"Aid Effectiveness and Growth in the Developing World: Does Institutional Quality Matter?"

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ABSTRACT

A growing debate in macroeconomics focuses on the role of institutional quality and governance in promoting economic growth. Jeffrey Sachs (2004) argues that the impact of governance on growth is insignificant and that, really, the structural variables that distinguish and define countries have more of a direct effect on growth. On the other hand, Craig Burnside and David Dollar (2004) empirically investigate the relationship between aid, institutions, and growth and claim that official development assistance (ODA) can have a positive effect on economic growth in high quality institutional environments. In this paper, I take a look at the role of institutions and the impact they have on promoting or inhibiting economic growth in various regions of the developing world. Based on the hypotheses that institutional quality is (1) an important determinant of economic growth and (2) a predictor of the potential effectiveness of aid in a developing country, I extend Burnside and Dollar's (2004) empirical specification to study the effect of aid and institutions on economic growth between 1996 and 2005. In addition to examining whether Burnside and Dollar's (2004) observations hold over time, I extend the model and analyze a different set of developing countries to see if there are any regional-specific differences that affect a nation's ability to grow. I also add parameters to the model to see if there are external influences that impact the relationship between aid, institutions and growth. I conclude that, rather than there being a joint effect of aid and institutions on growth, there is evidence that the effect of institutions on growth is direct. Furthermore, institutions in different regions of the developing world create environments that either foster or prevent future economic growth.

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I. INTRODUCTION

For almost half a century, since many developing nations gained independence from foreign rule, foreign aid has flowed into these countries. The aim of much of this aid has been to provide developmental assistance, but many of these recipients have suffered chronic poverty and underdevelopment over these years. A large body of research has examined the causes and consequences of low economic growth among developing nations with a view to making policy recommendations. Of particular interest is the growing emphasis on institutional quality and governance as drivers of economic growth. In this paper, I examine how institutional and governance quality affect economic growth. More specifically, I examine whether institutional quality is cross-sectionally related to both the level of financial aid and to the effectiveness of financial aid in achieving economic growth.

Recently, literature has examined whether institutional quality and governance have significant effects on economic growth. A nation's institutions are its mechanisms that govern the behavior and incentives of economic agents. It includes legislative, political, economic and social structures, both formal and informal. Governance refers to a nation's abilities to uphold the objectives of its institutions by enforcing the rule of law, achieving political stability and safeguarding freedoms for its citizens. The obvious claim with respect to institutional quality is that nations with poorer institutional structures are likely, on average, to achieve poorer economic performance. Dani Rodrik (2004) suggests that growth economists are increasingly emphasizing the significance of institutional quality. Lall, Spatafora, et al (2005) argue that institutional quality is so vital

that "if Africa could be improved to the level in developing Asia, African per capita GDP might be expected to almost double over the long term." This has led to policy recommendations like the recommendation that reforming institutions in Sub-Saharan African (SSA) countries should be the logical target of or prerequisite to financial assistance.

The problem with institutional reform, however, is that its success depends on other factors that are not as easily targeted by financial aid. Institutional reform measures, therefore, often yield temporary benefits and fail to push the nation to a level where it can achieve sustained economic growth. Acemoglu, Johnson, et al (2003) argue that attempts to reform institutions in nations with weak underlying structures produces a "see-saw effect." Institutions are shaped by a complex blend of attributes, including cultural, historical, political and economic attributes. When one institution undergoes reformation, the benefits of the reform may be offset by detrimental changes that naturally occur in another local institution, when there is a weak underlying structure (Acemoglu, Johnson, et al 2003). The relationship between institutions and economic growth is therefore a complex one, and the processing of changing institutions is subject to many unknowns.

Institutional quality is particularly important in developing nations, as many of these countries face dire poverty and have famously poor institutional quality and governance structures. A case in point is SSA, which, according to Sachs et al (2004) is stuck in a "poverty trap." The role of institutional quality and aid effectiveness in lifting developing nations out of this poverty trap needs to be addressed so that we may better understand the drivers of low economic growth. Burnside and Dollar (2004) hypothesize

that aid has a positive impact on growth in good policy and institutional environments. Using the Kaufmann, Kraay, and Zoido-Lobaton index (KKZ index) as a measure of the extent to which institutions and policies create an environment that stimulates factors associated with economic growth, they examine the impact of institutional quality on the effectiveness of aid in achieving economic growth. My study builds upon the Burnside and Dollar (2004) paper by examining the role of aid and institutions in several stages.

I begin by first analyzing the historical evolution of institutions and governance in the developing world. I then empirically examine how institutional quality cross-sectionally affects the level of foreign aid, as well as the relationship between foreign aid and economic growth. Finally, I expand the Burnside and Dollar (2004) model by considering the effects of legal origin and policy environment on economic growth.

As a starting point, I replicate the Burnside and Dollar (2004) model. Next, I extend two of their empirical models by utilizing data from a more current time period. While Burnside and Dollar (2004) look at data between 1990 and 1999, I analyze the data for the same variables between 1996 and 2005. Examining more recent time periods will provide more current analyses to support policy recommendations. Additionally, the time period examined by Burnside and Dollar (2004) include periods in which many developing nations around the world saw significant political and economic transitions. Many SSA countries, for instance, became democracies for the first time in the early 1990s. This was also a period in which many emerging market economies including those in East Asia and Latin America liberalized their capital markets. It is likely that the effects of these changes trickle down into institutional quality improvements after a lag of some time. Examining a more recent time period will thus help determine the stability of

the results obtained in Burnside and Dollar (2004).

