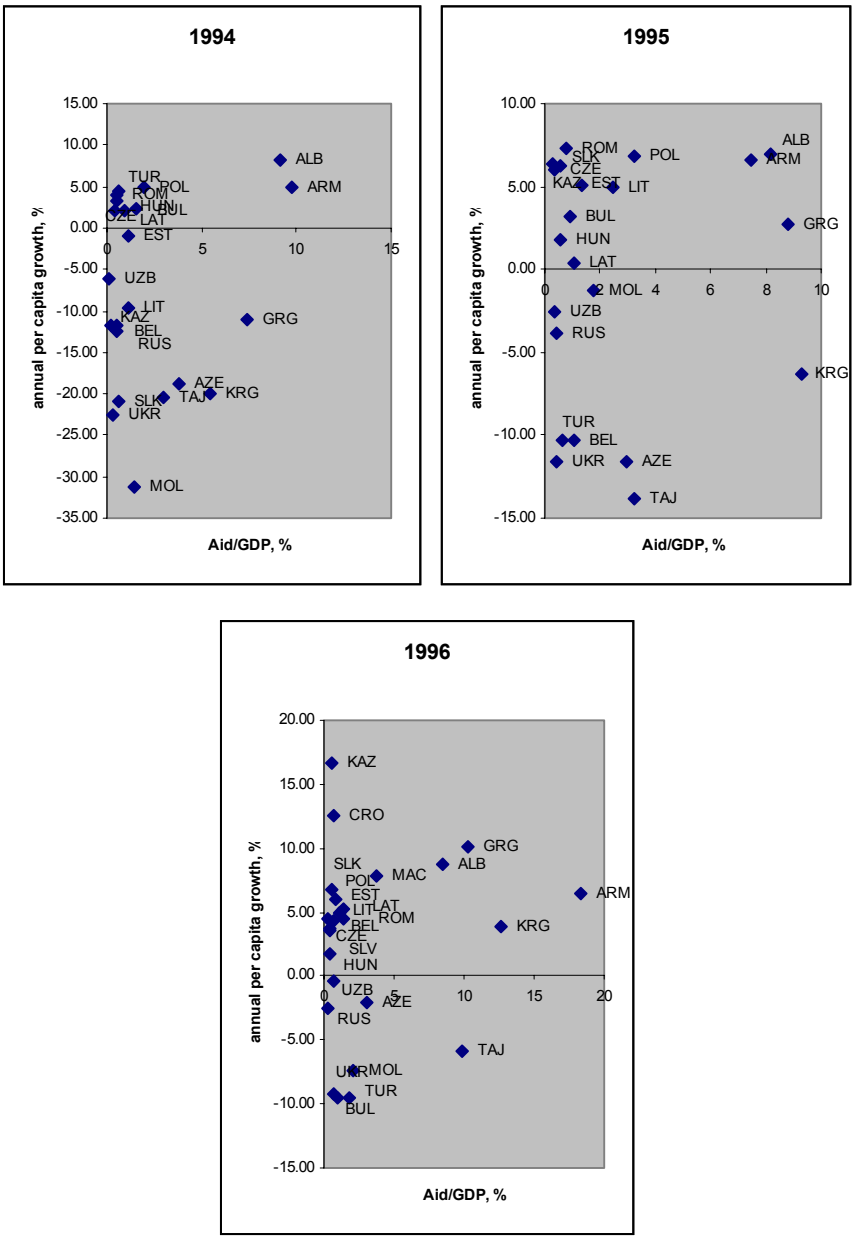

Figure 1 (continued).

