INTER COUNTRY ANALYSIS OF THE EFFECTS OF OFFICIAL DEVELOPMENT ASSISTANCE IN DEVELOPING COUNTRIES ON ECONOMIC GROWTH

1990-2001

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This thesis entitled

INTER COUNTRY ANALYSIS OF THE EFFECTS OF OFFICIAL DEVELOPMENT ASSISTANCE IN DEVELOPING COUNTRIES ON ECONOMIC GROWTH

1990-2001

BY

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The thesis investigates the impact of foreign aid on economic growth in developing 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 impact of foreign aid is not significant. Cross-sectional time-series analysis of growth performance of a subset of 29 developing countries is used to determine the possible effect of aid on economic growth. The developed model together with aid-to-GDP ratio variable includes growth determinants such as school enrolment, government consumption, Misery index, and world GDP growth rate to account for business cycle. The results of the study indicate that no consistent link exists between aid and growth in a typical developing economy.
ACKNOWLEDGMENTS

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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 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 amounts of aid. Traditionally foreign aid impact on growth is investigated on both micro and macro levels.
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, research that used a data set of 56 developing countries, which was first studied by Burnside and Dollar (2000), finds 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 a 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, in this thesis we investigate the growth impact of
foreign aid including macroeconomic factors. As an underlying growth specification we use a model proposed by Fischer (1993), where the emphasis is placed on the importance of a stable macroeconomic environment for sustainable economic growth. We use a Misery index developed by Arthur Okun that would account for macroeconomic policies environment. We employ panel data cross-sectional techniques as well as pooled econometrics methods and choose the ones that provide the best fit for the economic data for developing countries and allow capturing country 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 the empirical model. Chapter 4 presents the results of our empirical investigation. Finally, we conclude with a brief discussion of the results and policy implications.
Chapter 2

STUDIES OF FOREIGN AID EFFECTIVENESS IN DEVELOPING COUNTRIES: A REVIEW

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 the 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 a 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 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).
Fisher 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 performance 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 the 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 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 postcommunist 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 MODEL

This chapter provides a theoretical background for the empirical analysis of foreign aid impact on growth rates in developing 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 developing 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 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 economy. We begin in a similar manner and then incorporate variables to test for the growth impact of aid as described in the preceding theoretical model. The model is constructed for the cross-country panel data.

The benchmark growth equation is

\[ G_{it} = \beta_0 + \beta_1 I_{it} + \beta_2 A_{it} + \beta_3 M_{it} + \beta_4 W_t + \varepsilon_{it}, \]  

(3.1)
where $G_{it}$ – GDP 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 helps to explain growth in country $i$ during period $t$;

$M_{it}$ – a Misery Index – policy variable of country $i$ during period $t$;

$W_t$ - world GDP growth rate during period $t$.

Thus the growth equation $^1$ includes a vector of exogenous growth determinants $I$; an aid variable $A$, which reflects foreign aid inflows in a country; a vector of policy variable $P$, which reflect the institutional and policy distortions in a country; and the world GDP growth variable for control purposes.

### 3.2. The Model and Hypothesis

We formulate our theoretical hypothesis as follows:

*H 1. The growth impact of foreign aid in developing economies has no significant effect in the recipient country*

---

$^1$ 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 variable 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 stimulate positive changes, in which case the impact of growth on the amount of aid is positive; on the other hand, a 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 a donor country purposes its specific objectives (Burnside and Dollar 2000, p.849). Other possibilities 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.
To test the hypothesis of positive impact of aid on growth, given the vector of exogenous policy environment variables is to test:

$$H_0: \beta_2 = 0$$

$$H_A: \beta_2 \neq 0$$

By construction, the hypothesis of interest is supported by the alternative hypothesis.

### 3.3. The Model Specification

As we already specified above, the growth vector contains 1) set of growth determinants; 2) policy (misery index) variable; 3) aid variable of interest, and 4) the world GDP growth variable. Our primary purpose in this section is to specify the growth determinants for developing 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 29 developing countries from Central and Eastern Europe (including countries of former Soviet Union), Africa, Asia, and Latin America.