As another extension of Burnside and Dollar (2004), I examine the impact of the legal origin of a country as a potential influence on economic growth. Legal origins have been found to play an important role in the development of institutions and political systems and could therefore be associated with economic growth. Also, controlling for legal origin could potentially change the relationship between institutional quality and growth.

Finally, I explicitly incorporate policy environment into the growth model used by Burnside and Dollar (2004). The variables used to proxy for the policy environment capture a country's trade, fiscal and monetary policies. These policies are essential both directly to a country's GDP growth as well as indirectly as they influence the relationship between the aid recipient and donor nations.

Institutional quality largely determines the effectiveness of foreign aid in stimulating economic growth by boosting the public sector. Foreign aid, or official development assistance (ODA), is designed by donor nations and organizations to target specific national deficiencies that critically inhibit the sustenance of economic growth. If institutions are poor, economic agents are not held accountable for their actions. For instance, governmental agencies may be less diligent in providing high quality public service that is free from corruption, citizens may have fewer incentives to follow the rule of law, and capital markets that are important in fueling economic growth by allocating capital may be less efficient.

Poor institutions and governance mechanisms may be self perpetuating. This may be represented as a classical prisoners' dilemma problem. For instance, for all parties

involved, the growth maximizing strategy would be to adhere to the rule of law and maximize the efficiency of the public sector so that income via foreign aid is used in a manner that benefits society as a whole. However, with weak institutional structures in place, each member of a developing nation feels like other "players in the game" will turn their back on this socially desirable goal to minimize personal loss. Therefore, they will each have a disincentive to "co-operate." With an increasing number of "defectors," adherence to the rule of law becomes a goal that society as a whole is unable to achieve. This results in institutional weaknesses like political instability and poor rule of law, making the nation an undesirable target for foreign development assistance. As a result, foreign aid may not achieve its intended objectives, making donor nations and organizations more reluctant to provide monetary assistance.

Prior research has examined the causes of low growth in various regions of the developing world. One stream of this research has argued that structural variables such as geography, climate, and natural resource endowment can hamper development by increasing disease burden and transportation costs and decreasing the diffusion of technology from more advanced societies (Sachs et al 2004). Another stream of research has focused on the role of institutions and has argued that what matters are the social norms for economic behavior related to institutional features like property rights and the rule of law (North, 1991 and Acemoglu, Johnson, Robinson 2003).

While a growing body of research focuses on the importance of institutional quality and governance in promoting sustained economic growth in developing regions, some believe that there are exogenous differences that contribute to this impact. The legal origin of a country has been found to have a significant impact on the economic and

institutional development of a country. Numerous studies report that countries with British legal origin tend to be positively associated with growth, while countries with French legal origin tend to be negatively associated with growth. While institutional structure in developing countries today is a reflection of the leader's vision and the nation's culture, the origins of the legal system set the foundation for institutional quality.

This study contributes to these streams of research by examining the extent to which institutions are associated with economic growth after controlling for various regional differences. In this paper, I use measures to proxy for institutional quality and empirically test the effect of institutional quality on the relationship between foreign aid and growth. The results in this study could provide policy recommendations. For instance, Jeffrey Sachs (2004) argues that a massive, unconditional infusion of foreign aid in accordance with the Millennium Development Goals of 2015 will help pull the SSA region out of its "poverty trap." If the underlying nature of institutions, however, is poor, the incentive structure may not be conducive to promoting the sustained economic growth envisioned by foreign aid objectives.

The structure of this paper is as follows. In Chapter II, I take a step back and look closely at the historical influences on institutions in developing nations, with the objective of understanding dynamic factors that may have contributed to regional poverty. In Chapter III, I present theoretical arguments central to the study of economic growth, focusing on the determinants of economic growth. I discuss the theory behind Africa's "poverty trap" and show why it is difficult for poor countries to emerge out of their current state. In Chapter IV, I review the evidence presented in previous literature on the effects of institutional quality and development on economic growth. I define

institutional quality based on the Kaufmann, Kraay, Zoido-Lobaton Index and discuss the importance of institutional structure in promoting economic growth. In Chapter V, I examine the growing body of research on the effectiveness of foreign aid in the developing world. Specifically, I review literature focused on the impact of institutional quality in determining the effectiveness of developmental assistance in poor countries. In Chapter VI, I report the results of my empirical analyses. Chapter VII concludes and provides implications for policy deliberations.

II. HISTORICAL INFLUENCES ON INSTITUTIONS

Some economists argue that the quality of institutions plays a critical role in determining the efficacy of aid in stimulating growth in developing economies. Yet, other prominent ones like Jeffrey Sachs have downplayed the importance of institutional quality and proclaim that the only way to pull sub-Saharan African nations out of their "poverty trap" is a massive infusion of foreign assistance. In order to better understand the nature of institutions and how institutional quality affects the aid-growth relationship, I first examine the historical development of institutions in developing nations since they gained independence from colonial rule. By understanding its historical antecedents, we can develop a better understanding of the sources of current challenges and priorities in institutional reform.

Sub-Saharan Africa, North Africa, and the Middle East

Sub-Saharan Africa became a target for imperialism in the late 1800s due to its rich resources and economic potential. The European powers were looking to increase capital accumulation and secure strategic positions for the flow of overseas trade. The tropical region of sub-Saharan Africa became attractive for colonization and the colonization process divided the continent. The major players in the colonization of Africa included Britain and France, and, to a lesser extent, Belgium, Portugal and Italy. The abundance of African natural resources like diamond and cotton, for which there was high consumer demand in Europe, enhanced the diversity of European economies. Since Africa was essentially "divided" into distinct territories owned by several European

nations rather than one nation, governments and institutions were unique as well.

