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Governance and Foreign Aid Allocation

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PREFACE

This study is submitted as a doctoral dissertation to the Pardee RAND Graduate School in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Policy Analysis. The Pardee RAND Graduate School provided funding for this research through the Palevsky Dissertation Award.

The study examines the relationship between governance, foreign aid allocation and effectiveness. In particular, the study explores how different categories of aid impact economic growth, whether the interaction of different levels of governance with different categories of aid is significant in promoting growth. The study also explores whether the quality of governance in recipient countries affects the donors' aid allocation decisions. The findings of the study should be of interest to policy makers, policy analysts, scholars and officials of donor agencies and international financial institutions.

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Abbreviations

ADB – Asian Development Bank

AfDB – African Development Bank

CIS – Commonwealth of Independent States

CRS – Credit Reporting System

DAC – Development Assistance Committee

DOTS – Directions of Trade Statistics

EBRD – European Bank for Reconstruction and Development

EDA – Effective Development Assistance

IADB – Inter-American Development Bank

ICOR – Incremental capital-output ratio

IFC – International Finance Corporation

IFS – International Financial Statistics

ILO – International Labor Organization

IMF – International Monetary Fund

MCA – Millennium Challenge Account

MDGs – Millennium Development Goals

OA – Official Aid

ODA – Official Development Assistance

OECD – Organization for Economic Cooperation and Development

TA – Technical Assistance

UN – United Nations

UNDP – United Nations Development Program

USAID – United States Agency for International Development

WDI – World Development Indicators

Chapter I. Introduction

This dissertation addresses foreign aid allocation and development effectiveness. This is an important issue as each year donors transfer tens of billions of dollars in foreign aid to developing countries. The introductory chapter describes the policy problem and research objectives and provides the outline of the dissertation.

1.1. Policy Problem and Research Objectives

In the post-September 11 world, the perspectives of donor nations on foreign aid or official development assistance (ODA) have changed significantly. In the past, especially in the Cold War environment, foreign aid was at times used to "buy" elites and thus influence affairs in third world countries. Effects on development were viewed as secondary. This approach is no longer acceptable because developing nations' importance to global security has risen significantly in recent years. For instance, several developing countries in Asia and Africa have served as staging points for worldwide terrorist attacks. Industrialized countries have realized the need for a close cooperation with governments of developing countries to ensure global security. They have also begun to understand that persistent poverty makes developing countries vulnerable to security and other threats[1]. Therefore, rhetoric of foreign aid has been increasingly shifted towards the challenges of development[2]. The contemporary view links two groups of rationales for foreign aid - donors' self-interest (strategic, political, and economic) and recipient-needs (poverty reduction, improving primary school enrollment, reducing maternal and infant mortality) - to a form of enlightened donors' self-interest that recognizes that a world with less poverty and diseases, and more educated people

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[1] While some evidence suggests little direct connection between poverty or education and participation in terrorism, other evidence suggests that "poverty at the national level may indirectly affect terrorism through the apparent connection between economic conditions and the proclivity for countries to undergo civil wars" (Krueger and Malečkovà 2003).

[2] For example, "The National Security Strategy of the United States of America" (September 2002) considers promoting development through foreign aid, along with defense and diplomacy, is an important part of security policy (http://www.state.gov/documents/organization/15538.pdf).

is likely to provide a more secure and stable environment with more opportunities for all of the world's population.

Consequently, donor countries have begun to mobilize additional resources for the needs of developing countries. Several donors have pledged to reach the United Nation's target level (0.7 percent of donor's gross national income) for ODA over the next decade or so, and others have begun to significantly increase their commitments for development assistance (Heller 2005). For instance, the United States has started new Millennium Challenge Account, with potential budget of $5 billion per year by 2006 (Radelet 2003). Based on new pledges and greater commitments to development assistance from donor nations, there is a possibility of significant scaling up of foreign aid resources far beyond the current and past levels (Heller 2005).

Although scaling up of official development assistance seems to open hope and prospect for a better future for many developing countries, it will also raise many challenges for policymakers in donor and recipient countries and international financial organizations. Gupta et al (2005) and Heller (2005) have provided a checklist of policy issues that need to be considered by development partners. As they have stressed, the success of scaling up aid transfers depends on how these policy challenges are addressed. This is essential as past experiences with aid flows have not always brought the desired result and it is therefore important to learn lessons from past experiences and look toward the potential challenges of the future. The purpose of this dissertation research is to address one policy issue associated with scaling up of aid flows: how to use aid flows to promote higher growth, given the contradictory evidence that aid has promoted growth in the past.

From the donors' perspective, the commitment to increase aid flows to developing countries is only the starting point. Donors have to ascertain that aid flows are allocated among recipients and various sectors efficiently to ensure that resources will promote economic growth in recipient countries. Tying the allocation of foreign aid to improved governance might be one approach to increase the effectiveness of ODA. In recent years, calls for improving the effectiveness of foreign aid have increased, and demands for performance

driven aid allocation policies are expressed in a number of occasions (World Bank 1998, Svensson 2000, Radelet 2003, USAID 2004). This in turn raises questions regarding the economic role of the donors' aid allocation policies in ensuring the effectiveness of foreign aid transfers in promoting development outcomes. Indeed the allocation of foreign aid without proper goals and incentives may waste large amount of financial resources.

This dissertation aims to inform the policy debate and add to the literature on the subject in three ways:

- From an analytical perspective, the aim is to develop a framework drawing from the neoclassical growth model augmented with human capital and principal-agent framework, which uses the quality of governance in recipient countries as an informative signal to improve donors' aid allocation decisions. This framework allows the illustration of how aid can potentially impact development outcomes (economic growth) in recipient countries through diverse set of transmission channels.

- From an empirical perspective, aid flows are disaggregated into four mutually exclusive and collectively exhaustive categories: 1) aid to production sectors, 2) aid to economic infrastructure, 3) aid to social sector, and 4) other aid. Then focusing on the first three categories of aid, which account for about two thirds of all aid flows, aid effectiveness and allocation models are developed. Moreover, I attempt to control for four sources of unobserved heterogeneity: different aid categories, different levels of governance, country fixed affects and period fixed effects.

- From a policy perspective, policy recommendations are developed to improve donors' aid allocation policies based on the empirical results.

1.2. Outline of the Dissertation

This dissertation examines whether aid allocation patterns affect the outcomes of foreign aid in promoting economic growth. Specifically, the study explores how different categories of aid affect economic growth, whether the quality of governance is significant in explaining differences in economic growth, and whether the interaction of different levels of governance with different categories of aid flows is significant in promoting growth. This study also explores whether the quality of governance in recipient countries affects the donors' decisions at the aggregate and individual country levels.

In order to achieve the research objectives, the dissertation is organized as follows. Chapter 2 provides the background for the dissertation research by discussing the evolution of foreign aid and describing the trends and patterns of foreign aid considering aggregate volumes, sources and destinations. It also discusses some methodological issues related to the definition of foreign aid, differences between commercial and capital flows, official development assistance, and strategies of aid giving. The definition of foreign aid is less straightforward than one might think as the literature uses various definitions of aid. In this study, aid is defined as what the OECD calls official development assistance (ODA) as well as official assistance (OA). ODA is defined as the flows to developing countries that mainly aim to promote economic development and welfare of developing countries; and these flows are concessional in character and convey a grant element of at least 25 percent. OA comprises flows, which meet the definition of ODA, but are directed to countries in transition.

Chapter 3 provides an overview of existing studies. There is broad and contradictory literature relating to foreign aid allocation and effectiveness. The analysis suggests that there is a definite gap in existing voluminous literature on aid allocation and effectiveness. This chapter also reviews issues related to governance and its relation to foreign aid.

Chapter 4 defines the research methodology for the empirical analysis. It starts by describing the theoretical framework that outlines the basic causal relationship between foreign aid, governance and development outcomes (economic growth). Then, this chapter derives the econometric equations used to test the effectiveness of aid in promoting development outcomes. In doing so, I use augmented neoclassical growth framework following Mankiw et al (1992). In addition, this chapter develops a microeconomic model to explore donors' aid allocation decisions and their potential impact on aid effectiveness based on theory of incentives, viewing donors as principals and recipients as their agents.

Chapter 5 describes the data and the econometric methodology. This research analyzes the aid allocation and aid effectiveness by using panel data. The panel data that will be used consists of repeated measurements on the same unit, the recipient, that are "pooled" with those of other units to provide a combination of longitudinal and cross-sectional information. This raises some important methodological issues concerning aggregation, unobserved heterogeneity, and endogeneity. Therefore, I focus on these important aspects of the model specification that are relevant to both aid effectiveness and allocation equations. First, I propose to use feasible generalized least squares (FGLS) estimator to address the problem of autocorrelation within panels and cross-sectional correlation across panels. Second, I propose to use difference-in-difference and difference-in-difference-in-difference estimations to address unobserved heterogeneity problem since it provides consistent estimates in this context. Third, in reality, the impact of aid on development outcome is not instantaneous. It takes time for the aid effect to be fully transmitted into development outcomes. Therefore, it makes sense to relate lagged aid flows to development outcomes. Such a specification, to some extent, may allow us to avoid the problem of two-way causality if it indeed exists. I specify the models assuming the causation running from aid allocation patterns to development outcomes[3].

The analyses of empirical results, including the robustness test and their relation to existing research is provided in chapter 6. In contrast to overwhelming majority of existing

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[3] We fully understand that this assumption will only address some issues related to two-way causality, but it will not provide a full solution for the problem. Indeed, a full satisfactory solution may not exist.

studies, I examine the impact of disaggregated aid on growth assuming that different types of aid will impact the growth through different transmission channels. In addition, I propose that the effectiveness of these channels depend on the recipients' quality of governance. Further, the findings of the empirical analysis are supported by anecdotal evidences. This chapter also relates the results to existing literature and development practice. One of the most significant findings of this research is that foreign aid that goes to different sectors of the recipient country's economy will impact the development outcomes differently depending on their interaction with the quality of governance. The final chapter of the dissertation draws conclusions and makes policy recommendations developed from the key findings of the study.

Chapter 2. Foreign Aid in Perspective

The community of donor countries has now accumulated more than five decades of experience in providing development assistance to developing countries and countries with economies in transition. The objectives, strategies and policies, size and composition of foreign aid to developing countries has changed substantially over time. Although, in early years, it was expected that the need for foreign assistance would decline as private capital became available to developing countries, official foreign assistance has remained the most important source of external financing for many developing countries. While international flows of private capital to developing countries have increased significantly in recent years, the bulk of these flows is concentrated in a few countries that have particular attractions from investors' point of view[4]. Therefore, the majority of developing countries, especially those with low incomes, limited export earnings and without access to international private capital markets, continue to receive concessional flows to supplement their domestic capital accumulation and for sustaining their development efforts.

This chapter provides the background for the dissertation research by presenting a discussion of issues related to defining and measuring of foreign aid as well as an overview of its evolution and trends in aid considering aggregate volumes, sources and destinations. First, I discuss issues related to defining and measuring of foreign aid. Then I briefly explore the evolution of foreign aid since the 1950s. Third, I provide an overview of patterns of foreign aid flows.

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[4] According to World Bank (2005), net private flows increased by $51 billion in 2004, reaching $300 billion, including equity ($192 billion) and debt ($109 billion) inflows. The largest component of these flows consists of FDI, which stood at $166 billion in 2004. However, the bulk of these flows are concentrated in few highly attractive developing countries. For example, almost 90 percent of the estimated increase in net FDI flows to developing countries in 2004 went to five countries – Brazil, China, India, Mexico, and the Russian Federation.

2.1. Defining and Measuring Foreign Aid

The literature contains a certain amount of ambiguity in the terminology of foreign aid. Some authors include to foreign aid all financial flows from donor nations to developing and transition countries, including official grants and loans, trade financing and military assistance, while others include only grants and concessional loans. However, foreign assistance given for different purposes will probably have different consequences on development. Aid intended to promote economic reforms or build infrastructure is likely to have a greater impact on development than military assistance, which aims to build security forces in the recipient country. This by no means ignores indirect positive effect that military aid might have on development[5]. For example, military assistance may enable a recipient country to allocate a greater share of its resources to development programs than in the absence of such aid. It is more likely, however, military aid simply enables a recipient country to build stronger armed forces than would have been possible if it did not receive military assistance and impacts to development will be minimal.

This dissertation uses a conventional definition of foreign aid, which is official development assistance (ODA), widely accepted in the development community. This concept was introduced in the early 1970s by the Development Assistance Committee (DAC) of the Organization for Economic Cooperation and Development (OECD). According to this definition, the ODA consists of official grants and highly concessional loans from bilateral or multilateral donors to developing countries aiming to promote economic development and welfare[6]. There are three criteria that ODA should satisfy: (i) aid is given by the official sector of the donor country; (ii) with the objective of promoting economic development and welfare in recipient countries; (iii) loans are given with grant element, i.e., the implicit subsidy included in the loan, relative to loans' face value, of at least 25 percent, as calculated as the ratio of the grant equivalent part of the loan to the face value of a concessional loan and discount rate of 10 percent. The ODA also includes grants for

[5] For analysis of interrelationship between military expenditures and economic growth, see Castillo et al "Military Expenditures and Economic Growth", Santa Monica, RAND, 2001
[6] OECD, "Is it ODA?" Note by the DAC Secretariat, Paris, 22 May 2001

technical cooperation, such as capacity development, providing policy advice and training, however, it excludes military assistance, political development programs, trade credits, and debt forgiveness for military loans. The OECD also formally makes a distinction between ODA and official aid (OA). The OA consists of aid flows that meet conditions of eligibility for inclusion in ODA, but the recipients are countries in transition, mainly from Eastern Europe and Former Soviet Union. In this study foreign aid is defined as a sum of ODA and OA flows from both multilateral and bilateral donors to developing countries and both flows are simply called foreign aid or ODA.

The next question addressed is how to measure foreign aid flows: whether to look at ODA commitments or disbursements. Commitments are defined by the OECD's DAC as "a firm obligation expressed in writing", whereas disbursements "record the actual international transfer of financial resources" (OCED 2005). Some of the existing studies analyze disbursements while others look at commitments. In this study I use both measures of aid for different analyses. Following Dudley and Montmarquette (1976), White and McGillivray (1995) and others, I use commitments to analyze the determinants of aid allocation by donors, as commitments are donors' decision variables over which they exercise full control, whereas disbursements might be affected by other factors over which donors' have no control. However, since disbursements record the actual aid flows received by recipient countries, it is appropriate to use them to analyze the aid effectiveness. Another related question is whether to look at gross or net ODA disbursements, commonly used measures of aid flows from donors to recipient countries. This study uses both measures, where appropriate, to evaluate the aid effectiveness. They both have advantages and disadvantages in the analyses of the impact of foreign aid on development. If gross ODA captures all the disbursements from donors to recipients, net ODA represents the same transfers less amortizations, i.e., loan repayments. One might argue that excluding amortizations distorts the real picture of the actual resource transfers in a given year. However, if the objective is to understand and to evaluate the effectiveness of aid flows in promoting development

outcomes, then net disbursements are more appropriate. If the objective is to show the overall picture, then gross disbursements are more suitable.

Aid flows to developing countries are in one of three major currencies – the US dollar, the euro, and the Japanese yen. OECD converts transactions in other currencies into US dollars to facilitate comparison. The exchange rates used in the conversion and relative inflation between donors and recipients can have major influence on cross-country and over-time comparisons. For example, the significant depreciation of the US dollar against most major currencies in recent years has contributed to the increase in net financial flows over that period. Moreover, these comparisons will be affected by the sizes of recipients' economies and their economic growth rates. These problems are effectively addressed by transforming aid disbursements to a percentage of recipients' GDP.

There are some apparent shortcomings of the OECD approach to defining and measuring foreign aid. Chang et al (1999) argues that ODA does not accurately measure the true value of foreign aid flows, and "as a result the evolution of net ODA over time, as well as across donors and recipients, likely provides a distorted picture of aid trends". According to Chang et al (1999), the sources of this distortion are: under estimation of aid content due to netting out, over-representation of loans with high concessionality and under-representation of loans with low concessionality, the inclusion of official technical assistance (TA) grants with their full value, using constant discount and interest rates instead of actual market rates and not accounting for credit risk. They suggest a new approach to measurement of foreign aid that they call Effective Development Assistance. EDA comprises exclusively grants and the grant shares of official loans, which are calculated on a basis of actual interest rates. In a comprehensive empirical reassessment of foreign aid flows to 133 developing countries between 1975 and 1995, Chang et al (1999) claim that conventional net ODA has overstated the real aid flows by 25 to 30 percent over the last few years. While some of their points are legitimate, it is difficult to overcome these problems in practice. Moreover, some of their points are problematic and lead to underestimation of the actual value of aid flows. For example, the exclusion of official technical assistance grants from aid

flows goes against some of initial rationales[7] for foreign aid and underestimates the actual value of aid flows received.

Dalgaard and Hansen (2000) also claim that despite the valuable effort by Chang et al (1998) discussions of consistency and spurious changes in aid flows are irrelevant. They find that while ODA is somewhat higher than EDA, the difference between the two is a simple transformation. This was confirmed by an almost perfect correlation coefficient between nominal ODA and EDA. They find that the correlation coefficient between the two was 0.98 using either Pearson's standard or Spearman's rank correlations. Even Chang and his co-authors themselves noted that ODA and EDA data were very highly correlated with each other in spite of differences in their calculation.

Raffer (1999) claims that donor countries have brought a variety of public expenditures under the rubric of ODA over the past two decades, enabling them to considerably weaken the traditional OECD definition. He shows that donor governments have included the cost of development administration, education costs for students from developing countries, emergency and disaster aid (which grew rapidly during last 10-15 years), and debt relief. However, OECD's Credit Reporting System[8] (CRS) provides the sectoral breakdown of aid flows, so most of these expenditures mentioned by Raffer (1999) can be easily excluded from ODA flows, as I do in this study.

2.2. Evolution of Foreign Aid

As the large and ever growing body of literature on foreign aid documents, two important developments – political factors and the progress of development thinking – have made crucial impact in the evolution of modern era foreign aid policy (Hjertholm and White, 2000 and Kanbur, 2006). Each of these will be discussed in turn. If the evolution of development thinking has been more complicated and non-linear in nature, the central

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[7] See next section.

[8] The CRS was established in 1967, jointly by the OECD and the World Bank, to supply data on indebtedness and capital flows. Over the years the CRS was developed and its aid activity database has become internationally recognized source of data on geographic and sectoral breakdown of aid and widely used by interested parties, including researchers, in the field of development.

geopolitical factors behind international aid were the Cold War until 1990s, the collapse of Soviet Union, and the events of September 11, 2001.

The origins of modern foreign aid was launched in the aftermath of the Second World War. Table 2.1, modified and amended from Hjertholm and White (2000), provides a helpful overview of the main developments in the history of modern foreign aid. Three major events in the wake of the Second World War – the Marshall Plan, which represented US bilateral assistance to Europe, the establishment of the United Nations and the Bretton Woods conference that created the International Bank for Reconstruction and Development (now usually called as the World Bank) and International Monetary Fund (IMF), which represented the multilateral foreign assistance – played important roles in early stages of modern era international or foreign aid. Certainly, the objective of these major developments was reconstruction of war- ravaged Europe. The success of the Marshall Plan provided the impetus for turning the focus to developing countries, beginning with the World Bank's first loan to Colombia in 1950 and the United States Act for International Development of 1950. This act established USA's foreign aid policy to support the efforts of the peoples of developing countries to develop their resources and improve their welfare (Ohlin, 1966 and Wolf, 1960). Further, the inaugural address[9] of President Truman in 1949 enunciated a stance on aid for economic development to poor countries by rich nations that foreshadowed much of what followed in the next half century. Finally, the first wave of independence in mid 1950s created a constituency for the aid industry and aid became as a tool of foreign policy for western countries.

Formally, the need for foreign aid was justified as a moral responsibility of the rich countries to the poor at the time and during the Cold War period donor ideology and focus changed frequently from one objective to another (see table 2.1), such as supporting productive sectors, reducing poverty and population growth, increasing access to health care and basic education, macroeconomic reforms and opening markets, the main objective of western foreign aid was to stop newly independent developing countries going in the other

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[9] *Inaugural Addresses of the Presidents of the United States,* Washington, D.C.: U.S. G.P.O., 1989; Bartleby.com, 2001. www.bartleby.com/124/

(communist) direction (Kanbur 2006). Some economists saw important analytical disconnect between this objective and the means of foreign aid and claimed that while the objectives of foreign economic aid are worthy, the means are inappropriate to the objectives. For example, authors like Bauer (1971) and Friedman (1958) argued that foreign aid would create dependence and displace processes of institutional maturation that were essential to economic development. The long-run result of high aid levels would be relative economic regress. Similarly, Frank (1966) claimed that foreign assistance represented a side payment to elites in recipient countries, designed to buy their compliance in maintaining the economic and political dominance of the industrialized countries.

There are also periods, when foreign assistance lost some of its political overtones. For example, in the 1970s, foreign aid focused on poverty and "basic human needs", such as health and education. This was consistent with global development trends, particularly shifts in the priorities of bilateral and multilateral donors. For example, the United States established the International Development and Food Assistance Act[10], which instructed that 75 percent of food aid should go to countries with a per capita income less than $300. This period also marks an important shift in U.S. foreign aid delivery. USAID shifted the structure of its aid from large transfers of money to foreign governments and financing of infrastructure to sharing technical expertise, providing commodities and developing community-based distribution systems that bring family planning information door to door. For example, USAID's Office of Population began reproductive health training and international surveys, such as Demographic and Health Surveys, in 1972.[11]

Later, the advent of balance-of-payment problems and the emergence of the external debt crisis in the early 1980s shifted the focus of international aid to macroeconomic reforms and market liberalization. Both multilateral and bilateral donors focused on broad-based economic growth, trade, financial systems, and the promotion of market-based principles to restructure macroeconomic policies in developing countries. The greater focus on

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[10] Hjertholm, Peter and Howard White, "Foreign Aid in Historical Perspective: Background and Trends", in Tarp, Finn (ed) "Foreign Aid and Development: Lessons Learnt and Directions for the Future", 2000.
[11] http://www.usaid.gov/our_work/global_health/pop/timelineb.html

macroeconomic policy gave the IMF and the World Bank (hence the so-called "Washington Consensus") a preeminence they had not enjoyed before. Another important event in this period was the rise of non-governmental organizations (NGO) as agents in foreign aid delivery. At this time, bilateral donors agencies, such as USAID and DFID became further removed from the implementation of foreign assistance projects and began to channel their resources through NGOs. This trend became consistent and the number of NGOs involved in aid delivery has been increasing ever since. For example, USAID currently works with more than 3,500 companies and 300 private voluntary organizations.

The end of the Cold War in the 1990s also caused three important changes in the foreign aid industry. First, the countries of Eastern Europe and the former Soviet Union re-emerged as aid recipients. Second, poverty reappeared on the agenda of donor agencies, in part due to rising criticism of the macroeconomic and structural adjustment policies of the 1980s and early 1990s and the deterioration of socio-economic conditions in transition countries of Eastern Europe and the former Soviet Union (Milanovic 1998). The critics of the policies of the 1980s found their most effective voice in reports funded by UNICEF such as "The State of the World's Children" (Grant 1990) and "Adjustment with a Human Face" (Cornia et al, 1987). The turning point for poverty reappearing on the agenda of donor agencies was the 1990 World Development Report (World Bank 1990), which designed the "New Poverty Agenda". Third, although still inconsistently applied, donors started to show serious concerns about governance in recipient countries. In this new environment, some of previously important recipients countries became no longer so, and donors began awarding or withdrawing aid on the basis of perceived quality of governance. This was quite different from the Cold War period, when donors happily supported any "friendly regime" without giving much consideration to the quality of governance.

It is too early to get a clear view of the evolution of foreign aid in the 2000s but there are some clear differences before and after 2000. First, the new millennium started with the Millennium Assembly, which took place at the United Nations in September 2000. This largest gathering of world leaders in mankind history adopted the Millennium Development

Goals (MDGs, see appendix 1), which includes eight goals and eighteen targets. These are bold commitments to achieve sustainable development for the world's poorest people. These goals include: eradication of extreme poverty, achieving universal primary education, promoting gender equality and empowering women, reducing child mortality, improving maternal health, combating HIV/AIDS, malaria and other communicable diseases, ensuring environmental sustainability, and developing a global partnership for development.

A second important change was triggered by the events of September 11, 2001. These events have not only significantly changed the world geopolitics but they have also significantly influenced aid architecture. In the post September 11 world, the perspectives of donor nations on foreign aid has changed significantly. This perspective effectively realizes and includes developing nations' importance for global security as several developing countries in Asia and Africa have served as a staging point for worldwide terrorist attacks. The developed countries, especially the United States, have realized the need for a close cooperation with governments of developing countries to assure global security. They also comprehend that persistent poverty makes developing countries vulnerable to security and other threats. As a result of these realizations, the rhetoric of foreign aid has increasingly shifted towards the challenges of development. For example, the current view links two groups of rationales for foreign aid - donors' self-interest (strategic, political, and economic) and recipient-needs (poverty reduction, improving primary school enrollment, reducing maternal and infant mortality) - to a form of enlightened donors' self-interest that recognizes that a world with less poverty and diseases, and educated people is likely to provide a more secure and stable environment with greater opportunities for all of the world's population.

A third important event followed in March 2002, in Monterrey, Mexico at the International Conference on Financing for Development, which addressed the challenges of providing the financial means for economic progress. This conference highlighted both the role of private investment and official development assistance by acknowledging the fact that the poorest countries cannot really be expected to attract large inflows of private capital

because they lack the basic conditions (infrastructure and human capital) for private

investment. The major donor nations, including the United States, agreed to "urge all

Table 2.1. Schematic overview of main developments in the history of foreign aid

Decade	Dominant or rising institutions	Donor ideology	Donor focus	Types of aid
1940s	Marshal Plan and UN system (including World Bank)	Planning	Reconstruction	Marshall Plan was largely programme aid
1950s	USA, with Soviet Union gaining importance from mid 1950s	Anti-communist, but with role for the state	Community Development Movement	Food aid and projects
1960s	Establishment of bilateral programmes and regional development banks (including ADB, AfDB and IDB)	As for the 1950s, with support for state in productive sectors	Productive sectors (e.g. support to the green revolution) and infrastructure	Bilateral donors gave TA and budget support; multilateral donors gave project aid
1970s	Expansion of multilateral donors (especially World Bank, IMF and Arab-funded agencies)	Continued support for state activities in productive sectors and meeting basic needs	Poverty, taken as agriculture and basic needs (such as health and education)	Fall in food aid and start of import support
1980s	"Washington Consensus" and rise of NGOs from mid-1980s	Market-based adjustment (rolling back the state)	Macroeconomic reform and liberalization	Financial and structural adjustment aid and debt relief
1990s	Eastern Europe and FSU become recipients rather than donors; emergence of corresponding institutions (EBRD)	Move back to the state toward end of the decade	Support to political and economic transition, poverty and governance	Move toward sector support at the end of the decade
2000s	Bilateral aid agencies expanded aid flows (especially USA, establishment of MCC) and surge in private aid (remittances)	Move toward performance based aid allocation	MDGs, global health (HIV/AIDs), security and governance	Continued sector support with special focus on social sector

Note: Entries are main features or main changes; there are of course exceptions
Source: Reproduced from Hjertholm and White (2000), p.81, Table 3.1., with revisions and additions.

developed countries that have not done so to make concrete efforts towards the goal of 0.7 percent of gross domestic product as official development assistance."

There are four apparent stages in the progress of development thinking and their crucial impact in the evolution of foreign aid. First, in the early years of the independence, economic growth became the main policy objective for the newly sovereign countries. In this period development strategies and the role of foreign aid were greatly influenced by development theories developed by Rosenstein-Rodan (1943), Rostow (1956), Lewis (1954) and others, such as "big push", "take-off", "stages of growth" and "economic dualism". The central argument in these theories was that the main constraint to economic development in poor nations is the lack of capital and domestic savings and this constraint can be removed by providing external assistance. As Ruttan (1996) stated, most developing countries lacked capital (both physical and human) to attract private investment so that there was no alternative to foreign aid as a source of capital. Another important feature of early development theories and models was that they seem to indicate that as countries develop they progress through certain stages of development, and this will influence the composition of their external financing. They assumed that: the first stage, for developing countries at very low income levels, is concessional financing from official donors; in the next stage, non-concessional flows from official donors becomes important source of external financing for countries at slightly more advanced levels of development; and eventually, as countries develop they gain access to international capital markets and pure market-based solutions arise.

Chenery and Strout (1966), McKinnon (1961) and others further developed these theories and models. They assumed that growth in low-income developing countries moves through three consecutive phases of development – skill limited, savings limited and trade limited – and two binding constraints may limit the economic growth. If skills and savings gap were the binding ones then the investment-limited growth would follow and, alternatively, when the balance-of-payments constraint was the binding one then foreign exchange-limited growth would follow. The model considers that the role of foreign aid is to

remove either a savings or a balance-of-payments gap by an increased inflow of foreign savings or providing the necessary foreign exchange. While the savings gap emerges when the need for investment exceeds domestic savings the foreign exchange gap (trade gap) emerges when foreign exchange inflows from exports are insufficient to keep pace with the growing demand for imports of capital goods. Thus, foreign assistance is needed to make it possible for developing countries to fill the savings gap and invest more than what their domestic savings could allow. It also justifies the need for technical assistance since lack of skills restricts the capacity to invest. This model assumes that foreign assistance would also help to fill the foreign exchange gap by supplementing the countries' foreign exchange resources, which are generally severely limited.

Eventually, this model became popular as a "dual-gap" model and served until recently as the basis for the World Bank-led donor projections. Policymakers and analysts in donor agencies and recipient countries relied on this model to determine foreign financing requirements that were directly linked to targeted economic growth rates. The basic approach of this model includes projections of required domestic investment, derived by multiplying the incremental capital-output ratio (ICOR) by a targeted growth rate, and of potential domestic savings, on the one hand and on the other hand, projections of likely export earnings and foreign exchange necessity for imports.

Second, where in the 1950s and 1960s the dominant development objective was simply economic growth, in the 1970s, as result of contributions to development thinking, the development objectives appeared to be multidimensional, simultaneously including poverty alleviation, employment and income distribution in addition to the economic growth. The major contributions to development theory, in this period, include an explanation of dynamics of the transformation process of traditional agriculture and the role of informal sector in employment generation (ILO 1973), and the interdependence between economic and demographic developments (Little and Mirrlees 1974) and the determinants of the rural-urban migration (Harris-Todaro 1970). These advances in development thinking also led to a reconsideration of the role of foreign aid in promoting development.

Foreign assistance was no longer considered exclusively as an instrument to promote the economic growth by removing either the savings or the foreign exchange gap and a greater focus was placed on poverty alleviation, employment generation and income distribution. Major donor agencies, including the World Bank and USAID, started to focus on financing projects in agriculture and rural development, education and health and providing direct assistance to benefit the poor and technical assistance (Brown 1990). As a result, the percentage of poverty-focused concessional financing increased from 5 percent of the total in late 1960s to 30 percent in early 1980s (Thorbecke 2000).

Third, in the 1980s and the 1990s, the developing world witnessed a combination of three important events: (i) the debt crisis and increasing current account and budget deficits in most of the developing world (ii) collapse of income and employment in transition countries of Eastern Europe and the Former Soviet Union, and (iii) the Asian financial crisis. These events started with the Mexican financial crisis of 1982, which quickly extended to most of the developing world. The magnitude of the debt crisis was such that suddenly, the achievement of macroeconomic equilibrium (both internal and external) became an important policy objective and necessary condition to the restoration of the economic growth and poverty alleviation.

Moreover, an important advance in economic theory that occurred in the late 1970s and early 1980s, a so-called "neo-liberal counter-revolution" praised the virtues of free markets and private enterprise and the shortcomings of state intervention. The diagnostic was clear in the new paradigm: government intervention in the economy was the primary cause of macroeconomic disequilibrium and the best way to control the level of economic activity was through restrictive macroeconomic policy. Inflation was considered essentially a monetary phenomenon, and could be brought under control through a restrictive macroeconomic (monetary) policy. The new political economy emphasized, on the one hand, that market failures were less damaging than state failures; and, on the other, that any interference by the "predatory State" with the "magic of the marketplace" was bound to make matters worse. In addition, in the area of international trade analysis, this period was

marked by the rejection of past import-substitution strategies and the state interventionism associated with it. The research and literature on the cost of rent seeking, which became one of the new leading topics of research, evolved the key idea that an export-oriented development policy could have favorable effects on growth performance and welfare.

These ideas resulted in a decisive turning point in development policies advocated by major donor agencies and pursued hitherto by most developing countries. The implications of the "new" thinking for development were that state withdrawal from the economic sphere and the promotion of market mechanisms as the main engine of growth and development. The solution to the crisis was to allow the market to determine how economic resources can more productively be allocated, and to rely on market forces as the principal determinant of economic decision. Additionally, a large number of empirical studies using cross-sectional and panel data analyses of economic growth over time found a robust positive relationship between trade and growth (Frankel and Romer, 1996 and 1999). These studies found that countries that liberalized and encouraged trade grew faster than those that followed a more protectionist policies.

In the context of the afore-mentioned contributions to development thinking and events, the central objective of international development policy became promotion of a market-oriented economic system, the control of inflation through restrictive monetary policy, the attainment of budget deficit, trade and financial liberalization. These policies were not only advocated by major donor agencies. The Bretton Woods institutions (the IMF and the World Bank) actively promoted them through conditionality mechanism resulting in a serious erosion of the power of developing countries in shaping their domestic economic policies. Thus, the main functions devoted to foreign aid became to support developing countries to service their external debt, encourage implementation of appropriate macroeconomic and structural adjustment policies through conditionality attached to program lending.

Fourth, some important conceptual developments in economic theory that surfaced in the late 1980s and the early 1990s challenged the contemporaneous development policies

and further extended the evolution of development policy and foreign aid. First, arguably, the most important contribution was made during this period is the explanation of the role of institutions in economic development and endogeneity of policies (North 1990, Williamson 1991, World Bank 1993, etc.). These advances highlighted the importance of the strategic behaviors of governments, businesses and individuals in the context of incomplete markets, imperfect and asymmetric information. As Thorbecke (2000) noted, these important contributions "in addition to reminding the development community that appropriate institutions and rules of the game are essential to provide pro-development and anti-corruption incentives, also suggested broad guidelines in building institutions that reduced the scope for opportunistic behavior". Thus, "an inherently related issue is to identify the set of institutions most conducive to the acceleration of the process of economic growth and socio-economic development." World Bank (1993) argued that the mix of institutions and public policy adopted by the East Asian countries provides a general model, transferable to other developing countries.