Although developing countries are facing similar economic problems moving toward the market economy, there are significant differences in those countries. For example, the basic differences can stem from the fact that some countries were closer to the market-oriented economies, while others have a long history of the communist regime.
The literature on economic growth, as we mentioned above, is vast and policy-oriented, and different models test different growth determinants.

One of the most prominent and influential contributions in explaining the growth effects of education is that of Lucas (1988), which is in turn related to previous work by Uzawa (1965). In these models, the level of output is a function of the stock of human capital.

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

One of the possible negative impacts on growth stems from a too large government sector with associated high tax pressure to finance high government expenditures (Bassanini and Scarpetta, 2001). However, government consumption may have a positive effect on growth because it provides the fundamental equipment for the society. Thus,
government consumption as a growth variable is included in our model with expected ambiguous sign.

The Policy Variable

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 not follow the policy index technique suggested by Burnside and Dollar (2000). We will try to innovate the equation by incorporating the well known Misery Index. In the ’70s, Arthur Okun devised the “misery index” – simply adding together the inflation rate and the unemployment rate. It remains a handy device for summarizing the overall economic discomfort (Reynolds 2003).

In addition to the initial conditions, the factors that reflect the macroeconomic situation in the country played an important role in the growth process. One simple measure of the economic performance is the Misery Index, which adds inflation and unemployment rate. It can be seen as an indicator of country’s macroeconomic stability as a result of good environmental policy. The lower the index the better is macroeconomic environment to spur economic growth.

In the context of growth studies, two issues have generally been considered with respect to macroeconomic policy settings: the benefits of establishing and maintaining low inflation, and negative effects of large size of the government discussed above. In particular, inflation stabilization is considered to be one of the major contributors to growth in developing countries. According to Bassanini and Scarpetta (2001), arguments
for lower and more stable inflation rates include reduced uncertainty in the economy and enhanced efficiency of the price mechanism. A reduction in the level of inflation could have an overall effect on the level of capital accumulation important for economic growth in cases of tax distortions or when investment decisions are made with a long-run perspective (e.g. shift in technologies). However, one problem with inclusion of 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 an 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.

The Aid Variable

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.

In economic theory, the issue of growth effect of foreign aid is highly debated. On one side are the economic traditionalists, who argue that aid has indeed promoted growth and structural transformations in many LDCs (Chenery and Carter 1973). On the other side are critics who argue that aid does not provide faster growth but may in fact retard it
by substituting for, rather than supplementing, domestic savings and investment and by exacerbating LDC balance of payments deficits because of rising debt repayment obligations and the linkage of aid to donor-country exports (Bauer 1985).

In our work we will assume that foreign aid has indeed positive effect on economic development.

*The World GDP Growth Variable*

We include the world GDP growth independent variable in our model only for control purposes to look at the relationship between foreign aid and GDP growth. The expected sign is positive, because with a rise (fall) in the world GDP growth rate, the growth of a country’s GDP probably will rise (decrease) too.

Main growth determinants are presented in Table 1.
Table 1. Growth Determinants

<table>
<thead>
<tr>
<th>Structural and Institutional Variables</th>
<th>Secondary school enrolment</th>
<th>Initial conditions important in developing economies (Fischer and Sahay 2000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government consumption</td>
<td>To measure macroeconomic stability (Bassanini and Scarpetta 2001)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Policy (Misery Index) Variable</th>
<th>Inflation rate</th>
<th>To measure monetary policy (Fischer 1993)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unemployment rate</td>
<td>To measure macroeconomic stability (Okun)</td>
<td></td>
</tr>
</tbody>
</table>
Chapter 4

EMPIRICAL ANALYSIS

4.1. Data Description

The data we use in the empirical analysis are obtained from the World Bank Development Group, the OECD, and the International Monetary Fund databases. We use the unbalanced panel, which consists of 29 cross sections from 1990 to 2001. In our sample we include developing countries representing different regions: Africa, Latin America, Asia, and Europe.