During the colonization era, the French took control of West Africa (presently consisting of Benin, Burkina Faso, Senegal, Mauritania, Niger, Chad, Central African Republic, Republic of the Congo, Cote D'Ivoire). The French also captured Madagascar, but their main stake was in the vast West African region. They hoped to capitalize on the additional trade avenues and vast natural resources that this region provided. They also induced the natives to fight on their behalf in the two World Wars. In their relationship with the Africans, the French established dominance over the region and alienated a large majority of the constituency. The French found a large base of these natives to be "unsuitable" French citizens and treated them more as "subjects" than "citizens of their empire." In fact, only in Senegal did it appear that some natives were being assimilated into the French culture and way of life. This alienation led to a growing dissent among the natives, who felt exploited. The territories gained independence in the 1950s and 1960s.

Whereas France controlled the vast majority of West Africa, Britain staked strategic territorial claims on Egypt and South Africa. Britain needed to control sub-Saharan African territories in order to build a "Cape-to-Cairo" railroad linking their two primary colonies of interest. In sub-Saharan Africa, Britain controlled Botswana, part of Cameroon, Ghana, Kenya, Mauritius, Nigeria, Sierra Leone, Sudan, Tanzania, Uganda, Zambia, and Zimbabwe. Britain thus controlled 30% of the African population, far exceeding any other European power's stake in Africa (France was second with 15%). The intended economic benefits of a railway connecting Cape Town and Cairo led Britain to rule several sub-Saharan African nations. Among these nations were Botswana

and Mauritius, two nations that have experienced "growth miracles" in sub-Saharan Africa. Whereas France heavily exploited and stripped African nations of their national resources, Britain was more concerned with the strategic development of their railway and left these two nations in relatively good condition (Smith, 1998). In the mid 1950s, Britain did not offer any resistance when these African nations demanded independence from colonial rule. The British had more important territories to worry about and were not concerned about maintaining their presence in Africa.

In addition to France and Britain, other European powers had relatively minor stakes in Africa during the colonial period. Portugal controlled Angola and Mozambique, while Belgium controlled Burundi, Rwanda, and Democratic Republic of the Congo. Italy had a partial share of Somalia during the period of colonization as well. Liberia and Ethiopia maintained their independence during colonial rule. When the independence movement developed, these European powers were willing to give up their stake in Africa without much resistance.

In some cases, sub-Saharan African countries sought to establish an identity by significantly deviating from the characteristics of previous rule. Chad experienced this fate after gaining independence from France on August 11, 1960. The first president of an independent Chad, Francois Tombalbaye, originally from southern Chad, had strong negative sentiments toward the democratic government that was in place during colonial rule. Based on these emotions, he sought to establish authoritarianism and concentrate power that was originally spread across various political parties that had representation throughout all of Chad. Once he was able to dissolve all political parties outside his own, he began to run the country solely to the meet the needs of his constituency in southern

Chad. Rampant discrimination of citizens in northern and central Chad set the stage for Civil War that would ensue after his time in office. Leaders like Tombalbye clearly demonstrate the consequences of uncertainty following independence. Without the European powers around to stabilize the government, sub-Saharan African nations were often left with leaders who let their emotions and greed rule their decision-making. Sudan, which gained independence from Egypt and Britain slightly before Chad in 1956, is currently engaged in war with Chad because refugees from Darfur have been fleeing Sudan to live in Chad.

Since the authoritarian rule which marked the commencement of independent Chad, government officials have attempted to transition toward democracy. However, a country without unity will have political and government instability until the foundation upon which institutions have been built is significantly and permanently altered. The difficulty in accomplishing this objective is that this foundation, in many cases, has been in place for centuries and is steeped in local culture and tradition. Breaking the permanence of these institutional characteristics has proven to be quite a challenge. In sub-Saharan Africa, many independent territories were subjects of different European rulers who had different ideologies and political beliefs. This further complicated matters and led to more political instability and international strife.

In the aftermath of World War II, Franklin D. Roosevelt issued the Atlantic Charter, which among other things called for the autonomy of imperial colonies in Africa. Upon achieving independence however, the African territories realized that they had been bruised by imperialism, losing a sense of geopolitical identity and being stripped of valuable natural resources. These long-term effects are still being felt in the

vast majority of sub-Saharan African nations, where structural deficiencies and political instability have contributed to a diminishment of economic prospects. The institutions that have developed in these nations since independence are unique and likely influenced by the European power that previously ruled over the territory. Through the process of colonization and subsequent decolonization, independent African territories were left in shambles, both structurally and politically, with a lack of identity and cohesion.

Eastern Europe and Latin America

In addition to Sub-Saharan Africa, other important regions became colonies of the dominant superpowers of the era. For example, the Kyrgyz Republic was under Soviet control. Soviet influence extended to most of the Eastern European and Central Asian countries. Political motivations were predominant in this Soviet expansion and Communism was spread throughout the land. The Russian Empire sought to extend its influence across the region by instituting a consistent system of political rule. Unlike the incentives of the European colonizers of Sub-Saharan Africa, the Soviets were not as concerned about stripping target nations of their natural resource endowments. The Kyrgyz Republic is representative of the Europe and Central Asian region included in this analysis. In addition to the Kyrgyz Republic, I look at countries like Albania, Bulgaria, Hungary, Latvia, Lithuania, Romania, Turkey, and Ukraine. These countries were exposed to similar political influences and political pressures prior to independence. Institutions in this region are shaped by their historical foundation, which significantly differs from the Middle East and African regions.