Further, in this stage development doctrine also benefited greatly from contributions to the economic theory that explained the role of human capital in promoting development and technology transfer. The endogenous growth theory (Lucas 1988 and Romer 1990) identifies human capital endowment as the primary factor in achieving the potential scale economies that might come about through industrialization. This new approach magnifies raw labor and capital in a production function by a term representing human capital and knowledge that leads to increasing returns and converts technical progress to an endogenously determined factor of growth. Similarly, incorporating human capital into the neoclassical growth (Solow) model, Mankiw et al (1992) provides excellent explanation of international differences in income per capita. They find that differences in human capital (education) together with savings and population growth explain most of the international variations in income per capita. Certainly, there are very important methodological and practical differences between the findings of the endogenous growth theory and the human capital augmented neoclassical growth model but both of them highlight the importance of

human capital for growth[12]. If indeed human capital is important in explaining international variations in per-capita income and the market is likely to under-produce human capital, due to the fact that marginal social productivity of investment in human capital being greater than that of the marginal private productivity, these provide a powerful rationale for the role of the state and foreign aid in human capital development.

The current state of the aid dialogue reflects its evolution over the last five decades, the combination of political events in the early years of new millennium and the current state of the development thinking. As Kanbur (2006) noted, currently, the role of government and the importance of its accountability in promoting development are more clearly recognized. Donors understand that overall macroeconomic policy is important, but the role of institutions in determining policy outcomes is thought to be essential. Therefore donors' focus started to move toward performance-based aid allocation. When donors stress accountability in aid allocation, they hope that rewarding some recipients for good performance will create better incentives for other countries (Klitgaard et al 2005). The prime example of performance based aid allocation is the Millennium Challenge Account (MCA). In March 2002, at the Inter-American Development Bank (IADB) meeting, President Bush called for "a new compact for global development, defined by new accountability for both rich and poor nations alike. Greater contributions from developed nations must be linked to greater responsibility from developing nations."[13] In February 2003, President Bush sent Congress a bill that aimed to increase foreign aid by 50 percent by fiscal year 2006 by creating the Millennium Challenge Account for a select group of poor countries. Because good governance and sound policies are important condition of development, U.S. government announced that the MCA will be "devoted to projects in nations that govern justly, invest in people and encourage economic freedom."[14]

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[12] For example, Mankiw et al (1992) in contrast to Romer (1990) suggests that capital approximately receives its social return.

[13] Remarks by the President on Global Development at the Inter-American Development Bank, March 14, 2002, Washington, DC: Office of the Press Secretary (available at http://usinfo.org/wf-archive/2002/020314/epf409.htm).

[14] Ibid.

Table 2.2. Overview of trends in the relationship between development thinking and foreign aid

Objectives	Development theories & models	Policies and Strategies	Role of foreign aid
GNP growth External equilibrium Employment (From early 1950s to late 1960s)	"Big push" (Rosenstein-Rodan 1943), "Take-off" & stages of growth (Rostow 1956), Balanced growth (Nurkse 1953), economic dualism (Lewis 1954, Fei and Ranis 1964), Inter-sectoral structure & pattern of economic growth (Kuznets 1966, Chenery 1960), Harrod-Domar model (Harrod 1939, Domar 1946), Two-gap models (Chenery & Strout 1966), Semi-input-output models	Industrialization through import substitution, social overhead capital (SOC), infrastructure investment with emphasis in urban sector, appropriate prices, "Balanced growth" between agriculture and industry	Source of capital to trigger economic growth through higher investment based on belief in government capacity to use aid efficiently, removing investment-savings & import-export constraints and support to "balanced growth" strategy
GNP growth Poverty alleviation Employment Income distribution External equilibrium (From early 1970s to early 1980s)	Integrated rural & agricultural development, Role of informal sector (ILO 1973), Interdependence between economic & demographic variables and rural-urban migration (Harris-Todaro 1970), Relationship and trade-off between output, employment, income distribution and poverty (Little & Mirrlees 1974)	Unimodal strategy in rural development, comprehensive employment strategies, "redistribution with growth" & "basic needs fulfillment"	Support to "redistribution with growth" & "basic needs fulfillment" strategies; poverty alleviation became major criterion of aid allocation, emphasis on integrated rural development

Table 2 (Continued)

Objectives	Development theories & models	Policies and strategies	Role of foreign aid
Macroeconomic stabilization Structural Adjustment External & internal equilibrium (From early 1980s to mid 1990s)	Short-run macroeconomic stabilization, "Washington Consensus" (Williamson 2000), link between trade & growth (Frankel and Romer, 1996 and 1999), Impact analysis based on SAM models (Dervis et al 1982)	Stabilization and structural adjustment, outward orientation, privatization, deregulation and liberalization, reliance on markets and minimization of the role of government	Support developing countries to service their external debt; encourage the implementation of macroeconomic stabilization and structural adjustment policies through conditionality
Broad based growth Good governance & institution building Poverty alleviation MDGs Global health (HIV/AIDs and other communicable diseases) Global security and antiterrorism (From late 1990s)	Role of institutions in development & endogeneity of policies (North 1990, Williamson 1991, World Bank 1993, Persson and Tabellini 1990), roles of markets and governments (Commander et al 1996), role of human capital in development (Mankiw et al 1992, Lucas 1988, Romer 1990), Development and security (Abadie 2005, --)	Participation and ownership in decision-making, poverty reduction strategy papers, public-private partnership & participatory mechanism, enhancing security, promoting competitiveness and sound business environment, performance based aid allocation	Promote good governance and policies through selectivity; enhancing security; support poverty reduction; promote MDGs; provide assistance to cure communicable diseases & pandemics

 Note: Entries are main features; there are of course exceptions

2.3. Patterns of Foreign Aid Flows: Some Stylized Facts

This section reviews trends in aid, focusing on aggregate volumes, sources and destinations. Aggregate trends in net ODA to developing countries are presented in Figure 2.1. From only $25.6 billion in 1960, in constant 2003 prices and exchange rates, total net ODA flows from all donors reached $73 billion in 2004. While there is a clear upward trend in total aid flows, per capita aid flows were unstable during the 1960-2004 period. Average per capita aid flows peaked in 1980 when its value, in constant 2003 prices, reached 19.41 dollars. Since early 1980s to late 1990s general trend in per capita aid flows were descending, with some exceptions. Average per capita aid flows rounded at 11 dollars in 1997. Another relative measure of foreign aid, the average ratio of net aid inflows to recipients' gross national income (GNI), shows a generally downward trend during the entire period (see figure 2.2). This ratio declined from 2.4 percent in early 1960s to 1.2 percent in 2004, with lowest value of 0.9 percent in 1997.

Figure 2.1. Net Official Development Assiatance to Developing Countries from All Donors, 1960-2004 (In constant 2003 U.S. Dollars)
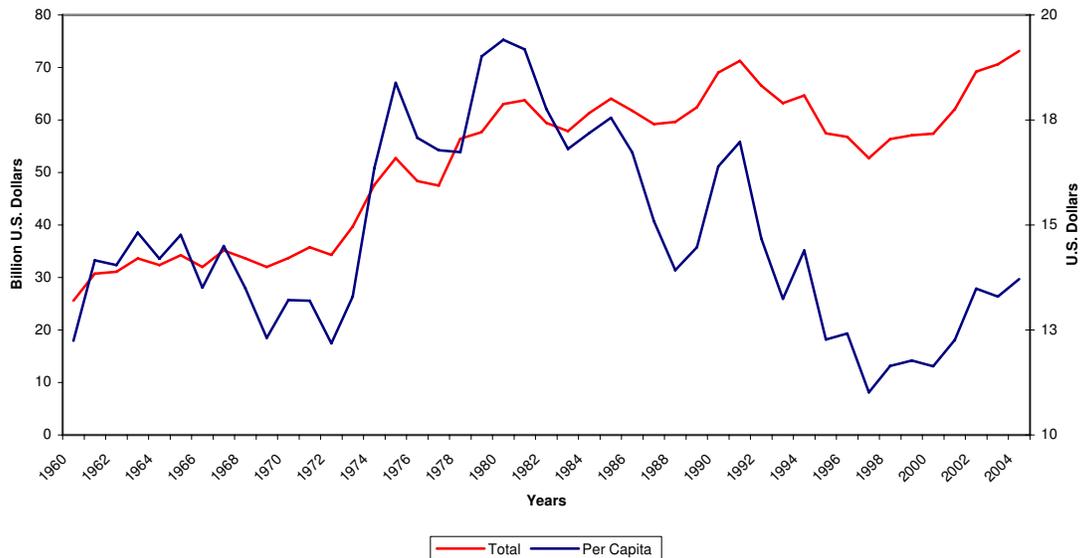
Source: OECD DAC

Despite the overall upward trend, total net ODA flows have experienced downward trends or were flat during some periods. For example, during the 1980s net ODA flows similarly to other capital flows to developing countries remained stagnant as a result of widespread debt crisis in developing countries. The declining trend was more pronounced during 1991-1997 with an absolute decline in net ODA flows from $71.3 billion in 1991 to $52.8 billion in 1997 (in constant 2003 prices and exchange rates) and the decline in the net ODA disbursements expressed as ratio of donor GNP from 0.33 percent in early 1990s to 0.22 percent in 1997. This turnaround in aid flows followed the end of the Cold War. The end of Cold War changed the geopolitical picture of the world and most donors experienced a decline in their aid budgets. This can partly be explained by an increasing pressure on the national budgets of donors: donors (Sweden, Italy, Finland, etc.) that have been running large fiscal deficits decreased their aid budgets significantly while donors (Norway, Japan and Ireland) with smaller budget deficits increased their aid budget in real terms (OECD 1997).

Figure 2.2. Net Oifficial Development Assistance To Developing Countries from All Donors, 1960-2004, % of Recipients' GNI (Average)
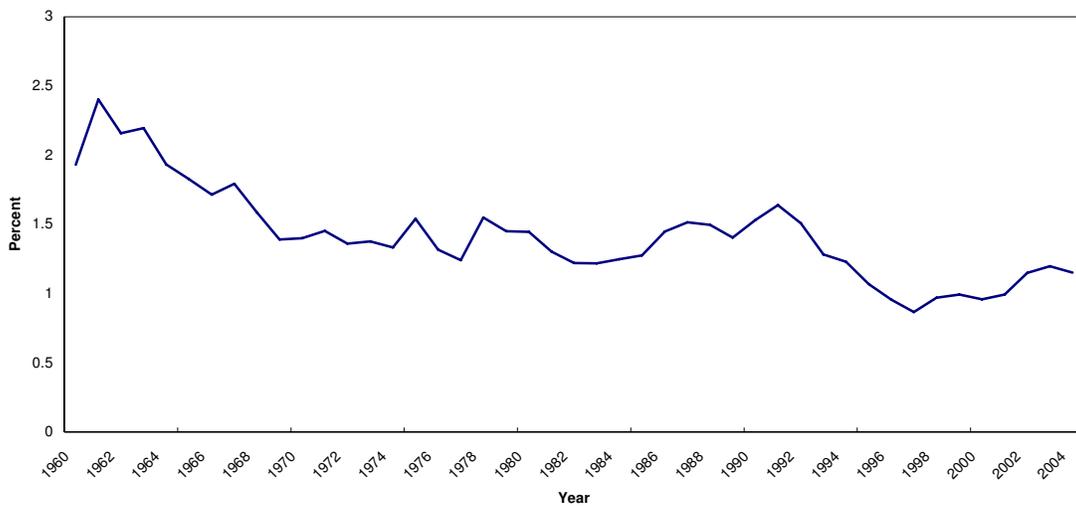
Source: OECD DAC

While sometimes a decline in foreign aid flows has been compensated by an expansion in private financial flows to developing countries, there were times when both aid flows and private capital flows expanded or declined simultaneously. For example, official aid flows expanded rapidly in the 1970s but there was also a rapid expansion of private financial flows, primarily in the form of bank credits. However, during 1980s both official aid and private capital flows to developing countries remained virtually stagnant. As mentioned earlier, from 1991 to 1997 there was a sharp decline in official aid inflows but it was compensated with a strong expansion in private capital inflows to developing countries, including both equity and non-equity flows (Akyuz and Cornford 1999). On average, during this period aggregate net private capital inflows to developing countries accounted for almost 4 percent of their GNI.

In the supply side, overall, the United States remains the world's largest aid donor in terms of volume ($15.8 billion in 2004), followed by Japan ($8.9 billion), France ($7.3 billion), Germany ($6.7 billion), the United Kingdom ($6.2 billion), and the Netherlands (4.1 billion). However, net ODA flows from the United States are declining over time relative to the total aid flows from DAC members while combined aid flows from EU member countries has been steadily increasing (see Figure 2.3). Also, from early 1990s to early 2000s, Japan had been the largest donor of aid to developing countries, in volume terms. That was until 2001, when the United States reclaimed that position, as Japan's aid dropped by nearly $4 billion, partly due to sharp depreciation of Japanese yen. Although aggregate trends in net ODA flows to developing countries present an upward trend, these flows are smaller than they used to be, relative to gross national incomes of the donor countries. Since the 1970s net ODA flows have shrunk by more than a quarter relative to the GNI of donor nations[15] (Klein and Harford 2005). Historically, average (weighted) aid effort of DAC members has been around 0.2 to 0.4%. This measure was equal to 0.26% in 2004 with highest value of 0.87% for Norway and lowest values of 0.15 and 0.17% for Italy and the USA, respectively.

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[15] This is a measure that the development community calls aid effort.

In addition to aid effort, the literature uses some other measures to evaluate donor performance. For example, Dollar and Levin (2004) attempt to measure the poverty focus of aid from individual donors – how much aid flows vary depending on the poverty of the recipient country. They also measure the policy focus of individual donors, using the Burnside and Dollar (2000) measure of good policy. Roodman (2004) weights aid from individual donors depending on whether it goes to poor countries and whether it goes to countries with better governance as measured by Kaufmann et al (2003) index. I will discuss these aspects of donor performance in the next chapter.

Figure 2.3. Net Official Development Assistance from DAC Members, 1960-2004
(In constant 2003 U.S. dollars)
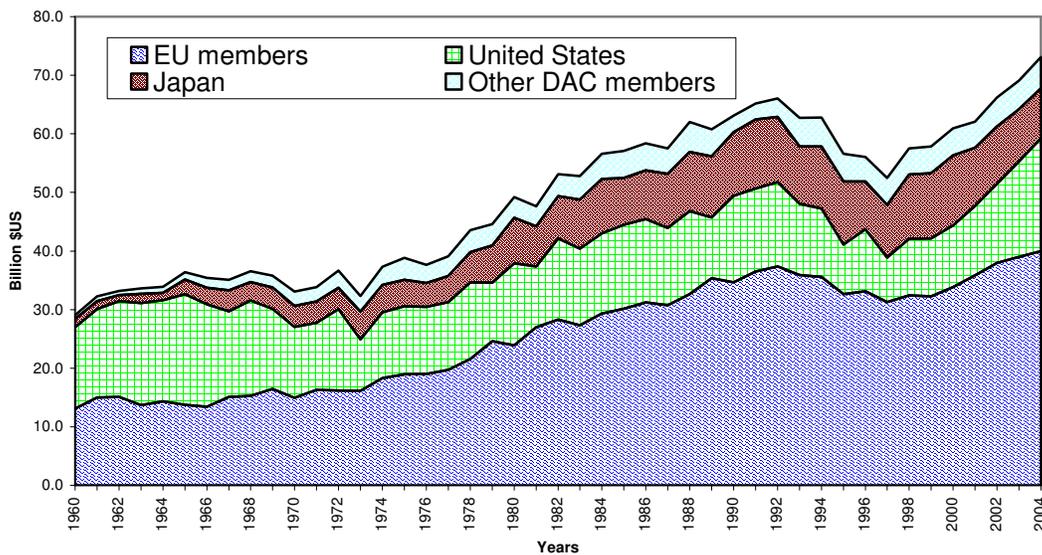
Source: OECD DAC

The geographic pattern of aid flows across from the 1960s to the 2000s changed slightly (see figure 2.4). As can be seen, the Sub-Saharan Africa (SSA) is of high priority since early 1970s with at least one third of total ODA is going to countries in this region. This priority becomes even more apparent if aid flows are calculated on per capita base. The Asia-Pacific region continues to be important for aid donors although its share in total aid flows has been declining since the 1970s. This can partly be explained by successful development

efforts of number of countries in the region, such as Republic of Korea, Malaysia, Singapore, and Peoples Republic of China. However, some complain that Asian countries receive less foreign aid in comparison to the size of population, the level of income, and the number of poor in the region[16]. According to recent UNESCAP report, per capita aid inflows to Sub-Saharan Africa, the CIS countries of Asia, Western Asia and the Caribbean range from US$ 21 to US$ 26 while South and South-Eastern Asia received in the range of US$ 10 -11 per capita. The report also claims that the share of ODA flows in GNI is substantial for SSA (4.0 percent) in contrast to Asian countries, for example, China and India (0.1 percent and 0.2 percent, respectively). However, the high priority given to the SSA can be easily understood in the context of the deep-seated political, social and economic problems that many countries in the region have been experiencing during last four decades or so.

While Sub-Saharan Africa (both in terms of total volumes and per capita) and the Asia-Pacific region (in terms of total volumes) continue to be major recipients of ODA, in the 1990s Eastern Europe and the Former Soviet Union emerged as another favored destination of foreign aid. Transition countries in this region received on average more than 13 percent of total ODA flows beginning early 1990s. On average, countries of this region received about US$ 22 aid per capita in 2000-2004 period.

In terms of individual country destinations, there have been shifts in the preferences of donors over the last three decades (see table 3). First, seven countries of Asian-Pacific region and two countries of Middle East and North Africa region together with Turkey were among the ten largest aid recipients in absolute terms during 1970-1974, after three decades (2000-2004) only three of them including India, Pakistan and Vietnam still were among the top 10 aid recipients. Others were replaced by China, Serbia and Montenegro, Tanzania, Iraq, Mozambique, Russia, and Ethiopia.

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[16] UNESCAP, "Achieving MDGs in Asia: a case for more aid," available at
http://www.unescap.org/mdgap/events/dfid%20meeting/LondonJ.pdf

Figure 2.4. Geographical Allocation of ODA Disbursements, 1960-2004
(In constant 2003 U.S. dollars)
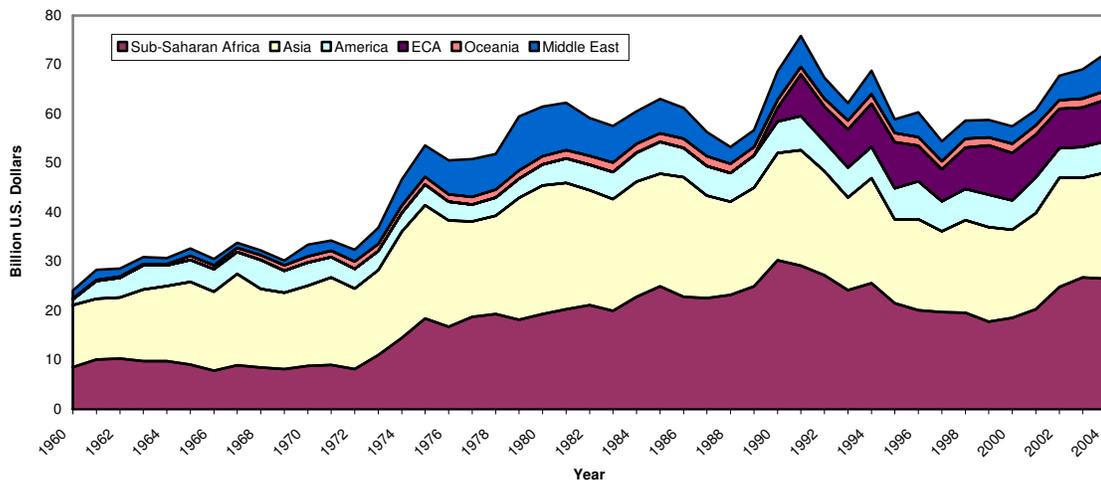
Source: OECD DAC

Second, one might ask what about per capita aid flows? Table 2.3 shows that only Jordan among top ten per capita aid recipients in 1970-74 still remained there while rest were replaced by other countries. Interestingly, three transition countries (all of them are former Yugoslav republics) appeared among top ten per capita aid recipients. Another important fact is that the spread of per capita aid inflows among top ten aid recipients both in terms of total inflows and in per capita terms became smaller. Third, in terms of aid inflows measured as a percentage of recipients' GNI, there were remarkable increases in most countries in Sub-Saharan Africa region during last three decades. Most countries in this region experienced a surge in net aid over time, ranging from an average of 5.6 percent of GDP in 1973 to an average of 12.6 percent of GDP in 2002. Today, the level of net aid is very high in most countries in Sub-Saharan Africa, with up to 40 percent (Guinea-Bissau) of GNI. Thus, unsurprisingly there are seven countries of this region among top ten aid recipients in this category. Some authors see high levels of aid to GNI (GNP) ratio as an indication of aid dependence. For example, Knack (2000) uses

aid to GNP ratio as an alternative measure of aid dependence, other alternative being aid

to government expenditure ratio[17].

Table 2.3. Top Ten Aid Recipient Developing Countries

Recipient	1970-1974	Recipient	2000-2004
Average Annual Net ODA/OA Inflows, in constant 2003 million US$			
India	3640.3	Congo, Dem. Republic	1796.9
Indonesia	2943.1	Vietnam	1659.0
Vietnam	1874.3	China	1599.0
Egypt	1804.0	Serbia & Montenegro	1536.3
Pakistan	1526.0	Pakistan	1532.0
Korea Republic	1354.9	Tanzania	1485.7
Bangladesh	1050.3	Iraq	1428.5
Syria	692.6	Mozambique	1396.2
Turkey	611.3	Russia	1386.7
Papua New Guinea	609.6	Ethiopia	1374.4
Average Annual Net ODA/OA Inflows Per Capita, in constant 2003 US$			
Suriname	417.9	Micronesia	1041.8
Djibouti	377.7	Cape Verde	248.9
Solomon Islands	328.6	Tonga	226.5
Jordan	315.9	Serbia & Montenegro	188.9
Belize	257.4	Bosnia & Herzegovina	180.2
Papua New Guinea	228.5	Nicaragua	168.7
Gabon	221.5	Solomon Islands	164.4
Botswana	138.5	Guyana	141.9
Equatorial Guinea	117.6	Macedonia, FYR	141.4
Oman	103.3	Jordan	133.6
Net ODA/OA Inflows as a Percentage of Gross National Income			
Comoros	36.0	Micronesia	47.0
Solomon Islands	32.4	Guinea-Bissau	38.9
Papua New Guinea	20.8	Sierra-Leone	35.9
Cambodia	18.6	Eritrea	35.5
Jordan	15.1	Congo, Dem. Rep.	32.1
Botswana	14.7	Burundi	31.2
Rwanda	12.4	Mozambique	30.5
Lesotho	11.8	Afghanistan	30.4
Suriname	11.6	Solomon Islands	26.2
Mali	11.2	Malawi	25.2

Source: authors estimates based on OECD 2006 and World Development Indicators 2005

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[17] Literature uses various other measures of aid dependence (see Lensink and White 1999). Bauer (1984) stresses that aid to government expenditures is more appropriate than aid per capita, because "aid goes to governments, not people." Moore (1998) defines aid dependence as a characteristic "not of economies but of governments." Klitgaard (1990) suggests (partly) facetiously that the most relevant measure might be aid per cabinet minister.

Chapter 3. Overview of Existing Studies

Since donors started providing foreign assistance to developing countries, a broad empirical literature has emerged to investigate the impact of foreign aid on development outcomes and determinants of aid allocation. This substantial and growing body of research has dramatically increased our knowledge of how aid affects developing economies and what factors determine donors' aid allocation decisions. In addition, this literature has introduced a variety of innovative techniques for dealing with the estimation inherent in evaluating development effectiveness. It would be vastly beyond the scope of this dissertation to provide a detailed review and critique of hundreds of studies that have analyzed donors' aid allocation policies and aid effectiveness. In this chapter instead, I summarize major results and weaknesses of past literature on aid effectiveness and allocation. This is done in three steps. First, in subsection 1, I review evidence on the impact of aid on development outcomes, focusing in particular on whether foreign aid promotes economic growth in recipient countries. Then, in subsection 2, I summarize studies on determinants of aid allocation. In subsection 3, I present evidence on the effect of governance on development effectiveness.

3.1. Aid effectiveness: What does past research tell us?

How do I define and evaluate aid effectiveness? As seen in Chapter 2, the role and function of foreign aid has been influenced by, and thus has to be evaluated in the light of, development thinking. In fact, economic theory and development thinking have been influential in identifying criteria for and evaluating aid effectiveness. As I highlighted earlier in this dissertation, most important in this respect has been the two-gap model (Chenery and Strout 1966 and others), which identifies inadequate domestic savings and foreign exchange earnings as a binding constraints on economic development (growth) in developing poor countries. Thus, the objective of promoting economic development and welfare in

recipient countries became an important part of the OECD's definition of ODA in the 1970s[18].

During this time the criterion for aid effectiveness was whether aid is effective in promoting economic development and welfare in recipient countries. This criterion has been explored from different methodological and ideological perspectives. Studies have evaluated aid effectiveness at both the micro- and macroeconomic level, relying on both cross-country comparisons and single country case studies, and by using broad surveys of a qualitative and multi-disciplinary analysis as well as empirical analytical studies. A complete survey of aid effectiveness studies is neither feasible nor essential task for this dissertation. Instead I focus on summarizing the main results and weaknesses of this literature. Before moving to the analysis of empirical studies on aid effectiveness, I will briefly discuss some conceptually different approaches to potential impact of foreign aid in recipient countries.

There are two conceptually different broad views in this context. On the one hand, proponents of foreign assistance to developing countries argue that most poor developing countries lack domestic savings to finance existing profitable investment opportunities and have limited or no access to international private capital markets; thus, official foreign assistance could play an important role (the only source in many developing countries) in filling the financing gap in order to attain a needed investment level and targeted growth rate. Contemporary proponents of foreign aid, such as Sachs (2005), Stiglitz (2002), Stern (2002) and others argue that although aid has sometimes failed, it has prevented worse performance in many countries and even supported poverty reduction and successful development efforts in several others. They provide a number of successful examples of programs that have been supported by western donors, such as the green revolution in Asia, eradication of various infectious diseases as a result of the Global Alliance for Vaccines and Immunization, the spread of family planning, the success of export processing zones in East Asia and so forth.

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[18] OECD, "Is it ODA?" Note by the DAC Secretariat, Paris, 22 May 2001

The contemporary advocates of foreign assistance mainly use some modified versions of initial rationale for foreign aid. For example, Sachs (2005) argues that the basic mechanics of capital accumulation in poor countries fall into a poverty trap. Since all household income goes to consumption, there are no taxes and no personal savings. However, rising population and depreciation leads to a fall in capital per person and a negative growth rate of per capita income. This further impoverishes the poor households in the future and leads to a vicious circle of falling incomes, zero savings and taxes, private and public investment, and falling capital per capita. Sachs (2005) argues that the solution is foreign assistance, in the form of ODA, which "helps to jump-start the process of capital accumulation, economic growth, and raising household incomes"[19]. He identifies three channels into which foreign aid goes: households for emergency situations, government to finance public investment, and private businesses (for example, farmers) through microfinance programs and other schemes to finance private investment. Finally, Sachs (2005) claims, "If the foreign assistance is substantial enough, and lasts long enough, the capital stock rises sufficiently to lift households above subsistence"[20].

On the other hand, Freidman (1958), Little and Clifford (1965), Bauer (1972), and other earlier critiques of foreign aid argued that the objectives of foreign aid are worthwhile but its premises are wrong and it would just be a waste of money. As Milton Freidman argued "The proponents of foreign aid have … accepted the view that centralized and comprehensive economic planning and control by government is an essential prerequisite for economic development"[21]. They also argued that aid flows have largely contributed or will contribute to the failure of development efforts in many developing countries by enlarging government bureaucracies, perpetuating rent seeking and corruption, and enriching the elites in poor countries. According to Easterly (2003 and 2006), one of the strong contemporary critics of foreign aid, there is too much corruption in recipient countries and unaccountability in aid delivery mechanism. He claims, therefore, that foreign aid has done

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[19] Sachs, Jeffrey (2005). "The End of poverty: Economic Possibilities of Our Time", p. 246.
[20] Sachs, Jeffrey, Ibid.
[21] Freidman, Milton, "Foreign Economic Aid: Means and Objectives", p. 77-78.

much bad and little good to recipient countries, and argues against upscaling of foreign aid flows.

However, while influential, these high level studies seldom provide empirical evidence to support their arguments (Easterly, 2003; 2006 and Sachs, 2005 are exceptions). Having briefly discussed the higher-level conceptually different views regarding the role of foreign aid in promoting development, the main thrust of this section is to provide a review of empirical literature on the effectiveness of aid. Although, my main focus is on most recent developments, I will start with a short background debate by discussing some earlier studies.

Early studies on aid effectiveness mainly used the framework of the Harrod-Domar growth model and two-gap models, in which incremental capital-output ratio is a key determinant of the economic growth. Assuming that there is a savings gap that constrains investment and growth, these studies emphasized the role of aid in financing investment and proposed a causal link running from aid to savings to investment to growth. First, I briefly focus on and discuss studies that attempt to estimate the direct impact of aid on domestic savings, and then I concisely examine studies that make an attempt to estimate a causal link between aid and domestic investment.

The studies available overwhelmingly suggest that there is a negative relationship between foreign aid and domestic savings (Hansen and Tarp 2000). For example, Snyder (1990), using data for 50 aid recipient countries, demonstrates that after controlling for per capita income, aid has no statistically significant effect on domestic savings. However, he does not rule out the possibility of some negative association between aid and domestic savings in some recipient countries because the relationship between aid and domestic savings were consistently negative, though statistically insignificant, in various specifications. The findings of Reichel (1995) support this conclusion. He found a strong and statistically significant negative relationship between domestic savings and aid, and concludes that there is considerable evidence of foreign aid substituting for domestic savings.

However, Hadjimichael et al (1995) demonstrate that there is a strong evidence of heterogeneity among aid recipient countries. This last study also initially finds a negative relationship between foreign aid and domestic savings in a sample of 39 Sub-Saharan African countries. However, when they controlled for differences in growth performance and the degree to which macroeconomic and structural adjustment efforts were sustained, they find that the negative impact of foreign aid on domestic savings is concentrated in those countries with prolonged imbalances and negative per capita growth. In countries with sustained adjustment efforts and positive growth rates, foreign aid appears to have stimulated domestic savings.

Papanek (1992) also doubts the negative relationship between savings and net aid inflows, and argues that exogenous factors, such as political factors, are likely to cause both high aid inflows and low savings rates. Griffin (1970) attempts to explain the estimated negative effect of foreign aid on savings as follows. He argues that aid inflows will increase income but would not increase savings (investment) one-for-one. The reason for this is that marginal propensity to savings is always less than one, and marginal propensity to consumption is always above zero. Therefore, when income rises as a result of foreign assistance, part of the additional income goes to current consumption, thus, savings increases by less than the value of aid flows. Further foreign aid displaces domestic savings and in this sense, aid has a negative influence on savings.

There are two problems with this argument (White 1992). First, the above reasoning is static in nature and it ignores potential feedback from higher income into future higher savings and higher growth. Second, the bulk of foreign assistance goes to health and education sectors that are considered as consumer goods but helps to build human capital that plays an important role for future savings, investment and the economic growth. Therefore, the results of static analyses that show a negative or insignificant effect of foreign aid on savings are flawed on methodological grounds.

The aid-investment relationship has also received noteworthy attention of researchers from academia and international financial institutions. Overall, the available studies seem to indicate a positive relationship between foreign aid and domestic investment in recipient countries (Hansen and Tarp 2000, Mavrotas 2003). Hansen and Tarp (2000) summarizes the results of 29 earlier studies that attempt to test the proposition that asserts that foreign aid stimulates domestic investment. Their meta-analysis provides overwhelming support for the proposition that aid helps to increase the level of investment ratio in recipient countries, with fifteen out of sixteen estimates providing a positive and statistically significant result.

Levy (1987) shows that much of aid transfers to developing countries go to finance investment. His results, based on a cross-sectional analysis of data from 39 LDCs, show that the estimated coefficient of aid with respect to domestic investment is approximately 0.86, thus suggesting that one point increase in aid to income ratio will lead to a 0.86 point increase in investment ratio[22]. Thus he concludes that the evidence overwhelmingly supports the proposition that most development assistance intended for fixed capital formation is indeed invested and a sustained increase in the aid ratio caused an almost equal increase in the investment ration. In another study, Levy (1988) also reports positive and statistically significant impact of aid on investment based on a cross-section of 22 Sub-Saharan African countries. Results of regression that controlled for fixed country effects suggested that "countries that experienced an increase in the flow of foreign aid found that their investment increased on average by an equal amount"[23]. Lensink and Morrisey (2000), in a cross-sectional study of 75 aid recipient countries, also find a positive and statistically significant impact of aid on investment. Furthermore, Hansen and Tarp (2001), in a panel data analysis of 56 developing countries, obtained similar results.

However, there are some studies that report a negative relationship between aid and domestic investment in recipient countries. For example, Snyder (1996) finds, using a

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[22] When aid net of technical assistance is used the coefficient rises to 0.96. This highlights the notion about heterogeneity of different aid flows and the importance of aid disaggregation in evaluating the impact of aid on development outcomes.

[23] Levy, V. "Aid and Growth in Sub-Saharan Africa: The Recent Experience", European Economic Review, 1988, Vol. 32, No. 9, pp. 1777-1795.

pooled data for a sample of 35 aid recipients, a negative and significant impact of aid on private investment. Easterly (1999) investigates the relationship between foreign aid and domestic investment country by country for the period 1965-95. He finds that out of 88 aid recipient countries for which he performed the investigation the relationship between aid and investment was negative and significant, in 36 countries a negative but insignificant in17 countries, positive and significant in 23 countries positive and significant, and positive but insignificant 12 countries. This study investigated the relationship between ODA/GDP ratio and Investment/GDP ratio using a simple ordinary least squares (OLS) model and did not control for potential sources of bias, and thus should be taken with precaution, but it still suggests that there is heterogeneity in the relationship between aid and investment across aid recipient countries.

Later the focus shifted away from simplistic Harrod-Domar and two-gap models towards more sophisticated models based on the neoclassical and other growth models and most of the academic and policy debate on aid effectiveness focused on the relationship between aid and growth despite the fact that a substantial part of foreign assistance is not primarily intended to support growth. Some of the studies based on these models estimate the impact of aid on the presumption that only temporary aid can increase investment and permanent aid merely increases consumption and does not increase investment, hence growth. Others assume that aid can help a recipient country to reduce poverty or even to escape from a "poverty trap" onto a higher steady-state growth path. A more sophisticated theoretical framework also led some researchers to give prominence to human capital, policies and institutional factors that may support or constrain growth.