Aid/GDP and Annual Per Capita Growth During Years of Transition

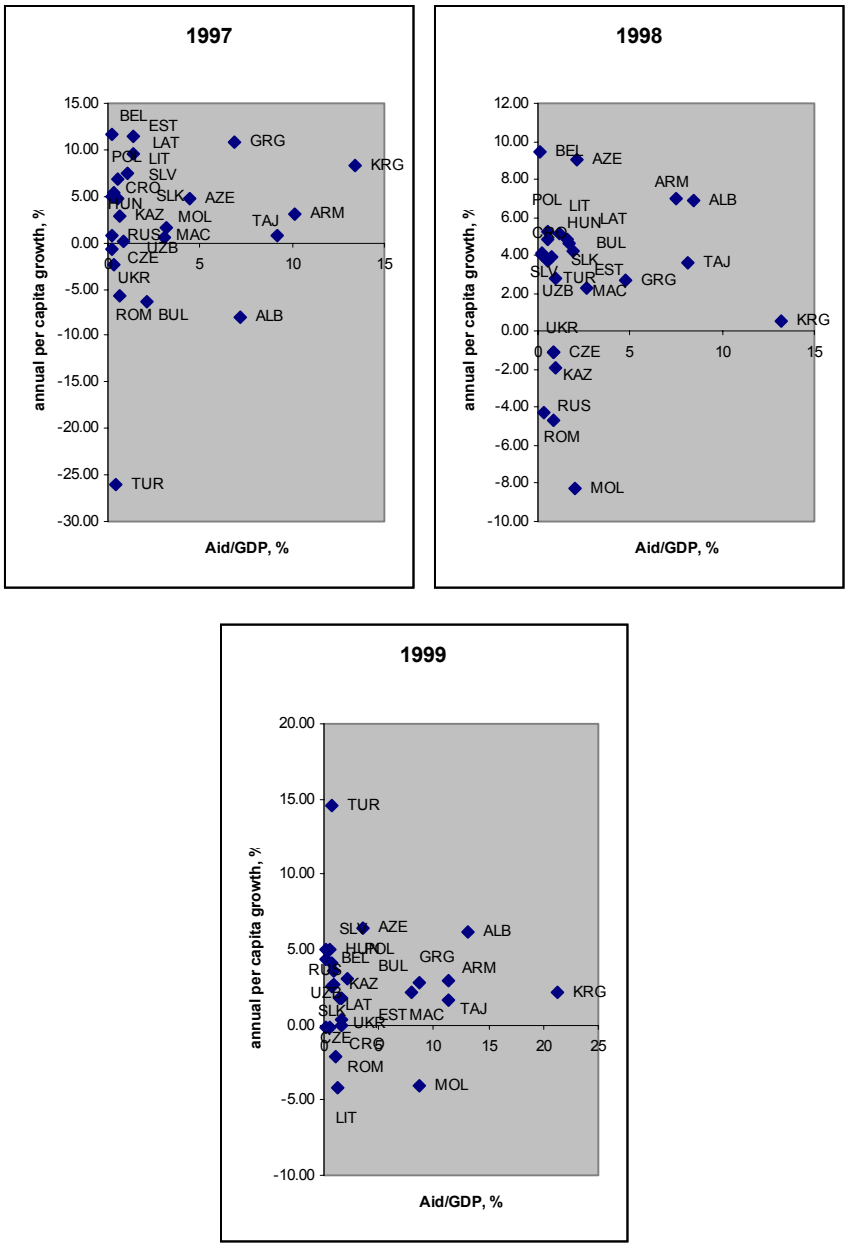

Figure 2.

Aid in Transition Time (AID over GDP)