Latin American nations have also endured the effects of colonization. Spain

conquered much of the region known today as Latin America and significantly influenced the way of life in this region. Along with the Spanish, who began colonization following Columbus' adventure in 1492, the British and the Portuguese were major players in the region and had to compete with the French, Dutch, and Danish among other European powers for territories. Most Latin American countries gained political independence from European rule in the early part of the nineteenth century with the wars of independence from 1810-1825. Even after the end of political colonialism, countries in Latin America were subject to foreign economic control, largely by the British. This era came to be termed "neocolonialism." In the twentieth century, economic control was shifted from the British to the United States. During the colonization and post-colonization periods, the European powers extracted natural resources from the Latin American territories and imported finished goods into this region. The infrastructure and transportation system was not used to integrate a country. Rather, it was used to transport raw materials across the region so that the European powers could maximize economic opportunities based on a set endowment of natural resources. Resources were taken away from domestic economies and standards of living of the locals were lowered to appease European colonizers' expensive tastes. During the neocolonialism, European powers introduced freedom of religion in predominantly Catholic countries that led to cultural shifts and a misplaced sense of identity (Fraser 1994, Young 2001).

Similar to experiences in other regions of the developing world like tropical sub-Saharan Africa and the Middle East, Latin American countries gaining full independence colonial rule were left bereft of economic, social and political stability. Physically, natural resource endowments were lower, leaving domestic economies in a

disadvantageous position. Culturally and socially, people were not nearly as united, which had significant political ramifications and left political and social institutions fractured. Many countries maintained close relationships with their former European rulers. This significantly affected the political structure of the Latin American countries because some nations departed significantly from the identity of Latin America (Burns 1980).

Colonization, Decolonization, and Institutional Development

Due to the historical evolution of developing regions, the resulting institutions were characterized by instability and turbulence, likely derived from a political vacuum and the lack of resources that could have potentially moved the economy in the proper direction. According to Acemoglu et al (2003), institutions are "shaped by a combination of history, economic structure, political system, and culture." The ingredients that go into the composition of institutions suggest that each institution is wholly distinct. Characteristics like the historical and cultural evolution would seem to be unique to independent nations, so the formation of their institutions would likewise be unique. Douglass North (1991) defines institutions as the formal rules that govern the behavior and set incentives for members of a society. Critical to the establishment of a sound institution and a framework that is conducive to economic growth is the protection of property rights and equal access to economic opportunity.

These experiences had significant influences on institutions in the developing world. Strong institutions, in addition, possess two other important characteristics: the control of corruption and the quality of governance (WEO 2006). The control of

corruption is not only important internally, but externally as well. The idea of perceived corruption can inhibit the willingness of donor nations and organizations to lend money to developing nations. To understand more about the development of this corruption, we must consider the maladaptive effects of colonization and decolonization. Mulinge and Lesetedi (2002) conclude that corruption is a "multifaceted, complex problem that requires a comprehensive approach that cuts across disciplines." In the case of many developing nations, this complex problem is a side-effect of colonization.

Along with the corruption level, governance quality is an integral component of the development of an institution. A government must be able to serve its people by upholding the letter of the law and ensuring that its citizens are entitled to certain fundamental rights and freedoms. The quality of governance in developing nations can be quantified on several different dimensions ranging from its democratic nature to its rule of law. Does poor governance arise from a dearth of natural resources and a paucity of economic prospects or from the political evolution of a nation after gaining independence? The citizens of many developing nations were resentful after a period of colonial rule and wanted to do whatever it took to establish their own identity.

Historical experience has influenced the development of political, social and cultural institutions among developing nations. These have strong influences on the makeup of a country's legal system and other governance and political mechanisms. It is striking that even within geographically clustered regions such as East Asia and SSA, there is a wide disparity in these influences. Understanding these influences will therefore enhance our appreciation of the unique challenges each country faces, rather than simply focusing our attention on broad regional influences. In this study, I attempt

to capture these effects on the relationship between financial aid and economic growth by using a variable that represents legal origins. I will use this in conjunction with more commonly specified growth models that I discuss in the next section.

III. GROWTH THEORY

The issue of what determines the long run path of growth rates of nations is a central question in economics. Why do some countries grow faster than others? In particular, why are some countries mired in long periods of low or negative growth? I discuss the evolution of growth models that attempt to address these central questions, starting with the standard neo-classical "Solow" model.

Earlier neo-classical models treat technology as exogenous and assume the efficient utilization of resources. These models also assume that labor productivity and capital stock are exogenous. Capital stock is assumed to increase in response to the continual increase in labor productivity. This expansion allows for growth in output and consumption levels. As it is also assumed that there are diminishing returns to capital and labor, poor countries with their low initial capital stock should have a higher return to capital investment and a fast growth rate in transition to the steady state. Depending on the window considered, these arguments might appear to be supported by the data. Poor countries have lower levels of initial income on which temporary fast growth rates are sometimes observed. For example, Venezuela reported per capita growth rates of -10.5% in 2002 and -9.3% in 2003. The very next year, 2005, Venezuela reported a per capita growth rate of 15.8%. Developed nations, on the other hand, have much larger levels of initial income and larger bases of capital stock and capital investments. Such economies may generally grow between 2-5% annually.

More recently, however, the literature has sought to shift the focus of the analysis from exogenous productivity growth to endogenous productivity growth. The new model

assumes that changes in labor productivity are affected through the internal technological improvement. The new Solow model assumes that the technology used for discovering and developing new technologies does not have its own source of exogenous technological change.

The Solow-Swan model of exogenous growth works under some key assumptions. The main assumption is that the capital stock K is subject to diminishing returns. When controlling for the labor force in the economy, the last unit of capital used to generate output will have less of an effect on output than the previous unit of capital. If we assume for simplicity that the labor-force growth rate and rate of technological progress is zero, then the infusion of new capital balances out the depreciation of old capital and the economy experiences no growth. Since, in the Solow-Swan model, we are concerned with per capita or per worker variables (output per worker, capital per worker), the growth rate of population will have to be exceed by the growth rates of output and capital for a noticeable positive change in the per capita variables.