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

Data on Aid

The data on aid have been obtained from the OECD International Development, World Bank Development, and International Monetary Fund databases. 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 developing economies. 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 money volume of official development assistance (ODA) has grown from an annual rate of $4.6 billion in 1960 to $55 billion in 1996. However, in terms of the percentage of developed country GNP allocated to ODA, there has been a steady decline from 0.51% in 1960 to 0.25% in 1996 (Todaro 2000). Table 2 shows the disbursement of ODA by principal donors both in total amount and as percentage of GNI. The USA remains the largest donor, but provides the lowest percentage of GNI – 0.38%.

Table 2. Official Development Assistance (ODA) Disbursements from Major Donor Countries

<table>
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<tr>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Millions of US $</td>
<td>% of GNI</td>
<td>Millions of US $</td>
</tr>
<tr>
<td>Canada</td>
<td>1623</td>
<td>0.47</td>
<td>3736</td>
</tr>
<tr>
<td>Denmark</td>
<td>460</td>
<td>0.69</td>
<td>1072</td>
</tr>
<tr>
<td>France</td>
<td>7770</td>
<td>1.26</td>
<td>6092</td>
</tr>
<tr>
<td>Germany</td>
<td>6819</td>
<td>0.9</td>
<td>13329</td>
</tr>
<tr>
<td>Italy</td>
<td>2380</td>
<td>0.47</td>
<td>5368</td>
</tr>
<tr>
<td>Japan</td>
<td>12860</td>
<td>0.78</td>
<td>20860</td>
</tr>
<tr>
<td>Netherlands</td>
<td>2722</td>
<td>1.83</td>
<td>4193</td>
</tr>
<tr>
<td>Sweden</td>
<td>1558</td>
<td>1.38</td>
<td>2317</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>4574</td>
<td>0.90</td>
<td>6075</td>
</tr>
<tr>
<td>United States</td>
<td>10024</td>
<td>0.24</td>
<td>15925</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>55633</strong></td>
<td><strong>0.58</strong></td>
<td><strong>85691</strong></td>
</tr>
</tbody>
</table>

More interesting than the total amount of aid is the way in which it is distributed. ODA is allocated in some strange and arbitrary ways (Human Development Report, 1992). In terms of regional distribution, Asia, where nearly 50% of the world’s poorest people live, receives only $4.88 in aid. Europe, with more than four times Asia’s per income capita, receives seven times the per capita aid. Table 3 and Figure 1 show the regional distribution of ODA.

Table 3. Official Development Assistance (ODA) by Region, 2001

<table>
<thead>
<tr>
<th>Region</th>
<th>GNI per Capita ($)</th>
<th>ODA per Capita ($)</th>
<th>ODA as % GNI (Recipient)</th>
<th>ODA, Total Net ($) Million</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa, Total</td>
<td>460</td>
<td>20.2</td>
<td>3.297</td>
<td>16,353.5</td>
</tr>
<tr>
<td>America, Total</td>
<td>3,580</td>
<td>11.5</td>
<td>0.328</td>
<td>5,977.28</td>
</tr>
<tr>
<td>Asia, Total</td>
<td>450</td>
<td>4.88</td>
<td>0.69</td>
<td>16,741.13</td>
</tr>
<tr>
<td>Europe, Total</td>
<td>1,970</td>
<td>34.34</td>
<td>1.683</td>
<td>3,346.43</td>
</tr>
<tr>
<td>Middle East, Total</td>
<td>2,220</td>
<td>15.24</td>
<td>1.375</td>
<td>2,438.92</td>
</tr>
<tr>
<td>Developing Countries, Total</td>
<td>2,554</td>
<td>10.62</td>
<td>1.044</td>
<td>51,680.41</td>
</tr>
</tbody>
</table>

The Special Features of Panel Data

We have decided to employ 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 29 developing 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 many variables affecting growth that may be 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 colinearity 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.