This new approach produced a broad but contradictory literature on the aid-growth relationship[24]. There is no agreement on the effects of aid. Some authors argue that aid helped to promote growth and structural adjustment in many less developed countries while

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[24] Hansen and Tarp estimates that from the 1970s to 2000 no less than 72 cross-country studies have tested the link between aid and growth in reduced form equations.

others oppose it. As stressed by many authors, the review of the results of these studies suggests three competing observations on the aid-growth relationship (Radelet et al 2004).

The first group of studies found that foreign aid has no effect on growth, and sometimes may even harm the economic growth in recipient countries. The most widely cited studies about aid-effectiveness that found a negative relationship between aid and growth are those by Mosley et al (1987 and 1992). They performed two empirical tests: one using cross-section data and the other, using time series data. The cross-section evidence consists of comparing the rate of change of income due to the change of aid among countries exhibiting high-aid and high-growth patterns with those exhibiting high-aid and low-growth patterns. The time series evidence is based on several growth regressions for 1960-1970, 1970-1980 and 1980-1983 for all developing countries in the sample, and also by region. Based on both cross-sectional and time series analyses, they concluded that it is more likely that foreign aid does not stimulate the economic growth. They explained this with the possible leakage into non-productive expenditure in the public sector and the transmission of negative price effect into the private sector.

Another widely cited study by Boone (1994) concluded that there is no significant relationship between aid and growth. This and other studies with similar findings have suggested crowding out of private investment and savings, the Dutch disease effect of aid, corruption, embezzlement, and rent seeking behavior among a variety of reasons why aid might not promote the economic growth. However, Ovaska (2003) argues that there is no considerable evidence that development aid is effective in promoting economic growth in developing countries even with better governance.

The results of Mosley et al (1987 and 1992), Boone (1994) and other similar studies have been fairly criticized on the grounds of their underlying structural model and econometric methodology. Their results were mainly based on simple OLS regression analysis (with some exceptions) and assumed only a simple linear relationship between aid

and growth[25]. Besides above, another important criticism of Boone (1994) is the use of a static model over a 20-year period of time, which does not allow dynamics of adjustment.

Furthermore, a recent study by Rajan and Subramanian (2005a), using cross-sectional and panel data and more sophisticated econometric methodology found no robust evidence of a positive (or negative) relationship between aid flows into a country and its economic growth, with their conclusion holding across time periods and types of aid. They also find no evidence that aid is more effective in better policy or geographical environments. Another work by Rajan and Subramanian (2005b) suggests that this may be due to aid flows causing the real exchange rate overvaluation in recipient countries, thereby weakening their competitiveness, as reflected in a decline in the share of labor intensive and tradable industries.

The second group of studies suggests that foreign aid in all likelihood positively influences economic growth, but with diminishing returns[26], and its effect is unconditional to policy environment (Durbarry et al 1998, Hansen and Trap 2000 and 2001, Dalgaard and Hansen 2000, Lensink and White 2001, Dalgaard et al 2004 and others). Most of these studies conclude that while aid has not always worked, on average higher aid flows have been associated with more rapid growth. For instance, Hansen and Tarp (2000 and 2001) formulate an empirical framework to allow for nonlinearities in the aid-growth relationship such as quadratic aid and policy along with aid policy interactions. They also control for some economic, political and institutional variables. They found that the coefficient for aid variable is positive and statistically significant, but the coefficient for aid squared is statistically significant and negative. In other words, that the causal relationship between aid and growth is positive but this positive impact diminishes as the volume of aid increases.

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[25] Apparently most of the studies on aid-growth relationship tested a linear relationship using simple OLS methodology.
[26] Some suggest that the diminishing return reflects absorptive capacity constraint, an idea that dates back to 1950s and 1960s and stems from limits in the quality and quantity of human capital and physical infrastructure (Quibria 2004).

Lensink and White (2001) claimed that aid might not merely have diminishing returns but that, after a certain level, returns become negative. They found the threshold for negative marginal returns to be 50 percent of the ratio of aid to GNP. However, this can be downplayed because 50 percent of GNP threshold for aid ratio exceeds the average aid ratio for most aid recipient countries. Some other authors found that the threshold for negative marginal return to aid is about 25 percent of GDP (Hansen and Tarp 2000, Hadjimicheal et al (1995).

The third group of studies suggests that aid has a provisional positive impact on growth, only helping recipients in certain circumstances. This conditional strand indicates that aid supported growth only in certain circumstances but not in other situations. For example, Guillaumont and Chauvet (2001) find that aid works positively in countries with difficult economic environments, as characterized by unstable terms of trade and natural disasters. The findings of Collier and Dehn (2001) also support the result obtained by Guillaumont and Chauvet (2001). They measure vulnerability by the change in export prices and show that the interaction term involving the change in aid and the change in export prices is significant.

Another well-publicized and influential study that belongs to the conditional strand is the study by Burnside and Dollar (2000). They applied the empirical strategy of making the impact of aid dependent on a summary measure reflecting the quality of policies instead of vulnerabilities. They define a "good policy environment" as a weighted combination of low inflation, low budget deficits, and trade openness. Then they introduced aid (as share of GNP) as well as the interaction of aid and the composite policy variable in a standard growth regression. Their results show that the coefficient for aid by itself is not significantly different from zero, but the coefficient for interaction term is positive and statistically significant, implying that aid works in "a good policy environment" but has little impact in "a poor policy environment" (Burnside and Dollar 2000, and World Bank 1998).

The findings of Burnside and Dollar have been extremely influential, and decisively changed the debate on aid effectiveness and donors' aid allocation policies. If foreign aid stimulates economic growth in countries with good policies, then foreign aid should be given selectively to countries that have adopted sound policies. Multilateral and bilateral donors have already recognized the importance of this finding and started moving towards new policies (World Bank 1998 and 2002, USAID 2004, U.K. Department for International Development (DFID) 2000). The findings of Burnside and Dollar (2000) suggested also specific criteria for targeting aid. This criterion is called a "poverty efficient allocation of aid" which focuses on those countries with a combination of high rates of poverty and a good policy environment (Collier and Dollar, 2001 and 2002). The basic message of this criterion is that poor countries with good policy environment, as measured by the World Bank Country Policy and Institutional Assessment (CPIA) index, should be eligible for aid, while countries with low CPIA score should not be eligible for aid, or alternatively receive less aid. This idea has been adopted by the International Development Association (IDA) and DFID (Dalgaard et al 2004). The Millennium Challenge Corporation (MCC) of the United States also uses similar methodology to determine the eligible countries for its aid.

However, some researchers have questioned the robustness of the Burnside and Dollar (2000) findings and concluded that there is need for more research on the subject. First, Hansen and Tarp (2000) found that "the basic Burnside-Dollar results turn out to be sensitive to data and model specification". They argue that by changing the number of observations and the model specification one can make the crucial aid-policy interaction term significant and also turn off this result. More recently Easterly et al (2004) reassessed the links between foreign aid, policy, and growth using extended data. While the Burnside and Dollar (2000) results were based on a panel of 56 countries and six four-year time periods from 1970-73 to 1990-93, Easterly et al (2004) extended the number of observations by adding additional countries and one more time period (1994-1997). Thus, using the same methodology, this study reexamines whether foreign aid has a positive effect on economic growth in the presence of sound policies. They no longer find that foreign aid

promotes economic growth in good policy environments. These new findings cast doubt in the previous conclusion that aid will promote growth in countries with good policies.

All of these studies have one common feature: they examine the impact of aggregate aid on growth over four or five years[27]. In the late 1990s and early 2000s, some researchers started to focus on disaggregating aid flows by using different criteria and then estimating the impact of disaggregated aid on development outcomes. Owens and Hoddinott (1999) find that aid to infrastructure and agricultural extension in Zimbabwe increased the household welfare far more than by humanitarian (food aid and emergency aid) aid. Mavrotas (2003) disaggregates aid to Uganda into program, project, technical assistance, and food aid. He then uses a time-series error-correction model to test the growth impact of aid and finds a significantly positive impact of program aid much larger than of project aid. He also finds significantly negative impacts of technical cooperation and food aid. Cordella and dell'Ariccia (2003) disaggregate development assistance into program and project aid, then find the evidence that shows that program aid is preferable than to project aid when donors and recipients' preferences are aligned.

A recent study by Clemens, Radelet, and Bhavnani (2004) divides aggregate aid into three mutually exclusive, collectively exhaustive categories: "short-impact" aid, "long-impact" aid, and "humanitarian" aid. Then they focus on "short-impact" aid (about 53% of all aid flows) and find a positive causal relationship between the "short-impact" aid and the economic growth. They find at the mean a $1 increase in short-impact aid raises output (and income) by $1.64 in present value in the typical country. This impact is two to three times larger than in studies using aggregate aid. The study also finds diminishing returns to aid: the maximum growth rate takes place when the "short-impact" aid reaches 8 percent of recipient's GDP.

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[27] Rajan and Subramanian (2005a) try to distinguish the impact of different types of aid following Clemens et al (2004)

3.2. What Are the Determinants of Donors' Aid Allocation Policies

While studies of aid effectiveness have focused on economic development, do donors allocate foreign aid aiming to promote economic development and welfare in recipient countries? In other words, do donors allocate aid according to the needs of the recipient countries or according to their own interests? The review of the aid allocation literature suggests that donors seem to be neither entirely altruistic nor completely self-serving, i.e., donors' aid allocation aims to promote their own interests as well as oriented towards the needs of recipient countries. Four broad factors seem key in determining donors' aid allocation decisions:

- Recipient needs. It appears that promoting economic development and welfare appear crucial for most of the donors' in making aid allocation decisions.

- Donors' strategic and political interests. Most of the variation in aid flows can be explained in accordance with donors' strategic assessments of changing international situations.

- Donors' economic interests also explain a significant part of the variation in foreign aid flows, i.e., donors allocate some aid with the aim of expanding their own markets, creating sources of cheap imports from developing countries, and protecting foreign investments of their private companies.

- Recently some donors started focusing on good governance and allocating more aid to countries with good performance on the various aspects of good governance.

A review of the aid allocation literature leads to the following observations. First, while most empirical studies do not explicitly present the theoretical model embodied in their regressions, it is possible to incorporate them into the theoretical framework proposed by Dudley and Montmarquette (1976) and later extended by Trumbull and Wall (1994). Therefore, I present here their framework in some detail. The model is based on the standard microeconomic theory of constrained utility maximization and tries to explain bilateral

donors' two decisions: first, whether or not to give aid to a given developing country (eligibility stage), and second, how much aid to grant given a positive decision had been made in first part (level stage). The model assumes that there are only two goods in donors' utility function: impact of foreign aid and the other good. The donor maximizes the relative impact of its aid on the recipient country, as measured by the ratio of the per capita aid to the per capita income, weighed by the size of recipient's population.

The main assumptions of the model are as follows: donor country may expect that (i) the recipient country will behave more favorably toward donor country by supporting donor's national political interests, (ii) the recipient country will confer economic benefits towards the donor by buying more of the products from the donor country, and (iii) the lives of people in the recipient country will be better because of donor's assistance (altruistic vision). While the first two assumptions refer to donor interests, the third assumption refers to recipient needs. By solving the utility maximization problem subject to budget constraint, Dudley and Montmarquette (1976) derive two econometric specifications to test the relative importance of various factors in donors' aid allocation decisions.

The model developed by Dudley and Montmarquette (1976) aimed to explain individual donor's aid allocation decision assuming that different donors have different subjective measures of the impact of aid to a recipient country. Later Trumbull and Wall (1994) extended the model to allow optimization by multiple donors assuming that all donors have the same subjective measure of the impact of aid to a recipient country. In this model, similarly to Dudley and Montmarquette (1976), a donor maximizes the weighted sum of the total impacts of its official development assistance on all recipients subject to its aid budget.

Second, an empirical analysis of the determinants of donors' aid allocation policies indicated some identification issues. Evidence shows that individual donors provide a positive amount of aid to some recipients and nothing to others. Also, larger donors (USA, Japan, UK, France) tend to give some amount of aid to most of the recipients, while smaller donors (Denmark, Finland, Ireland, etc) tend to focus on fewer recipients (Dudley and

Montmarquette (1976), Alesina and Dollar 2000, Neumayer 2003). As Neumayer (2003) and others pointed out, the exclusion of some countries from the recipient list by some donors makes the dependent variable, aid, only partly continuous with positive probability mass at the value of zero. Since OLS depends on the assumption that the expected value of the dependent variable is linear relative to the independent variables, this creates a problem for standard OLS estimation. The existing literature suggests using more sophisticated estimation techniques, such as the two-part model (Dudley and Montmarquette 1976, Apodaca and Stohl 1999, Svensson 1999, Neumayer 2003, etc.) and the Tobit model (Alesina and Dollar 2000, Alesina and Weder 2000) to overcome this problem.

Third, nearly all reviewed studies control in one way or another for donor interests and recipient needs in their empirical analysis of donors' aid allocation decisions. For example, Trumbull and Wall (1994) explores the variations in the per capita aggregate ODA across recipients by using fixed effects estimator and find that ODA allocations are determined by the needs of the recipient, such as infant mortality, and political and civil rights. However, the empirical results of this study should not be taken seriously because they failed to control for other aid determinants, in particular for donor interests. Alesina and Dollar (2000) control for both donor interests (mostly for strategic and political interests) using such variables as colonial experience, UN voting similarity, the share of Muslims and Roman Catholics in the recipients' population and recipient needs through per capita income. They find considerable evidence that the allocation of bilateral foreign aid is mostly determined by political and strategic considerations, while at the margin, developing countries that support political rights and civil liberties receive more aid, ceteris paribus.

Another study by Apodaca and Stohl (1999), exploring U.S. foreign aid allocation, find the support for recipient needs at the eligibility stage and for donor interests and human rights at the eligibility and level stages. The findings of this study suggest that, while the impact of recipient needs, as measured by GNP per capita, on the aid allocation decisions made by U.S. government is positive and statistically significant, U.S. national security interests play a more prominent role in aid allocation. Noticeably, countries perceived to be

of vital importance to U.S. national security along with Latin America receive aid regardless of other factors.

The studies often use the following variables to control for donor interests among others: political similarity, arm transfers, military presence, religious similarity, geographic proximity, proportion of a donor export or imports traded with a particular recipient country, stock of private direct investment from a donor to a recipient country. While per capita income is often included in empirical analysis to control for recipient needs, other variables such as infant mortality, literacy rate, and life expectancy are also widely used in aid allocation regressions for that purpose.

Fourth, as I mentioned above, researchers have recently started to focus on the impact of the recipients' governance on donors' aid allocation decisions. The reviewed studies use various indicators to measure the quality of governance in recipient countries, including personal integrity rights (Apodaca and Stohl 1999), political and civil rights (Alesina and Dollar 2000, Trumbull and Wall 1994, Svensson 19999, Neumayer 2003), rule of law and corruption (Alesina and Dollar 2000, Alesina and Weder 2000, Neumayer 2003). For instance, Alesina and Weder (2000) explore the impact of the level of corruption of the recipient country on aid flows and find no evidence that corruption negatively affects the amount of foreign aid flows, but the Scandinavian countries appear to reward less corrupt countries with higher amounts of aid and large donors such as U.S., U.K., Japan and others appear indifferent to the level of corruption in a receiving country. According to Neumayer (2003) all aspects of good governance (he controls for democracy, human rights, corruption, rule of law, and regulatory burden) except for the rule of law have statistically significant influence on donors' decisions in eligibility stage. He also finds that democracy, respect for human rights and low regulatory burden are statistically significant determinants of aid flows for some donors. Alesina and Dollar (2000) also find that, at the margin, developing countries that support political rights and civil liberties receive more aid, ceteris paribus.

Knack (2000) examines the interdependence between foreign aid and the quality of governance by relating the quality of governance, as measured by indexes of bureaucratic

quality, the rule of law, corruption and their simple combination (the paper calls it the quality of governance index, which is created by a simple summation of the first three indicators) to aid variable, as measured by the total foreign aid as percentage of GDP and percentage of government expenditures. The paper finds that higher levels of foreign aid erode the quality of governance.

Fifth, in addition to explaining the impact of donor interests, recipient needs and recipients' governance on donors' aid allocation policies, previous studies have revealed some population bias in the allocation of foreign aid. For example, Dudley and Montmarquette (1976) found a strongly significant correlation between per capita aid and the population of recipient countries. Trumbull and Wall (1994) also found some evidence of population bias. More recently, Neumayer (2003) found that there is no population bias at the eligibility stage, but at the level stage certainly all donors have population bias, indicating that less populous countries receive more per capita aid than more populous ones. The literature suggests the following explanations of population bias: donors might think that there would be a greater impact in small countries due to decreasing marginal benefits of aid allocation as population size increases, relatively smaller aid absorbing capacity of more populous countries, donors might be reluctant to concentrate aid in a few large countries, such as China and India (Neumayer 2003).

Sixth, the literature also suggests that the determinants of bilateral and multilateral aid will be different (Maizels and Nissanke, 1984) and there are important differences among bilateral donors' aid allocation decisions (Alesina and Dollar 2000). Alesina and Dollar (2000) find that four Nordic countries, including Denmark, Finland, Norway and Sweden behave similarly in that they allocate more aid to recipients with less per capita income, open economies and democratic governance. Marginally, the US behaves similar to the Nordic countries but allocates more aid to political allies, such as Egypt and Israel, as measured by similar UN voting patterns. France and Japan allocate more aid to their political allies and former colonies at the margin and pay less attention to recipient needs and good governance.

The earlier study by Dudley and Montmarquette (1976) also found similar differences among donors.

Despite the above-mentioned important differences among them, individual donors' aid allocation decisions are influenced by the total amount of aid received from the rest of the donors. This is called a "bandwagon effect" whereby donor might expect that the impact of its aid on recipient country would be higher, the greater the aid the rest of the donors grants to a recipient country (Dudley and Montmarquette 1976). Literature also suggests that there is some alliance among large donors. For example, Katada (1997) finds that Japanese aid allocation decisions pursue the following simultaneous objectives: own political and economic interests, collaboration with the USA in support of USA maintenance in the developing world, and improvement of the USA-Japan relationship by satisfying US interests in Asia-Pacific region.

Finally, some recent studies investigate incentives in donor-recipient relations, and how they might influence the implementation of policy reforms intended to reduce poverty and promote development (Svensson 1997, 2000). Svensson (1997) uses a game theoretic model in which an altruistic donor allocates aid according to recipient needs, and the aid allocation rule adversely affects recipients' incentives to carry out policies to promote human development indicators: infant mortality, life expectancy, and primary school enrollment. The empirical tests show that recipient needs and population are the main determinants of aid allocation, but aid flows have no statistically significant impact on promoting human development indicators. Also some authors investigate donors' aid allocation policies by examining the interactions between donors and recipients (Casella and Eichengreen, 1996; Svensson 2000; Lahiri and Raimondos-Moller, 2004). These studies show how policy differences across donors may affect the development outcomes. They stress the importance of the timing of aid disbursements and the degree to which aid flows are aimed at poor for outcomes.

3.3. Governance and Its Relation to Foreign Aid and Development

What role can aid play in promoting development outcomes in recipient countries? Overall, successful long-term development is a complex process that depends on many factors. Nevertheless, the evidence suggests that the quality of governance in a country is particularly important and will heavily influence its development. Compared to this factor, other factors including foreign aid appear to be much less important in determining whether a given country will achieve its development objectives, such as long-term economic growth and poverty reduction. Probably, foreign aid is likely to be most helpful when it is combined with better governance. However, what is the evidence regarding the role of governance in economic development. How do I define quality of governance? In order to answer these questions, in this section, I briefly review the development literature on the relationship between governance and development and then discuss its relation to foreign aid.

The term governance is not new. However, it has become a key concept in international development debate over the past 10 to 15 years. Since early 1990s, there has been a growing interest among academia, policymakers and analysts of international institutions and developing countries on the role of governance in development process. Governance is used in several contexts such as corporate governance, international governance, national governance and local governance. In this dissertation, the focus is in national governance.

Despite a growing popularity of governance at both the theoretical and policy levels, the term continues to mean different things to different organizations and researchers. There are several definitions of governance. For example, the Oxford dictionary defines governance as "the act or manner of governing, of exercising control or authority over actions of subjects; a system of regulations."[28] The UNDP has adopted a definition that defines governance as "the exercise of economic, political, and administrative authority to manage a country's

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[28] Online Oxford English Dictionary

affairs at all levels."[29] Based on this definition, governance involves the mechanisms, processes, and institutions, through which citizens and government institutions exercise their legal rights and meet their obligations, and mediate conflicts. In this context, three dimensions of governance are identified: political, economic and administrative. Political dimension comprises the policy formulation, while economic dimension includes the decision-making process that affects a country's domestic economic activities and its relationship with international economy and administrative dimension involves the system of policy implementation.

In an influential study, Kaufmann et al (1999) proposed a broad and comprehensive view of governance, which defines governance as the combination of rules and institutions by which a country is governed. This includes (1) the way governments are selected, monitored and replaced, (2) the capacity of the government to effectively formulate and implement policies, and (3) the respect of citizens and the state for the rules and institutions that govern political, social, and economic interactions among them (Kauffmann et al 1999 and 2003). Moreover, Kaufmann et al (1999), using an unobserved components method, aggregated various measures of governance into six aggregate indicators corresponding to six dimensions of governance: voice and accountability, political stability, government effectiveness, regulatory burden, rule of law, and corruption. This definition of and measurement of governance is widely acknowledged by academia and international financial institutions (such as World Bank, IMF, ADB, EBRD, etc.), and it is becoming very popular among researchers and development practitioners.

Having given a brief discussion on the different definitions of governance, I turn to the review of literature on the impact of governance on development effectiveness. Since all definitions relate governance to institutions, the review of literature includes the studies that explicitly test the impact of governance on development outcomes as well as the studies that test the impact of institutions on development outcomes. As Jutting (2003) pointed out

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[29] UNDP, "Reconceptualizing Governance", New York: UNDP 1997, pp.2-3.

institutions craft order and reshape incentives, thus building the governance structure of a country and leading to the formation of national government.

A review of cross-sectional studies with respect to the impact of governance on institutions on development outcomes results in the following conclusions:

First, there is an overall acknowledgement that various dimensions of governance have a direct impact on economic growth. For example, Rodrik et al. (2004), using the rule of law indicator from Kaufmann et al. (2002), found in a recent cross-sectional study that the observed direct effect of the institutional quality of governance[30] on income per capita is positive and both statistically and practically significant. Hall and Jones (1999), using equally weighed averages of five indicators from the ICRG (law and order, bureaucratic quality, corruption, risk of expropriation and government repudiation of contracts), documented that the differences in capital accumulation, productivity, and thus output per worker are driven by differences in institutions and government policies.

Second, the development literature suggests that the country's governance impacts its rate of development. Particularly, it suggests that the characteristics of governance such as political stability and social order, the quality of country's governmental institutions and capable government bureaucracy and administration are more likely to impact the long-term development. These governmental institutions are composed of laws, regulations and other formal mechanisms and organizations that protect property rights, make and enforce contracts, provide regulatory framework (CBO 1997 and Mankiw 1995).

Third, democratic governance with market liberalization plays a crucial role in sustaining the long-term growth, but without strong market institutions democracy will not be able to sustain growth (Bhagwati 1995). The experiences of China and the newly industrialized countries of East Asia shows that even authoritarian governments with strong markets and public policies can facilitate and sustain long-term economic development (World Bank 1993).

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[30] Rodrik et al. (2004) calls it just institutional quality

Fourth, besides the evidence on direct impact of governance on development outcomes, literature suggests that governance and institutions have an indirect impact on the economic growth and development. This indirect effect appears to run through their impact on investment, conflict prevention and mitigation, policies and the stock of social capital (Jutting 2003). In this context, Fedderke et al (2005) find that governance has an indirect impact on output as well as a direct one. They estimate that the productivity of investment increases by a factor of 1.6 between countries with the worst governance, and those with moderate governance. The indirect impact of governance on development outcomes might have important implications for aid effectiveness. The challenge for research is how to identify the interaction effect of governance with foreign aid.

Finally, in a recent paper Glaeser et al (2004) present evidence suggesting that human capital is a more basic source of the economic growth than are the institutions, and that it is human capital that leads to institutional development. Independently of this particular evidence, Alvarez et al (2000) and Barro (1999) also present similar evidence. These findings raise significant questions about the validity of the evidence presented above.

3.4. Summing Up

Summarizing the evidence presented above, the following observations can be made with respect to aid effectiveness and aid allocation:

- Past research primarily addresses two interrelated issues: the effectiveness of foreign aid and determinants of aid flows. However, these two research areas rarely intersect. Studies aiming to explain determinants of aid flows did not consider effectiveness issues and vice versa.

- The evidence on the aid-growth relationship, which is at the center of aid effectiveness and allocation debate, appears to be inconclusive. While conventional wisdom suggests that aid works in "a good policy environment" but has little impact

in "a poor policy environment", this perception is not fully supported by the available studies.

- Past research to a great extent investigates the aid-growth relationship aiming to estimate the impact of aggregate aid on growth despite the fact that a substantial part of foreign assistance is not primarily intended to support growth. Aid is given for many different purposes (sectors), as classified by OECD's Development Assistance Committee Credit Reporting System, and in many different forms. Therefore, one cannot expect that aid allocated to different sectors will influence the economic growth homogeneously.

- Previous research suggests that different aid flows are heterogeneous in their impact on economic growth and support the importance of aid disaggregation in evaluating the impact of aid on development outcomes. It also suggests that there is heterogeneity with respect to the relationship between aid and development outcomes across recipient countries.

- Donors' aid allocation decisions seem to be neither entirely altruistic nor completely self-serving, i.e., donors aim to promote their own interests and to address the needs of recipient countries. Also, donors recently started focusing on the recipients' quality of governance and countries with better governance seem to receive more aid, at the margin.

- Development effectiveness depends on many factors. The quality of governance appears to be the most among them and the interaction of foreign aid with governance seems significant for aid effectiveness.

Chapter 4. Methodological Approach

As indicated in the introduction, the main objective of the dissertation is to analyze how foreign aid is allocated under the current system, how such allocation takes into account the quality of recipients' governance, and how current allocation patterns might have affected the aid effectiveness, i.e., in promoting development outcomes in recipient countries. The purpose of this chapter is to describe a conceptual approach and heuristic model that outlines basic causal relationships between foreign aid, governance and development outcomes, and present propositions that will be tested in subsequent sections. This chapter also presents the testable hypothesis and specifications of empirical equations for econometric analysis of aid effectiveness. Lastly in this chapter I present the theoretical model of aid allocation that characterizes the optimal rent extraction-efficiency tradeoff faced by the donors when designing their aid allocation policies and develop testable hypotheses for econometric estimation.

4.1. Conceptual Framework

In reality, as suggested by previous studies, multiple factors influence the allocation of foreign aid and its effectiveness. In order to improve the effectiveness of foreign aid, donors aid allocation decisions should be guided by evaluation of the results of past policies. Nevertheless, previous research on the topic rarely linked the effectiveness of official development assistance to foreign aid allocation policies. Studies aiming to explain determinants of aid flows do not consider effectiveness issues and vice versa. This dissertation addresses this weakness by linking aid allocation policies and development effectiveness through recipients' quality of governance. Diagram 1 presents a simple heuristic framework (omitting some plausible factors and relationships) for understanding the relationship

between foreign aid, governance and development outcomes[31]. The arrows in the diagram represent the links among the respective variables, and potential direction of the causal linkage. Within this simple framework, there are three transmission channels by which aid might influence development outcomes. The first transmission channel is through its potential impact on easing government budget constraints and investment needs of recipient countries. Depending on the nature of government's fiscal response and the degree of aid fungibility, foreign aid may lead to greater consumption and investment or reduced taxation.

The second channel is through its interrelationship with governance and policy. Foreign aid might encourage governments to improve the quality of governance and policy or support bad governance and unsustainable policies damaging long-term development prospectus.

The third channel is through improving the access to international capital markets. In general, differences in access to international private capital markets have important implications for foreign aid allocation and effectiveness. Foreign aid, through its positive impact on governance, policies and economic infrastructure, might lead to increased access to international capital markets and, thus, decrease the aid dependency. The magnitude and composition of foreign direct investment and changes in sovereign and corporate credit ratings might serve as approximate measures of the access to international private capital markets.

As figure 4.1 shows, there are complex interactions between governance, foreign private capital, public expenditures and growth outside of foreign aid. While I try to control for other transmission channels in the analysis, my main focus is in the interaction of governance and aid flows. What role does governance play in recipient countries in donors' aid allocation policies? And how do aid allocation patterns impact the aid effectiveness?

Why is there a concern about the quality of governance? How is governance defined? What dimensions of governance are important for promoting development outcomes? How

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[31] In developing this simple framework, I benefited from George Mavrotas (2003). Assessing Aid Effectiveness in Uganda: An Aid-Disaggregation Approach, Oxford Policy Management, Oxford, UK

is it measured? The most important reason is that, as evidenced in chapter 3, theory and evidence suggest that countries with good governance are more likely to achieve better development outcomes, including income per capita, educational attainment, health and so forth (Knack and Keefer, 1995; Mauro, 1995; Hall and Jones, 1999; Acemoglu, Johnson and Robinson, 2001 and 2002; Feng 2003, Baldacci at el, 2004; and many others)[32]. Also recent research identifies poor governance as a major reason for ineffective public spending (Mauro 1998, Abed and Gupta 2002, Rajkumar and Swaroop 2002). Since foreign assistance works similarly to public spending in many ways, the lack of control for governance could plausibly lead to biased and inconsistent results regarding aid effectiveness in some previous studies.

In this context, as suggested by Mavrotas (2003), there could be two contrasting experiences within which individual national practice may lie. At one extreme, foreign assistance may contribute to a virtuous circle of development through initiating required institutional and policy changes, relaxing savings and foreign exchange constraints, and easing the access to international capital markets. The experiences of several Asian countries, such as Korea Republic, Taiwan, and some others, appear to lie close to this extreme. These countries benefited from extensive foreign assistance in earlier years, allowing them to develop their economies and build democratic governance. At the other extreme, foreign assistance may contribute to a vicious circle by delaying necessary institutional and policy reforms, and encouraging rent seeking behavior and corruption both within society and inside government structures. The experiences of many countries in Sub-Saharan Africa appear to lie close to this extreme.

Given this discussion, it is then appropriate to hypothesize an important role for the quality of governance in analyses of aid effectiveness and allocation. A focus on governance does not imply that the variables emphasized by previous studies are unimportant, but it

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[32] It is necessary to mention that there are some economists who support the reverse idea, namely growth in income and human capital causes institutional improvement. This line of research is most closely associated with the work of Seymour Martin Lipset (1960) and seems to accord well with the experiences of South Korea and Taiwan, which grew rapidly under one-party autocracies and eventually turned to democracy. Glaeser et al (2004) is most recent work in this line.

does lead to a different emphasis in empirical inquiries. In this dissertation, the simple hypothesis is that differences in governance and their interactions with different categories of aid flows play an indispensable role in exploring the effectiveness of foreign aid in promoting development outcomes.

If differences in governance and their interaction with different categories of foreign aid were often a decisive influence on aid effectiveness, then the lack of control for these interactions would plausibly lead to biased and inconsistent results regarding aid effectiveness. By explicitly incorporating governance into the model, this dissertation helps to mitigate this problem. This allows us to evaluate the role of governance in improving the impact of aid in order to inform critical policy questions such as the allocation of aid between recipient countries.

As mentioned in the previous chapter, there are several definitions of governance. It is sometimes narrowly defined in terms of public sector management. However, in this study, a broad and comprehensive view of governance is taken; governance is defined as the combination of rules and institutions by which a country is governed. This includes (1) the way governments are selected, monitored and replaced, (2) the capacity of the government to effectively formulate and implement policies, and (3) the respect of citizens and the state for the rules and institutions that govern political, social, and economic interactions among them (Kauffmann, Kray, and Maztruzzi, 2003).

There are a number of approaches to measuring the quality of governance. In this dissertation, I use two dimensions of governance. First, the democratic quality of governance is approximated by combination of political rights and civil liberties indicators from Freedom House. Second, the institutional quality of governance is approximated by rule of law, bureaucratic quality, stability of government, and corruption indicators from the International Country Risk Guide. The detailed discussion of these and other measures of governance, and issues related to using them in empirical panel analysis is provided in the next chapter.