The neoclassical model has short-run and long-run implications which help us identify prospects for growth in different regions of the world. In the short-run, the economy converges to a steady state output level and growth is only affected by the extent of this change in output level as the economy reaches its steady state. Also in the short-run, a nation's growth rate is determined by its capital accumulation as it converges to its steady state. At the steady state level, output per worker and capital per worker do not change over time. When considering prospects for capital accumulation, we can clearly see how countries will have distinct growth advantages or disadvantages. Some nations have fewer initial endowments and resources and a lower initial capital stock.

When combined with a lack of technological innovation, this makes capital accumulation quite difficult.

The neoclassical model also has long-run implications for nations' growth rates. Growth rates in this model are exogenously determined, meaning that external factors not included in the model will contribute to a nation's ability to grow. In the long-run, the model predicts that an economy will converge to its steady state growth rate, which will be determined by technological progress and labor force growth. Earlier neoclassical models anticipate that countries with higher savings rates will encounter faster growth rates, but more recently, the Solow model of exogenous growth predicts that technological progress has a more significant impact on economic growth than does the savings rate.

More recently, there has been an attempt to understand the role played by non traditional inputs in explaining cross-sectional and time variance in growth rates. Factor inputs like labor, technology, and capital play a large role in determining differences in growth across countries and across time. Institutions and political movements, however, can also influence a nation's ability to grow. According to Aron (2000), several empirical studies on growth have found that the traditional inputs like labor, human capital and physical capital accumulation don't adequately explain slow economic growth in Africa. Easterly and Levine (1997), among others, show that institutional deficiencies can prevent developing nations like those in the sub-Saharan region from reaching their full growth potential. Additionally studies such as Sachs (2004) argue that structural variables like geographical attributes, disease burden, etc., are significant variables in explaining low growth rates in SSA countries. In this study, I attempt to push this stream of research

forward by considering political, institutional and structural variables as endogeneous to the process explaining growth.

As with empirical representations of economic models, the most challenging issue with incorporating institutional variables into growth models is the ability to assign objective measures of political, social, and economic institutional quality. It is difficult to determine how institutions should be measured and how they differ from organizations or firms in the national growth model. We must also be able to extract the effect of policies derived from an institutional system on factors normally associated with slow or fast economic growth like labor and human capital. Institutional quality may be distinguished from one country to the next, based on the strength of a nation's governance systems – i.e., its ability to uphold the rule of law, control corruption, and maintain political stability, among other important roles. Next, I present these ideas analytically.

In order to integrate institutional quality into the Solow growth model, I first consider the determinants of growth as specified in the model. The production function is given as follows

$$Y = A*F(K, L, T) \quad (1)$$

$$Y = B*F(K, L) \quad (1a)$$

In equation (1), Y measures the output generated by the national economy. A is a measure of technological progress. It measures the efficiency with which a nation's endowment of labor and capital stock is used to create output. In equation (1a), B captures technical effectiveness. The variable K measures a nation's capital stock and L describes the quantity of labor in a particular nation. In equation (1), T is an indicator for levels of technology in a particular country. The partial derivative with respect to T is the

rate of change of technology, or technological progress.

The neoclassical model assumes constant returns to scale for K and L, so doubling these inputs will result in increasing the output by a factor of two. Technological progress is also included in the production function, because it represents efficiency in resource utilization. T represents the rate at which technology is diffused into the population of a given country. In developing nations, the diffusion of technology often faces obstacles due to the poor quality of the nation's institutions. In the production model above, A can be thought of as a constant which measures the efficiency with which units of L and K are used in the economy to produce Y. Technological progress plays a big role in determining capital accumulation and output growth. If institutions are weak, then the efficiency with which inputs are managed may be lower than standard expectations and technology may not be acquired at optimum levels or used in the proper manner. A nation's investments may be lower due to poor institutional quality, leading to a lower-than-desired level of future capital accumulation. Aron (2000) states that, on the assumption of competitive markets, the growth rate of the economy (g_y) can be modeled as the weighted sum of three factors: the growth rate of the efficiency parameter (g_A) and the weighted sum of the growth rate of capital and labor (where the weights a_K and a_L are the amount of GDP invested in each of these components).

$$g_y = g_A + a_K g_K + a_L g_L \qquad (2)$$

Equation (2) comes from the production function modeled in equation (1a). A key assumption in the Solow model is that, as the amount of K in an economy increases, the marginal product of K decreases. Likewise, as the amount of L in an economy increases,

the marginal product of L decreases towards 0.[1] These conditions imply that, in the long-run, g_K and g_L converge to 0 and that the growth rate is eventually determined by g_A. The efficiency with which inputs are managed in an economy to produce the necessary output is a reflection of the stability and efficiency of a nation's political, economic, and social institutions. In the short-run, any differences in institutional quality likely won't be seen in the growth equation due to high weighted values of g_K and g_L. These institutional differences tend to disappear when levels of capital and labor are low and, as a result, marginal products of capital and labor respectively, are high. If the quality of a nation's institutions affects technological progress and diffusion, then cross-country growth regressions should account for these differences. Rather than treating technological progress as a constant, its endogeneity is captured by its relationship to country specific institutional characteristics. Aron (2000) suggests that "introducing country specific institutional variables can affect the estimate of the responsiveness of output to capital (human as well as physical)…"

The preceding analysis suggests that poor countries faced with low initial capital stock and technology levels and low rates of capital diffusion have different Solow growth functions relative to developed, well-endowed nations. More recently, growth models have explored the poverty trap phenomenon that has supposedly afflicted most sub-Saharan African nations. Sachs (2004) for instance argues that tropical sub-Saharan African countries are mired in a "poverty trap". Central to this notion is the idea that savings decisions are a function a household income. Impoverished families in the tropical SSA region are too poor to save any of their income and rather had to shift the

[1] These are known as the Inada conditions and are assumed to be true in the neoclassical Solow Model (Barro 1991)

entire allocation to consumption to meet basic needs.