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 over time, we work with the most recently designed data sets.

The second problem with the data are their 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, first, we cannot get longer annual time periods for some countries; second, 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 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 a good fit for our data.

*Static Panel Data Models*

To estimate the equation (3.1), we should use the panel estimation method
(Wooldridge 2003, Greene 2000 and Verbeek 2000). The basic framework of the panel
data modeling starts from the following equation:

\[ y_{it} = \beta_0 + \beta_1 x_{1, it} + \beta_2 x_{2, it} + \beta_3 x_{3, it} + \beta_4 x_{3, t} + \varepsilon_{it}, \quad (4.1) \]

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; \( \beta \) is a vector of the slope coefficients; \( \varepsilon_{it} \) is an error component for cross-unit \( i \) at time \( t \). 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 units 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 modelled as the country specific error term plus the conventional disturbance $\varepsilon_{it}$ 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 a 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.

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. The 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. At the end we will use the Hausman test to examine which model to choose.

4.3. Econometric Analysis of the Growth Impact of Foreign Aid

This section presents the results of the empirical estimation of growth, aid and policy determinants.

As described in the preceding chapter, we estimate growth regression using pooled OLS and panel data techniques.

Hausman test\(^2\) 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.

The results of the estimations are reported in the Table 2 (see Appendix C).

The main regression results indicate that foreign aid has a positive overall effect on economic growth, although the magnitude of this effect is small. All regressions are based on panel data for 1990-2001, and were estimated using the cross section weights for OLS techniques and no weighting for random effects model.

\[ HA = (\hat{\beta}_{\text{Fixed}} - \hat{\beta}_{\text{RE}}) [V_{\text{Fixed}} - V_{\text{RE}}]^{-1} (\hat{\beta}_{\text{Fixed}} - \hat{\beta}_{\text{RE}}) \sim X^2(k), \]

where \( V = \) variance-covariance matrix.

\[ HA_{\text{Model}} = 1.3625 \]
Table 2 reveals several interesting results for the effects of foreign aid on economic growth. Regression 1.1 was on to test effect of foreign aid solely. Although the coefficient is not significant it indicates that for each percentage point of increase in the aid – to – GDP ratio, the rate of growth of the host economy increases by 0.03 percentage points. However, as we add a new variable we can see that the aid coefficient decreases but stays positive.

Finally, as we run the regression including all the variables of our model, we obtain such results. The coefficient of our main variable of interest, aid – to – GDP ratio, stays positive, but insignificant, as it was expected and stated by hypothesis.

According to the theory, we expected the school enrollment variable to be positive, but the empirical result yielded a negative sign. To fix this problem, we probably would have to add control variables such as public spending and R&D. This can be done in future research.

The coefficient of the government consumption variable was expected to have an ambiguous sign. Regression results confirm these expectations. However, the coefficient is not significant, so it is not important for growth.

Magnitude of Misery Index is also small, but the negative sign is important and what is expected. High inflation and unemployment rates have negative impacts on economic growth, therefore on macroeconomic stability of the developing country.

The sign of world GDP growth rate is positive as was expected. Inclusion of this variable improves the model and increases the coefficient of foreign aid in Regression 1.6.
Regressions 1.7, 1.8, and 1.9 were run in order to estimate the effect of transition economies, which experienced high flows of foreign aid over the last decade, on our model. The results indicate that the effect on economic aid in these countries is positive. Exclusion of the transition economies from the sample brings a negative sign of the aid-to-GDP ratio coefficient.
Chapter 5

CONCLUSIONS

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 a good policy environment.

The challenge of this work has been the investigation of the growth impact of foreign aid in developing countries including some transition economies.

Based on our study, we cannot reject the hypothesis of growth impact of foreign aid. In particular, we have found that no consistent evidence from developing economies that foreign aid has raised growth rates in a typical developing economy exists. However, it was not tested in this research, but it is possible that the growth impact of foreign aid has a positive impact in a good policy environment.