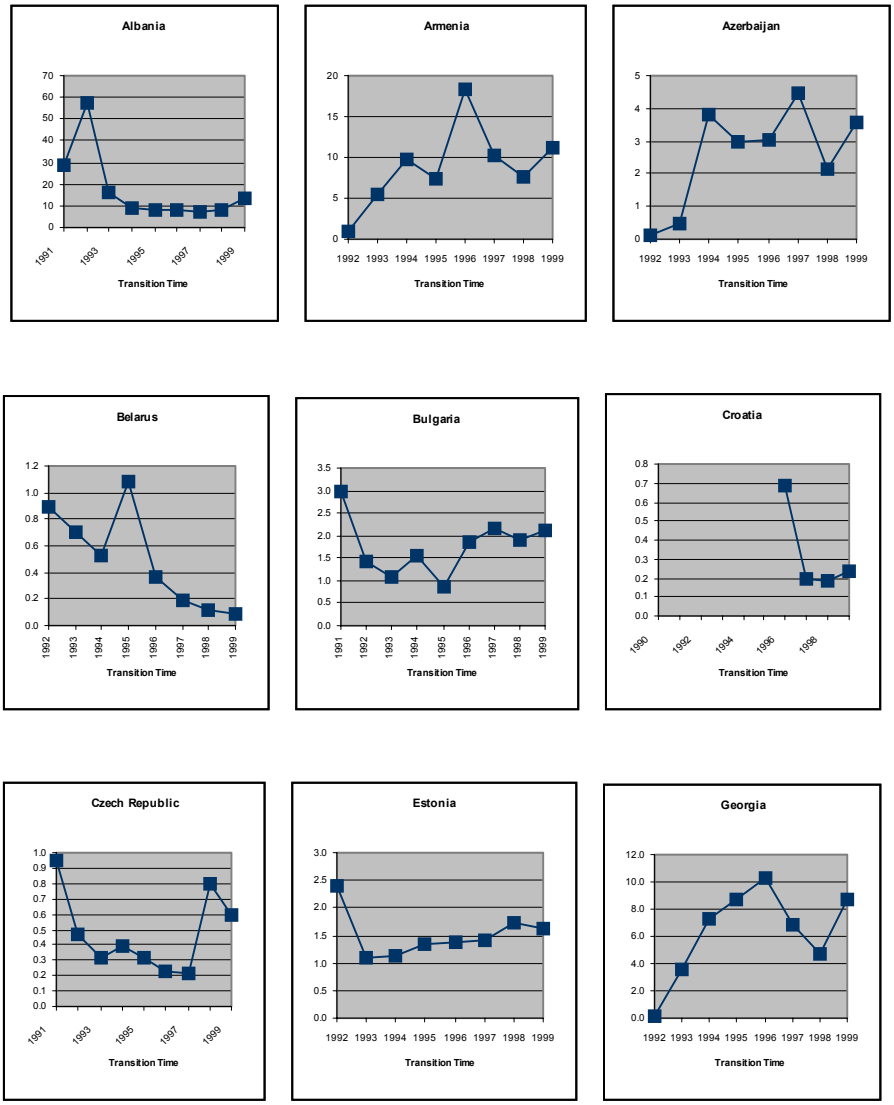

Figure 2 (continued).