Sachs et al (2004) further argue that, in order for capital accumulation to take place according to the following equation,

$$dk/dt = sAf(k) - (n + d)k \quad (3)$$

the saving rate must exceed capital widening. Capital accumulation, or capital deepening (dk/dt), exists, when the capital-labor ratio k can be increased in the presence of population growth n and capital depreciation d. In the case of population growth, the denominator in the capital-labor ratio is rising and in the case of capital depreciation, the numerator is falling. Both of these changes reduce the capital labor ratio and this decrease must be adequately offset by savings in order for a nation's economy to grow (in per capita terms). A nation's ability to save is clearly hurt by its initial resource endowments, which significantly affect savings-consumption decisions. Therefore, the prospects for growth in a country mired in a "savings" trap (Sachs (2004) are not nearly as good as one where the savings rate is significantly higher.

Savings decisions aren't solely affected by personal income. Alternatively, limited or inhibited access to financial institutions could affect a households' decision to save. An unpublished study of rural Ugandan households reported that only 23.8% of households had saved some money. While a large majority of the non-savers attributed their decision to lack of income (85.4%), a number of non-savers responded that they had limited access to financial institutions and that this access deterred them from saving (Sachs 2004).

Barro proposes productivity equations for growth models with poverty traps of the following form:

$$Y_A = Ak^{\alpha} \quad (4)$$

$$Y_B = Bk^{\alpha} - b \quad (5)$$

Barro (2004) describes the poverty trap as simply a tendency for low-income nations to settle on a lower steady-state level of production. The stable steady state is characterized by low output per worker (Y/L) and capital per worker (K/L). Any attempt by an impoverished economy to raise living standards for its citizens is usually unsuccessful and results in a return back to this steady state, hence the phrase "poverty trap". Equation (4) models the traditional production model in AK form where Y_A is the output per worker, *k* is the amount of capital per worker and α is the capital share. This is a simple reduction of the Cobb-Douglas production function to a function in per-worker terms. Equation (5) is the modern production function which allows a nation to operate at a higher productivity level for a fixed cost b. It is up to an individual nation to determine whether the potential rise in productivity is enough to comfortably cover the fixed cost and offer some advantages.

Developing nations suffer from both an inability to save and high fertility rates which prevent them from achieving sustained economic growth. The growth problem for developing nations is a circular one. Many of these countries have poor endowments which make it impossible for them to generate the marginal income necessary for adequate capital accumulation. An infusion of foreign aid can alter a nation's resource constraints: Burnside and Dollar (2004) incorporate the effect of foreign aid in the following manner:

$$C_t + I_t \leq AK_t^{\alpha} + F_t \quad (6)$$

The consumption-investment decisions made by a developing nation are now maximized

subject to resource constraints that include the original production function at time t (AK_t^{α}) and a set amount of foreign aid (F_t) allocated to a nation at time t. While the infusion of foreign aid may broaden the resource constraints a country must adhere to, it may also alter savings-investment decisions. It's possible that the all of the new developmental funds are allocated towards capital investment, resulting in a reduction of domestic savings (as a percentage of overall real GDP). Hansen and Tarp (2000) argue that aid positively affects economic growth in favorable policy environments, but its positive effect is subject to diminishing returns. The inclusion of foreign aid to a nation's resources changes savings, investment, and consumption decisions and this decision-making can be crucial to capital and labor accumulation and sustained economic growth.

Lucas (1988) and Romer (1986) develop endogenous growth models that further specify effects found in the Solow-Swan model. They look at the labor component and think about labor in terms of human capital. The acquisition of knowledge leads to increased human capital and can have positive external effects on firms in society. Knowledge spillovers can increase human capital and raise total worker productivity in a developing economy. Learning by doing is a way to internalize the process of economic growth. The development of human capital is an important step in the internalization of economic growth. In order for developing economies to sustain growth, the ability to accumulate capital and raise levels of productivity must be characteristics of local economic agents. Changes in levels of technology should affect the "total knowledge stock" and not just an isolated group in the labor force. Overall productivity levels uniformly increase as a result of knowledge spillovers and enhancements in human capital.

As growth models evolve, recent research is making strides in capturing more complex effects of institutions and aid in explaining economic growth. In my study, I use the Burnside and Dollar (2004) model specifications as a springboard and incorporate the effect of other key elements that could potentially explain cross-sectional differences in economic growth rates – notably, legal origins and policy environment. As discussed in Chapter 2, legal and colonial origins could be associated with growth rates due to their influences on culture and institutions, which, in Barro's model potentially affects the productivity of both labor and capital. Similarly, the policy environment also potentially influences economic growth through its effect on the productivity of labor and capital. Explicitly controlling for these factors, therefore could clarify the links between aid, institutions and growth that have been studied in the literature.

IV. INSTITUTIONAL QUALITY AND ECONOMIC GROWTH

The relationship between institutional quality and economic growth has been the focus of academic research and policy debate. Studies have found that there is a positive correlation between per capita GDP and the institutional quality. The implication often drawn is that improving a country's institutions is likely to result in a sustained increase in per capita growth. Edison (2003), for instance, finds that institutional quality has a significant effect on the level of income, GDP growth, and the volatility of growth. She concludes that "economic outcomes could be substantially improved if developing countries strengthened the quality of their institutions." Edison also estimates that the potential benefit to sub-Saharan nations from improving institutional quality to the level of developing East Asian countries is likely to almost double the per capita real GDP of sub-Saharan Africa. While the causal link between institutional quality and economic growth is intuitively appealing, there are several problems in estimating the strength of the relationship as well as the direction of causality. More refined empirical methods are needed before we understand these complex relationships.