We also found that the difference exists between transition economies and other developing countries. This may suggest that the effects of foreign aid in transition economies were more significant. This relationship may be recommended to study in future research.

By good policy environment, we mean sound macroeconomic policies conducive for growth. In particular, we have found that by controlling inflation and unemployment rate, a country could create a stable macroeconomic environment, which enhances the growth impact of foreign aid.
Based on our study, we would suggest the following policy implication:

- stable macroeconomic environment is one of the important steps toward economic development. Thus, governments in developing countries should aim at coping with problems of inflation and unemployment.

Therefore, 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 in 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 of the indicators of institutional quality of the recipient economy.
BIBLIOGRAPHY


Figure 1. ODA Disbursements to Developing Countries (Total Net, $ Million)
Figure 1: continued.
Figure 1: continued.
Figure 1: continued.
Figure 1: continued.
Note: List of abbreviations used in figures

A  Foreign Aid
_ALG  Algeria
_ARG  Argentina
_BEL  Belarus
_BOLV  Bolivia
_BRZ  Brazil
_BULG  Bulgaria
_CHIN  China
_COLMB  Colombia
_CZECH  Czech Republic
_EGY  Egypt
_HUNG  Hungary
_ISR  Israel
_KAZ  Kazakhstan
_LITH  Lithuania
_MAL  Malaysia
_MEX  Mexico
_NIC  Nicaragua
_PAK  Pakistan
_PHI  Philippines
_POL  Poland
_ROM  Romania
_RUS  Russian Federation
_SLOV  Slovak Republic
_SAF  South Africa
_THAI  Thailand
_UGA  Uganda
_UKR  Ukraine
_VEN  Venezuela
_ZIM  Zimbabwe
# APPENDIX B

Table 1. Descriptive Statistics of the Variables

<table>
<thead>
<tr>
<th></th>
<th>GDP growth rate</th>
<th>Aid-to-GDP ratio</th>
<th>School enrollment</th>
<th>Government consumption to GDP ratio</th>
<th>Misery index</th>
<th>World GDP growth rate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mean</strong></td>
<td>2.017178</td>
<td>2.448603</td>
<td>56.30229</td>
<td>14.20726</td>
<td>149.5010</td>
<td>2.365079</td>
</tr>
<tr>
<td><strong>Median</strong></td>
<td>3.559095</td>
<td>0.598986</td>
<td>65.76982</td>
<td>13.14540</td>
<td>22.98979</td>
<td>3.000000</td>
</tr>
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<td><strong>Maximum</strong></td>
<td>13.35314</td>
<td>52.27471</td>
<td>108.4861</td>
<td>34.39306</td>
<td>7496.595</td>
<td>4.000000</td>
</tr>
<tr>
<td><strong>Minimum</strong></td>
<td>-26.00222</td>
<td>-0.463552</td>
<td>0.000000</td>
<td>0.000000</td>
<td>0.000000</td>
<td>1.000000</td>
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<td><strong>Std. Dev.</strong></td>
<td>5.863841</td>
<td>5.735381</td>
<td>33.99155</td>
<td>5.980736</td>
<td>607.4518</td>
<td>0.975848</td>
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<tr>
<td><strong>Skewness</strong></td>
<td>-1.537770</td>
<td>4.945379</td>
<td>-0.554079</td>
<td>0.522894</td>
<td>8.007442</td>
<td>-0.205338</td>
</tr>
<tr>
<td><strong>Kurtosis</strong></td>
<td>6.309118</td>
<td>33.06626</td>
<td>1.897619</td>
<td>3.880177</td>
<td>82.28162</td>
<td>1.830731</td>
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<tr>
<td><strong>Jarque-Bera</strong></td>
<td>267.8709</td>
<td>13148.72</td>
<td>32.06778</td>
<td>24.52256</td>
<td>85864.42</td>
<td>20.15797</td>
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<td><strong>Probability</strong></td>
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<td>0.000000</td>
<td>0.000005</td>
<td>0.000000</td>
<td>0.000042</td>
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<td><strong>Observations</strong></td>
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<td>315</td>
<td>315</td>
<td>315</td>
<td>315</td>
<td>315</td>
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<tr>
<td><strong>Cross sections</strong></td>
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<td>29</td>
<td>29</td>
<td>29</td>
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</table>
### APPENDIX C