Figure 4.1. Outline of Basic Causal Relationships Between Foreign Aid, Governance and Development Outcomes[33]

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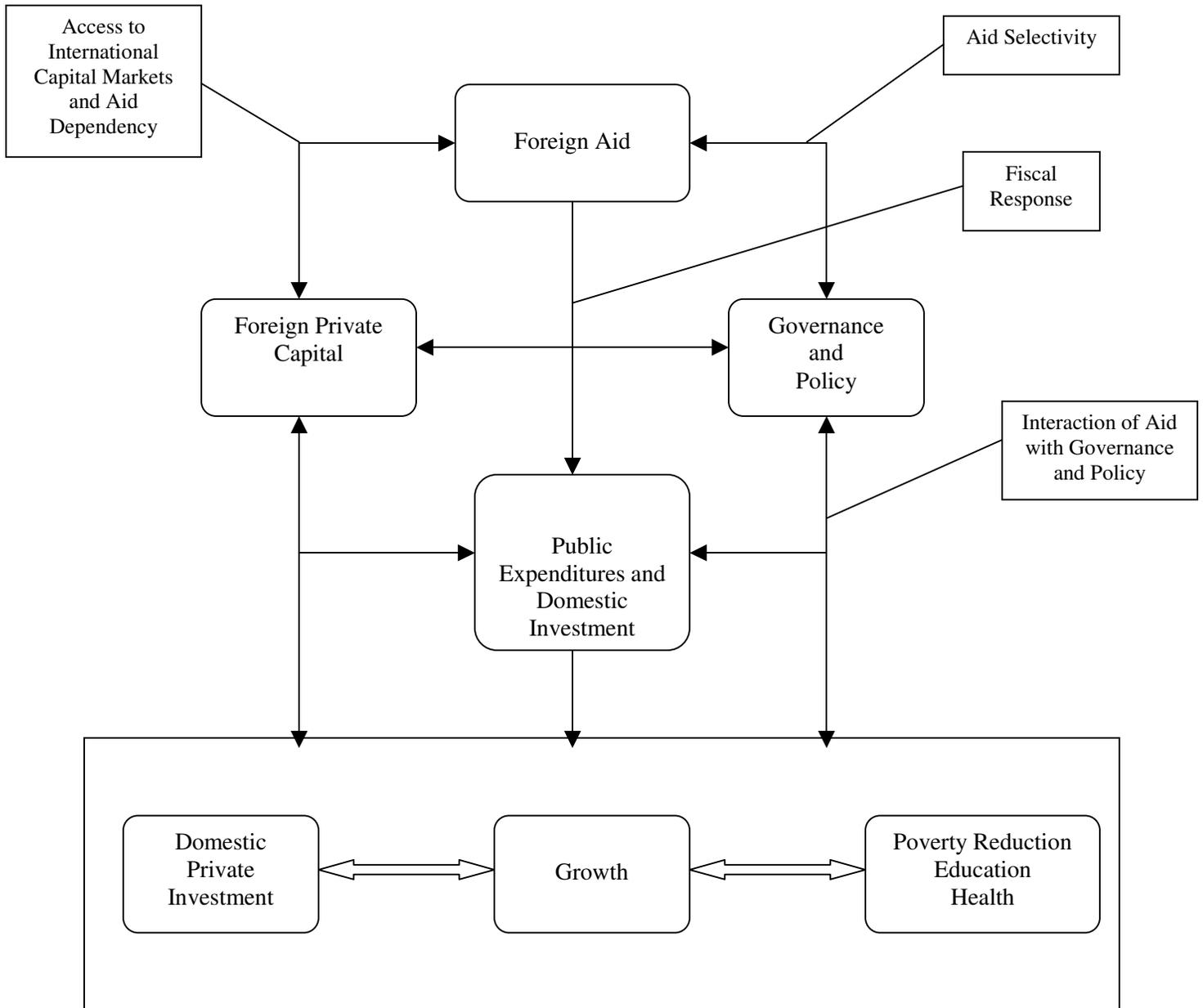
[33] In developing this heuristic framework I have benefited from Mavrotas, George, Assessing Aid Effectiveness in Uganda: An Aid-Disaggregation Approach, Oxford Policy Management, Oxford, U.K., 2003

Furthermore, as seen earlier, past research on this topic has mainly focused on aggregate aid flows trying to match aid flows to a realistic time period over which they might influence economic growth and other development outcomes[34]. However, as OECD's DAC suggests that aid flows are allocated to different sectors depending on "which specific area of recipient's economic or social structure is the transfer intended to foster"[35]. While one category of contributions might intend to promote education, another category might intend to foster agricultural development, and third category might just aim to provide balance-of-payments support. These different categories of aid flows might not influence the economic growth in the same way and uniformly. Also, it is plausible to expect that the interactions of different categories of aid with various levels of governance in recipient countries will produce different results.

One category of aid might help to foster economic development in a recipient country by building physical capital while another type of aid might harm incentive structures and encourage rent seeking behavior. Therefore, any evaluation of aid effectiveness trying to estimate the impact of aggregate aid flows on economic growth and other development outcomes is flawed. However, one can mitigate this conundrum to the degree so one can disaggregate aid flows and isolate the impact of these disaggregated aid flows on development outcomes.

Therefore, in contrast to most existing studies and in spirit of Clemens et al (2004), I disaggregate aggregate aid into four categories and link the allocation and effectiveness of sectoral aid flows to the recipients' governance. However, differently from Clemens et al, I disaggregate aggregate aid flows based on which specific sectors of recipient's economy are transfers intended to promote.

My evaluation approach is based on panel data regression for aid effectiveness and aid allocation. The specifications of these equations are derived from an augmented neoclassical

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[34] As we discussed in previous chapters only few studies attempted to disaggregate aid flows.
[35] OECD DAC "CRS Aid Activities documentation"

growth model and aid allocation model described in subsequent sections, and consistent with the literature.

In disaggregating aid flows by sector, I follow the standard OECD classification. Figure 4.2 provides a skeletal diagram of the disaggregated aid flows and their potential impact. The four mutually exclusive, collectively exhaustive aid categories include the following:

- Aid to production sectors is defined as aid funding for projects in agriculture, manufacturing, mining, construction, trade, and tourism industries. This aid should plausibly help recipient countries to accumulate physical capital.

- Aid to economic infrastructure is defined as an aid to build networks and services that facilitate economic activity. This type of aid goes to energy distribution, auto and railroad construction, equipment for communication and electronic networks, and to financial infrastructure. This aid should probably help recipient countries by improving the overall economic efficiency and boosting the demand for investment.

- Aid to social sector, including education, health, and water supply. This aid is more likely to help recipients to build their human capital.

- The remaining aid flows are combined with other aid. This includes assistance for the environment, gender projects, food aid, action relating to debt, budget and balance of payments support, emergency and distress relief, aid for refugees, etc. This aid has no pre-imposed sectoral allocation and is intended to smooth short-term fluctuations or to support longer-term activities.

**Figure 4.2. Outline of Transmission Channels in Aid-Growth Relationship
within Neoclassical Growth Framework Augmented with
Human Capital**