Aid in Transition Time

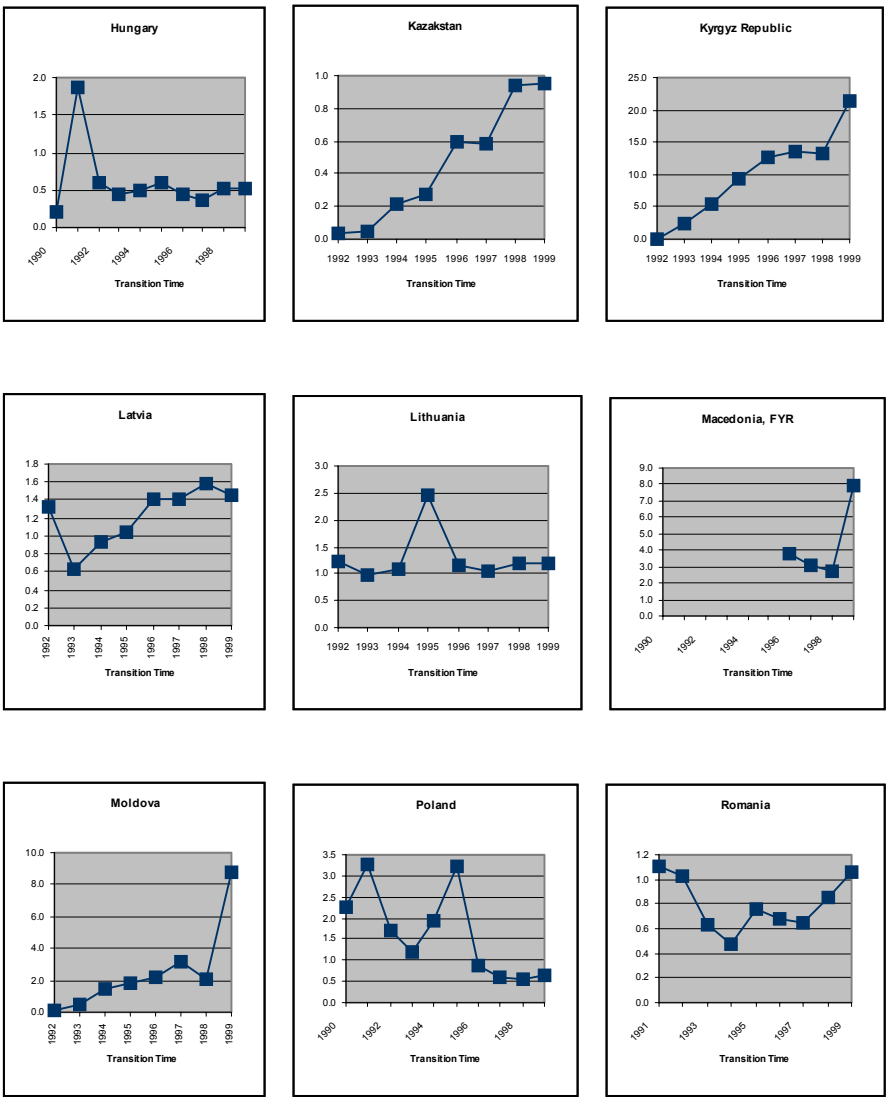

Figure 2 (continued).

Aid in Transition Time

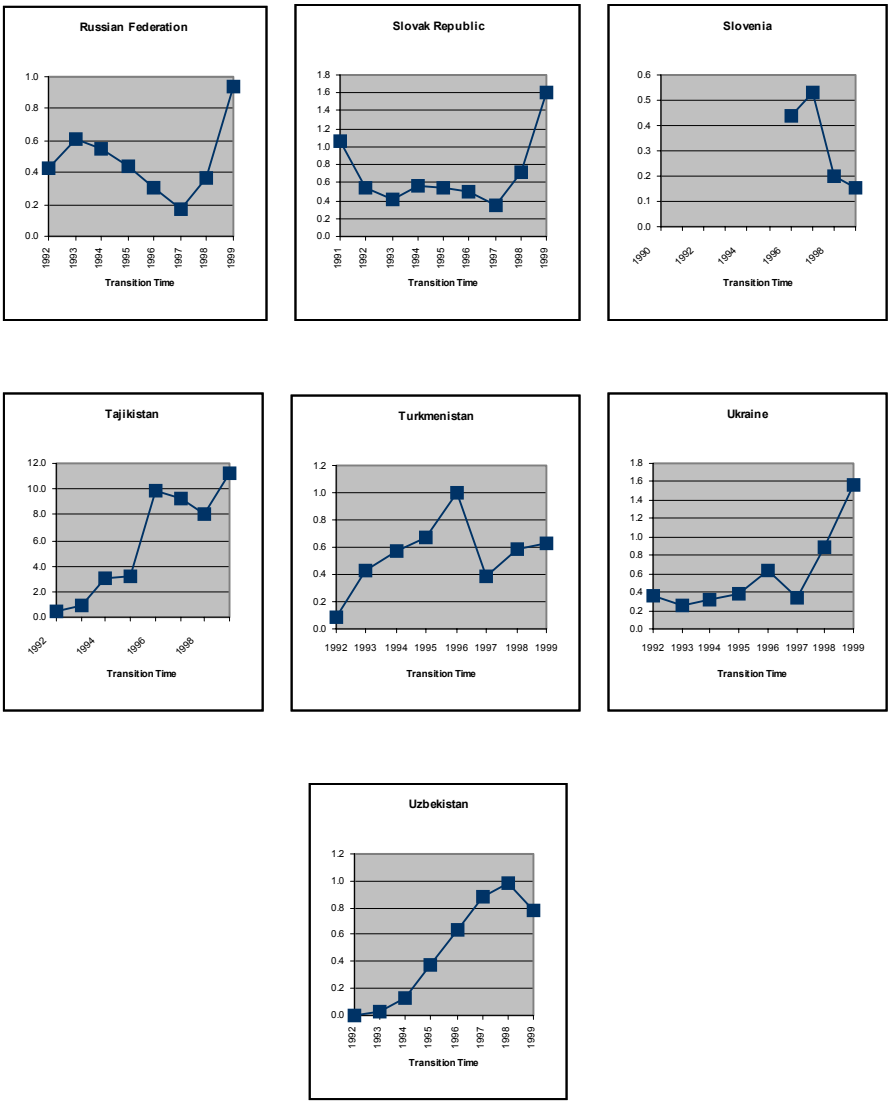

Table 1. Summary Statistics (Total Sample, Main Variables)