Table 2. Foreign aid and GDP growth: panel of one decade (1990-2001)

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Regression Number</th>
<th>Coefficient (standard errors)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OLS Random effects</td>
<td>OLS Random effects</td>
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<tr>
<td>C</td>
<td>2.7446 (0.2095)</td>
<td>4.1842 (0.3467)</td>
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<tr>
<td>Foreign aid</td>
<td>0.0288 (0.0289)</td>
<td>0.0054 (0.0248)</td>
</tr>
<tr>
<td>School enrollment</td>
<td>-0.0243 (0.0058)</td>
<td>-0.0343 (0.0097)</td>
</tr>
<tr>
<td>Government consumption</td>
<td>-0.1317 (0.0318)</td>
<td>0.031833 (0.0736)</td>
</tr>
<tr>
<td>Misery Index</td>
<td>-0.0006 (0.0003)</td>
<td>-0.0013 (0.0004)</td>
</tr>
<tr>
<td>R²</td>
<td>0.1995 0.2362</td>
<td>0.3074 0.2542</td>
</tr>
</tbody>
</table>
Table 2. : continued.

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Regression Number</th>
<th>1.6 OLS Random effects</th>
<th>1.7 (transition economies) OLS Random effects</th>
<th>1.8 (transition economies) OLS Random effects</th>
<th>1.9 (without transition economies) OLS Random effects</th>
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</thead>
<tbody>
<tr>
<td>C</td>
<td></td>
<td>3.2120</td>
<td>1.1360</td>
<td>1.0637</td>
<td>-0.4034</td>
</tr>
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<td></td>
<td></td>
<td>(0.7254)</td>
<td>(1.3116)</td>
<td>(2.0098)</td>
<td>(2.4242)</td>
</tr>
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<td>Foreign aid</td>
<td></td>
<td>0.0028</td>
<td>0.0194</td>
<td>1.3588</td>
<td>1.6487</td>
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<tr>
<td></td>
<td></td>
<td>(0.0179)</td>
<td>(0.0803)</td>
<td>(0.5149)</td>
<td>(0.6748)</td>
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<tr>
<td>School enrollment</td>
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<td>-0.0287</td>
<td>-0.0496</td>
<td>-0.0436</td>
<td>-0.0543</td>
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<tr>
<td></td>
<td></td>
<td>(0.0062)</td>
<td>(0.0097)</td>
<td>(0.0157)</td>
<td>(0.0190)</td>
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<tr>
<td>Government consumption</td>
<td></td>
<td>-0.0912</td>
<td>0.0626</td>
<td>0.1366</td>
<td>0.1929</td>
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<td></td>
<td></td>
<td>(0.0365)</td>
<td>(0.0677)</td>
<td>(0.1092)</td>
<td>(0.1164)</td>
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<tr>
<td>Misery Index</td>
<td></td>
<td>-0.0005</td>
<td>-0.0011</td>
<td>-0.0028</td>
<td>-0.0035</td>
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<td></td>
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<td>(0.0003)</td>
<td>(0.0004)</td>
<td>(0.0012)</td>
<td>(0.0012)</td>
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<tr>
<td>World GDP growth</td>
<td></td>
<td>1.0194</td>
<td>1.2311</td>
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<td></td>
<td></td>
<td>(0.1991)</td>
<td>(0.2976)</td>
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<td></td>
<td>R²</td>
<td>0.3346</td>
<td>0.3163</td>
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<td>0.3700</td>
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