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                    ┌─────────────────────────┐
                    │    Aggregate aid flows   │
                    └─────────────────────────┘
                                 │
      ┌──────────────┬───────────┴───────────┬──────────────┐
┌───────────┐  ┌───────────┐          ┌───────────┐   ┌───────────┐
│  Aid to   │  │   Aid to  │          │ Aid to social │ │ Other aid │
│ Production│  │infrastructure│       │   sector   │   │           │
└───────────┘  └───────────┘          └───────────┘   └───────────┘
      │              │                      │
      ▼              ▼                      ▼
┌───────────┐  ┌───────────┐          ┌───────────┐
│  Physical │  │ Efficiency│          │   Human   │
│  capital  │  │           │          │  capital  │
└───────────┘  └───────────┘          └───────────┘
      │              │                      │
      └──────────────┼──────────────────────┘
                     ▼
             ┌───────────────┐
             │   Economic    │
             │    growth     │
             └───────────────┘
```
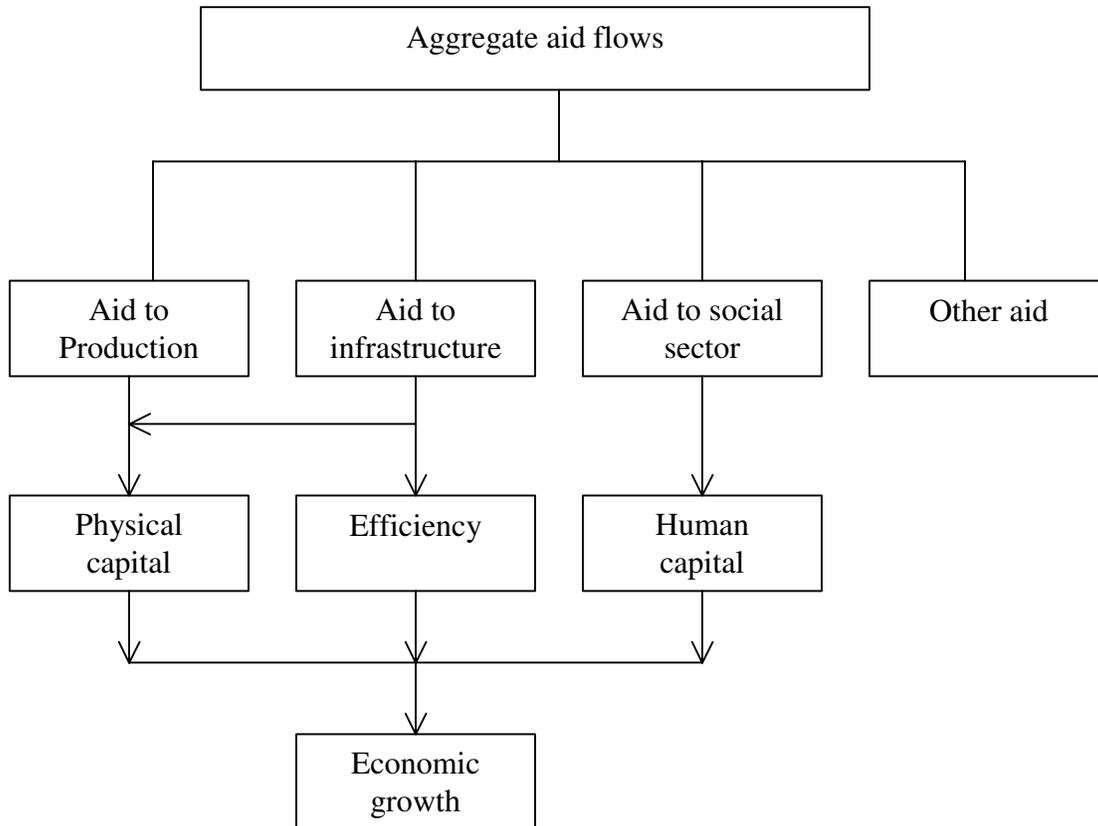
4.2. Aid Effectiveness Model

The aid effectiveness equations analyzed in this dissertation are based on neoclassical growth framework augmented with human capital. The aid effectiveness equations are based on a system of three equations for (1) real per capita income growth, (2) gross capital formation or investment, and (3) human capital. These equations are derived in a neoclassical growth framework enhanced by human capital. The specifications of these equations allow for the identification of the channels through which foreign development assistance affects development. Under the assumption that error terms are not correlated across equations, standard single equation least squares techniques can produce unbiased and

efficient estimates for each equation. However, there will be feedback structures between these equations and thus, error terms across equations are likely to be correlated. Some other estimation techniques, such as structural equation modeling or seemingly unrelated equations (SUR) regression, might improve the precision of estimates, but appropriate software was not available. The results here, based on single equation methods, remain unbiased and the standard errors are correct even without using such multiple equation methods.

I will test the following three hypotheses:

(1)   Aid to production sector impacts the economic growth through its impacts in capital accumulation by enlarging the pool of resources available for investment and growth. If foreign aid to the production sector supplements the domestic resources then the impact of this sectoral aid flows on investment should be positive. If foreign aid substitutes for domestic resources rather than supplementing them, then its impact on investment and growth could be negative or trivial. There are two plausible cases when aid flows might substitute for domestic resources. First, since aid flows are similar to public investment, they may crowd out private investment. Second, if a recipient is able to reduce its own public investment expenditures and replace them by foreign aid. Further, I assume that the magnitude and sign of this impact could be affected by the quality of governance in recipient country. Therefore, aid to the production sector enters the investment equation by its interactions with the quality of governance. In general, one might expect that the impact of better governance on the effect of aid to production sector would be positive. Even in a favorable policy environment, however, this impact might be negative or trivial, particularly if foreign aid causes crowding out effect. Vice versa foreign aid might help raise the level of investment in countries with poor governance if (1) it helps to ease the constraints on

public funds available for necessary public investments and (2) it funds profitable investment projects in the private sector.

(2)   As mentioned before, aid to economic infrastructure might impact growth through one of or more of the three potential channels of influence. First, it may improve total productivity in the economy. If it does so at all, it must do so by reducing the private cost of production. For example, a reduction of communication costs can make international knowledge more accessible to local businesses and other establishments. Thus it seems likely that countries with better communication infrastructure will have easier and cheaper access to knowledge stocks, which in turn, should lead to higher rates of total productivity growth. However, empirical evidence suggests that in least developed countries economic growth is primarily input-driven, i.e., capital accumulation and utilization of additional labor, and that total factor productivity increases are negligible if not zero (Forstner et al 2001, Krugman 1994, Young 1995, Collins and Bosworth 1997). Therefore, one can expect this impact to be very small if it does exist at all. Second, aid to economic infrastructure by improving its quality may reduce cost of capital, and therefore increase the demand for investment. Third, aid to economic infrastructure directly adds to investment and helps to ease the constraints on public funds available for necessary public investments. Correspondingly, I assume that the magnitude and sign of these impacts could be affected by the quality of governance in a recipient country. Hence, the interactions of aid to economic infrastructure with governance enter both growth and investment equations with one period lag.

(3)   Aid to social sector aims to improve human capital and living standards in recipient countries, for example, by supporting primary education or basic health care. Therefore, it is expected that this portion of aid may impact

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the growth by creating additional human capital. The interactions of aid to social sector with governance enter the human capital equation.

4.2.1. Growth Equation

Drawing upon Mankiw, Romer, and Weil (1992), Barro (1996), Bassanini and Scarpetta (2001), Bassanini et al (2004), Bloom and Sevilla (2004) and others, the growth equation is based on a neoclassical growth model augmented by human capital. The per capita output equation is assumed to take the following form:

$$y = f (k, h, Gov, A, X)$$

where y is real per capita gross domestic product; k denotes the capital labor ratio; h is human capital; Gov and A denotes governance and aid variables, respectively, and X denotes the set of other variables that may affect real per capita GDP. The latter may include quality of governance and development aid variables along with inflation, trade openness, and financial depth that further augment the neoclassical growth model with human capital.

Additionally, I assume there is a relationship between the lagged interactions of development assistance that goes into economic infrastructure and the recipient countries' quality of governance. Following Baldacci et al (2004), it is also assumed that both the initial stock and incremental human capital affect per capita economic growth. This is an important assumption because I propose that aid that goes to social sector may impact the growth of per capita GDP by helping the recipient countries to build human capital. Hence, the following equation describes the growth (g) of real per capita GDP[36]:

$$g = f (s_k, h, \Delta h, Gov, X, A)$$

where s_k is the net investment (incremental capital), h denotes the stock of human capital, and Δh is the change in human capital, Gov, X and A denote governance, aid and other control variables. I approximate human capital mainly by years of schooling and add lagged

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[36] A detailed derivation of the growth specification, based on Bassanini and Scarpetta (2001), and Bassanini, Scarpetta and Hemmings (2001), is provided in Appendix 2.

life expectancy to control for possible health component of human capital. As a result, I estimate the per capita growth equation as follows:

$$g_{i,t} = \beta_0 + \beta_1 \ln(y_{i,t-1}) + \beta_2 \Delta k_{i,t} + \beta_3 h_{i,t-1} + \beta_4 \Delta h_{i,t} + \beta_5 (\text{life})_{i,t-1} + \beta_6 (\text{pop})_{i,t} + \sum_{j=7}^{10} \beta_j X_{i,t} +$$

$$\beta_{11} (\text{INS})_{i,t} + \beta_{12} (\text{LOW})_{i,t} + \beta_{13} (\text{MED})_{i,t} + \beta_{14} (\text{IAID})_{t-1} + \beta_{15} (\text{LOW} * \text{IAID})_{i,t-1} + \beta_{16} (\text{MED} * \text{IAID})_{i,t-1} +$$

$$\eta_i + \mu_t + \xi_{i,t}$$

where

- $ln(y_{i,t-1})$ denotes the logarithm of per capita income at the beginning of each period that controls for the expected diminishing growth rates as per capita income rise, thus, its coefficient is expected to be negative.

- $\Delta k_{i,t}$ is the ratio of gross capital formation (investment) to GDP , its coefficient expected to be positive since higher investment ratio leads to higher stock of physical capital.

- $h_{i,t-1}$ and $\Delta h_{i,t}$ denote the stock of human capital and change in human capital, respectively, proxied by the years of schooling. The economic theory suggests that stock of human capital promote economic growth via innovations and productivity growth (Romer, 1990) while changes in human capital likely affect growth via adjustments in the level of productive (educated labor) input (Lucas, 1988). Obviously, most of developing countries are less likely to have a capacity to create innovative technologies suited to domestic production. However, levels of human capital may affect the speed of technological catch-up. Therefore, the expected impact of lagged stock of human capital on per capita GDP growth is ambiguous and of incremental human capital is positive.

- $life_{i,t}$ controls for the health component of human capital assuming that health condition of the population affects GDP growth.

- $pop_{i,t}$ refers to the population growth rate, this controls for potential changes in labor.

- $X_{i,t}$ consists of three macro variables, including trade openness (*trade*), inflation rates (*inflation*), and financial depth (*money*). These variables are often identified as key

macroeconomic determinants of growth (Fisher, 1993; King and Levine, 1992; Levine, 1996; and others). Trade openness is identified as the ratio of total trade (exports plus imports) to GDP. Inflation rate is the logarithm of 1 plus the deflator. As an indicator of financial depth is used the monetization ratio, i.e., the ratio of broad (M2) money, to GDP. Obviously, trade openness and financial depth should have positive impact on growth.

- $INS_{i,t}$ denotes the institutional quality of governance, which is based on the bureaucratic quality, the rule of law, government stability, and corruption indices from International Country Risk Guide compiled by the Political Risk Services group.

- $LOW_{i,t}$ and $MED_{i,t}$ are dummy variables for poor and medium democratic quality of governance, respectively, based on political rights and civil liberties indicators compiled by the Freedom House.

- $(IAID)_{i,t-1}$ is the ratio of aid to economic infrastructure with one period lag.

- $(LOW*IAID)_{i,t-1}$ and $(MED*IAID)_{i,t-1}$ are interactions of poor and medium democratic quality of governance with lagged aid to economic infrastructure, respectively. These are key independent variables of this equation, as I expect differences in quality of governance have impact on the effect of aid. Here I include only the part of aid that goes to economic infrastructure because it is assumed that it may impact the growth of real GDP by improving overall productivity.

- η_i and μ_t refer to the time-invariant country-specific fixed effects and period-specific country-invariant fixed effects, respectively.

4.2.2 Investment equation

The economic theory and evidence emphasize the accumulation of physical capital as a major force behind real GDP growth. Pursuing the general approach described above, I estimate the following investment equation:

$$I_{i,t} = \beta_0 + \beta_1 \ln(y_{i,t-1}) + \beta_2 h_{i,t-1} + \beta_3 \Delta h_{i,t} + \beta_4 (\text{life})_{i,t-1} + \sum_{j=5}^{10} \beta_j X_{i,t} + \beta_{11} (\text{INS})_{i,t} + \beta_{12} (\text{DEM})_{i,t} +$$

$$\beta_{13} (\text{HIGH} * \text{PAID})_{i,t} + \beta_{14} (\text{MED} * \text{PAID})_{i,t} + \beta_{15} (\text{LOW} * \text{PAID})_{i,t} + \beta_{16} (\text{HIGH} * \text{IAID})_{i,t-1} + \beta_{17} (\text{MED} * \text{IAID})_{i,t-1} +$$

$$\beta_{18} (\text{LOW} * \text{IAID})_{i,t-1} + \eta_i + \mu_t + \xi_{i,t}$$

where

- *DEM$_{i,t}$* controls for democratic quality of governance.

- *(HIGH*PAID) $_{i,t}$* , *(MED*PAID)$_{i,t}$* and *(LOW*PAID)$_{i,t}$* are interactions of high,
  medium, and poor democratic quality of governance with aid to production sectors,
  respectively. And *(HIGH*IAID)$_{i,t-1}$, (MED*IAID)$_{i,t-1}$* and *(LOW*IAID)$_{i,t-1}$* are
  interactions of high, medium, and poor democratic quality of governance with
  lagged aid to economic infrastructure, respectively. These are key independent
  variables of this equation. I expect that current aid to production sectors directly
  impact the current investment ratio while aid to economic infrastructure may have
  impact on investment ratio with one period lag. Since it is assumed that the
  effectiveness of aid depends on recipients' quality of governance, I interact these aid
  variables with governance variables.

In specifying the above equation, I benefit from Fischer (1993), Mauro (1996), and
Baldacci et al (2004). The investment equation also controls for some of the variables
included in growth equation because these variables may also impact the accumulation of
capital independently from growth. These variables include: human capital (lag and change),
life expectancy, inflation, trade openness, financial depth, and institutional quality. As
suggested by Lucas (1990), the human capital may play as an engine in attracting
investment. Increasing life expectancy at birth may also encourage people to invest. Further,
financial depth can affect investment by improving allocative efficiency of limited financial
resources, lowering the cost of intermediation, and increasing the returns to investment
(Montiel, 2003). Control variables also include the ratio of foreign direct investment (FDI)
to GDP to measure its expected positive impact on investment ratio. In addition to inflation

rate, I include the high-inflation dummy to control for the possible nonlinear effects of inflation on investment.

4.2.3. Human Capital Equation

This equation examines the impact of aid to social sector on human capital as proxied by the years of schooling for different levels of governance quality. I benefited from Baldacci et al (2004) in developing the following specification:

$$h_{i,t} = \beta_0 + \beta_1 \ln(y_{i,t}) + \beta_2 (life)_{i,t} + \beta_3 (urban)_{i,t} + \beta_4 (pop15)_{i,t} + \beta_5 (gpi)_{i,t} + \beta_6 \ln(EDU)_{i,t-1} + \beta_7 (LOW)_{i,t} + \beta_8 (MED)_{i,t} + \beta_9 (SAID)_{i,t-1} + \beta_{10} (MED * SAID)_{i,t-1} + \beta_{11} (LOW * SAID)_{i,t-1} + \eta_i + \mu_t + \xi_{i,t}$$

where
- $\ln(y_{i,t})$ denotes the logarithm of current per capita income. Higher level of per capita income is more likely to raise the demand for schooling; thus, its coefficient is expected to be positive.
- $(life)_{i,t-1}$ controls for the accumulated health assuming that healthier people will be able to invest in education.
- $(Urban)_{i,t}$ denotes the share of urban population. This variable captures the effect of superiority of education and other social services in urban areas in developing countries.
- $(Pop15)_{i,t}$ is the share of population under age of 15. This variable intends to control for age structure of population.
- $(gpi)_{i,t}$ denotes the gender parity indicator in education. This controls for gender inequality in education, which is apparent in most of developing countries, especially, in South Asia, Middle East and Africa.
- $Ln(EDU)_{i,t-1}$ is the lagged five-year average of education spending. A logarithm of education spending in percent of GDP used to control for diminishing returns to education expenditures.

- $LOW_{i,t}$ and $MED_{i,t}$ are dummy variables for poor and medium democratic quality of governance, respectively, based on political rights and civil liberties indicators compiled by the Freedom House.
- $(SAID)_{i,t-1}$ is the ratio of aid to social sector to GDP with one period lag.
- $(LOW*SAID)_{i,t-1}$ and $(MED*SAID)_{i,t-1}$ are interactions of poor and medium democratic quality of governance with lagged aid to social sector, respectively. These, together with previous variable, are key independent variables of this equation.

Alternative specification would be including all types of aid variables in all equations. One cannot do this because all aid variables share a common cause (for example, aid is provided because a recipient country is poor) and therefore, are highly correlated with each other. Since different aid variables are highly correlated, they might seem to convey similar information. Consequently, other types of aid make an insignificant contribution when they are added to the model last. However, the inclusion of all types of aid in all specifications might cause multicollinearity problem. The greater the multicollinearity, the greater the standard errors, and confidence intervals for coefficients tend to be very wide. Therefore, based on the theory described earlier, I decided to include only certain types of aid in specific equations.

4.3. Aid Allocation Model

The main objective of this section is to characterize the optimal rent extraction-efficiency trade-off faced by the donors (principal) when designing their aid allocation policies and develop testable hypotheses for econometric estimation. This proceeds through the following steps. First, I describe the donor motives in providing and allocating aid, and the set of allocations that the donors can achieve despite the information gap. Any aid allocation considers an impact to be produced and a transfer of aid flows. To characterize those allocations one needs to describe donors' objective function, a set of incentive compatibility constraints, and participation constraints. Incentive compatibility constraints

are due to information asymmetry while participation constraints are required to ensure that recipients are willing to participate in the agreement. Incentive and participation constraints give the set of feasible allocations. Second, once this characterization is achieved, I will proceed to normative analysis and optimize donors' objective function within the set of incentive feasible allocations. Then, I investigate the impact of improvements of the donors' information system on the optimal aid allocation.

In doing so, I implicitly apply the following assumptions that are standard for principal-agent models (Laffont and Martimort 2002). First, it is assumed that donors and recipients are both fully rational economic agents and maximize their own utility. Second, there is information asymmetry between donors and recipients. Donors do not know recipients' private information, but the probability distribution of this information is common knowledge. Third, the donors are expected utility maximizers.

I begin by examining potential sources of demand for foreign aid, including objectives of each of these sources. The literature indicates two competing groups of motives for providing aid: recipient needs and donor interests (Maizels and Nissanke 1984). Recipients need foreign assistance to finance development while donors may pursue their own political and economic interests in providing aid. I combine these two potentially competing groups of rationales into a form of enlightened donors' self-interest that recognizes that a world with less poverty and diseases and better educated people is likely to provide a more secure and more stable environment with more opportunities for all of the world's population. In this regard, the sources of demand for foreign aid can be summarized as follows. First, citizens or taxpayers in donor countries have a real demand for foreign aid because they want to have an impact on development outcomes in developing countries because of genuine desire to help the poor and a belief that relatively small amount of tax money spending on promoting development can make the world more secure and save billions in security related expenses. Second, businesses in the developed world have demand for foreign aid to promote their exports. Evidence suggests that a large part of aid money is used to buy goods and services from donor country. Thus, donors are interested in

maximizing the total impact of aid. This allows us to describe foreign aid situation in terms of principal-agent framework. One may assume that donors delegate to recipients the production of impact on development and transfer foreign aid in exchange.

Now consider a donor who wants to delegate to recipients the production of h units of impact on development outcomes. The value for the donor of these h units of impact is $H(h)$ where $H' > 0$, $H'' < 0$ and $H(0) = 0$. The marginal value of the impact on development is thus positive and strictly decreasing with the number of units received by the donor. In terms of development outcomes, this impact could be an increase in per capita income and schooling, a reduction in poverty and maternal and infant mortality, etc. The costs of recipients are not observable to the donor, but it is common knowledge that the marginal cost μ belongs to the set $M = \{ \underline{\mu}, \bar{\mu} \}$. The recipient can be either efficient ($\underline{\mu}$) or inefficient ($\bar{\mu}$) with respective probabilities ρ and $1-\rho$. I assume that the spread of uncertainty on the recipient's marginal cost is

$$\Delta\mu = \bar{\mu} - \underline{\mu} > 0 \qquad (1)$$

The variables of the problem considered thereafter are the impact produced (h) and the aid transfer (a) received by the recipient. Formally, there is a set of feasible allocations $A = \{h, a\}$. Suppose there is no information asymmetry between the donors and the recipients. The efficient allocation of aid budget is obtained by equating the donors' marginal value of impact and the recipients' marginal cost. Hence, first-best allocation is obtained by the following first order conditions

$$H'(\underline{h}^*) = \underline{\mu} \qquad (2)$$

$$H'(\bar{h}^*) = \bar{\mu} \qquad (3)$$

Since the donors' marginal value of impact is decreasing, the optimal impact levels defined by (2) and (3) are such that $\underline{h}^* > \bar{h}^*$, i.e., the optimal level impact of an efficient recipient is greater than that of an inefficient recipient.

For successful delegation of the task, the donor must offer the agent a utility level that is as high as the utility level that recipient obtains without receiving aid transfers. I normalize to zero the recipients' utility level without aid. Thus, the recipients' participation constraints can be formalized as

$$\underline{U} = \underline{a} - \mu\,\underline{h} \geq 0 \tag{4}$$

$$\bar{U} = \bar{a} - \bar{\mu}\,\bar{h} \geq 0 \tag{5}$$

To implement the first-best aid allocation, in complete information case, the donor can make the following take-it-or-leave it offers to the recipient: if $\mu = \bar{\mu}$ (respectively $\mu = \underline{\mu}$), the donor offers the aid $\bar{a}^*$ (respectively $\underline{a}^*$) for the impact level $\bar{h}^*$ (respectively $\underline{h}^*$). In the complete information case the aid allocation model becomes similar to the model first developed by Dudley and Montmarquette (1976) and later extended by Trumbull and Wall (1994), which maximizes donors' utility given a budget constraint.

Now consider the case in which, there is an information gap between donors and recipients. This information gap is due to fungibility of aid and potential leakages of foreign assistance when donors and recipients have different objectives. The literature identifies two types of aid fungibility:

- Fungibility in the development/foreign aid context refers to the recipients' ability to circumvent donor-imposed restrictions and spend some amount of targeted aid on other programs.

- Fungibility in the public finance context refers to the ability of aid recipient to replace its own expenditures with aid transfers and to transform some portion of targeted aid into pure income or income-generating resources that can be spent in the way the recipient chooses.

In the existence of information asymmetry inefficient recipients can mimic the efficient one and spend some amount of targeted aid on other activities. Thus, complete information optimal aid allocation can no longer be implemented under asymmetric

information. Using the language of incentive theory, one can say that complete information aid allocation is not incentive compatible. That is why incentive compatibility constraints have to be added to the complete information optimal aid allocation model. Further, under complete information, I assumed that donors are able to maintain all types of recipients at their zero status quo utility level. However, since donors want to allocate aid to all types of recipients this will not be possible when there is information asymmetry. Inefficient recipients would get some information rent by mimicking an efficient recipient:

$$\underline{U} = \underline{a} - \underline{\mu}\,\overline{h} = \overline{a} - \overline{\mu}\,\overline{h} + \Delta\mu\,\overline{h} = \overline{U} + \Delta\mu\,\overline{h} \qquad (6)$$

where the first term is zero status quo utility level of efficient recipient and second term is information rent coming from inefficient recipients ability to mimic the efficient recipient. Since donors want to allocate some positive amount of aid to less efficient recipients, donors have to give up some positive information rent to relatively inefficient recipients. For simplicity, I denote the respective information rents of efficient and inefficient recipients as $\underline{U}$ and $\overline{U}$.

Now I can formalize donors' utility maximization problem. The respective expected utilities that donor gets from allocating aid to efficient and inefficient types of recipients are

$$\rho\,(H\,(\underline{h}) - \underline{a}) \text{ and } (1-\rho)\,\left(H\,(\overline{h}) - \overline{a}\right)$$

The expected information rent can be written as

$$\rho\,\underline{U} + (1-\rho)\,\overline{U}$$

So donors will maximize the expected total utility from allocating aid between efficient and inefficient recipients minus the expected information rent of the recipients, i.e.,

$$\max_{a,\,h}\ \left\{\rho\,(H\,(\underline{h}) - \underline{a}) + (1-\rho)\,\left(H\,(\overline{h}) - \overline{a}\right)\right\} - \left\{\rho\,\underline{U} + (1-\rho)\,\overline{U}\right\} \qquad (7)$$

subject to incentive compatibility, participation and budget constraints.
The incentive compatibility constraints can be written as:

$$\underline{a} - \underline{\mu}\,\underline{h} \geq \overline{a} - \underline{\mu}\,\overline{h} \qquad (8)$$

$$\overline{a} - \overline{\mu}\,\overline{h} \geq \underline{a} - \overline{\mu}\,\underline{h} \qquad (9)$$

The participation constraints are same as in (4) and (5):

$$\underline{U} = \underline{a} - \underline{\mu}\,\underline{h} \geq 0$$

$$\bar{U} = \bar{a} - \bar{\mu}\,\bar{h} \geq 0$$

Finally, donors' total aid is constrained with available aid budget:

$$\sum_j a_j = Y \tag{10}$$

where Y is total aid budget.

After some algebraic transformations, the first order conditions for efficient recipients yield for:

$$H'(\underline{h}^*) = \underline{\mu} \tag{11}$$

And, maximization with respect to inefficient recipients yields

$$H'(\bar{h}^*) = \bar{\mu} + \frac{\rho}{1-\rho}\,\Delta\mu \tag{12}$$

The first order conditions show that under asymmetric information, the optimal allocation of aid entails that there would be no distortion for efficient recipients with respect to the complete information. There would be a downward distortion for inefficient recipients with (12).

The results above indicate that any improvements in donors' information system will allow it to better maximize their expected utility from allocation of foreign aid, i.e., improvements in donors' information structure increases the allocative efficiency. The idea here is to find signals that are exogenous to the aid allocation process. The informative signal will reduce information asymmetry, and thus allow better aid allocation among recipients. Following Klitgaard et al (2005), I propose the quality of governance could be used as such a signal. Why the quality of governance? The theory and evidence suggest that quality of governance is important in development process. Countries with high measures of political stability and accountability, less corrupt governments and better protection of property rights are more likely to develop faster than countries with lower measure of political stability and accountability, higher corruption, and poor property rights protection (Gradstein, 2004; Hall and Jones, 1999; Kauffman at el, 2001; CBO, 1997). Another way of reducing information asymmetry is to give less control over aid money to governments in poor

governance countries. This can be done by allocating aid to sectors and/or projects that are not under direct control of government.

Rather than dealing with the original model discussed above, I use the insights of the model to derive the specification of the empirical aid allocation equation. Thus, governance is included as a key variable to the deterministic aid allocation model introduced by Dudley and Montmarquette (1976) and later extended by Trumbull and Wall (1994). This model assumes that in each period, each donor maximizes the sum of the total impacts of their development assistance on the recipient countries, subject to the limited aid budget. In what follows, I first present this model, and then extend the specification with two important additions.

The model assumes that in each time period t, each donor country i allocates its foreign aid budget $Y_{i,t}$ among N recipient countries, with the objective of maximizing the weighted sum of the total impacts of their assistance to the recipient countries. The most important assumption of the model is that all donors have the same subjective measure of the impact of aid to a recipient, i.e., all donors use the same set of weights (ω_j) with respect to individual donors. However, these weights vary for individual donors based on relative importance of a given recipient for donors. The degree of relative importance is determined by historic, strategic, and geographic factors. Suppressing the time dimension, the per capita impact of aid (h_j) for year t in recipient j is a function of the per capita aid received a_j, per capita well-being (income) x_j, and population size N_j:

$$h_j = \frac{a_j^\beta}{x_j^\gamma N_j^\tau} ; \quad 0 < \beta < 1, \quad 0 < |\gamma| < 1, \quad 0 \leq \tau < 1 \qquad (13)$$

The donors expect (or hope) that the total impact of aid will increase as per capita aid rises. The effect of recipients' well-being (income) on the total impact of aid might be positive if aid is considered as a complement for low levels of well-being (income) or negative if aid is considered as a substitute for low levels of well-being (income). Donors might expect that it is easier to make positive impact to smaller countries, thus, the expected effect of the size of population on the impact of per capita aid is negative.

So, each donor faces the following problem

$$\max_{a_{ij}} H_i = \frac{\omega_j a_{ij}^\beta}{x_j^\gamma N_j^\tau} \qquad\qquad (14)$$

subject to budget constraint

$$\sum_j a_{ij} = Y_i \qquad\qquad (15)$$

Assuming that aid received from various donors is perfectly fungible and making use of the Lagrangian, Trumbull and Wall (1994) solves the above maximization problem to obtain the equilibrium values of the marginal effect of an increase in the aid budget and of per capita aid for each year to each donor. Introducing the time dimension, taking the log transformation and some algebraic transformations, they obtain the following linear form

$$\log a_{jt}^* = \alpha_0 + \alpha_1 \log X_{jt} + \alpha_2 N_{jt} + \eta_j + \mu_t \qquad\qquad (16)$$

where a (*) indicates equilibrium values. Since the aid allocation decisions are independent for each time period, the period effect (μ_t) is the same for all recipient countries within a given year. However, recipient countries are assigned different weights; thus, there are recipient effects (η_j) that are fixed over time. Consequently, equation (15) allows to account for unobserved recipient and period effects.

As noted earlier, the most important assumption of the model is that all donors have the same subjective measure of the impact of aid to a recipient. This is a very strict assumption. However, there may be differences between donors in measuring the impact of aid with respect to different recipients. There are many factors that might lead to the differences in donor policies. For example, these differences might be a product of their past colonial relationship. Therefore, in contrast to Trumbull and Wall (1994), I acknowledge that donors indeed might have different subjective measures of the impact of ODA to a recipient and introduce fixed donor effects into the model specification.

Also, following the discussion above, the quality of governance is introduced into the aid allocation model. If donors believe that aid is put to good use in countries with better governance, the total impact of aid increases with better quality of governance. Therefore, it can be expected that donors would allocate more aid to countries with better governance, all other things being equal, i.e., the marginal impact of governance on per capita aid should be positive.

Based on these considerations, I change the equation (16) by introducing a donor subscript, governance, donor effects and other control variables. Thus, we obtain the following specification of the aid allocation model that allows us to estimate the marginal effects of the three groups of independent variables on aid allocation while isolating unobserved donor, recipient and period effects:

$$\text{Aid}_{i,j,t} = \alpha_0 + \alpha_1 Z_{i,j,t} + \alpha_2 X_{j,t} + \alpha_3 (\text{GOV})_{j,t} + \delta_i + \eta_j + \mu_t + \xi_{i,j,t} \tag{17}$$

where

- Z is a matrix of time-variant strategic and economic relationships between a donor and a recipient. This includes donors' exports to recipient countries and political similarities between donors and recipients as revealed by the voting behavior in the UN General assembly.

- X is a matrix of time-variant control variables for recipient-country j at time t. This includes per capita GDP, population size, life expectancy at birth, amount of aid received from other donors, military grants received from United States, and a dummy variable for a failed state.

- GOV denotes the key independent variable, which is quality of governance. For this purposes, I use institutional quality and democratic quality of governance.

In this model, donors' aid allocation decisions are motivated by two broad groups of rationales for providing foreign aid: donors' self-interest (strategic, political, and economic) and altruism or recipient-needs (promoting economic development, poverty reduction, improving schooling, reducing maternal and infant mortality). Further, the quality of governance enters the model as an information signal that allows donors to make judgment about potential efficiency of the utilization of their aid. The model assumes that in each period, each donor maximizes the sum of the total impacts of their development assistance on the recipient countries, subject to the limited aid budget.

Furthermore, for the purposes of analytical clarity, I assume that donors' make aid allocation decisions in two stages: eligibility and level stages[37]. Also, the level stage is divided

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[37]We fully understand that, in reality, donors may make these decisions simultaneously.

into two: an aggregate and a sectoral level. The dependent variable is different in each stage. In the eligibility stage, the dependent variable is a binary decision variable on whether or not a country is deemed eligible to receive aid. Following the common usage in the aid allocation literature, I assume a country is eligible to receive aid if it gets any positive amount of aid. At the level stage, donors will decide how much aid to allocate in a given recipient country. Thus, the dependent variable in this stage is the actual level of aid allocated to the eligible country. In sectoral allocation stage, donors allocate aid among different sectors. In this research, I deal with three subparts of aid: aid to production sectors, aid to social sectors, and aid to economic infrastructure. Therefore, in this stage the dependent variables are: per capita aid to production sector, per capita aid to social sector, and per capita aid to economic infrastructure.

The linked evaluation of aid effectiveness and aid allocation by using the specifications derived in this chapter raises a host of identification and data related issues. These issues will be discussed in more detail in the following chapter.

Chapter 5. Data and Identification Strategy

This chapter addresses data and identification problems. Evaluating the effectiveness of foreign aid and determinants of donors' aid allocation in a cross-country setting using panel data is plagued by several problems. These issues are related to empirical estimation and include: the availability and quality of data, measurement errors, possible omission of variables and unobserved heterogeneity, endogeneity or reverse causality between regressors, autocorrelation within panels and cross-sectional correlation across panels. In the following sections, I will provide the sources of the data, present descriptive statistics of the data, discuss issues related to using various measures of governance in the context of panel data analysis, discuss identification issues, and propose the estimation techniques.

5.1. Data sources and computations

A panel dataset covering both bilateral and multilateral donors, and more than 140 recipient countries from 1973 to 2002 was compiled for the purposes of this dissertation research (see appendix 4 for a list of donors and appendix 5 for a list of recipient countries). I utilize data from various sources[38]. First, the official foreign aid data for 1973-2002 are derived from OECD Development Assistance Committee Creditor Reporting System (CRS). The data cover all major bilateral and multilateral donors (four large bilateral donors provide about 70 percent of total ODA/OA: U.S., Japan, France, and Germany; (figure 5.1)).

Using CRS data, I compute sectoral allocation of ODA disbursements. Probably one of the reasons why an analysis of this kind has just started is that disaggregated aid disbursements are not readily available. The sectoral allocation of aid disbursements must therefore be estimated based on commitments data, which is available from CRS. In

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[38] A more detailed description of the data used and sources are given in Appendix 3.

estimating the sectoral allocation of aid disbursements, I use the approach suggested by Clemens et al (2004). I classified 375,490 donor-recipient transactions in the CRS database from 1973-2002 into four sectors as described earlier. Then I assume that the fraction of aid disbursements in each of aid categories in a given period is equal to the fraction of commitments in each category in that period.

Figure 5.1. Cumulative Bilateral Aid: 1973-2002, at constant dollars
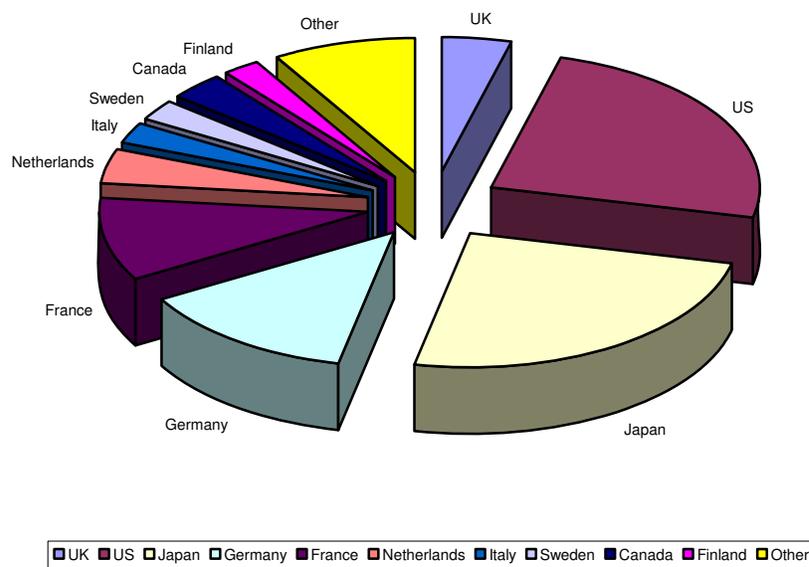
In reality, there could be some variations from this equality if there is a time gap between commitment and disbursements. The longer the delay between commitment and disbursement the greater is the variation from the above assumption. Clemens et al (2004) finds that this estimation method is reliable and allows one to estimate "disaggregated disbursements to a high degree of accuracy" except for humanitarian aid. Further, averaging variables over five-year periods will significantly smooth the short-term fluctuations between commitments and disbursements and reduce the measurement error. Figure 5.2 shows the dynamics of sectoral allocation of aid flows from 1973 to 2002. It is clear from this figure that on average about two third of total aid is allocated to infrastructure, production and

social sectors. The graph also reveals that starting from 1990s the share of aid to social sector more than doubled while the share of other two aid categories, especially aid to production sectors dropped significantly.

Second, I derive data on per capita in income, population and other general socio-economic variables, such as inflation, investment ratio, trade openness, spending on education, and so forth from World Bank's World Development Indicators (WDI) and IMF's World Economic Outlook databases. Third, the data on human capital used are standard to the literature on economic growth and are taken from the Barro-Lee (2003) dataset. Average years of schooling is used as a human capital indicator. Fourth, data on exports from donors to recipients are taken from International Monetary Funds Direction of Trade (DOT) database. Finally, data on governance is taken from Freedom House's Freedom in the World database, World Bank Institute's Governance database and the Political Risk Group's International Country Risk Guide (ICRG) database.

Figure 5.2. Sectoral Allocation of Aid Flows, 1973-2002, at constant dollars
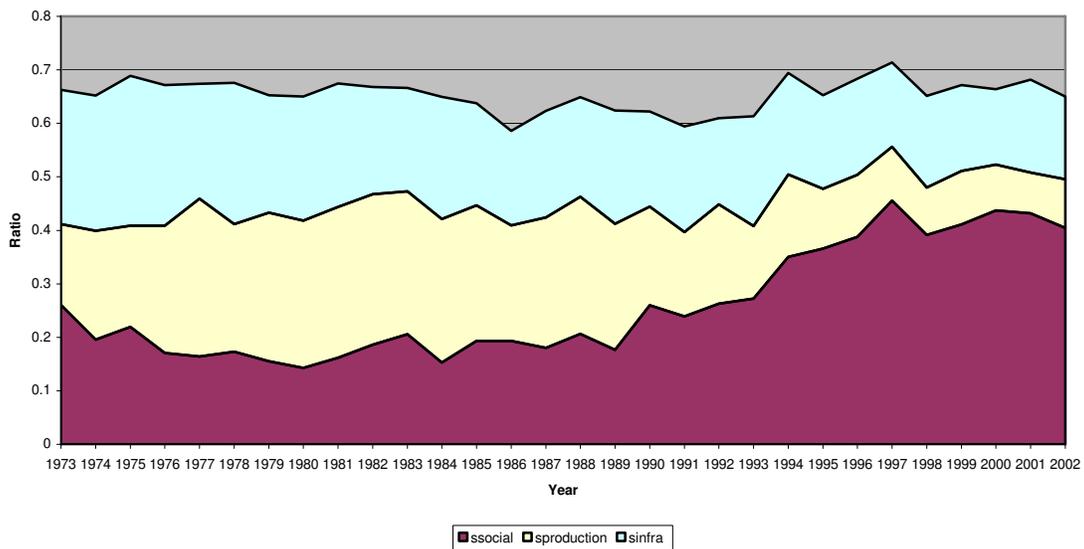
I now briefly report on the computations of the dependent and key independent variables. As noted earlier aid-effectiveness estimation includes three equations: growth, investment, and human capital. The dependent variable on the human capital equation

measures the years of schooling. While the dependent variable on the growth equation measures the growth rate of real GNI per capita in constant terms, the dependent variable on the investment equation measures the ratio of investment to GNI in a given year. Specifically, for country i and year t, these variables, respectively, are computed as follows:

$$g_{i,t} = \frac{y_{i,t} - y_{i,t-1}}{y_{i,t-1}}$$

$$(INV)_{i,t} = \frac{(INVESTMENT)_{i,t}}{(GDP)_{i,t}}$$

The key independent aid variables related to aid effectiveness measure the ratios of relevant aid flows to GNI in a given year to quantify them as a fraction of GNI. Specifically, for country i and year t, aid to production, social and economic infrastructure sectors are computed, respectively, as follows:

$$PAID_{i,t} = \frac{(PODA)_{i,t}}{(GDP)_{i,t}}$$

$$SAID_{i,t} = \frac{(SODA)_{i,t}}{(GDP)_{i,t}}$$

$$IAID_{i,t} = \frac{(IODA)_{i,t}}{(GDP)_{i,t}}$$

As mentioned above, the interactions of these variables enter respective equations as key independent variables. I will discuss governance indicators below.

Several other measures of foreign aid relevant to aid allocation model are also computed as follows. The first divides total real ODA commitments of each donor by population to express it on a per capita basis:

$$AIDP_{i,j,t} = \frac{(ODA)_{i,j,t}}{(POP)_{i,t}}$$

To put aid flows in additional perspective, three similar measures of sectoral real ODA commitments are constructed in a similar way:

$$PAIDP_{i,j,t} = \frac{(PODA)_{i,j,t}}{(POP)_{i,t}}$$

$$IAIDP_{i,j,t} = \frac{(IODA)_{i,j,t}}{(POP)_{i,t}}$$

$$SAIDP_{i,j,t} = \frac{(SODA)_{i,j,t}}{(POP)_{i,t}}$$

An important aspect of this study is related to governance and its relation to aid effectiveness. There are many aspects of governance that may matter for development and aid effectiveness. Ideally we would like to account for all possible dimensions in order to avoid estimation problems. However, this is not a feasible approach because of the lack of sufficient degrees of freedom. Thus, we need governance measures that have long time runs, and wide country coverage, and that are highly correlated with other dimensions of governance.

5.2. Descriptive Statistics of the Data

This subsection will provide a brief analysis on the nature and quality of main variables. First, univariate statistics reveal that most variables are deviated from the normal distribution. These statistics for key variables are presented in table 5.1[39]. The distributions of most variables (except for growth, political rights and civil liberties) are skewed to the right, i.e. the right tails are longer than the left tails. Also, the distributions of most variables

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[39] Descriptive statistics for all variables including control variables are provided in appendix 6.

have extremely strong peaks and more rapid decays compared to the normal distribution. Almost all variables (except for political rights, civil liberties, log income and years of schooling) have major outliers.

The distributions of real per capita income (*income*) and its log transformation (*lincome*) are both skewed to the right. However, while the distribution of per capita income is severely right tailed, the distribution of its log transformation is only mildly skewed to the right and even becomes more symmetric over time. The median and mean of its distribution become virtually equal over time and the spread of the distribution is relatively stable. The growth variable has a relatively symmetric, two-tailed distribution with mild skewness (the skewness coefficient of -0.2). However, the standard deviation and interquartile range tend to fluctuate over time, the spread increases up to the mid-1990s and then reduces fully. Simple average of the annual growth across all countries in the sample also tends to fluctuate, with relatively high rates from the early 1970s up to the early 1980s. Then, however, it contracts and again picks up starting from the mid-1990s. Average growth across all countries fell below zero in the early 1980s and the early 1990s. While the former is explained with worldwide debt crisis of the 1980s, the latter could be explained mostly with a decline of income in formerly socialist countries of Eastern Europe and the Former Soviet Union.

The measures of the center (both mean and median) and spread (standard deviation and interquartile range) of the investment ratio (*inv*) fluctuate over time with a general declining trend, while skewness and kurtosis oscillates with no particular trend. Overall, average investment ratio across all countries steadily rises from the early 1970s to 1981 when it peaks at 25.8 percent, then sharply drops the following year and slightly rises from the mid-1980s to the mid-1990s, and falls thereafter. The human capital variables (average years of schooling (*syears*) and change in years of schooling (*syearsch*)) have relatively stable distributions over time, but the average years of schooling is moderately skewed to the right while its change is symmetrically distributed.

Table 5.1. Univariate Descriptive Statistics for Key Variables

	Mean	SD	Median	IQR	Skewness	Kurtosis	Outliers* (%)
growth	1.2	6.6	1.8	6.1	-0.19	15.2	1.3
income	1959	2789	963	1966	3.7	22.3	3.4
lincome	6.9	1.2	6.9	1.9	0.16	2.3	0
inv	22.7	9.1	21.8	10.9	1.3	9.1	0.5
syears	4.27	2.28	4.06	3.47	0.39	2.5	0
syearsch	0.37	0.44	0.28	0.38	0.03	14.0	1.5
aid	7.6	10.8	3.3	9.8	2.8	14.7	2.4
paid	1.5	2.3	0.6	1.8	3.2	18.0	3.0
said	2.1	3.2	0.8	2.7	3.6	24.8	2.4
iaid	1.4	2.4	0.5	1.8	4.7	49.4	3.0
aidp	65.3	114.8	33.8	61.8	6.0	53.2	3.9
paidp	12.6	24.6	5.2	13.3	6.3	63.6	3.9
saidp	18.4	40.6	8.8	17.3	9.9	144.2	3.9
iaidp	12.6	32.5	5.0	11.0	11.4	218.1	3.8
PR	5.0	2.0	5	3	-0.37	1.7	0
CL	4.4	1.7	5	3	-0.27	2.1	0

*Outliers present % of observations that are beyond outer fences.

The aid variables (ratio of aggregate and sectoral aid flows to GDP (*aid, paid, said,* and *iaid*) and per capita aggregate and sectoral aid flows (*aidp, paidp, saidp*, and *iaidp*)) have severely skewed distribution with heave right tails. Although both the measures of the center and spread for all aid variables oscillate over time, there are some major differences between these variables. For example, the average value of the ratios of aggregate aid and aid to social sector to GDP steadily rise up to the early 1990s, with some exceptions, and falls significantly thereafter, while the ratio of aid to production sector to GDP rises only up to the late 1980s, and starts to fall significantly thereafter. Similar trends are observed with respect to per capita aid variables.

The two approximate measures of democratic governance (political rights and civil liberties) range from 1 to 7. The distribution of the political rights across time and countries

as well as on yearly basis is approximately bimodal, with peaks at 2 and 6 ranges, while the distribution of the civil liberties oscillates over time with roughly unimodal shape across time and countries. Differently from most of the key variables, these variables are left skewed and have no major outliers. While the average of both governance scores across countries in the sample improves over the time period studied, there is considerable heterogeneity at the country and regional levels. The strongest improvements in perceived governance scores occurred in Latin America and the Caribbean, and Eastern Europe and the Former Soviet Union. Although there are some improvements in average governance scores across countries in Sub-Saharan Africa, the level of perceived governance still remains low. On average, there is no improvement in the Middle East and North Africa region in perceived governance. Many country experiences have diverged from regional averages of their respective regions. For instance, several countries in Sub-Saharan Africa (e.g. Benin, Ghana, Cape Verde, Botswana) differ from their peers in the region, having experienced lasting improvements in perceived governance with transitions from low to moderate or high levels of governance. On the other hand, several countries (e.g. Belarus, Turkmenistan, Venezuela, Pakistan, and Haiti) differ from their peers in their respective regions, having experienced sharp shifts in both directions with long-term deterioration of governance or still remain relatively unchanged. A thorough discussion of the approach to using governance variables in the context of panel analysis follows in the next section.

The pairwise correlations of key variables with respect to aid effectiveness are given in table 5.2. As evident in table 5.2, there is virtually no direct linear association between all aid variables on one side and growth and investment variables on the other side. Perhaps, these relationships are neither immediate nor linear if they do exist at all. There seems some reasonable negative association between years of schooling and the aid variables. Governance is negatively correlated with all aid variables though these coefficients are practically insignificant. However, governance provides reasonable positive correlation with log-transformed income and years of schooling and virtually no correlation with growth and

investment ratio. Log-transformed income provides moderate negative correlation with the aid variables.

Table 5.2. Correlation coefficients for key aid effectiveness variables

	growth	inv	syears	lincome	gov	aid	paid	said
inv	0.30*							
syears	0.20*	0.32*						
lincome	0.11*	0.30*	0.78*					
gov	-0.07	-0.05	-0.52*	-0.45*				
Aid	-0.00	-0.01	-0.48*	-0.48*	0.18*			
paid	-0.04	0.01	-0.48*	-0.45*	0.17*	0.81*		
said	-0.01	-0.01	-0.43*	-0.43*	0.11*	0.90*	0.71*	
iaid	0.01	0.01	-0.48*	-0.40*	0.10*	0.88*	0.69*	0.81*

Correlations are statistically significant at the 5 % significance level or better; negative correlation coefficients of governance with other variables suggest positive association since lower scores mean better governance and vice versa.

Table 5.3 reports the pairwise correlations of per capita aid with key independent variables. The per capita aid is negatively correlated with income per capita (poorer countries get more aid) and positively correlated with total aid from other donors (bandwagon effect). There is also a modest positive correlation between exports from a donor to a recipient and aid per capita, somewhat expected in that seemingly economic links is an important factor. There are practically no correlations between both the democratic and institutional quality of governance and aid per capita for each donor-recipient pair as well as total aid from all donors. Similar correlations between governance variables and per capita sectoral aid flows from all donors and governance measures are observed. These could be explained in two ways. First, donors do not pay attention to recipient's quality of governance, thus, there is no

relationship between these variables. Second, donors do differentiate recipients based on the quality of governance, but this relationship is not linear.

Table 5.3. Correlation coefficients of per capita aid disbursements with determinants of aid

	Income	Democracy	Institutions	Exports	Other aid**
Aid per capita*	-0.1	0.04	-0.06	0.22	0.37
Income		0.42	0.29	0.33	-0.15
Democracy			0.21	0.07	0.16
Institutions				0.25	-0.08
Exports					-0.35

*Aid per capita for each donor-recipient pair; **Total aid from all donors*
All correlations are statistically significant at the 5 % significance level or better

The correlations with respect to both aid effectiveness and aid allocation tend to change over time. There are virtually no significant correlations (both statistically and practically) between both aggregate and sectoral per capita aid flows and democratic governance from the mid-1970s to the early 1990s. However, starting from the mid-1990s these correlations became statistically significant though still very modest. For example, the correlation coefficient between aggregate per capita aid flows and democratic governance variable increases up to –0.2, while the correlation between per capita aid flows to social sector improves up to –0.26. These suggest that there could be changes in donor policies over time.

The detailed analysis of the relationship between total aid per capita and the quality of governance in recipient countries indicate that there is strong heterogeneity across recipient countries. There is positive correlation for 48 recipient countries, negative correlation for 22 recipients, and no statistically significant correlation for 72 countries. The average quality of governance (simple mean for all recipients) is improved from 1975 to 2000, but on average per capita aid has a declining trend in that period (figure 5.3). One explanation for the latter is that the number of countries eligible to receive a foreign aid increased significantly as the cold war and socialism ended in Eastern Europe and the Former Soviet Union.

Figure 5.3. Governance and Aid Per Capita Over Time, 1972-2002
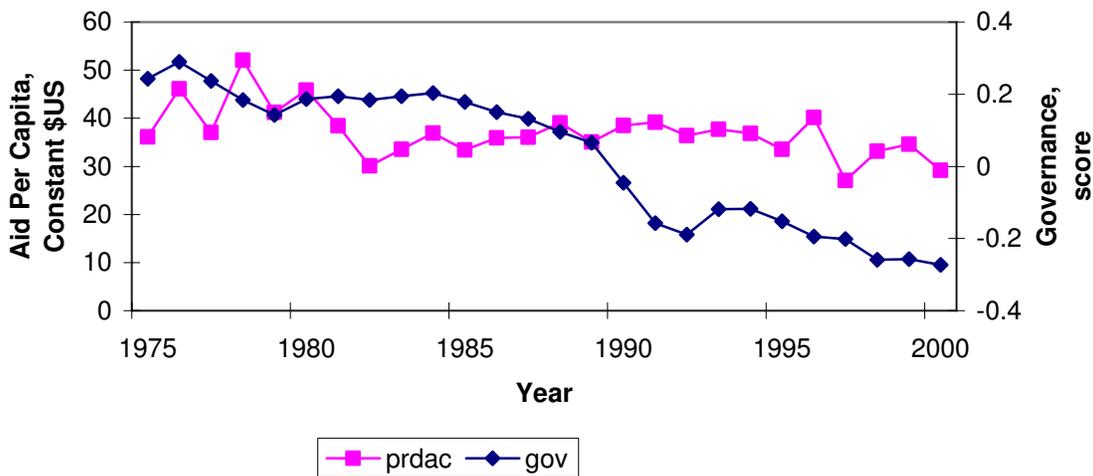
The descriptive analysis of the data shows that the raw data have a lot of noise and fluctuations. The literature suggests (Durlauf et al 2004, Baldacci et al 2004) that to reduce the short-term fluctuations and the noise in the data, one can use four-five year averages. I use five-year averages of the variables in estimating the equations. For example, the first observation is the average for the 1973-1977 period, following with the average for the 1978-1982 period and so forth. The econometric analysis of aid effectiveness and allocation using panel data confronts some methodological challenges. The sources of the challenges and possible solutions will be discussed in the following sections.

5.3. Using Measures of Governance in the Context of Panel Analysis

In empirical analysis, two governance variables are used. The institutional quality of governance is approximated with a combination of four ICRG indicators (bureaucratic quality, rule of law, government stability, and corruption) while the democratic quality of governance is approximated by a combination of the Freedom House's political rights and civil liberties indicators. The main focus is on the democratic quality of governance while the institutional quality of governance variable enters the estimation mainly for control purposes. There are two grounds for this approach: conceptual and practical. First, the notion of good governance combines features of a government in which ordinary citizens have the rights and liberties to govern themselves (democracy) with arrangements and mechanisms that are used to manage public affairs accordingly to accepted rules and procedures (institutions). The democratic quality of governance creates conditions for increased accountability, citizen participation and meaningful decentralization of authority making them accessible to citizens. The institutional quality of governance allows the efficient fulfillment of those rights and liberties by the incorporation of the views of citizens and political groups in the formulation of policies and equitable delivery of public services. These two dimensions of governance have to dynamically interact to reinforce good governance. The basic dynamic here is that initially political rights and liberties (even if they are very limited) generate demand for appropriate institutions. Consequently, improved institutions create conditions for better fulfillment of rights and liberties.

The practical ground is based on the availability of more comprehensive measures of governance because as mentioned previously the concept of governance is multi-dimensional and most governance indicators intend to measure only one dimension. Therefore, one needs to find measures as comprehensive as possible. As mentioned earlier, I use the Freedom House's two indicators – political rights and civil liberties – because they are available over long period of time and provide wide country coverage. The general characteristics of the

values of these categorical variables and some exemplary countries are presented in tables 5.4 and 5.5.

One may argue that these indicators are not objective measures; thus, they only describe perceptions about the democratic quality of governance. However, even though the Freedom House's indicators are subjective measures, they may still be a reasonable signal about the quality of governance across countries and are constructed applying the same procedures for all countries. Thus they can be safely accepted as a proxy for the quality of governance. Another concern: even if they somehow measure or proxy the actual democratic quality of governance in recipient countries, they describe only one dimension of governance, i.e., the dimension of democracy. However, it turned out that this concern also is not necessary. To the best of my knowledge, the World Bank Institute constructed the most comprehensive and sophisticated measurement of governance publicly available at the moment (Kauffmann et al, 2003). This measurement of governance includes six aggregate indicators of governance that capture "(1) the process by which governments are selected, monitored and replaced, (2) the capacity of government to effectively formulate and implement sound policies, and (3) the respect of citizens and the state for institutions that govern economic and social interactions among them." It turns out that there are strong correlations between these six indicators and Freedom House's two indicators (correlation coefficients vary from 0.6 to 0.9). Moreover, canonical correlation analysis indicates that a simple linear combination of World Bank's governance variables is highly dependent on and can be predicted using the linear combination of political rights and the civil liberties variables (canonic correlation is 0.95).

How can one interpret these correlations? These strong correlation coefficients suggest that these indicators of governance are measuring very similar things. Thus, it can be assumed that a latent governance variable that is constructed from political rights and civil liberties indicators is a reasonable proxy of the quality of governance[40]. Further, the

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[40] Nevertheless, these two indexes do not cover the meaning of "governance", although they are the best we have, and they are closely correlated with other governance variables. Therefore, the results should be viewed with some caution.

introduction of institutional variable allows us to control for aspects of governance that are not captured by democracy variable.