Variable	Obs	Mean	Std. Dev.	Min	Max
Grwoth of real GDP per capita, %	215	-3.16	10.57	-53.17	16.71
Aid/GDP, %	197	2.92	5.69	0.01	57.72
Real aid per capita, $	197	21.17	20.15	0.06	114.06
Log of initial income	215	8.32	0.60	6.44	9.35
Sec school enroll in pre-transition year	215	0.87	0.10	0.57	1.01
Years of communism	215	57.15	14.66	41.00	75.00
M2 as a share GDP, %	196	32.23	20.33	0.40	89.10
Budget Balance as a share of GDP, %	211	-5.72	6.59	-54.70	3.10
Inflation, %	215	425.54	1276.85	-8.50	15607.00
Trade as a share of GDP, %	211	91.99	34.15	14.24	182.70
Population growth, %	214	0.17	1.16	-3.82	7.18
Population, ind.	215	15,600,000	28,600,000	1,442,390	149,000,000

Table 2. Summary Statistics of Growth and Aid by Country

Country	Year of Transition	Number of Observations	Variables			
			Real GDP per capita growth, %		AID as a share of GDP, %	
			Mean	Std. Dev	Mean	Std. Dev
Albania	1991	9	0.74	12.40	17.42	16.57
Armenia	1992	8	-4.81	20.96	8.86	5.01
Azerbaijan	1992	8	-7.39	13.61	2.57	1.57
Belarus	1992	8	-1.35	9.64	0.50	0.37
Bulgaria	1991	9	-2.34	5.93	1.77	0.64
Croatia	1990	10	-1.39	10.35	0.33	0.24
Czech Republic	1991	9	-0.68	5.72	0.48	0.26
Estonia	1992	8	-0.18	9.77	1.51	0.43
Georgia	1992	8	-6.48	19.49	6.31	3.31
Hungary	1990	10	0.39	5.26	0.60	0.46
Kazakhstan	1992	8	-0.01	9.22	0.45	0.40
Kyrgyz Republic	1992	8	-5.16	10.43	9.71	6.93
Latvia	1992	8	-3.09	14.29	1.23	0.32

Table 2 (continued). Summary Statistics

Country	Year of Transition	Number of Observations	Variables			
			Real GDP per capita growth		AID/GDP, %	
			Mean	Std. Dev	Mean	Std. Dev
Lithuania	1992	8	-3.56	10.99	1.30	0.48
Macedonia, FYR	1990	10	-3.40	6.84	4.37	2.40
Moldova	1992	8	-10.16	12.90	2.50	2.68
Poland	1990	10	2.01	6.38	1.63	1.04
Romania	1991	9	-1.68	6.54	0.80	.022
Russian Federation	1992	8	-5.25	6.26	0.48	0.23
Slovak Republic	1991	9	0.35	7.32	0.70	0.40
Slovenia	1990	10	0.76	5.76	0.33	0.18
Tajikistan	1992	8	-9.58	11.92	5.75	4.36
Turkmenistan	1992	8	-9.50	13.07	0.55	0.26
Ukraine	1992	8	-9.75	8.21	0.60	0.44
Uzbekistan	1992	8	-2.63	5.25	0.48	0.40
Total Pooled Sample		215	-3.16	10.57	2.92	5.70

Table 3. Initial Growth Regressions (OLS and Instrumental Variables Regressions)

Dependent Variable: growth of real GDP per capita

Explanatory variable	Pooled OLS*	Panel Regression 3 (Random Effects, G2SLS**)
1	2	5
Initial GDP per capita (log)	-1.840 (0.324)	-2.929 (0.144)
Years under communism	-0.076 (0.255)	-0.097 (0.303)
Secondary school enrollment (initial)	0.168 (0.020)	0.181 (0.091)
Rate of population growth	-0.329 (0.617)	-0.754 (0.344)
Financial depth (M2/GDP, lagged)	-0.003 (0.929)	-0.003 (0.951)
Government consumption	0.078 (0.560)	-0.002 (0.993)
Industry share in GDP	0.026 (0.818)	-0.001 (0.991)
Inflation (log)	**-2.113 (0.000)**	**-2.201 (0.002)**
Budget Balance	**0.032 (0.116)**	**-0.033 (0.230)**
Trade (share of GDP)	**0.330 (0.089)**	**0.327 (0.006)**
1993	3.673 (0.110)	5.431 (0.030)
1994	2.335 (0.384)	3.924 (0.099)
1995	5.320 (0.017)	6.512 (0.007)
1996	5.537 (0.012)	6.948 (0.006)
1997	5.255 (0.037)	6.821 (0.010)
1998	2.483 (0.329)	3.918 (0.159)
1999	1.725 (0.511)	3.105 (0.296)
Number of observations	133	133
R^2/Log-likelihood	0.501	0.495
F/ Wald-statistics	F(17, 115) = 5.78 (0.000)	χ^2 (14) = 108.01 (0.000)
F test for common intercept	F(22, 96) = 2.17 (0.005)	-
Hausman test	-	χ^2 (17) =1.02 (0.999)

Note: p-values are in parentheses. All regressions are run with constant. *Heteroscedasticity was detected based on Breusch-Pagan test (at the 1% level of significance), p-values are reported following Huber/White correction. **Inflation is instrumented with its lagged value and dummy for Central European countries.