Institutions and Governance

Perhaps the biggest challenge to understanding the role of institutions is to define what institutions are. North (1991) defines the term broadly to encompass rules, both formal and informal, that govern human interaction. Recent empirical research has adopted narrower definitions, characterizing institutions in terms of degree of property rights protection, the extent to which the rule of law is fairly and consistently applied, and

the degree of corruption.

Another challenging task is to measure institutional quality. Institutional quality is difficult to quantify because standards cannot be applied uniformly across countries. Developing nations in different parts of the world have experienced unique transitions following decolonization and have followed different paths to development. Their unique historical antecedents have blended with their distinct cultural characteristics to shape today's institutions. What is supposedly a strong economic institution in one country may be considered a weak economic institution in another when all other contributing factors are taken into account (Kaufmann et al 2006). Consistent with recent empirical research, I use a broad measure of institutional quality to assess its cross-sectional influence. Kaufmann et al (2006) develop an aggregate governance index based on quality measures of six different dimensions of institutions.

Using Kaufmann-Kraay governance indicators as a proxy for institutional quality, I will attempt to capture the effect of institutional quality on economic growth. By using cross-sectional data on average governance estimates to look at regional differences in institutional quality (measured by governance indicators), I examine how these regional differences affect economic growth. I also examine the use of foreign aid by recipient nations to determine whether foreign assistance initiatives are effective in meeting their goals. In the next section, I review prior literature on the relationship between institutional quality and growth. I will follow this by describing the variables and data sources that I use in my empirical analyses.

Institutions and Growth – Background Literature

While Sachs et al (2004) diminish the role played by governance and institutional quality on sustaining economic growth, there is a growing body of evidence suggesting that the structure and quality of institutions directly impacts economic growth. As discussed earlier, institutional frameworks are made up of formal and informal rules, norms or constraints (North 1990, Aron 2000). A system that assigns ratings of institutional quality must be able to identify subtle differences in these rules and their interaction which in aggregate capture differences in the quality of social, political and economic institutions. According to North (1990), the enforcement of rules is important in determining relative differences in institutional quality. Rules may be absent, suboptimal or poorly enforced (Aron 2000). The cost of information is particularly important and can potentially inhibit a nation's institutional quality. Another key aspect to the definition of institutional quality is the extent to which a country's rules and structures protect the property rights of its citizens. Costs of monitoring and enforcing the rule of law may be too high, thus preventing a nation from adequately protecting the property rights of its citizens.

The developing sentiment in recent literature is that governance and institutional quality affects economic growth, but that the impact can be made directly or through indirect channels. Ahrens and Meurers (2002) attempt to objectively define governance and examine the channels through which governance affects short and long-run economic growth. They find that governance indirectly affects economic growth through the quality of policy and institutional reforms. The structure of national governance affects policymakers, political coordination, and the strength of economic reforms. Ahrens and Meurers (2002) find no evidence that the impact of governance on economic growth is

direct, but rather that the impact is seen through this indirect policymaking channel.

When considering the effect of institutional quality on sustained economic growth, the direction of causality (if one exists) also needs to be considered. While it is intuitively appealing to suggest that good institutions cause higher economic growth, it is certainly plausible to imagine that sustained economic growth could impact institutional quality as well. Higher levels of capital stock and more resources at a country's disposal would enable it to better protect the rights of citizens and enforce the rules of law. Chong and Calderon (2000) examine the issue of causality in their investigation of institutional quality and economic growth. They cite a growing body of cross-sectional research that links measures of corruption, bureaucratic quality, property rights, and other institutional variables to economic growth and hypothesize that causality goes both ways. They conclude that, in poorer countries, the effect of institutional quality on economic growth is higher and more significant. Chong and Calderon (2000) also claim that reverse causality exists—economic growth causes institutional quality. In this empirical investigation, I attempt to address this potential endogeneity by using instrumental variables to isolate the direction of causality.

Acemoglu, Johnson, and Robinson (2001) argue that institutional differences were created at the time of colonization, and that the development of institutional structures in developing nations is influenced by the European country that colonized it. Chapter 2 describes the historical context of the evolution of institutions. Acemoglu et al (2001) find that there is a high correlation between earlier institutions and institutions today. They conclude that colonial experience is one of several factors affecting institutions.

Acemoglu, Johnson, and Robinson (2003) consider examples of these historical antecedents. For instance, they consider Botswana as an example of an African success story. In a region marked by slow economic growth and adverse geographic and structural conditions, Botswana has risen above its neighbors. Acemoglu et al identify several important characteristics which impact Botswana's development, differentiating it from its peers. First, the fact that Botswana was ruled by the British played a positive role in its institutional development. Its pre-colonial institutions were more inclusive and rights were given to the citizens rather than being absorbed by state authorities. Political elites did not have dictatorial power. Second, British colonialism was not destructive to Botswana's institutions. The British authorities did not set up extractive colonies in the region to strip Botswana of its vast natural resource endowments. The transfer and management of resources differentiate one political institution from another. Third, Botswana's economic elite had a clear vision to maintain and strengthen institutions that protected property rights, one of the core ingredients that characterize quality institutions. Fourth, since Botswana was not stripped of its natural resource endowment (it is very rich in diamonds), the economy was well-endowed. Finally, critical decisions made by post-colonial leaders in Botswana played a vital role in creating and sustaining economic growth.