I created three level (dummy) variables for low, medium, and high quality of democratic governance. Figure 5.4 demonstrates the dynamics of the average governance score for these three groups of countries. As is evident from the graph, the democratic quality of governance in poor governance countries is almost stagnant while medium and high quality governance countries have experienced moderate and significant improvements, respectively. These variables that approximate three levels of governance are created using the following approach. First, I combine political rights and civil liberties indicators resulting in new variable with values from 2 to 14. Then using this variable, I classify all countries into three groups as follows:

1. High quality governance countries, with scores from 2 to 6;
2. Medium quality governance countries, with scores from 7 to 10;
3. Low quality governance countries, with scores from 11 to 14.

The results of the above classification are adjusted using the following approach. It is more likely that real democratic and responsive governance - erected on the foundation of people's active participation in public affairs – does not happen overnight. Almost all of developing countries attempted to establish democratic governance at some point in their development. While some have succeeded, many have been sorely disappointed with the results. This sense of disappointment when it ran to excess did serious damage – undermining both transformation and further work to promote democratic governance.

The surprising thing about developing countries during the last five decades is not how many transformations occurred, but how they occurred. Surprisingly, most of the countries with gradual but persistent transformations have succeeded while countries, which had rapid movements to democratic governance often failed. It seems that when small advances are achieved both within governments and within society, they usually have greater value than a cursory glance would indicate. Perhaps, small changes prepare them psychologically for similar actions in the future – an important gain. Such things usually

occur because powerful people in government who favor more openness have joined forces with others like them. The links that they establish tend to persist beyond any single episode, and make further change more likely. On the contrary, when rapid and enormous transformations are attempted, there could be enough people, both within government and within society, who resist changes because it requires for fundamental cultural changes. Cultural changes take time; one needs to identify the place where changes are needed, prioritize those changes, and then make the transition gradually.

Figure 5.4. Average Governance Scores in Low, Medium, and High Governance Countries
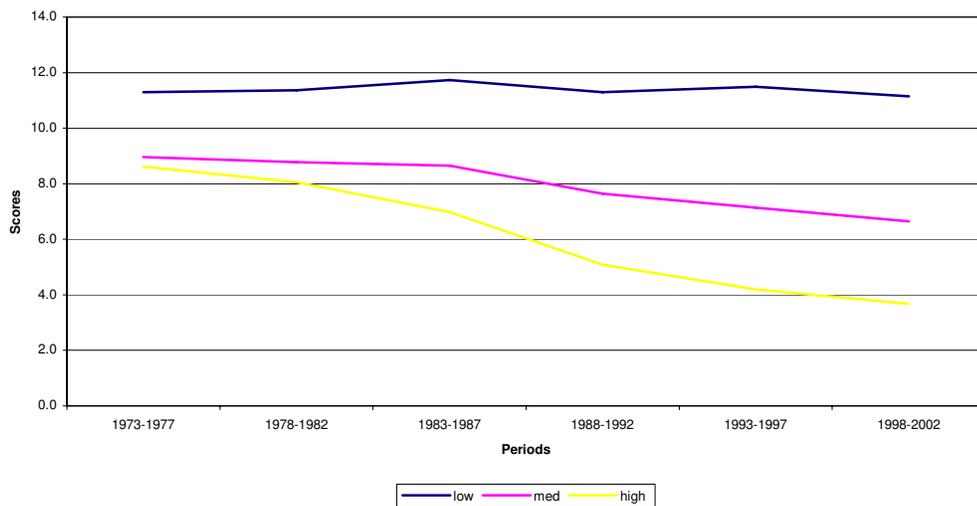
Therefore, categorization of countries into high, medium and low quality governance countries should be done carefully. For example, consider a country with a rapid transformation. When a country adopts a rapid reform strategy, the policy perceptions about its governance changes quickly. Consequently, a country's governance score improves dramatically. However, when disappointment with results is excessive and reform stops or backfires, perceptions about its governance worsen, and governance scores declines dramatically. As a result, we get extremely volatile governance scores suggesting that the quality of governance in the country from one period to another changed from low state to

high state and vice versa. However, such rapid changes were unlikely to happen. It was more likely that only perceptions about the quality of governance changed over time but the actual quality of governance never improved. Therefore, I categorize countries with similar patterns of governance scores as a low governance country for entire period.

Another example, consider a country with a gradual but persistent changes in governance. When we compare its more modest achievements with dramatic transformations, we often perceive it like a failure. But we are using inappropriate yardsticks to measure its achievements. We need to recognize that thoroughgoing transformations are extreme rarities and that most of the time; it is incremental change and not massive transformation that is needed. In the end, those countries with gradual and persistent change will move from low state to medium and eventually to high governance state. Therefore, I categorize countries with similar patterns of change as high quality governance countries for all periods. Similar logic is applied to medium governance categorization.

Applying the approach above, I assessed country by country the patterns of changes in governance scores for all countries. Based on the results of this detailed analysis, I made adjustments to the categorization above. This adjusted classification applies to the entire time span.

Table 5.4. General Characteristics of Political Rights Scores

Score	Description	Examples of Countries
1	Country has a fully competitive electoral process with free and fair elections and competitive political parties; and opposition has actual power and plays an important role	Barbados, Bulgaria, Cape Verde, Costa Rica, Grenada, Hungary
2	As ranking 1, however, such factors as political corruption, political discrimination against minorities, and foreign military influence on political process may be present and weaken the quality of political freedom	Bolivia, Botswana, Brazil, Chile, Croatia, El Salvador, Ghana, India, Jamaica, Mexico, Namibia, Peru, Senegal
3	Less effective enforcement of competitive election process than 1 and 2	Albania, Argentina, Benin, Ecuador, Honduras, Indonesia, Macedonia
4	Ditto3, but government may have been selected outside the public view by various fraction leaders	Bangladesh, Bosnia-Herzegovina, Burkina-Faso, Columbia, Djibouti, Georgia, Guatemala
5	No effective electoral process in place, however, struggle for consensus among variety of political, ethnic and other groups in society	Bahrain, Central African Republic, Comoros, Ethiopia Malaysia, Russia
6	No competitive electoral processes are allowed and a country is ruled by one party dictatorships, religious hierarchies, military juntas, or autocrats, however, leaders may respond to certain popular (cultural, religious and ethnic) desire	Afghanistan, Algeria, Bhutan, Burundi, Cambodia, Chad, Congo, Cote d'Ivoire, Iran, Jordan, Lebanon, Liberia, Pakistan, Qatar, Somalia, Tajikistan
7	Political rights are absent or virtually nonexistent and power is controlled by political despots only	Burma, China, Cuba, Eritrea, Iraq, North Korea, Libya, Rwanda, Sudan

Table 5.5. General Characteristics of Civil Liberties Scores

Score	Description	Examples of Countries
1	Country provides full freedom of expression, assembly, association, education, and religion and distinguished by an established and generally equitable rule of law	Barbados, Chile, Kiribati, Marshal Islands, Slovenia, Uruguay
2	Same as score 1; however, there are deficiencies in the implementation of some aspects of civil liberties	Belize, Benin, Bulgaria, Cape Verde, Costa Rica, Guyana, Latvia, South Africa
3	There are some elements of censorship in the press and some restrictions with respect to assembly, association, and religion	Albania, Argentina, Bolivia, Brazil, Ecuador, Fiji, Ghana, India, Lesotho, Mali, Namibia, Tanzania
4	The press is strongly censored, free speech and other civil liberties are limited and torture may be existent	Bangladesh, Burkina Faso, Colombia, Gabon, Indonesia, Kenya, Niger
5	Little or no free press, legal authorities have apparently extensive control over social order, and political prisoners are in place	Algeria, Angola, Chad, Djibouti, Ethiopia, Guinea, Kazakhstan, Lebanon, Morocco, Pakistan
6	Severely restricted rights of expression and association, few partial civil liberties, such as some religious and social freedoms, and some highly restricted private business activity	Belarus, Cameron, China, Haiti, Iran, Laos, Liberia, Qatar, Uzbekistan, Vietnam, Zimbabwe
7	Virtually no civil liberties, an overwhelming and justified fear of repression based on politics and ethnicity	Burma, Cuba, Iraq, North Korea, Libya, Saudi Arabia, Somalia, Syria, Turkmenistan

5.4. Identification Issues and Estimation Techniques

The core questions regarding aid effectiveness are how different categories of aid affect the economic growth and whether the interaction of different levels of governance with different categories of aid flows is significant in promoting growth. The main question regarding aid allocation is whether the quality of governance in recipient countries affects the donors' aid allocation decisions.

First, consider a general model specification that examines the research questions regarding aid effectiveness:

$$Y_{jt} = \beta_0 + \beta_1 \text{ Governance}_{jt} + \beta_2 \text{ Aid}_{jt} + \beta_3 \text{ (Governance X Aid)}_{jt} + \beta_{jt} X_{jt} + \xi_{jt}$$

where Y is a development outcome variable for recipient-country j at time t, *Governance* is a matrix of governance variable for recipient j at time t, *Aid* is a matrix of disaggregated aid variables for recipient j at time t, (*Governance X Aid*) is an interaction between the quality of governance and aid variables, X is a matrix of control variables, and ξ is an observed error term.

Second, consider the general form that explores whether the quality of governance has an impact on donors aid allocation policies:

$$\text{Aid}_{ijt} = \alpha_0 + \alpha_1 \text{ Governance}_{jt} + \alpha_1 X_{jt} + \xi_{ijt}$$

where *Governance* is a matrix of governance variables for recipient j at time t, X is a matrix of control variables for recipient-country j at time t. *Aid* is an aid variable, aid per capita from donor i to recipient-country j at time t, for example, ξ is unobserved error term.

I will start with identifying estimation issues that are common for both specifications. Then I will discuss specific solutions. In addressing the research questions formulated above empirically, we face at least two methodological estimation challenges, and one related to the

nature of the panel data is used in the analysis. These estimation issues are relevant to both specifications mentioned earlier.

First, the most immediate aspect of the model specification is unobserved heterogeneity or the omitted (third) variable effect. Overall, the literature suggests that over 50 variables are considerably correlated with growth (Levine and Renelt, 1992). One may include in the model whenever these variables are available. However, many of these variables are not readily available across countries and time periods. Moreover, some of these variables are not observed. For example, literature suggests that country-specific effects, such as cultural factors, can impact both growth and exploratory variables simultaneously.

Another source of unobserved heterogeneity is measurement error. If the explanatory variable we observe is measured with significant error, the unobserved error term in the relation of interest will contain the measurement error that will be correlated with the regressor. These have potentially serious consequences if explanatory variables to be correlated with those unobservable variables, whereas in a regression model regressors and unobservables are uncorrelated by construction. If those correlations between observables and unobservables are not zero then it renders standard estimation subject to bias and inconsistency, i.e., if unobservables that have direct impact on both dependent and explanatory variables are omitted, the error term will be correlated with explanatory variables and regression coefficients will be biased measures of the parameters of interest (Wooldridge 2002, Arellano 2003).

Contemporary econometrics provides a response to the presence of time invariant unobserved heterogeneity. If unobservable variables are country specific and time invariant, unbiased estimates of the models can be obtained by using fixed effects (or first-difference) estimation. This estimator is more appropriate because it embraces the cases when covariances of unobservables with explanatory variables are not zero.

The fixed effects estimator is motivated by a model when unobserved error term ξ_{jt} includes both a zero-mean country-specific time invariant component η_j and a zero-mean

random component ν_{jt} independent of all other values this random component and country specific component, i.e.,

$$\xi_{jt} = \eta_j + \nu_{jt}.$$

Since the fixed effects estimator captures only time invariant country specific unobserved effects, it is most likely that temporal events render standard estimation subject to bias and inconsistency. For example, the debt crisis in the early 1980s extended to a number of developing countries and most likely affected both development outcomes and aid variables. Or, the collapse of socialism at the end of 1980s and the early 1990s affected development outcomes and governance in formerly socialist countries. This also affected the aid flows to not only transition countries but to many developing countries in other parts of world.

One generalization, which produces unbiased and consistent estimates in the more general case, is the difference-in-difference (DOD) estimator that is one of the most popular estimation tools for applied policy research to evaluate the effects of policy interventions. This estimator assumes that unobserved error term ξ_{jt} has a factor structure, including a zero-mean country-specific time-invariant component η_j, a zero time-specific country-invariant component, and a zero-mean random component ν_{jt} independent of all other values this random component, and country and time specific components, i.e.,

$$\xi_{jt} = \eta_j + \mu_t + \nu_{jt}.$$

So, this specification (the DOD) introduces a second difference, which allows the estimation to capture the unobserved effects of time specific events. Unbiased and consistent estimation can then proceed by means of two fixed effects on first and second differences, where first difference isolates the time invariant unobserved effects, the second difference the event or time-specific unobserved effects.

Second, it is often argued that the relationship between aid flows and the quality of governance, and between development outcomes and aid flows are endogenous and can be interpreted in two ways. The evidence of a causal relationship between these variables is

inconclusive. For instance, shocks to economic growth and income may well carry implications for the stability of governance structures, the amount and sectoral allocation of aid flows and vice versa. If this is the case then it violates conditional independence assumption. From a theoretical point of view, the best approach is thorough and extensive econometric analysis using valid instrumental variables (IV). However, finding valid instrumental variables can be a formidable task. The impact of aid on development outcome is not instantaneous. It takes time for the aid effect to be fully transmitted into development outcomes. Therefore, it makes sense to relate lagged aid flows to development outcomes. Such a specification, to some extent, may allow us to avoid the problem of two-way causality if it indeed exists. Therefore, I specify the models assuming the causation running from aid allocation patterns to development outcomes[41].

Third, another problem frequently encountered in aid effectiveness studies relates to outliers, values of the dependent variable that are abnormal, given the values of the explanatory variables (response outliers), or odd values of explanatory variables (design outliers). As table 5.1 presents, outliers are somewhat of a problem for some variables in the dataset. One way of dealing with outliers is mere exclusion of them. However, this can substantially alter the results of regression analysis. Another way of solving the problem could be re-estimation of the model iteratively omitting one observation at a time to see that what exerts a significant influence on the set of estimates. I have chosen robust regression to address the problem related to outliers. Robust regression results will be provided for the purposes of robustness check. The advantage of the robust estimation procedure is that it minimizes the influence of extreme observations on the estimated equation rather than omitting them. The robust estimation procedure involves an iteratively weighted least squares method whereby the outliers are identified and weights assigned. Robust regression uses the Huber/White/sandwich estimator of variance in place of the traditional calculation.

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[41] I fully understand that this assumption will only address some issues related to two-way causality, but it will not provide a full solution for the problem. Indeed, a fully satisfactory solution may not exist.

This alternative variance estimator produces consistent standard errors even if the data are weighted or the residuals are not identically distributed.

Fourth, the panel data that are used in this study consists of repeated measurements on the same unit, the recipient, that are "pooled" with those of other units to provide a combination of longitudinal and cross-sectional information. Therefore, there is a strong possibility of the existence of autocorrelation within panels and cross-sectional correlation and/or heteroskedasticity across panels. In most panel data, the error terms associated with successive observations on the same unit - the observation for Uganda in 1999 and Uganda in 2000, for instance - are correlated with each other. The same could be true of spatially related units, such as countries in the same geographic region - the observations for countries of Sub-Saharan Africa, for example - that are subject to similar exogenous influences. Another possibility is that most economies of most developing countries are dominated by a limited number of commodities. Therefore, fluctuations in world commodity markets may produce similar effects for a number of countries.

Further, it is highly possible that estimates may have a different or non-equal variance of errors across countries and time periods. The first of these two problems can be demonstrated on the variance-covariance matrix of the error term as a pattern in which the off-diagonal elements are non-zero, while the second problem can be shown as a pattern in which these elements are non-equal. In general, estimates of models of this structure are flawed if one uses the simple OLS estimation method. Analysis of this data requires techniques that are robust to both problems mentioned above. Generalized least squares (GLS) methods are most often considered the most efficient approach, since they can specify the structure of the data and account for it directly (Green 2001).

So far I have highlighted a number of estimation issues and possible solutions relevant to the analysis of aid effectiveness and allocation using panel data. In the following, I will provide some details. First, I start with the aid effectiveness model. The estimations of growth, investment and human capital equations start with ordinary least squares models. However, as mentioned above, OLS will produce biased results for panel data. Here one has

to focus on all three aspects of the model specification discussed earlier. The first aspect of the model specification is unobserved heterogeneity due to time-specific events and omitted (third) variable effect, i.e. unobservable variables that may affect the quality of governance, aid flows, and development outcomes. Since these unobservables are country specific and time invariant or time-specific and country invariant, consistent estimates of the models are obtained using difference-in-differences estimator.

A second aspect of model specification is endogeneity or reverse causality given the likelihood of the two-way causality between development outcomes and aid flows. As mentioned before, the aid effectiveness model relates aid variables to development outcomes with one period lag assuming the causation running from aid allocation patterns to development outcomes[42]. Third, robust and FGLS estimators are employed to address the issues related to the possibility of the existence of autocorrelation within panels, cross-sectional correlation and/or heteroskedasticity across panels, and non-equal variances of errors across countries and time periods.

Now I turn to the aid allocation model. As mentioned elsewhere, the objective of aid allocation model is to evaluate the effect of governance on foreign aid flows. Identifying this effect requires controlling for any systematic shocks to foreign aid flows that are correlated with, but not due to, the governance. I do so in three ways in the two-part estimation below. First, I include period effects, to capture any global trends in foreign aid flows. Second, I include donor dummies, to control for differences in donor aid allocation policies. Third, I include recipient effects, to control for differences in donors' behavior towards individual recipient countries. That is, I identify the pure effect of governance variable on bilateral foreign aid flows. This identification strategy is applied separately to examine three research questions. At the first step, I estimate the effect of governance on the probability of supplying foreign aid by donors to given recipient country using random effects probit estimator. Then, I estimate the effect of governance on per capita aggregate aid flows as well as per

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[42] I fully understand that this assumption will only address some issues related to two-way causality, but it will not provide a full solution for the problem. Indeed, a fully satisfactory solution may not exist.

capita sectoral aid flows, conditional on positive decision in the first step, using difference-of-differences estimator. The identifying assumption of these estimators is standard difference-in-differences: it simply requires there be no recipient-specific or donor-specific effects over this period of time that affect the outcome variables. I control for following determinants of aid: per capita income, recipients' population, economic and political links between a donor and a recipient, and so called "bandwagon effects." A "bandwagon effect" is the observation that a donor provides aid to a particular recipient because many other donors do the same. In other words, the "bandwagon effect" arises when a donor's preference for a recipient increases as the amount of aid given by other donors increases. I also control for some macroeconomic variables to see if this will change the results. I do not explicitly control for time invariant characteristics in donor-recipient relationships, such as colonial background, ethnic and religious fractionalizations, but the identification strategy described above allows to implicitly control for fixed relationships between donors and recipients.

The sample includes both recipients and non-recipients of aid from the bilateral donors under consideration. Thus, some of bilateral aid commitment flows are equal to zero, because donors tend to allocate aid only to specific targeted countries. Consequently, we deal with a censored variable, which implies that estimates are flawed if one models average aid, including the zeros. A misleading regression model will be fitted since zero outcomes are the result of a non-random aid allocation process. Consider an alternative approach, which assumes excluding the non-aid recipients from the sample. This truncates the error term if the donors' have systematically used some criteria to partition aid recipients from non-recipients and thus violates an important assumption that the expectation of the error term is zero. There is a group of limited variable modeling techniques, which allows to model the data with censored character: two-part model, Heckman's two-step method and type one Tobit model. Each of these estimation techniques has its own strength and weaknesses. Following the aid allocation literature (Neumayer 2003), I have chosen a two-part model: in the first step, a probability model determines the likelihood of giving aid, and in a second, a difference-in-difference model explaining aid disbursements estimated, conditional only on

strictly positive aid commitments. This procedure assumes that the choice of the recipient is independent from the amount allocated to this recipient in the second step.

As mentioned above, the second part of the aid allocation model examines the per capita aggregate aid flows as well as per capita sectoral aid flows, conditional on positive decision in the first step, using difference-of-differences estimator. For the per capita aggregate aid flows model I use ordinary least squares and/or time series cross-sectional generalized least squares estimation techniques. However, one cannot safely use these techniques for the sectoral per capita aid flows model because some donors tend to allocate aid only to specific targeted sectors. Hence, we deal with a censored variable, which implies that estimates are flawed if one models the sectoral aid flows, including the zeros. If the share of zero values is big, then the above mentioned techniques result in misleading outcomes. Therefore, I estimate the sectoral per capita aid flows models by using standard tobit and cross-sectional time series tobit techniques.

Chapter 6. Analysis and Discussion of the Results

Employing the framework developed in chapter 4 and using the data described in chapter 5, this chapter empirically examines the impact of disaggregated aid on development outcomes. Then, I present the results of aid allocation models. Thereafter, I relate the findings to previous literature and development practice.

6.1. Aid Effectiveness

An innovation of this dissertation is that I estimate the impact of aid on growth in a different manner than typical of the aid-growth literature. To make the link to the existing literature, I begin with analysis of the impact of aggregate aid on per capita aid growth. The results of different specifications of difference-in-difference estimator for the aggregate aid flows are presented in table 6.1. The most significant variables in the regression are initial income, investment ratio, education and health capital, and inflation. Change in educational capital appears to be more important than its stock. The effect of inflation on growth appears to be nonlinear (high inflation dummy), especially high levels of inflation are harmful for per capita growth.

As concerns to aggregate aid, I begin with a base regression presented in column 1 (DOD1 model) of table 6.1. This regression suggests that there is no significant relationship between aid and growth. I then extend the model including the interaction of aggregate aid with the quality of governance (democracy). This makes aggregate aid and its interaction with governance statistically significant (DOD3 model). Taking the derivative of growth with respect to aid, we see that the slope of this derivative in the governance dimension is slightly positive. This suggests that aid has relatively higher positive impact on growth in countries with better governance. While the conditional variable (governance) in this study is different from Burnside and Dollar (2000, policy environment), the result is similar to their findings. However, this result is not robust to adding and dropping other variables into the

model. For example, if one adds the democracy variable into the model the coefficients for aggregate aid becomes statistically insignificant (DOD2 model). The coefficient for the interaction variable is statistically significant only at 10% significance level.

Further, I estimate the model allowing the interactions of aggregate aid with different levels of governance (DOD4 and DOD5 models). These results suggest that the impact of aggregate aid on growth in low- and medium governance countries is virtually zero. The results also imply that this impact might be slightly positive for high-governance countries. However, using a chi-squared statistic test (χ^2=5.46, p-value=0.1413), I cannot reject the null hypothesis (three estimated coefficients are equal) at 5% significance level and conclude there is no difference in regression coefficients between the three groups of countries. Thus, the results suggest that the impact of aggregate aid on growth is insignificant and indifferent to the quality of governance.

As noted earlier, aid flows are allocated to different sectors of recipients' economy. These different categories of aid flows might not impact economic growth uniformly. Therefore, any evaluation of the impact of aggregate aid on growth is flawed because different categories of aid might impact growth through different transmission channels. I attempt to mitigate this challenge by disaggregating aid flows and estimating the impact of these disaggregated aid flows on economic growth.

As mentioned earlier, the empirical approach in this study is based on panel data regressions in a system of three equations. The estimation results for growth, investment and human capital equations are presented in tables 6.5-6.8. The results for alternative specifications, used for robustness check are also reported in these tables. In most cases the coefficients are statistically significant, and all equations have a good fit. The equations explain from 50 to 65 percent of the variation in per capita growth, about 50 percent of the variation in investment ratio and almost 80 percent of the variation in human capital (years of schooling). Goodness-of-fit of these models was assessed by F-test and Chi-squared test. In

the following sections, I first present the results for baseline (DOD) specification, and then discuss the robustness of the core findings using the results of alternative specifications.

Table 6.1. Growth Regressions: Using Aggregate Aid Variable

	DOD1	DOD2	DOD3	DOD4	DOD5
Initial GDP per capita (logs)	-1.21***	-1.31***	-1.27***	-1.32***	-1.15**
	(0.36)	(0.38)	(0.36)	(0.37)	(0.36
Investment	0.18***	0.18***	0.18***	0.18***	0.18***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Education capital (lagged)	0.36**	0.38**	0.40**	0.33**	0.36* (0.17)
	(0.17)	(0.17)	(0.17)	(0.17)	
Change in education capital	0.83**	0.79**	0.80**	0.84**	0.85* (0.36)
	(0.36)	(0.36)	(0.36)	(0.36)	
Health capital	0.08**	0.07**	0.07**	0.07**	0.07**
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Population (log)	0.23	0.23	0.23	0.24	0.25
	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)
Trade openness	0.01	0.01	0.005	0.01	0.01
	(0.01)	(0.01)	(0.005)	(0.01)	(0.01)
Inflation	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
High inflation dummy	-0.81**	-0.74**	-0.76**	-0.71**	-0.78*
	(0.36)	(0.36)	(0.36)	(0.36)	(0.36)
Financial depth	-0.02*	-0.02**	-0.02**	-0.02*	-0.02*
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Democracy		0.04		0.11*	
		(0.08)		(0.06)	
Aggregate aid	0.01	0.10	0.12**	2.01**	2.08** (0.94)
	(0.3)	(0.06)	(0.05)	(0.93)	
Aid x Democracy		0.01*	0.01**		
		(0.006)	(0.005)		
Low democracy x Aid				-2.03**	-2.09**
				(0.93)	(0.94)
Medium democracy x Aid				-1.99**	-2.05**
				(0.93)	(0.93)
High democracy x Aid				-1.98**	-2.02**
				(0.93	(0.94
Constant	-4.37		-3.7	-2.30	
R-squared	0.35	0.37	0.37	0.38	0.37
No. of countries	75	74	74	74	74
No. of time periods	5	5	5	5	5
No. of observations	336	331	331	331	331

Standard errors in parentheses

*** significant at 1 percent; **significant at 5 percent; *significant at 10 percent

6.1.1 The Core Results

This section tests the three hypotheses regarding the link between disaggregated aid flows and development outcomes. The following analysis is based on the results of the baseline (difference-in-differences) model. As mentioned earlier, the difference-in-difference estimator produces unbiased and consistent estimates of the parameters of interest by means of two fixed effects on first and second differences, where first difference isolates the time invariant unobserved effects, the second difference the period specific unobserved effects. Moreover, the baseline specifications relate lagged values of key independent variables, where appropriate, to dependent variables to mitigate endogeneity problem.

Table 6.2 reports the results of the test for the impact of aid to production sector on investment. The first important and somewhat puzzling result emerging from table 6.2 is that aid to production sector in countries with low governance has a positive and significant contemporaneous impact on capital accumulation (investment). The estimated impact from the OLS model is 0.78. However, one might argue that the OLS result is biased due to time-invariant country specific and country-invariant time specific effects. Therefore, I estimated DOD model, which allows us to control for these specific effects. This reduces the estimated impact of aid to production on investment to 0.71. This means that a percentage point increase in the ratio of aid to production sector to GDP leads to 0.71 percentage point increase in investment ratio, on average, in recipient countries with low quality of governance. In other words, one standard deviation increase in aid to production sector to GDP ratio will cause about 1.6-percentage point increase in the investment ratio on average, other things being equal. Further, the results for the growth equation (table 6.4) suggest that a percentage point increase in investment ratio is associated with 0.2 percent increase in per capita GDP growth rate, on average. Thus, one standard deviation increase in aid to production sector to GDP ratio leads to 0.33 percentage point increase in average annual growth rates, on average, in recipient countries with low quality of governance.

The second important result emerging from table 6.2 is that there is some probability that aid to production sector in medium and high governance countries might have a negative impact on investment on average. However, the estimated coefficients are statistically insignificant for both OLS and DOD models indicating that we cannot say with any acceptable level of confidence if these coefficients are in fact different from zero. In light of these results, one can say that aid to production sectors helps to boost growth through its effects on physical capital accumulation in countries with low quality of governance countries, but this channel of influence on per capita GDP growth in recipient countries with medium and high levels of governance appears insignificant or nonexistent.

Table 6.2. The core results for the impact of aid to production sector on investment

Quality of governance	OLS	DOD	Impact
High	-1.09 (1.32)	-1.72 (1.23)	Negative but statistically insignificant
Medium	-0.1 (0.38)	-0.28 (0.36)	Negative but statistically insignificant
Low	0.78* (0.27)	0.71* (0.26)	Positive and statistically significant

*Statistically significant.

The equality of regression parameters in three groups was assessed by partial F-test (F (3, 301) = 5.26, p-value=0.0000). Null hypotheses are rejected at 95% significance, and it is concluded that there are significant differences in regression coefficients between low, medium and high governance countries. The coefficients are for the interactions of aid to production sector with respective levels of governance and reflect the change in investment ratio associated with one percentage point increase in the ratio of aid to production sector to GDP. For example, the coefficient 0.78 means that one percentage point increase in the ratio of aid to production sector causes 0.78 percentage point increase in investment ratio.

How can one explain these somewhat puzzling results? First, aid to production sector is a foreign public investment and its relationships with domestic investment in a host country would be partially similar to those of domestic public investment. As economic theory suggests public investment might cause a crowding out effect if it reduces the loanable

funds available for private investment and distorts relative prices, reducing the level of private investment. If the positive impact of increased foreign public investment in production sectors outweighs the negative impact of reduced private investment then investment ratio will increase and lead to higher growth rates. In the opposite case, the negative impact of reduced private investment completely cancels or even overrides the positive impact of increased public investment, and economic growth will remain unchanged or be even reduced. Actually, the evidence suggests that contemporaneous effect of public investment on private investment, in countries with medium to high level of democratic governance, is negative and statistically significant. For example, Mitra (2006) provides considerable empirical evidence suggesting that public investment in India has been crowding out private investment. Second, foreign aid flows into production sector, as a foreign public investment will impact domestic private investment similar to foreign private investment. According to empirical studies foreign direct investment appears to crowd-out domestic investments in net terms (Alfaro 2003, Kumar and Pradhan 2002, etc.).

Now, recall that there is a considerable positive association between the quality of governance and per capita income across countries. Countries with poor governance also have low per capita income. As Sachs (2005) suggests, majority of households in those countries live below subsistence level and there is no domestic (both personal and public) savings to finance private investment. Therefore, foreign aid intended to finance investment in productive sectors would not cause a crowding-out effect simply because there is no private investment to begin with. On the contrary, countries with moderate to high level of governance might have domestic savings to finance profitable private investment projects and the negative impact of reduced private investment might completely cancel out or even overrate the positive impact of increased public investment.

Let us now turn to testing the second hypothesis. Table 6.3 reports the results of the test for the impact of aid to economic infrastructure on investment and growth. First, as expected, there is no evidence that aid to economic infrastructure directly impacts economic growth by helping to improve the overall efficiency of a recipient's economy, i.e., improving

total factor productivity in a recipient country. The estimated coefficients for the interactions of aid to economic infrastructure with high and medium levels of governance are positive but statistically insignificant suggesting that the estimated parameters of interest are not different from zero. The estimated coefficient for the interaction of this category of aid with low governance is negative but also statistically insignificant. Therefore, one cannot make any decisive conclusion regarding the direct impact of aid to economic infrastructure on the per capita GDP growth. These findings are consistent with empirical evidence that in the least developed countries the economic growth is primarily input-driven and total factor productivity increases are negligible if not zero (Forstner et al 2001, Krugman 1994, Young 1995, Collins and Bosworth 1997). Thus, aid to economic infrastructure might impact the economic growth through capital accumulation if it does impact at all.

Second, the test of the impact of aid to economic infrastructure on the investment ratio shows that this impact is positive and statistically significant for recipient countries with high and medium quality of governance, but virtually insignificant (both practically and statistically) for countries with low quality of governance, on average. The estimated coefficients (DOD model) for the interaction of the lagged (one period) aid to economic infrastructure with medium and high levels of governance are 1.4 and 2.71, respectively. This indicates that a percentage point increase in the aid to economic infrastructure to GDP ratio in an average country with medium quality of governance leads to 1.4 percentage point increase in the investment ratio. This impact is even greater in countries with high quality of governance leading to 2.7 percent increase in the investment ratio, on average. Furthermore, recalling the result from the growth equation, a percentage point increase in the investment ratio is associated with 0.2 percentage point increase in average annual per capita GDP growth, one can say that one standard deviation increase in aid to economic infrastructure to GDP ratio leads to 0.67 % and 1.3 % increase in average annual per capita growth rates, on average, respectively.

How can one explain these results? The contribution of aid to economic infrastructure on investment and thus to economic growth is similar those of public

investment to infrastructure. Theoretically, the basic connection between infrastructure and investment, and growth is simple. The stock of public highways, bridges, communication systems, and other infrastructure is essential to the profitable and efficient private sector production and distribution of goods and services. The potential importance of public investment to economic infrastructure was discussed by Aschauer and Greenwood (1985). First, an increase in public investment on infrastructure would be expected directly to raise the level of domestic investment. Second, under certain circumstances, public capital (infrastructure) and private factors of production – labor and capital – may be complementary inputs in the production process so that an increase in the stock of economic infrastructure reduces the cost of capital and thereby increases the demand for private investment. Donors' decision to increase aid to economic infrastructure might well encourage domestic and foreign investors to invest more in the country. The predictions of the economic theory are supported by empirical evidence on the positive and significant impact of public investment on private capital spending (Aschauer 1989, Munnel 1990, and Holtz-Eakin 1992).

The empirical evidence also indicates that the quality of governance will not only impact the selection of new infrastructure projects, but will also affect the rate of return that a country gets from its existing infrastructure (Tanzi and Davoodi 1997). Tanzi and Davoodi (1997) provide the following reasons for this evidence: first, to the extent that corruption is persistent, the existing infrastructure has also been contaminated because past investments were also misdirected or distorted by corruption; second, higher spending on new infrastructure projects will reduce the resources available to maintain existing infrastructure.

The implications of theoretical underpinning and empirical evidence for the results are as follows. First, countries with better governance are probably using the aid to economic infrastructure more efficiently, and thereby the investment ratio in these countries is positively influenced by aid to economic infrastructure through its direct addition to domestic investment and indirect impact by reducing the cost of capital and thus increasing demand for private investment. In contrast, countries with low quality of governance are

probably not only using aid to economic infrastructure inefficiently but are also not getting enough output from the existing infrastructure. These finding are consistent with the theoretical aid allocation model and anecdotal evidence that are further discussed in the following section to illustrate the reliability of the findings.

Table 6.3. Core results for the lagged impact of aid to economic infrastructure on investment and growth

Quality of governance	OLS	DOD	Impact
Dependent variable growth*			
High	0.23 (0.39)	0.27 (0.68)	Positive but statistically insignificant
Medium	-0.1 (0.4)	-0.16 (0.67)	Positive but statistically insignificant
Low	-0.31 (0.39)	-0.38 (0.69)	Negative but statistically insignificant
Dependent variable investment ratio**			
High (one period lag)	2.42[a] (0.98)	2.71[a] (0.91)	Positive and statistically significant
Medium (one period lag)	1.23[a] (0.36)	1.4[a] (0.33)	Positive and statistically significant
Low (one period lag)	-0.05 (0.29)	0.12 (0.28)	Both practically and statistically insignificant

* The coefficients are for the interactions of aid to economic infrastructure with respective levels of governance and reflect the change in growth rate associated with one percentage point increase in the ratio of aid to economic infrastructure to GDP. However, all coefficients are statistically insignificant indicating that the estimated parameters of interest are not different from zero.

** The coefficients are for the interactions of aid to economic infrastructure with respective levels of governance and reflect the change in investment ratio associated with one percentage point increase in the ratio of aid to economic infrastructure to GDP; [a] Statistically significant, for example, the coefficient 1.4 means that one percentage point increase in the ratio of aid to economic infrastructure leads to 1.4 percentage point increase in investment ratio with one period lad.

Note: the equality of regression parameters in the investment equation across three groups was assessed by partial F-test ($F_{(3, 301)}$= 7.57, p-value=0.000). Null hypotheses are rejected at 95% significance, and it is conclude that there are significant differences in regression coefficients between low, medium and high governance countries.

Now let us turn to test the third hypothesis. Table 6.4 reports the results of the test on the impact of aid to social sector on creating additional human capital. As is evident in this table, overall aid to social sector has a lagged negative and statistically significant effect on years of schooling. However, its effect in countries with a medium quality of governance is insignificant and in countries with a low quality of governance is positive and statistically significant. However, this effect is very small. One standard deviation increase in aid to social sector to GDP ratio will lead to only 0.13 years increase in average years of schooling, on average. Both the lagged stock and flow of human capital affect the per capita growth. If the effect of the flow of human capital is positive and statistically significant, the effect of the lagged stock of human capital on growth is positive but statistically insignificant. Additionally, the flow of human capital also affects growth indirectly via investment.

The results on the impact of aid to social sector on years of schooling, except for countries with low quality of governance, contradict my expectations. Obviously, one would expect that aid to social sector would help to increase the average years of schooling. However, there seem some plausible explanations for these results. First, the dependent variable is average years of schooling, and I am trying to estimate the impact of aid to social sector on average years of schooling with one period lag, i.e., in five years. However, it is possible that the full effect of social spending on average years of schooling will realize in a longer period of time. Moreover, aid to social sector includes aid to education, health care, water and sanitation. Perhaps, the spending on health, water and sanitation will have an impact on average years of schooling indirectly via health capital. In fact, the human capital model includes lagged health capital as an explanatory variable and its effect on average years of schooling is positive and significant (table 6.8).

Second, the quality of data for developing countries in general, and on average years of schooling in particular, are very poor quality and contains a lot of measurement error. For example, Tooley and Dixon (2006) in a recent edition of the Index of Economic Freedom, sponsored by the Heritage Foundation and The Wall Street Journal, report that government data on education in the Lagos State of Nigeria underestimates the number of children in

school by 24 percent. They suggest that the reason for this underestimating is, "because so many children are in unrecognized private schools that do not appear in government statistics…"[43] They made similar observations in Ghana, Kenya and India. For example, in "Hyderabad's Old City, capital of the state of Andhra Pradesh, India,"[44] they found that about 37 percent of all schools were unrecognized private schools.

Table 6.4. Core results for the impact of aid to social
sector on human capital (average years of schooling)

	OLS	DOD	Impact
Aid to social sector (SC), lag	-0.28[*] (0.12)	-0.33[*] (0.12)	Negative and statistically significant
Interaction of aid to SC with medium governance (lag)	0.14 (0.13)	0.16 (0.13)	Negative but statistically insignificant
Interaction of aid to SC with low governance (lag)	0.35[*] (0.15)	0.37[*] (0.13)	Positive and statistically significant

[*]Statistically significant.

Third, it is possible that in fact additional spending on education is not increasing the average years of schooling in developing countries. Tooley and Dixon (2006) observe that additional enrollment in public schools of Kenya was "a result of children transferring from private to public schools." [45] Then, it is not an increase in overall enrollment by any means, though it will appear as such in government statistics. Probably, the expansion of public schools is partially financed by foreign aid. However, this kind of increase in overall enrollment will not lead to an increased average years of schooling at all. The problems of public education for the poor in developing countries are well documented by many other studies (for example, Watkins 2000, Dreeze and Sen 2002). For example, the Oxfam Education Report suggests "there is little or no value in attending school. Under these circumstances, it is not difficult to see why many poor households regard spending on

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[43] Tooley, James and Pauline Dixon, "The Failures of State Schooling in Developing Countries and the People's Response", in 2006 Index of Economic Freedom, p. 32.
[44] Ibid, p. 31
[45] Ibid.

(public) education as a bad use of scarce resources."[46] Dreeze and Sen (2002) observed similar evidence of gross failure of public education for the poor in India.

   The results from the baseline (DOD) model with respect to other control variables are as follows:

- Accumulated health capital (life expectancy at birth) positively impacts both investment and growth with one period lag. However, its impact on growth is statistically insignificant. Thus, health capital helps boost growth via its effects on investment and schooling. Although I did not estimate the health capital equation, there is possibility that aid to social sector has positive impact on health capital.

- The institutional quality of governance has both direct and indirect (via investment) effects on per capita growth. The coefficients for institutional quality are positive and statistically significant in both growth and investment equations. The direct effect of democracy on dependent variables is statistically insignificant, except for low quality of governance. Countries with poor democratic quality of governance, all other things being equal, tend to have growth of about 1.1 percent lower per annum than other countries with better governance, the effect capturing the impact of a discrete change in governance.

- As to other control variables, initial income levels matter for per capita growth, and its impact is negative as expected, i.e., average growth rates diminish as per capita income rises, all other things being equal. Inflation has direct negative impact on growth, but its impact on investment is negative only in high inflation environments. Trade openness has no direct significant impact on growth but its impact via investment is positive. The financial depth has positive indirect impact on growth via investment. Foreign direct investment positively influences the investment ratio, but the coefficient is less than one. One percentage point increase in FDI to GDP ratio associates only with a half percentage point increase in investment ratio, on average.

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[46] K. Watkins, "The Oxfam education report", 2000, p. 230.

- The human capital equation suggests that the years of schooling are positively associated with gender parity in education and negatively correlated with the age structure of population. The share of urban population has no significant association with years of schooling. Countries with poor democratic quality of governance, other things being equal, have average years of schooling of about 0.8 years lower than other countries. This effect captures the impact of a discrete change in governance from lower-than-medium to higher-than-medium.

The estimated coefficients are consistent under different estimators and changes in model specifications. In the next section, I will discuss the robustness of the results.

Table 6.5. Growth Equation
Dependent variable: Growth of Real Per Capita GDP

	OLS	Robust	DOD	REGLS	FGLS
Initial GDP per capita(logs)	-0.95***	-0.95***	-0.95***	-1.19***	-0.95***
	(0.24)	(0.27)	(0.34)	(0.29)	(0.24)
Investment	0.21***	0.21***	0.20***	0.21***	0.20***
	(0.02)	(0.03)	(0.03)	(0.03)	(0.02)
Education capital (lagged)	0.1	0.1	0.11	0.12	0.11
	(0.13)	(0.12)	(0.15)	(0.15)	(0.12)
Change in education capital	1.17***	1.17***	1.04**	0.97***	1.04**
	(0.37)	(0.37)	(0.47)	(0.37)	(0.36)
Health capital (lagged)	0.04	0.04	0.03	0.07*	0.03
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Population (log)	-0.82***	-0.82***	-0.98***	-0.91***	-0.98***
	(0.26)	(0.26)	(0.26)	(0.28)	(0.25)
Trade openness	-0.01	-0.01	-0.01	-0.004	-0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Inflation	-1.4***	-1.4***	-1.52***	-1.45***	-1.52***
	(0.27)	(0.24)	(0.27)	(0.28)	(0.26)
Financial depth (monetization ratio)	-0.001	-0.001	0.000	-0.01	0.000
	(0.008)	(0.007)	(0.01)	(0.01)	(0.01)
Institutional quality	0.09***	0.09***	0.13***	0.11**	0.13***
	(0.04)	(0.04)	(0.04)	(0.05)	(0.04)
Low democratic quality	-1.22**	-1.22**	-1.11*	-1.26*	-1.11*
	(0.55)	(0.54)	(0.70)	(0.65)	(0.54)
Medium democratic quality	-0.72	-0.72	-0.65	-0.86	-0.65
	(0.45)	(0.42)	(0.51)	(0.53)	(0.43)
Aid to economic infrastructure (lag)	0.23	0.23	0.27	0.17	0.27
	(0.39)	(0.46)	(0.68)	(0.43)	(0.38)
Low democracy * Aid to economic Infrastructure (lag)	-0.31	-0.31	-0.38	-0.23	-0.38
	(0.39)	(0.47)	(0.69)	(0.43)	(0.38)
Medium democracy * Aid to economic Infrastructure (lag)	-0.1	-0.1	-0.16	-0.01	-0.16
	(0.40)	(0.46)	(0.67)	(0.43)	(0.38)
Constant	0.84	0.84	1.18		1.02
	(1.75)	(1.67)	(2.03)		(1.68)
R-squared	0.47	0.47	0.49	0.64	
No. of countries	67	67	67	67	67
No. of time periods	5	5	5	5	5
No. of observations	304	304	304	304	304

Standard errors in parentheses

*** significant at 1 percent; **significant at 5 percent; *significant at 10 percent

OLS - Ordinary Least Squares; DOD - difference of differences; REGLS - random effects GLS;

FGLS - feasible GLS

Table 6.6. Investment Equation
Dependent variable: Average Annual Investment Ratio

	OLS	Robust	DOD	REGLS	FGLS
Initial GDP per capita (logs)	0.85	0.85	0.35	0.31	0.35
	(0.53)	(0.58)	(0.83)	(0.68)	(0.51)
Education capital (lagged)	-0.74***	-0.74***	-0.53	-0.47	-0.53**
	(0.26)	(0.25)	(0.34)	(0.33)	(0.24)
Change in education capital	1.85**	1.85**	0.81	0.48	0.81
	(0.79)	(0.77)	(0.69)	(0.69)	(0.76)
Health capital (lagged)	0.26***	0.26***	0.27***	0.24***	0.27***
	(0.06)	(0.06)	(0.09)	(0.08)	(0.06)
Inflation	0.0004	0.0004	0.0006	0.0009*	0.0006
	(0.0006)	(0.0005)	(0.0006)	(0.0005)	(0.0006)
High Inflation dummy	-1.50*	-1.50**	-1.65*	-1.23*	-1.65**
	(0.79)	(0.75)	(0.98)	(0.75)	(0.74)
Trade openness	0.03**	0.03**	0.02	0.03**	0.02**
	(0.01)	(0.01)	(.02)	(0.01)	(.01)
Financial depth	0.08***	0.08***	0.08***	0.06***	0.08***
	(0.02)	(0.02)	(0.03)	(0.02)	(0.02)
FDI (ratio to GDP)	0.42***	0.42***	0.53***	0.63***	0.53***
	(0.16)	(0.16)	(0.19)	(0.15)	(0.16)
Democratic quality	-0.24*	-0.24*	-0.22	-0.03	-0.22*
	(0.13)	(0.12)	(0.15)	(0.12)	(0.12)
Institutional quality	0.05	0.05	0.2**	0.14*	0.2**
	(0.08)	(0.07)	(0.01)	(0.08)	(0.08)
High democracy*Aid to prod. Sector	-1.09	-1.09	-1.72*	-1.59	-1.72
	(1.32)	(0.86)	(0.99)	(1.29)	(1.23)
Medium democracy*Aid to prod. Sector	-0.1	-0.1	-0.28	-0.45	-0.28
	(0.38)	(0.33)	(0.45)	(0.37)	(0.36)
Low democracy*Aid to prod. Sector	0.78***	0.78*	0.71*	0.87***	0.71***
	(0.27)	(0.45)	(0.37)	(0.25)	(0.26)
High democracy*Aid to economic infrastructure (lag)	2.42**	2.42**	2.71**	1.45	2.71***
	(0.98)	(1.02)	(1.17)	(0.92)	(0.91)
Medium democracy * Aid to economic Infrastructure (lag)	1.23***	1.23***	1.4***	1.58***	1.4***
	(0.36)	(0.42)	(0.49)	(0.33)	(0.33)
Low democracy * Aid to economic Infrastructure (lag)	-0.05	-0.05	0.12	0.03	0.12
	(0.29)	(0.34)	(0.39)	(0.26)	(0.28)
Constant	-6.94	-6.94	-7.04	-5.62	-9.48
	(4.1)	(4.03)	(5.67)	(4.74)	(3.83)
R-squared	0.44	0.44	0.49	0.52	
No. of countries	69	69	69	69	69
No. of time periods	5	5	5	5	5
No. of observations	305	305	305	305	305

Standard errors in parentheses

*** significant at 1 percent; **significant at 5 percent; *significant at 10 percent

OLS - Ordinary Least Squares; DOD - difference of differences; REGLS - random effects GLS;

FGLS - feasible GLS

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Table 6.7. Human Capital Equation (excluding institutional quality variable)
Dependent variable: Average Years of Schooling

	OLS	Robust	DOD	REGLS	FGLS
Current GDP per capita (logs)	0.02	0.02	0.1	0.40***	0.1
	(0.13)	(0.14)	(0.25)	(0.12)	(0.13)
Health capital (lagged life expectancy)	0.05***	0.05***	0.04*	0.01	0.04***
	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)
Urban population (share)	0.01**	0.01**	0.01	0.02***	0.01*
	(0.005)	(0.005)	(0.01)	(0.01)	(0.01)
Population under 15 (share)	-0.08***	-0.08***	-0.07***	-0.06***	-0.07***
	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)
Gender parity in education	0.04***	0.04***	0.04***	0.02***	0.04***
	(0.01)	(0.01)	(.01)	(0.01)	(.01)
Log of education expendures (lag)	0.36**	0.36**	0.34	0.19*	0.34**
	(0.16)	(0.16)	(0.25)	(0.10)	(0.15)
Low democracy	-0.73***	-0.73***	-0.79*	-0.86**	-0.79***
	(0.24)	(0.24)	(0.43)	(0.35)	(0.23)
Medium democracy	-0.33*	-0.33	-0.37	-0.52	-0.37*
	(0.2)	(0.23)	(0.42)	(0.32)	(0.19)
Aid to social sector (lag)	-0.28**	-0.28***	-0.33***	-0.18**	-0.33***
	(0.12)	(0.09)	(0.12)	(0.07)	(0.12)
Low democracy * Aid to social sector (lag)	0.35***	0.35***	0.37**	0.16**	0.37***
	(0.13)	(0.10)	(0.15)	(0.08)	(0.13)
	0.14	0.14	0.16	0.14*	0.16
Medium democracy * Aid to social sector (lag)					
	(0.13)	(0.09)	(0.14)	(0.08)	(0.13)
Constant	0.86	0.86	0.36	0.91	0.61
	(1.1)	(1.15)	(1.89)	(1.25)	(1.1)
R-squared	0.79	0.79	0.8	0.79	
No. of countries	80	80	80	80	80
No. of time periods	5	5	5	5	5
No. of observations	291	291	291	291	291

Standard errors in parentheses

*** significant at 1 percent; **significant at 5 percent; *significant at 10 percent

OLS - Ordinary Least Squares; DOD - difference of differences; REGLS - random effects GLS;

FGLS - feasible GLS

Table 6.8. Human Capital Equation (including institutional quality variable)
Dependent variable: Average Years of Schooling

	OLS	Robust	DOD	REGLS	FGLS
Current GDP per capita (logs)	-0.06	-0.06	0.01	0.42***	0.01
	(0.14)	(0.16)	(0.26)	(0.13)	(0.14)
Health capital (lagged life expectancy)	0.04**	0.04**	0.03	-0.003	0.03**
	(0.02)	(0.02)	(0.03)	(0.01)	(0.01)
Urban population (share)	0.01*	0.01**	0.01	0.01*	0.01*
	(0.006)	(0.006)	(0.01)	(0.01)	(0.01)
Population under 15 (share)	-0.09***	-0.09***	-0.08***	-0.07***	-0.08***
	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)
Gender parity in education	0.05***	0.05***	0.05***	0.02***	0.05***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Log of education expendures (lag)	0.27	0.27	0.27	0.21*	0.27
	(0.17)	(0.17)	(0.27)	(0.11)	(0.16)
Institutional quality	0.02	0.02	0.01	0.03***	0.01
	(0.02)	(0.02)	(0.03)	(0.01)	(0.02)
Low democracy	-0.77***	-0.77***	-0.82*	-0.90**	-0.82***
	(0.24)	(0.24)	(0.44)	(0.39)	(0.24)
Medium democracy	-0.44**	-0.44*	-0.48*	-0.60*	-0.48**
	(0.20)	(0.24)	(0.44)	(0.34)	(0.20)
Aid to social sector (lag)	-0.33**	-0.33***	-0.37**	-0.12	-0.37***
	(0.15)	(0.11)	(0.16)	(0.08)	(0.14)
Low democracy * Aid to social sector (lag)	0.37**	0.37***	0.39**	0.10	0.39***
	(0.15)	(0.12)	(0.18)	(0.10)	(0.15)
	0.2	0.2*	0.21	0.07	0.21
Medium democracy * Aid to social sector (lag)					
	(0.16)	(0.126)	(0.18)	(0.09)	(0.15)
Constant	1.71	1.71	1.38	1.85	1.59
	(1.21)	(1.18)	(1.96)	(1.38)	(1.17)
R-squared	0.79	0.79	0.8	0.78	
No. of countries	70	70	70	70	70
No. of time periods	5	5	5	5	5
No. of observations	259	259	259	259	259

Standard errors in parentheses

*** significant at 1 percent; **significant at 5 percent; *significant at 10 percent

6.1.2 Checking the Robustness of Results