Table 4. Aid Regressions (OLS and Instrumental Variables Regressions)

Dependent Variable: Aid as a share of GDP

Explanatory variable	Pooled OLS*	Panel Regression 3 (Random Effects, G2SLS**)
Initial GDP per capita (log)	-6.830 (0.002)	-0.327 (0.172)
Population (log)	-0.970 (0.000)	-6.914 (0.000)
Infant mortality rate	-1.161 (0.004)	-0.913 (0.113)
Years under communism	0.093 (0.011)	-0.178 (0.043)
Dummy for CEE	3.458 (0.007)	-.091 (0.213)
Policy index	**-0.283 (0.280)**	**3.406 (0.073)**
Policy index (lagged)	0.053 (0.629)	0.067 (0.669)
1993	-3.327 (0.204)	-5.690 (0.001)
1994	-2.037 (0.339)	-4.258 (0.009)
1995	-1.474 (0.449)	-3.648 (0.021)
1996	-0.653 (0.730)	-2.784 (0.076)
1997	-1.079 (0.556)	-3.200 (0.045)
1998	-0.831 (0.599)	-3.095 (0.070)
1999	0.142 (0.940)	-2.125 (0.208)
Constant	71.533 (0.000)	73.549 (0.000)
Number of observations	162	162
R^2/Log-likelihood	0.456	0.737***
F/ Wald-statistics	F (14, 147) = 6.35 (0.000)	χ^2 (14) = 60.55 (0.000)
F test for common intercept	F(24, 125) = 2.17 (0.003)	-
Hausman test	-	χ^2 (14) = 4.53 (0.991)

Note: p-values are in parentheses.

*Heteroscedasticity was detected based on Breusch-Pagan test (at the 1% level of significance), p-values are reported following Huber/White correction

**Policy index is instrumented with growth lagged and war dummy.

Table 5. Policy Regressions (OLS and Instrumental Variables Regressions)

Dependent Variable: Policy index

Explanatory variable	Pooled OLS*	Panel Regression 3 (Fixed Effects IV**)
Initial GDP per capita (log)	0.588 (0.314)	-
Secondary school enrollment (initial)	-0.044 (0.150)	-
Years under communism	-0.085 (0.016)	-
Rate of population growth	0.383 (0.283)	-1.202 (0.080)
Financial depth (M2/GDP, lagged)	-0.053 (0.030)	-0.127 (0.000)
War dummy	-1.146 (0.219)	-1.980 (0.231)
Growth (lagged)	0.240 (0.000)	0.317 (0.000)
Aid (share of GDP)	**-0.100 (0.202)**	**-1.281 (0.147)**
1993	-2.183 (0.151)	-4.626 (0.052)
1994	-1.950 (0.066)	-4.578 (0.024)
1995	0.287 (0.765)	-2.961 (0.164)
1996	-0.028 (0.979)	-3.592 (0.066)
1997	-0.193 (0.861)	-4.189 (0.057)
1998	0.667 (0.541)	-4.342 (0.064)
1999	0.999 (0.366)	-1.459 (0.431)
Number of observations	158	151
R^2/Log-likelihood	0.634	0.265
F/ Wald-statistics	F(15, 142) = 19.20 (0.000)	$\chi^2(12) = 302.46$ (0.000)
F test for common intercept	F(24, 121) = 2.37 (0.001)	-
Hausman test	-	χ^2 (12) = 4.19 (0.980)

Note: p-values are in parentheses. *Heteroscedasticity was detected based on Breusch-Pagan test (at the 1% level of significance), p-values are reported following Huber/White correction. **Aid is instrumented by initial GDP per capita, population, infant mortality, and dummy for CEE.