In this section, the results from the preceding section are subjected to several robustness checks. The estimated models generate parameter estimates that are generally robust with respect to a several changes. The results do not change dramatically if we:

- Control for the impact of outliers using robust regression estimator.

- Check for the presence of autocorrelation within panels and cross-sectional correlation and/or heteroskedasticity across panels using feasible generalized least squares estimator.

- Change model specifications by adding and dropping additional control variables.

In most cases, the results from these models are consistent with the baseline specification, and all equations have a good fit. Tables 6.5-6.8 also report the results from the GLS random effects estimator. However, the results from this model are sometimes noticeably different from other estimates in the study. This is expected because the Hausman specification test, the classical test of model specification, does not indicate the appropriateness of the random effects estimator. If there is correlation between the unobserved country-specific random effects and the regressors, then the random effects model may not be more powerful and parsimonious. In the presence of such a correlation, the random effects model would be inconsistently estimated, and thus the results from DOD and FGLS models would be the consistent estimates of the parameters of interest.

The results for key independent variables are robust across all estimated models with minor fluctuations[47]. For example, the estimated coefficient for the interaction of aid to production sector with low governance varies between 0.71 (DOD model) and 0.87 (random effects GLS model), and statistically significant across all models (table 6.5).

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[47] I did not find any alternative governance measures that provide sufficient time series data to check the robustness of our results. However, using an alternative governance measure would not most likely generate inconsistent results, given the strong cross-sectional correlations we found among various governance measures (0.6-0.9).

Similarly, the estimated coefficient for the interaction of aid to economic infrastructure with medium governance fluctuates in the interval between 1.23 (OLS model) and 1.58 (random effects GLS model), and it is statistically significant across all estimated models (table 6.5). However, the estimated coefficient for the interaction of aid to economic infrastructure with high governance, from the random effects GLS model, is significantly smaller than the results of other models, though its sign does not change (table 6.5). Nevertheless, I do not worry about this result. As noted before, in the presence of correlation between the unobserved country-specific random effects and the regressors, the random effects GLS model might produce inconsistent results. The estimated coefficients for key independent variables in human capital equation (table 6.6 and table 6.7) are also robust across all models, except random effects GLS model including institutional quality variable. The estimates for other key independent variables are also consistent across all estimated models.

Further, the estimates on direct impact of governance on growth and other dependent variables are also broadly robust across all estimated models and consistent with the literature. The different specifications of the growth model suggest that a discrete jump from a low-governance to a high governance country is associated with an increase in the per capita GDP growth rate of about 1.1 to 1.3 percentage points. This effect is similar to the results obtained by Baldacci et al (2004) and Mauro (1996). For example, Baldacci (2004) finds that a discrete jump from a low-governance country to a high-governance country is associated with a 1.6 percentage point increase in the growth rate.

Furthermore, the estimates for control variables, such as inflation, openness, population, financial depth, gender parity in education, foreign direct investment are also generally robust across all estimated models and consistent with literature. For example, Baldacci (2004) finds that, on average, high inflation countries are likely to have about 1.8 percentage point lower annual growth rate than other countries. The estimated parameters suggest that high inflation countries are likely to have about 1.7 percentage point lower growth rate per annum than other countries.

6.2. Aid Allocation

The objective here is to explore donors aid allocation policies. The key independent variable in the analyses is the quality of governance. Particularly, the focus is on democratic quality of governance. In the analysis, we want to see how recipients' quality of governance influences donors' aid allocation decisions. I start with aggregate aid flows and then turn to aid allocation decisions of individual donors.

6.2.1 Aggregate aid flows

The regression results on aggregate aid flows are reported in tables 6.9-6.13. I start with a simpler standard model, such as probit (eligibility stage) and OLS (level stage); then I provide the results from more sophisticated estimations. The results are robust and do not change dramatically when we:

- Control for donor, recipient and period fixed effects.

- Use more sophisticated estimators such as random effects probit (eligibility stage) and FGLS (level stage), random effects tobit (sector stage).

- Add and drop additional control variables.

Aid Eligibility Stage

At aggregate level, the democratic quality of governance positively influences the likelihood of being eligible for foreign aid and the estimated coefficient is statistically significant. By using probit results, one may suggest that low-governance countries have about 0.2-point (associated with estimated coefficient of –1.05, table 6.8, probit model 2) lower probability of receiving foreign aid than high-governance countries, all other things being equal. Similarly, medium-governance countries have about 0.16-point (associated with

estimated coefficient of -0.79) lower probability of receiving foreign aid, all other things being equal. These effects would change slightly when one uses the results from random effects probit estimators with recipients as an independent unit, and donor and period fixed effects (table 6.8, RE Probit models 1-4). Nevertheless, I suggest, based on these findings, that the democratic quality of governance positively influences the eligibility of developing countries to receive a foreign aid. With respect to the institutional quality of governance, the probit model shows that it also positively affects the dependent variable, but its marginal impact on the probability of aid eligibility is very small. Moreover, the random effects probit model indicates that the marginal effect of the institutional quality of governance on aid eligibility is virtually none. Therefore, we cannot reject the null hypothesis that institutional quality of governance has no effect on aid eligibility.

As different variations of random effects probit models suggest, on average, population size plays a positive role in the aid eligibility decisions at aggregate level. As expected, per capita income has significant and negative effect on aid eligibility, which suggests that donors are more likely to select poorer countries, but life expectancy plays an insignificant role in donors' decision making once per capita income is controlled for. As concerns donors' interests, on average, donors seem select their trade partners with greater probability. The estimates also suggest that so-called "bandwagon effects" have positive influence on aid eligibility. These results are consistent with our theoretical model of aid allocation. The coefficients for a failed state dummy, political similarity, and US military grants are inconsistent across estimated models, but insignificant most of the time indicating that they are not important in determining the eligibility for foreign aid.

Aid Levels Stage

Let us turn to the aid levels stage and examine whether the quality of governance influences donors' decisions at this stage. All estimated models have a good fit and explain about 60 to 70 percent of the variations in per capita aid disbursements. The estimated

results suggest (table 6.9) that the democratic quality of governance has significant positive effect on the amount of per capita aid flows. At the margin, low-governance countries receive about 0.73-0.95 percent or 0.48-0.62 dollars less per capita aid than high governance countries. Similar results, but with smaller magnitude, can be observed with respect medium-governance countries. The result for institutional quality of governance is insignificant.

The results also suggest that, similarly to eligibility stage, recipient needs play a positive and significant role in donors aid allocation decision. The estimated coefficients for recipient needs variables (income per capita and life expectancy) are significant across all estimated models. For example, a one percent decline in GDP per capita associates with 0.77 to 1.1 percent increase in per capita aid disbursements, depending on the specification of the estimated model. Similarly, a one year change in life expectancy associates with about 1 to 3 percent change in per capita aid flows received. As concerns donors' interests (trade link and political similarities), only trade links have significant positive association with per capita aid disbursements. On average, one percent increase in exports from a donor country to recipient country is associated with about 0.5 percent to 0.8 percent increase in per capita aid disbursements.

Besides explaining the allocation of aid flows with respect to quality of governance, recipient needs and donor interests, the estimates show that there is a systematic bias with respect to population size, which is consistent with past studies. More populous countries receive less aid in per capita terms. Further, theoretical models of aid allocation predict so-called "bandwagon effect" have significant positive association with per capita aid disbursements. The elasticity of per capita aid disbursements with respect to per capita aid received from other donors varies from 0.4 to 0.8 based on various specification of the model. Among all estimated models, only one model (Probit 3) suggests that failed states receive more per capita aid at the margin. Surprisingly political similarities between donors and recipients have a significant negative impact on per capita aid disbursements.

Sectoral Allocation Stage

Tables 6.10-6.12 provide information on the results of sectoral allocation models. The analysis of these results with respect to governance suggest that democratic quality of governance has statistically significant positive impact per capita aid to production and social sectors, but its impacts on aid per capita aid to economic infrastructure is insignificant. Other things being equal, low-governance countries receive about 0.5 percent less per capita aid to social sector (table 6.11) and about a quarter percent less per capita aid to production sectors (table 6.12) than high governance countries. However, I find no significant difference between the three groups of countries with respect to per capita aid to economic infrastructure (table 6.13). I also find no significant differences between medium- and high-governance countries with respect to any categories of aid. The institutional quality of governance has no significant impact on sectoral allocation of aid.

The effects of variables, which control for donor interests and recipient needs, on per capita sectoral aid flows are similar to those found at aggregate level stage. The failed state dummy has a significant negative effect on aid to production sector. On average, failed states receive about 0.12 percent less per capita aid to production sectors than other countries.

The analysis at aggregate level suggests that donors' aid allocation decisions are somewhat affected by both donors' own interests and recipient needs. Also interesting are the results due to the quality of governance. These results suggest that recipients with better governance have a higher marginal probability of being eligible to receive foreign aid. They also receive more per capita aid at aggregate level as well as to production and social sectors, at the margin. Further, I would like to investigate whether there is more evidence for an impact of governance upon aid allocation once the aggregate aid flows are disaggregated into individual bilateral donors. These relationships are investigated in the following section.

Table 6.9. Aid Equation: Eligibility Stage (all bilateral donors)
Dependent variable: Eligibility Dummy

	Probit			RE Probit			
	1	2	3	1	2	3	4
GDP per capita (log)	-0.60***	-0.62***	-0.55***	-0.44***	-0.46***	-0.42***	-0.43***
	(0.04)	(0.04)	(0.03)	(0.08)	(0.08)	(0.08)	(0.06)
Population (log)	-0.10***	-0.05	-0.002	0.26***	0.30***	0.30***	0.25***
	(0.03)	(0.03)	(0.02)	(0.07)	(0.06)	(0.06)	(0.05)
Life expectancy (log)	-0.27	-0.1	-0.13	-0.33	-0.28	-0.43	-0.46
	(0.21)	(0.2)	(0.16)	(0.43)	(0.42)	(0.30)	(0.36)
Exports (logs)	0.34***	0.34***	0.33***	0.23***	0.23***	0.25***	0.22***
	(0.02)	(0.02)	(0.01)	(0.03)	(0.03)	(0.02)	(0.02)
Bandwagon Effect (log)	0.06*	0.15***	0.11***	0.37***	0.45***	0.32***	0.30***
	(0.03)	(0.03)	(0.02)	(0.07)	(0.06)	(0.04)	(0.03)
US military grants (log)	-0.04***	-0.04***	-0.04***	0.001	-0.001	-0.01	
	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	
Political similarity	-0.18*	-0.13*	-	0.04	-0.06		
	(0.10)	(0.10)		(0.31)	(0.30)		
Failed State dummy	0.06	0.11*	0.13***	-0.06	0.003	0.02	0.07
	(0.07)	(0.07)	(0.05)	(0.11)	(0.11)	(0.08)	(0.07)
Institutional quality	0.02***	0.03***	0.02***	-0.02*	-0.02	-0.01	-0.01
	(0.005)	(0.005)	(0.004)	(0.01)	(0.01)	(0.01)	(0.01)
Democratic quality	0.13***			0.1***			
	(0.01)			(0.02)			
Low (autocracy)		-1.05***	-0.90***		-1.11***	-1.07***	-1.02***
		(0.09)	(0.06)		(0.2)	(0.13)	(0.14)
Medium		-0.79***	-0.52***		-0.91***	-0.62***	-0.62***
		(0.1)	(0.06)		(0.2)	(0.12)	(0.16)
Constant	6.95	5.17	4.53	7.97	6.52	6.52	2.71
No. of donor countries							
No. of recipients	98	99		98	99	101	105
No. of time periods	5	5		5	5	5	5
No. of observations	4526	4562	7806	4526	4562	7806	9558

Standard errors in parentheses

*** significant at 1 percent; **significant at 5 percent; *significant at 10 percent

Table 6.10. Aid Equation: Level Stage (all bilateral donors)
Dependent variable: Log of per capita aid disbursements

	OLS	DDD1	DDD2	DDD3	DDD4	FGLS1	FGLS2
GDP per capita (log)	-0.96***	-1.06***	-1.09***	-1.07***	-1.10***	-0.79***	-0.77***
	(0.05)	(0.07)	(0.07)	(0.06)	(0.05)	(0.05)	(0.03)
Population (log)	-0.77***	-0.85***	-0.86***	-0.81***	-0.86***	-0.60***	-0.59***
	(0.04)	(0.06)	(0.06)	(0.04)	(0.04)	(0.04)	(0.03)
Life expectancy	-0.03***	-0.02***	-0.02***	-0.02***	-0.01***	-0.03***	-0.03***
	(0.01)	(0.01)	(0.01)	(0.005)	(0.005)	(0.004)	(0.003)
Exports (logs)	0.82***	0.71***	0.72***	0.68***	0.70***	0.61***	0.54***
	(0.02)	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)
Bandwagon Effect (log)	0.67***	0.39***	0.40***	0.36***	0.41***	0.76***	0.61***
	(0.05)	(0.06)	(0.06)	(0.04)	(0.04)	(0.04)	(0.02)
US military grants (log)	-0.05***	0.02	0.04**		0.02*	0.01	
	(0.02)	(0.02)	(0.02)		(0.01)	(0.01)	
Political similarity	-1.25***	-0.76***	-0.79***			-0.85***	
	(0.10)	(0.19)	(0.19)			(0.18)	
Failed State dummy	0.06		-0.14	-0.02		0.05	0.15***
	(0.08)		(0.08)	(0.06)		(0.07)	(0.05)
Institutional quality	0.02**	0.01	0.01	0.01**		0.01	0.02***
	(0.01)	(0.01)	(0.01)	(0.006)		(0.01)	(0.005)
Democratic quality	0.11***	0.08***					
	(0.01)	(0.01)					
Low (autocracy)			-0.81***	-0.95***	-0.73***	-0.88***	-0.90***
			(0.18)	(0.14)	(0.12)	(0.09)	(0.06)
Medium			-0.25	-0.23*	-0.14	-0.43***	-0.27***
			(0.17)	(0.13)	(0.11)	(0.09)	(0.06)
Constant	9.67	15.19				10.04	3.87
	(0.67)	(1.20)				(1.02)	(0.46)
R-squared	0.48	0.71	0.73	0.59	0.59		
No. of recipients	98	98	99	105	133	99	105
No. of time periods	5	5	5	5	5	5	5
No. of observations	3778	3778	3801	7664	8485	3801	7664

Standard errors in parentheses

*** significant at 1 percent; **significant at 5 percent; *significant at 10 percent

Table 6.11. Aid Equation: Sectoral Allocation Stage (all bilateral donors)

Dependent variable: Log of per capita aid disbursements to social sectors

	Tobit	RET1	RET2	RET3
GDP per capita (log)	-0.61***	-0.63***	-0.72***	-0.67***
	(0.06)	(0.07)	(0.08)	(0.08)
Population (log)	-0.55***	-0.54***	-0.64***	-0.58
	(0.04)	(0.04)	(0.05)	(0.05)
Life expectancy (log)	0.003	0.002	0.003	0.003
	(0.005)	(0.007)	(0.007)	(0.01)
Exports (logs)	0.41***	0.44***	0.51***	0.49***
	(0.02)	(0.02)	(0.03)	(0.03)
Bandwagon Effect (log)	0.01***	0.002	0.001	0.001
	(0.003)	(0.01)	(0.003)	(0.003)
Inflation	0.000**	0.000**	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
Financial depth			0.001	
			(0.002)	
Failed State dummy	-0.07	-0.11	-0.11	-0.13
	(0.08)	(0.08)	(0.08)	(0.08)
Institutional quality	0.04***	0.01	0.02	0.01
	(0.01)	(0.01)	(0.01)	(0.01)
Democratic quality				
Low (autocracy)	-0.53***	-0.49***	-0.53***	-0.47***
	(0.12)	(0.17)	(0.16)	(0.17)
Medium	-0.02	-0.09	-0.10	-0.08
	(0.11)	(0.15)	(0.15)	(0.16)
Constant	7.16	7.4	9.58	7.75
	(0.52)	(0.68)	(0.82)	(0.81)
No. of recipients	105	105	102	105
No. of time periods	5	5	5	5
No. of observations	5678	5678	5429	5678

*** significant at 1 percent; **significant at 5 percent; *significant at 10 percent

RET - Random Effects Tobit

Table 6.12. Aid Equation: Sectoral Allocation Stage (all bilateral donors)

Dependent variable: Log of per capita aid disbursements to production sectors

	Tobit	RET1	RET2	RET3
GDP per capita (log)	-0.39***	-0.41***	-0.52***	-0.46***
	(0.04)	(0.05)	(0.06)	(0.05)
Population (log)	-0.31***	-0.28***	-0.35***	-0.32***
	(0.02)	(0.03)	(0.03)	(0.03)
Life expectancy (log)	-0.02***	-0.003	-0.002	-0.004
	(0.004)	(0.005)	(0.005)	(0.006)
Exports (logs)	0.37***	0.33***	0.39***	0.38***
	(0.02)	(0.01)	(0.02)	(0.02)
Bandwagon Effect (log)	0.01***	0.01***	0.01***	0.01***
	(0.001)	(0.001)	(0.001)	(0.001)
Inflation	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Financial depth	-0.004***	-0.003***	-0.001	-0.003***
	(0.001)	(0.001)	(0.001)	(0.001)
Trade openness			-0.002*	
			(0.001)	
Failed State dummy	-0.11*	-0.10	-0.12**	-0.10*
	(0.06)	(0.06)	(0.06)	(0.06)
Institutional quality	0.01	-0.002	-0.001	-0.003
	(0.01)	(0.01)	(0.01)	(0.01)
Democratic quality				
Low (autocracy)	-0.33***	-0.19*	-0.24**	-0.21*
	(0.08)	(0.11)	(0.11)	(0.11)
Medium	0.02	0.01	0.02	-0.01
	(0.08)	(0.01)	(0.1)	(0.01)
Constant	5.01	4.43	5.47	4.75
	(0.35)	(0.46)	(0.57)	(0.59)
No. of recipients	104	104	102	104
No. of time periods	5	5	5	5
No. of observations	5529	5529	5429	5529

*** significant at 1 percent; **significant at 5 percent; *significant at 10 percent
RET - Random Effects Tobit

Table 6.13. Aid Equation: Sectoral Allocation Stage (all bilateral donors)

Dependent variable: Log of per capita aid disbursements to economic infrastructure

	Tobit	RET1	RET2	RET3
GDP per capita (log)	-0.56***	-0.64***	-0.71***	-0.66***
	(0.05)	(0.09)	(0.1)	(0.09)
Population (log)	-0.34***	-0.41***	-0.48***	-0.43***
	(0.03)	(0.05)	(0.09)	(0.05)
Life expectancy (log)	-0.01	0.002	0.002	-0.000
	(0.01)	(0.01)	(0.01)	(0.000)
Exports (logs)	0.47***	0.53***	0.60***	0.57***
	(0.02)	(0.02)	(0.03)	(0.03)
Bandwagon Effect (log)	0.01***	0.01***	0.01***	0.01***
	(0.002)	(0.002)	(0.003)	(0.003)
Inflation	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Financial depth	-0.004***	-0.004***	-0.001	-0.004***
	(0.001)	(0.001)	(0.001)	(0.001)
Trade openness			-0.003	
			(0.002)	
Failed State dummy	-0.08	-0.16*	-0.17	-0.14
	(0.08)	(0.1)	(0.12)	(0.1)
Institutional quality	0.01	-0.01	-0.01	-0.01
	(0.01)	(0.01)	(0.01)	(0.01)
Democratic quality				
Low (autocracy)	-0.51***	-0.40	-0.36	-0.44*
	(0.10)	(0.25)	(0.38)	(0.23)
Medium	-0.06	0.06	0.09	0.02
	(0.09)	(0.19)	(0.19)	(0.18)
Constant	5.2	5.91	6.51	6.18
	(0.43)	(0.94)	(2.04)	(1.12)
No. of recipients	104	104	102	104
No. of time periods	5	5	5	5
No. of observations	5529	5529	5429	5529

*** significant at 1 percent; **significant at 5 percent; *significant at 10 percent

RET - Random Effects Tobit

6.2.2. Donor by Donor Results

In this section the same approach is used to study the aid allocation patterns of individual donors. Table 6.14 reports donor-by-donor results of the eligibility model estimated by using random effects probit estimator, whereas table 6.15 reports the results of the level stage, based on difference-in-differences estimator. Unlike the aggregate model, I use the governance variable only in continuous form for this part of the study. The results suggest that there are some important differences in individual donors' aid allocation policies.

The governance variable has statistically significant (at 5% significance level) positive effect in the aid eligibility decisions of only four individual donors - Canada, Denmark, Sweden and United States - but is statistically insignificant for other bilateral donors. Additionally, six other donors also select countries with better governance with higher probability, but the estimated coefficients on governance variable for these countries are statistically insignificant. These donors are: Austria, Finland, Ireland, New Zealand, Norway, and United Kingdom. The results of the DOD model indicate that only three donors, including Belgium, Germany and New Zealand, reward countries with better governance with more per capita aid. Again, seven other donors seem to reward countries with better governance with more aid, but the estimated coefficients are statistically insignificant. Overall, the results suggest that only seven bilateral donors reward countries with better governance at eligibility stage or at level stage. Those seven donors provide about 46 percent of total bilateral foreign aid. Thus, more than one half of the total bilateral foreign aid is allocated disregarding the quality of governance. Note that since we are controlling for recipients' per capita income, these results cannot be explained by the fact that poorer countries tend to have lower quality of governance (correlation is 0.5, see table 1), assuming that donors are likely to give aid to poor countries.

In fact, all donors tend to provide aid to poorer countries with higher probability. However, the estimated coefficient is statistically insignificant for one third of bilateral

donors, including Finland, Belgium, Greece, Japan, Netherlands and Portugal. Also as DOD model suggests, all other things being equal, majority of donors give more aid to poorer countries. However, in cases of donors such as Australia, Canada, Denmark, Greece, Ireland, Italy, Japan and Spain, there is simply not a statistically significant relationship between aid flows and recipients' per capita income. Since I am controlling for two-dimensional fixed effects, the recipient-specific or period-specific effects cannot explain these results.

Further, the analysis at aggregate level suggested that donors tend to give more aid to those recipient countries that already have economic (trade) links with a donor. The eligibility model suggests that the parameter estimate was positive for all donors, but only nine of them were statistically significant. The level model estimated by using DOD estimator suggests that eleven donors allocate more aid to their trade partners, at the margin. Combining the results of these two models, one can say that thirteen individual donors give more aid to recipients' that have stronger economic links with a donor, ceteris paribus.

A "bandwagon effect" is a factor in which there is relatively clear consensus across all bilateral donors. There are only four small donors (Greece, New Zealand, Portugal and Spain) that have statistically insignificant parameter estimates corresponding to the aid the rest of the bilateral donors provide to a given recipient country. All other donors in the first step and/or second step have a positive parameter estimates corresponding to the "bandwagon effect." Thus, bilateral donors tend to give higher evaluation to the impact of their aid, the greater the aid that the rest of the donors give to a particular recipient country. Finally, I would like to see whether there is population bias in individual donor's aid allocation decisions. The results suggest that not all individual donors have population bias. Only about half of the individual donors have positive statistically significant population bias.

Table 6.14. Aid Allocation-Eligibility Stage: Individual Donors – RE Probit

Donor	Constant	income	pop	export	Bandwagon	Gov	Pseudo R-square
			Variables				
As expected and statistically significant							
Canada	10.17	-1.51	0.01	0.05	0.68	-0.75	0.84
		(0.49)	(0.16)	(0.12)	(0.21)	(0.33)	
Denmark	7.00	-1.05	-0.10	0.33	0.51	-0.32	0.43
		(0.27)	(0.13)	(0.13)	(0.12)	(0.16)	
Sweden	1.49	-0.62	0.13	0.21	0.18	-0.30	0.50
		(0.24)	(0.13)	(0.10)	(0.10)	(0.15)	
United States	10.37	-1.20	-0.14	0.17	0.43	-0.77	0.73
		(0.47)	(0.19)	(0.15)	(0.15)	(0.28)	
As expected but statistically insignificant							
Austria	2.06	-0.56	0.05	0.24	0.62	-0.02	0.63
		(0.28)	(0.14)	(0.09)	(0.15)	(0.19)	
Finland	-0.05	-0.35	0.26	0.05	0.22	-0.26	0.49
		(0.22)	(0.13)	(0.08)	(0.10)	(0.16)	
Ireland	-3.13	-0.57	0.36	-0.09	0.47	-0.14	0.51
		(0.25)	(0.14)	(0.09)	(0.14)	(0.18)	
New Zealand	6.2	-0.98	-0.02	0.31	0.18	-0.03	0.41
		(0.26)	(0.17)	(0.07)	(0.15)	(0.18)	
Norway	3.64	-0.71	0.07	-0.04	0.55	-0.23	0.54
		(0.19)	(0.09)	(0.06)	(0.11)	(0.14)	
United Kingdom	21.48	-2.16	-0.84	0.75	0.63	-0.12	0.72
		(0.66)	(0.26)	(0.25)	(0.17)	(0.25)	
Contradicting to expected but statistically insignificant							
Australia	5.49	-0.53	-0.11	0.27	0.11	0.01	0.42
		(0.16)	(0.09)	(0.05)	(0.08)	(0.13)	
Belguim	-6.95	-0.42	0.27	0.37	1.21	0.26	0.73
		(0.45)	(0.21)	(0.21)	(0.35)	(0.30)	
France	3.91	-0.58	-0.39	0.36	0.58	0.48	0.77
		(0.30)	(0.15)	(0.12)	(0.18)	(0.22)	
Greece	-10.77	-0.18	0.40	0.35	-0.11	0.05	0.78
		(0.20)	(0.13)	(0.08)	(0.12)	(0.17)	
Japan	1.42	-0.12	-0.30	0.60	0.63	0.50	0.94
		(0.70)	(0.32)	(0.18)	(0.27)	(0.55)	
Netherlands	9.61	-0.53	-0.65	-0.04	0.88	0.34	0.81
		(0.47)	(0.27)	(0.20)	(0.28)	(0.30)	
Portugal	-10.86	-0.89	-0.26	0.69	-0.04	0.07	0.49
		(0.64)	(0.30)	(0.40)	(0.34)	(0.43)	
Switzerland	2.51	-0.60	0.29	0.02	0.37	0.07	0.62
		(0.32)	(0.15)	(0.12)	(0.11)	(0.19)	

Note: Standard errors are given in parentheses; Models for Germany, Italy and Spain are weakly identified, therefore not reported.

Table 6.15. Aid Allocation – Level Stage: Individual Donors (DOD Model)

Donor	Constant	Income	Pop	Export	Bandw-n	Gov	R2	F-stat.	p-value
			Variables						
Negative and statistically significant									
Belguim		-0.74	-0.67	0.27	0.52	-0.26	0.26	9.96	0.0000
	5.93	(0.30)	(1.29)	(0.14)	(0.11)	(0.13)			
Germany		-0.33	-0.65	0.21	0.91	-0.17	0.54	47.27	0.0000
	3.85	(0.18)	(0.56)	(0.07)	(0.06)	(0.07)			
New Zealand		-0.51	1.50	-0.003	0.02	-0.72	0.38	9.37	0.0000
	-15.56	(0.47)	(1.50)	(0.09)	(0.20)	(0.21)			
Negative but statistically insignificant									
Austria		-1.31	1.47	0.30	0.36	-0.05	0.24	9.82	0.0000
	-9.53	(0.47)	(1.72)	(0.12)	(0.17)	(0.2)			
Canada		-0.43	-1.86	0.34	0.79	-0.03	0.3	17.4	0.0000
	13.97	(0.29)	(0.90)	(0.07)	(0.11)	(0.12)			
Ireland		0.46	2.66	-0.25	0.26	-0.24	0.45	45.48	0.0000
	-34.35	(0.40)	(1.43)	(0.10)	(0.15)	(0.18)			
Japan		-0.23	-0.57	0.61	0.83	-0.01	0.58	56.02	0.0000
	-0.56	(0.23)	(0.71)	(0.08)	(0.07)	(0.1)			
Norway		-1.10	-2.06	0.30	0.60	-0.11	0.22	8.24	0.0000
	20.78	(0.45)	(1.74)	(0.09)	(0.19)	(0.19)			
Spain		0.15	1.05	0.07	1.79	-2.69	0.35	1.72	0.1693
	-24.26	(3.97)	(14.98)	(0.88)	(1.01)	(1.28)			
United Kingdom		-0.88	-1.42	0.30	0.49	-0.06	0.17	7.46	0.0000
	14.74	(0.31)	(0.86)	(0.13)	(0.12)	(0.12)			
Positive but statistically insignificant									
Australia		0.24	-1.50	0.16	0.36	0.06	0.11	3	0.0021
	5.89	(0.39)	(1.16)	(0.07)	(0.13)	(0.15)			
Denmark		-0.80	-1.09	0.67	0.91	0.10	0.27	8.65	0.0000
	8.02	(0.55)	(1.69)	(0.18)	(0.21)	(0.21)			
Finland		-1.14	1.42	0.20	0.82	0.31	0.2	5.41	0.0000
	-11.36	(0.55)	(2.11)	(0.13)	(0.15)	(0.22)			
France		-0.49	-0.67	0.44	0.61	0.01	0.33	17.51	0.0000
	-7.34	(0.23)	(0.70)	(0.08)	(0.07)	(0.09)			
Greece		2.86	-14.75	-0.48	0.38	0.93	0.98	18.09	0.0533
	111.89	(2.94)	(8.68)	(1.23)	(0.64)	(0.86)			
Italy		-0.62	2.03	0.23	0.69	0.11	0.62	32.13	0.0000
	-17.57	(0.42)	(1.55)	(0.16)	(0.15)	(0.16)			
Netherlands		-0.55	1.42	0.28	0.79	0.01	0.39	24.67	0.0000
	-13.12	(0.27)	(0.77)	(0.09)	(0.09)	(0.11)			
Sweden		-1.35	0.98	0.21	0.78	0.27	0.18	4.9	0.0000
	-5.54	(0.59)	(2.02)	(0.15)	(0.15)	(0.22)			
Switzerland		-1.19	-2.88	0.11	0.22	0.01	0.15	5.59	0.0000
	31.2	(0.39)	(1.38)	(0.11)	(0.11)	(0.16)			
United States		-0.95	1.47	-0.03	1.29	0.03	0.47	33.25	0.0000
	-10.25	(0.28)	(0.86)	(0.09)	(0.10)	(0.12)			

Note: Standard errors are given in parentheses; Model for Portugal is not identified

6.3. Discussion of the results

In this section, I discuss the results presented in previous sections by relating them to the recent empirical literature and development practice. The analysis of aid allocation at aggregate level suggests that recipients with better governance have marginally higher probability of being eligible to receive foreign aid. They also receive relatively higher per capita aid at aggregate level. The donor-by-donor analysis shows that there are some differences between individual donors. The quality of governance is statistically significant, but only a marginally important determinant at the eligibility or level stage for some donors, whereas others disregard governance in their aid allocation decisions. Overall, recipients' governance influences donors' aid allocation decisions only marginally. These results are consistent with literature. Similar conclusions were made by Alesina and Dollar (2000), Neumayer (2003) and others.

As concerns donors' sectoral aid allocation decisions, donors seem to provide relatively more per capita aid to production and social sectors of medium- and high-governance countries as compared to low-governance countries. There is virtually no difference in per capita aid flows to economic infrastructure across levels of governance. These findings are important if one puts them into perspective of aid effectiveness. The results regarding aid effectiveness suggested that aid to production (significantly) and social (marginally) sectors are likely to be efficient in low-governance countries in promoting economic growth, whereas aid to economic infrastructure is likely to be efficient in medium- and high-governance countries. Therefore, given the results obtained in this dissertation it seems that donors can improve the effectiveness of foreign aid by merely improving their aid allocation decisions. The results suggest that reallocation of aid between sectors might significantly increase the growth rate of per capita income in recipient countries regardless of their governance.

In this context, I assess the impact of two following policy interventions: (1) an increase in aid to production sector in low-governance countries by one percentage point by reallocating the aid to economic infrastructure; (2) an increase in aid to economic infrastructure in medium- and high-governance countries by one percentage point by reallocating the aid to production sector. Assuming that the other factors, such as the quality of governance, macroeconomic policy environment, external factors are unchanged, an increase in aid to production sector in low-governance countries would increase the average growth rate of per capita income in these countries by 0.15 percent per annum. Further, an increase in aid to economic infrastructure in medium-governance countries by one percentage point would increase the average annual growth rate of per capita income in these countries by 0.29 percent, whereas the same policy intervention with respect to high-governance countries would increase the average per capita GDP growth rate in these countries by 0.57 percent.

Now I would like to see whether the findings of the study are consistent with the predictions of the theoretical model, the recent empirical literature and development practice. Let us start with the analysis of the consistency of the results with a theoretical aid allocation model. The results on the impact of aid to production sector and aid to economic infrastructure on investment and economic growth are consistent with the predictions of the theoretical aid allocation model. Recall that the theoretical model from chapter 4 suggested that any improvements in donors' information system will allow to better maximize their expected utility, i.e., impact on recipients' development outcomes, from allocation of foreign aid. Any improvements in donors' information structure would increase the allocative efficiency. The model also suggested that another way of reducing information asymmetry is to give less control over aid money to governments in poor governance countries, i.e., by allocating aid to sectors and/or projects that are not under direct control of government.

Generally, aid to production sector is directly delivered to non-governmental (business) sector and government has very limited control over that aid. Moreover, this

category of aid is not subject to fungibility or is less fungible than other aid categories for two reasons. First, as already noted, government has less control over this type of aid flows, and thereby less ability to circumvent donor-imposed restrictions and spend some amount of aid on other programs. Second, one would not expect that government would invest in the production sector, and thereby cannot replace its own expenditures with aid transfers. Therefore, aid to the production sector is more likely to be effective even in countries with poor governance. As to medium- and high-governance countries, as mentioned elsewhere, crowding out effect outplays the positive impact associated with aid because foreign aid works similar to public investment.

In contrast, aid to economic infrastructure is given directly to government or delivered through government and government has great or even full control over this category of aid flows. Therefore, these aid flows are subject to both types of aid fungibility. Recipient government can do both: circumvent donor-imposed restrictions and spend some amount of targeted aid on other programs. Or, it can replace its own expenditures with aid transfers. For example, recipient government can decide to reduce or even abandon its own expenditures on physical expenditure if it expects that donors will allocate more aid for that purpose. More speculatively, as Tanzi and Davodi (1997) stressed, "in cases of extreme corruption, operation and maintenance on physical infrastructures, such as roads, will deteriorate quickly to the point where they will need to be rebuilt, thus allowing some high level officials the opportunity to extract another commission from the enterprises that will undertake the project"[48]. Therefore, one would expect that countries with better governance use aid to economic infrastructure better than others, which is evidence in the findings of this study.

How do the results compare with existing studies? No direct comparison is possible since my approach is quite different from most of the past studies. Nevertheless, I can relate my findings to three groups of studies, including the influential study by Burnside and Dollar

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[48] Tanzi, Vito and Hamid Davoodi, "Corruption, Public Investment, and Growth", IMF Working Paper No. 97/139, p. 9.

(2000). First, past research consistently found that foreign aid stimulates investment. For example, Levy (1987 and 1988) finds that one percentage point increase in aid to GDP ratio is associated with 0.86–1.08 percentage point increase in investment to GDP ratio. More recently Hansen and Tarp (2001) in a cross-sectional study, including 56 of the least developed countries, estimated that the coefficient is 0.71. Another study by Easterly (1999) suggested that the relationship between foreign aid and investment is heterogeneous across countries. My findings are not only consistent with the results of above-mentioned, and other similar, studies; they further advance the cause about heterogeneity of the aid-investment relationship. The results indicate that there is a positive relationship between foreign aid and investment, but transmission channels seem different for different countries. Countries with poor governance seem to benefit from aid to production sector while countries with better governance will benefit more from aid to economic infrastructure. For low-governance countries, one percentage point increase in aid to production sectors to GDP ratio corresponds to 0.71-0.87 percentage point increase in the investment ratio. On the other side, for medium-governance countries, one percentage point increase in aid to economic infrastructure to GDP ratio associates with about 1.4 percentage point increase in the investment ratio. Whereas, for high-governance countries, one percentage point increase in aid to economic infrastructure to GDP ratio corresponds with about 2.7 percentage point increase in the investment ratio. The results also suggest that aid to social sector might stimulate domestic investment in recipient countries by improving human capital.

Second, Clemens et al (2004) claimed that when aid is properly defined, aid's effect on growth can be easily detected using cross-country data. They disaggregate foreign aid into three categories with respect to their potential impact on growth: "short-impact", "long-impact" and other aid. Then find that so-called "short- impact" aid has significant positive impact on economic growth. I further develop the idea on disaggregated impact of foreign aid on growth. However, my approach is simple: I disaggregate aggregate aid flows based on which specific sectors of recipient's economy are transfers intended to promote, using

OECD's official classification of aid flows. I believe that this approach is more appropriate for purposes of donors' aid allocation policies.

Third, my findings support Clemens et al (2004), Hansen and Tarp (2000) Dalgaard et al (2004) and other similar studies in questioning the results of the "conditional" literature, such as Burnside and Dollar (2000) - that aid works only in a "good policy environment", but not in all recipient countries. Moreover, the results extend that literature by finding different channels through which foreign aid might promote the economic growth and other development outcomes in developing countries. Motivated by the findings of Burnside and Dollar (2000) and other similar studies, the rhetoric of policy debate on foreign aid shifted significantly. The core question of debate on foreign aid may boil down to this: should donors stop giving aid to countries with poor governance? These are countries that have exhibited dismal development performance in the last several decades and have extremely low per capita incomes, and undoubtedly, people of these countries are in the greatest need of foreign aid, perhaps more than others. The results show that donors can make a difference even in countries with poor governance by improving the allocation of their aid budget.

How do the results relate to development practices of development institutions? The following anecdotal evidence from the practice of ADB provides support for my findings.

The following evidence is drawn from the development practice of Asian Development Bank (ADB)[49]. ADB provided assistance to the financial sector development in Lao People's Democratic Republic (PDR) with three financial sectors program loans[50] as they aimed to change policies and regulatory frameworks to upgrade state owned commercial banks' operations to best banking practice standards. However, the two completed program loans failed to achieve the intended changes and the third program third program assistance is underway. However, the donor is still facing the increased risk of information asymmetry

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[49] ADB, Operations Evaluations Department, Country Assistance Evaluation for Lao People's Democratic Republic, April 2006

[50] These loans are concessional and thus considered as ODA

and associated with that problematic behavior of the recipient government, and thus a negative outcome, because the government who caused the problem did not suffer any consequences, and probably benefited from previous concessional loans.

The same evaluation report provides the evidence of ADB's contribution to agricultural sector development in Lao PDR. ADB, together with other donors, such as Japan, provided assistance to the agricultural sector development with several concessional loans to support irrigation systems and agriculture commercialization. Some measurable impacts from 1995 to 2004 includes: "(i) sustained agricultural output growth rate of 4.3 percent, (ii) increased rice yields from 2.5 tons to 3.2 tons per hectare, and (iii) achieved food self-sufficiency in rice"[51]. In my classification of aid flows, aid to agricultural sector is classified as aid to the production sector and aid to financial sector development is classified as aid to economic infrastructure and Lao PDR is classified as a low-governance country. Obviously, it is difficult to generalize from these anecdotal evidences; nevertheless, these evidences are consistent with the findings.

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[51] Ibid, p. 38

Chapter 7. Conclusions and Policy Implications

Recently, rhetoric of foreign aid has been increasingly shifted towards the challenges of development. Accordingly, donor countries have began to mobilize additional resources for the needs of developing countries. Several donors have pledged to reach the United Nation's target level (0.7 percent of donor's gross national income) for ODA over the next decade or so, and others have begun to significantly increase their commitments for development assistance. Moreover, recently, some have argued in favor of a massive increase in foreign aid to Sub-Saharan Africa in order to escape from a poverty trap (UN 2005, Sachs 2005, Sachs et al. 2004)). Based on these new calls, pledges and greater commitments to development assistance from donor nations, there is a possibility of significant scaling up of foreign aid transfers far beyond the current and past levels.

From donor's perspective, the commitment to increase aid flows to developing countries is only the starting point. Donors have to achieve efficient allocation of aid flows among recipients and various sectors of recipients' economies in order to ensure that aid resources will help to promote development outcomes. This in turn raises issues regarding the role of the donors' aid allocation policies in ensuring development effectiveness. The contemporary wisdom suggests that countries with better governance are more likely to utilize aid flows more efficiently.

This dissertation contributes to the policy debate and literature on aid effectiveness as it explores how different categories of aid affect economic growth and whether the interaction of different levels of governance with different categories of aid is significant in promoting growth. The study makes some important assumptions regarding the measures of governance and uses democratic quality and institutional quality as proxy measures of governance. Although these two variables provide a reasonable measure of the quality of governance, they do not fully cover all dimensions of governance and might miss some components of governance. For example, while some components (e.g., "stability") of these

governance measures connote security, they do not imply the same thing. Governance without or with limited security is seriously halted, and more likely that critically impaired from stand point of aid effectiveness. Therefore, the findings of the study should be considered with some caution.

As a way of concluding the dissertation, this final chapter will summarize major findings and derive policy implications based upon these conclusions.

7.1. Major Findings

This dissertation has examined some important propositions relating governance to foreign aid allocation and effectiveness, and produced several empirical findings. This research contributes to the debate on foreign aid through unraveling the critical heterogeneous impacts of governance and different aid categories on development effectiveness and aid allocation. The most important and salient results of the dissertation can be summarized as follows:

- The fundamental finding of this dissertation supports the notion that governance does matter for economic growth and aid effectiveness. It is evident that, on average, countries with better governance have higher growth rates but the relationship between governance and aid effectiveness is not straightforward. This relationship seems heterogeneous across countries with different levels of governance and various categories of foreign aid. The results suggest that the interactions of governance and different categories of aid are important for aid effectiveness. Some categories of foreign aid can be effective even in countries with poor governance.

- Aid to production sector appears to cause an increase in domestic investment for low-governance countries whereas this effect for medium- and high-governance countries is insignificant. Hence, aid to production sector can foster economic growth in low-governance countries through capital accumulation.

- Aid to economic infrastructure appears to associate with a significant increase in domestic investment and economic growth rates in medium- and high-governance countries, but this impact is insignificant for low-governance countries.

- While the results do suggest that there are important direct and indirect (via investment) links between human capital and growth, the relationship between aid to social sector and human capital accumulation appears to be negative for high-governance countries, insignificant for medium-governance countries, and slightly positive for low-governance countries. Emphatically, these results do not mean that aid to social sector has no considerable effect on development outcomes. Data limitations and measurement errors could bias the results of the study one way or another. Therefore, any improvements in data quality would definitely help to make the results more clear. I leave that to future research.

- The analysis at the aggregate level suggests that donors appear to allocate seemingly more aid to countries with better governance, at the margin. However, the results also suggest that only seven bilateral donors reward countries with better governance one way or another. Those seven donors provide about a half of the total bilateral foreign aid flows. Additionally, a number of other donors also seem more likely to reward recipients with better governance, but the estimated coefficients on governance variable for these countries are statistically insignificant. Thus, it appears about a half of the total bilateral foreign aid is allocated disregarding the quality of governance.

- The findings at the sectoral level suggest that the marginal impact of governance is positive and significant on donors aid allocation decisions with respect to aid to production and social sectors. However, this impact is insignificant with respect to aid to economic infrastructure.

7.2. Policy Implications

From the preceding conclusions, it is possible to identify potentially important policy implications for improving donors' future aid allocation policies. First, one important policy lesson is that to have sustained economic growth, recipient countries should improve and maintain good governance. Therefore, donors should continue (if they are already doing so) or start (if they are not doing so yet) to reward good governance.

Second, however, foreign aid has to be allocated among recipient countries not simply based on the quality of governance, but donors in making decisions with respect to aid allocation should take into account the quality of governance in combination with sectoral needs of a given recipient. This study reveals large differentials in the effect of different types of aid, depending on the level of recipients' governance, on factor accumulation and growth. The potential gains from reallocating aid transfers are enormous. Production sectors should receive higher priority in donors' portfolio in low-governance countries, whereas economic infrastructure sector should receive higher priority in medium- and high governance countries.

Third, donors have to give less control to government over aid money in low-governance countries. Currently, foreign aid feeds into three channels: households, mainly for consumption such as food aid; governments to support current and capital public expenditures; and private (non-governmental) sector through microfinance programs to establish and develop businesses. The third channel should receive higher priority for low-governance countries. This is easier to do with aid to production sector, but not that easy with aid to social sector and economic infrastructure. Nevertheless, as the recent edition of the Index of Economic Freedom, sponsored by the Heritage Foundation and The Wall Street Journal (Miles et al, 2006) reveals, donors may consider granting aid directly to new private schools.

Fourth, improving the coordination of donors seems to be reasonable goal as this research reveals some important differences among various donors.

Fifth, given the fact that donors are not considering ending foreign aid, it is more desirable for research to move away from unproductive debate of whether aid is effective, and focus on finding ways to improve aid allocation in order to enhance its effectiveness.

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The Millennium Development Goals	
Eradicate extreme poverty and hunger	Halve, between 1990 and 2015, the proportion of people whose income is less than one dollar a day
	Halve, between 1990 and 2015, the proportion of people who suffer from hunger
Achieve universal primary education	Ensure that by 2015 children everywhere, boys and girls alike, will be able to complete a full course of primary schooling
Promote gender equality and empower women	Eliminate gender disparity in primary and secondary education, preferably by 2005, and to all levels of education no later than 2015
Reduce child mortality	Reduce by two thirds, between 1990 and 2015, the under-five mortality rate
Improve maternal health	Reduce by three quarters, between 1990 and 2015, the maternal mortality ratio
Combat HIV/AIDS, malaria and other diseases	Have halted by 2015 and begun to reverse the spread of HIV/AIDS
	Have halted by 2015 and begun to reverse the incidence of malaria and other major diseases
Ensure environmental sustainability	Integrate the principles of sustainable development into country policies and programs and reverse the loss of environmental resources
	Halve by 2015 the proportion of people without sustainable access to safe drinking water and basic sanitation
	By 2020 to have achieved a significant improvement in lives of at least 100 million slum dwellers

Table 1. Continued

1. Develop a global partnership for development	Develop further an open, rule-based, predictable, nondiscriminatory trading and financial system. Includes a commitment to good governance, development, and poverty reduction—both nationally and internationally
	Address the special needs of the least developed countries. This includes: tariff- and quota-free access for least developed countries' exports; an enhanced program of debt relief for HIPC and cancellation of official bilateral debt; and more generous ODA for countries committed to poverty reduction
	Address the special needs of landlocked countries and small island developing states (through the Program of Action for the Sustainable Development of Small Island Developing States and the outcome of the twenty-second special session of the General Assembly)
	Deal comprehensively with the debt problems of developing countries through national and international measures in order to make debt sustainable in the long term
	In cooperation with developing countries, develop and implement strategies for decent and productive work for youth
	In cooperation with pharmaceutical companies, provide access to affordable, essential drugs in developing countries

Source: http://www.un.org/millenniumgoals/

Derivation of the Growth Equation Augmented with Human Capital[52]

The derivation of the growth equation enhanced with human capital and governance is adapted from Bassanini and Scarpetta (2001) and Bassanini, Scarpetta, and Hemmings (2001). The standard neoclassical growth model augmented with human capital presents output at time t by the following constant return to scale production function with two inputs (capital and labor):

$$Y(t) = K(t)^{\alpha} H(t)^{\beta} (A(t) L(t))^{1-\alpha-\beta} \qquad (1)$$

where Y is output, L, K and H are labor (population), physical and human capital respectively, A is level of technological and economic efficiency, and α and β are the partial elasticities of output with respect to physical and human capital. We assume that the level of economic and technological efficiency is determined by the combination of the technological progress (Ω) and the quality of governance (G) (Bassanini, Scarpetta, and Hemmings (2001) assumes that second part is dependent on institutions and economic policy) . Time path of the right-hand side variables can be described as follows:

$$\dot{k}(t) = s_k(t) A(t)^{1-\alpha-\beta} k(t)^{\alpha} h(t)^{\beta} - (n(t) + d) k(t)$$
$$\dot{h}(t) = s_h(t) A(t)^{1-\alpha-\beta} k(t)^{\alpha} h(t)^{\beta} - (n(t) + d) h(t)$$
$$A(t) = G(t) \Omega(t) \qquad (2)$$
$$\dot{A}(t) = g(t) A(t)$$
$$\dot{L}(t) = n(t) L(t)$$

where dotted variables represent derivatives with respect to time, k and h are capital-labor ratio and average human capital, respectively. s_k and s_h are the investment rate in physical and human capital, n and d stands for labor (population) growth and the depreciation rate. Assuming that there are decreasing returns to reproducible factors (physical and human capital), i.e., $\alpha+\beta<1$, this system of equations can be solved to obtain steady-state values of k^* and h^* defined by:

$$\ln k^*(t) = \ln A(t) + \frac{1-\beta}{1-\alpha-\beta} \ln s_k(t) + \frac{\beta}{1-\alpha-\beta} \ln s_h(t) - \frac{1}{1-\alpha-\beta} \ln(g(t) + n(t) + d)$$

$$\ln h^*(t) = \ln A(t) + \frac{\alpha}{1-\alpha-\beta} \ln s_k(t) + \frac{1-\alpha}{1-\alpha-\beta} \ln s_h(t) - \frac{1}{1-\alpha-\beta} \ln(g(t) + n(t) + d) \qquad (3)$$

Substituting (3) into (1) and taking logs we can obtain the following expression for the steady-state output in per capita terms (i.e., y = Y/L)

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[52]This derivation of the economic growth specification is based on Bassanini and Scarpetta (2001), and Bassanini, Scarpetta and Hemmings (2001).

$$\ln y^*(t) = \ln A(t) + \frac{\alpha}{1-\alpha} \ln s_k(t) + \frac{\beta}{1-\alpha} \ln h^*(t) - \frac{\alpha}{1-\alpha} \ln(g(t) + n(t) + d) \qquad (4)$$

In this intensive form the steady-state output can be expressed either as a function of investment in human capital,   or as a function of the steady-state stock of human capital, h*. In this dissertation the human capital is approximated by the average years of schooling of the population over the age of 15. Thus, the equation (4) is expressed in terms of the stock of human capital.

However, h* cannot be observed. Bassanini and Scarpetta (2001) establishes a relationship between the steady-state human capital stock and the actual level of human capital by solving the system of differential equations in (2) and substituting the investment rates in physical and human capital by the equation (3). Suppressing time subscript,

$$\frac{d \ln \frac{k}{A}}{dt} = (n + g + d) \, e^{-(1-\alpha)\ln \frac{k}{k^*}} \, e^{\beta \ln \frac{h}{h^*}}$$

$$\frac{d \ln \frac{h}{A}}{dt} = (n + g + d) \, e^{\alpha \ln \frac{k}{k^*}} \, e^{-(1-\beta)\ln \frac{h}{h^*}} \qquad (5)$$

Solving for ln h, we obtain the following linearized form,

$$\ln(h(t)/A(t)) = \psi \ln(h^*(t)/A(t)) + (1-\psi)\ln(h(t-1)/A(t-1)) \qquad (6)$$

where Ψ is a function of α, β and the term (n+g+d). We can rearrange the form (6) to obtain the expression for h* as a function of actual human capital:

$$\ln h^*(t) = \ln h(t) + \frac{1-\psi}{\psi} \Delta \ln(h(t)/A(t)) \qquad (7)$$

Substituting (7) into (4), the expression for the steady state output as a function of the investment rate and the actual stock of human capital can be obtained.

$$\ln y^*(t) = \ln A(t) + \frac{\alpha}{1-\alpha} \ln s_k(t) + \frac{\beta}{1-\alpha}\left\{ \ln h(t) + \frac{1-\psi}{\psi} \Delta \ln(h(t)/A(t)) \right\} -$$

$$- \frac{\alpha}{1-\alpha} \ln(g(t) + n(t) + d) \qquad (8)$$

As stressed by Bassanini and Scarpetta (2001), Bassanini, Scarpetta and Hemmings (2001) and other related empirical literature, the expression (8) would be a valid specification of the growth equation only if either one of the following two conditions are satisfied. First, if countries were in their steady-states, and second, if deviations from the steady-states were independent and identically distributed. Otherwise, the transitional dynamics have to be modeled explicitly. Following Mankiw et al (1992), the transitional dynamics can be expressed as

$$\frac{d \ln (y(t) / A(t))}{dt} = \lambda (\ln (y^*(t) / A(t)) - \ln (y(t) / A(t)) \qquad (9)$$

where $\lambda = (1-\alpha-\beta)(g(t)+n(t)+d)$.

Substituting the expression for y* and h* into the solution of (9) yields the following expression:

$$\Delta \ln y(t) = -\phi(\lambda) \ln y(t-1) + \phi(\lambda) \frac{\alpha}{1-\alpha} \ln s_k(t) + \phi(\lambda) \frac{\beta}{1-\beta} \ln h(t) \frac{+1-\psi}{\psi} \frac{\beta}{1-\alpha} \Delta \ln h(t) -$$

$$\phi(\lambda) \frac{\alpha}{1-\alpha} \ln (g+n(t)+d) + \left(1 - \frac{\phi(\lambda)}{\psi}\right) g + \phi(\lambda) \ln A(0) + \phi(\lambda) gt \qquad (10)$$

In this dissertation, we assume that the level of economic and technological efficiency is determined by the combination of the technological progress ( ) and the quality of governance (G). Since the level of technological progress and g is not observable and therefore cannot be distinguished from the constant term empirically. However, we can proxy the quality of governance with perceived level of governance. Thus, estimated growth equation can be expressed as follows

$$\Delta \ln y(t) = a_0 + a_1 \ln y(t-1) + a_2 \ln s_k(t) + a_3 \ln h(t) + a_4 \Delta \ln h(t) +$$

$$+ a_5 n(t) + a_6 t + a_7 G(t) + \xi(t) \qquad (11)$$

where $a_1 = -\phi(\lambda), a_2 = \phi(\lambda) \frac{\alpha}{1-\alpha}, a_3 = \phi(\lambda) \frac{\beta}{1-\beta}, a_4 = \frac{1-\psi}{\psi} \frac{\beta}{1-\alpha}, a_5 = -\phi(\lambda) \frac{\alpha}{1-\alpha}.$

In this dissertation, we proxy human capital with years of schooling of the working age population and assume that the time path for human capital, h, is as follows:

In a simplified representation, after adding a matrix of control (X) and aid (A) variables, the specification (11) can be expressed as follows:

$$g = f(s_k, h, \Delta h, Gov, X, A) \qquad (12)$$

List of Donors Included in the Sample and Data Sources

Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, UK, USA.

List of aid recipients

Afghanistan, Albania, Algeria, Angola, Argentina, Armenia, Azerbaijan, Bangladesh, Barbados, Belarus, Belize, Benin, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Brunei, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Cape Verde, Central African Republic, Chad, Chile, China, Colombia, Comoros, Congo/Brazzaville, Congo/Kinshasa, Costa Rica, Cote d'Ivoire, Croatia, Cuba, Cyprus, Czech Republic, Djibouti, Dominican Republic, Ecuador, Egypt, El Salvador, Equatorial Guinea, Eritrea, Estonia, Ethiopia, Fiji, Gabon, Gambia, Georgia, Ghana, Grenada, Guatemala, Guinea, Guinea Bissau, Guyana, Haiti, Honduras, Hungary, India, Indonesia, Iran, Jamaica, Jordan, Kazakhstan, Kenya, Korea Republic, Kyrgyz Republic, Laos, Latvia, Lebanon, Lesotho, Liberia, Libya, Lithuania, Macedonia, Madagascar, Malawi, Malaysia, Maldives, Mali, Malta, Marshall Islands, Mauritania, Mauritius, Mexico, Micronesia, Moldova, Mongolia, Morocco, Mozambique, Myanmar, Namibia, Nepal, Nicaragua, Niger, Nigeria, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Romania, Russia, Rwanda, Senegal, Serbia and Montenegro, Sierra Leone, Singapore, Slovak Republic, Slovenia, Solomon Islands, Somalia, South Africa, Sri Lanka, Sudan, Suriname, Swaziland, Syria, Tajikistan, Tanzania, Thailand, Togo, Tonga, Trinidad & Tobago, Tunisia, Turkey, Turkmenistan, Uganda, Ukraine, Uruguay, Uzbekistan, Venezuela, Vietnam, Yemen, Zambia, Zimbabwe.

Description of variables

```
     Variable |       Obs        Mean   Std. Dev.         Min         Max
--------------+--------------------------------------------------------------
   growth_per |       741    1.139755     4.72572   -27.28988    46.84499
    lngdp_per |       729    6.985929    1.189272    4.154924     10.5063
      inv_gdp |       730    21.55967    8.039476     2.23354    70.33183
       syears |       531    4.554652    2.426585         .09       10.84
     syearsch |       428    .3712383    .4226997       -2.92        2.34
         life |       867    60.68889    10.86388    33.03902    79.75752
       pop_gr |       886    .0208064    .0149907   -.0480281    .1925672
        trade |       714    74.15724    41.61768    1.530677    275.6158
        lninf |       737    .2507005    .5054948   -.0835742    4.101707
      highinf |       737    .1818182    .3859565           0           1
        money |       681    35.21951    31.43428    4.080822    497.9068
         gov2 |       566    12.19892     6.30507           0    27.41667
         gov1 |       802   -9.174252     3.42145         -14          -2
         high |       894    .2348993    .4241732           0           1
          low |       894    .4765101    .4997275           0           1
          med |       894    .2885906    .4533608           0           1
    gdisb_gdp |       741    7.865207    10.57105           0    71.33886
    ndisb_gdp |       741    7.293093    10.12834   -.0685906    70.17598
   social_gdp |       714    1.950382     2.92585           0    37.39399
    infra_gdp |       714    1.608147    2.340443           0    18.55616
     prod_gdp |       714    1.474869      2.3283           0    17.45076
      edu_exp |       658    4.070529     1.96223    .3364306    14.39094
        urban |       882    44.32195    22.35381     3.23026         100
        pop15 |       866    37.75678    8.721522    15.72723    50.75036
          gpi |       687    86.21824    19.01593        17.8    138.9667
    lnprgdisb |     12076   -2.036802    2.804881   -13.27142    6.834252
    lnprndisb |     11818   -2.121144    2.800847   -13.27142    6.834252
         lnre |     15938    2.434939    2.780458   -6.584585    11.47898
       lnprgw |     16611     3.33157    1.512317   -7.603981    7.097583
```