Table 6. Growth Regressions with Aid (OLS and Instrumental Variables Regressions)

Dependent Variable: growth of real GDP per capita

Explanatory variable	Pooled OLS*	Panel Regression 3 (Random Effects, G2SLS**)
Initial GDP per capita (log)	-0.882 (0.630)	2.326 (0.470)
Years under communism	-0.095 (0.192)	-0.083 (0.356)
Secondary school enrollment (initial)	0.162 (0.012)	0.167 (0.097)
Rate of population growth	-0.810 (0.256)	-0.832 (0.430)
Financial depth (M2/GDP, lagged)	0.010 (0.825)	-0.010 (0.832)
Government consumption	0.006 (0.963)	0.056 (0.757)
Industry share in GDP	-0.010 (0.933)	-0.014 (0.898)
Policy Index	**0.942 (0.000)**	**1.099 (0.000)**
Aid	**0.478 (0.029)**	**0.888 (0.217)**
1993	3.039 (0.203)	5.988 (0.040)
1994	0.865 (0.775)	1.678 (0.525)
1995	5.119 (0.038)	6.662 (0.011)
1996	5.380 (0.024)	6.046 (0.020)
1997	5.600 (0.038)	6.415 (0.017)
1998	3.014 (0.263)	3.714 (0.177)
1999	2.188 (0.423)	2.549 (0.365)
Number of observations	127	123
R^2/Log-likelihood	0.519	0.733
F/ Wald-statistics	F(16, 110) = 4.81 (0.000)	χ^2 (16) = 103.19 (0.000)
F test for common intercept	F(22, 91) = 1.99 (0.013)	-
Overidentified restrictions test	-	χ^2 (5) =0.652 (0.985)
Hausman test	-	χ^2 (16) =10.42 (0.844)

Note: p-values are in parentheses. All regressions are run with constant.
*Heteroscedasticity was detected based on Breusch-Pagan test (at the 1% level of significance), p-values are reported following Huber/White correction.
**Aid and policy index are instrumented with logarithm of population, infant mortality rate, growth lagged, dummy for war, and dummy for Central European countries

Table 7. Growth Regressions with Aid/Policy Interaction Terms (OLS and Instrumental Variables Regressions)

Dependent Variable: growth of real GDP per capita

Explanatory variable	*Pooled OLS**
Initial GDP per capita (log)	-1.326 (0.409)
Years under communism	-0.059 (0.339)
Secondary school enrollment (initial)	0.148 (0.020)
Rate of population growth	-1.465 (0.027)
Financial depth (M2/GDP, lagged)	0.033 (0.362)
Government consumption	0.014 (0.919)
Industry share in GDP	0.058 (0.600)
Policy Index	**0.953 (0.000)**
Aid	**0.489 (0.025)**
Aid*Policy Index	**0.349 (0.020)**
Aid^2*Policy Index	**-0.036 (0.026)**
1993	1.781 (0.470)
1994	1.972 (0.503)
1995	5.627 (0.026)
1996	4.442 (0.072)
1997	5.116 (0.063)
1998	2.424 (0.365)
1999	1.406 (0.602)
Number of observations	124
R^2/Log-likelihood	0.526
F/ Wald-statistics	F(18, 105) = 4.60 (0.000)
Ramsey-RESET test for omitted variables***	F(33, 72) = 1.31 (0.168)

Note: p-values are in parentheses. All regressions are run with constant. *Heteroscedasticity was detected based on Breusch-Pagan test (at the 1% level of significance), p-values are reported following Huber/White correction. **White-Heteroscedasticity-Consistent Standard Errors and Covariance. ***Ramsey-RESET test for omitted variables using powers of the independent variables

Table 8. List of Countries Included in the Sample

Country	Abbreviation
Albania	ALB
Armenia	ARM
Azerbaijan	AZE
Belarus	BEL
Bulgaria	BUL
Croatia	CRO
Czech Republic	CZE
Estonia	EST
Georgia	GRG
Hungary	HUN
Kazakhstan	KAZ
Kyrgyz Republic	KRG
Latvia	LAT

Country	Abbreviation
Lithuania	LIT
Macedonia, FYR	MAC
Moldova	MOL
Poland	POL
Romania	ROM
Russian Federation	RUS
Slovak Republic	SLK
Slovenia	SLV
Tajikistan	TAJ
Turkmenistan	TUR
Ukraine	UKR
Uzbekistan	UZB