In addition to differences created by colonization, ethnic division or ethnic fragmentation within developing nations can place a limit on the effectiveness of the nations' institutions. Easterly and Levine (1997) hypothesize that ethnic divisions influence public policies and economic growth. Their major conclusions are centered on the sub-Saharan African region. They find that poor levels of economic growth are

associated with low schooling, political stability, an underdeveloped financial system, distorted foreign exchange markets, high government deficits, and insufficient infrastructures. These maladaptive characteristics are explained to a large extent by the ethnic fragmentation that exists within these nations.

Institutions set the rules of law which govern society. Poor institutions simply set rules which are worse or do not enforce the proper rules well enough to create an environment conducive to higher economic growth. However, poor institutions may not be the cause of slow economic growth. They may simply be acting as a channel through which another key determinant affects sustained levels of growth. Rodrik and Subramanian (2003) point out that there are three schools of thought that help explain why countries grow differently. Along with institutions, which essentially set the "rules of the game" for society, international trade and geography play pre-eminent roles. Rodrik and Subramanian (2003) find that institutional quality overrides other potential determinants of sustained economic growth. They also find that, while geography has weak direct effects on growth, its main effect can be seen through its impact on the quality of institutions. Likewise, international trade has a strong effect on institutional quality, but no direct effect on income. Rodrik and Subramanian's (2003) research suggests that institutional quality is an important determinant of economic growth.

The quality of institutions in developing nations is increasingly regarded as a causal factor in economic growth levels. According to Dani Rodrik (2004), "institutional quality holds the key to prevailing patterns of prosperity throughout the world." While Rodrik (2004) hypothesizes that institutions are causal and predicts that improving institutional quality would increase productive capacity, he concludes that countries may

not need an extensive set of institutional reforms in order to grow; rather, they may be better off trying to identify the binding constraint on economic growth and pinpointing the areas of the regional economy with the highest growth potential.

Glaeser, La Porta et al (2004) find that the causal link between institutions and growth is not quite as strong as other researchers claim. They conclude that the significance of institutional quality as a determinant for economic growth pales in comparison to human capital. The formation of sound, effective policies helps countries emerge from poverty. This policymaking can be done by a dictator and still produce effective results. Subsequently, after policies have been initiated by a government, their success helps improve the quality of political institutions. These conclusions are in line with the research of Djankov et al (2003), who argue that each community is presented with institutional opportunities based on cultural and societal factors. It is human and social capital that determines the attractiveness of institutional opportunities within a region. Institutional opportunities become richer as a society becomes richer. Even though institutions are largely influenced by history and politics, social choices can evolve and shape modern-day institutional quality. Human and social capital plays a more direct role in influencing economic growth than institutional quality. Institutions, according to Djankov et al, have a "second order" effect on economic performance.

I extend this line of research in an attempt to clarify mixed results obtained in prior research. I use a database that is more comprehensive and updated than many of these prior studies and also attempt to control for potential endogeneity problems by using instrumental variables representing institutional quality.

Institutions and Governance – Data Sources

I examine cross-sectional determinants of growth using data from countries from different developing regions. For the first part of my study that evaluates the effect of individual governance variables on growth, I use cross-sectional data on growth and institutions from the World Bank's World Development Indicators database (2006) as well as the governance database of Kaufmann et al (2006).

The World Bank data set contains governance information for developed and developing countries of interest over time. Major regions of developing nations include East Asia and the Pacific, the Middle East and North Africa, Latin America, sub-Saharan Africa and Europe and Central Asia. There are 124 developing nations in these 5 regions. The developed countries are represented by one category – OECD nations. Using a broad cross-section of countries and regions around the world will help me detect overall institutional effects in the developing world as well as isolated regional effects by increasing variability in growth rates, institutional quality and political structures. Figures 5A through 5F show relative regional differences for each of the six Kaufmann-Kraay governance indicators. These indicators are explained in detail later in this section.

All told, the updated data-set contains 148 countries (Table 1B), with seven observations each for the 7 years between 1996 and 2005 that contain institutional data (missing data for 1997, 1999, and 2001)[2]. As the data availability is not sufficient to do a time series growth regression based on panel data, I use the average of these 7 estimates for each country for each of the six governance indicators to do a cross-sectional analysis. Given the relatively tight time frame of the analysis, it is reasonable to assume that

[2] Kaufmann, Kraay et al did not publish data for aggregate governance indicators in 1997, 1999, and 2001. They published biannual data from 1996 to 2002, and then began releasing annual governance indicators.

average indicators are representative of governance and institutional quality as these are fairly stable over short periods of time.

Kaufmann, Kraay, et al (2006) identifies 6 governance indicators: Voice and Accountability, Political Stability/No Violence, Control of Corruption, Government Effectiveness, Rule of Law, and Regulatory Quality. I will provide more complete definitions of these variables when I describe the components of my empirical model.

The six governance indicators were developed by Kaufmann, Kraay, and Mastruzzi (2006). The data that go into these six aggregate indicators were taken from 31 different sources, produced by 25 different organizations. Unlike Transparency International, another source from which data for this study were gathered, the Kaufmann-Kraay governance indicators do not use lagged variables for their calculations when data are available. When developing an aggregate indicator, avoiding lagged variables makes it possible to avoid external factors from previous years that are independent of government quality. Kaufmann-Kraay indicators only focus on the contributors to governance in the current year of study. The richness and diversity of underlying sources contributes to creating an index that is expected to closely reflect the relative differences in government quality from one country to another. Kaufmann, Kraay, et al (2006) conclude from their updated data on the aggregate governance indicators that the indicators are beneficial for cross-country and cross-sectional comparisons of governance. They warn us, however, that it is necessary to keep in mind that the index values associated with each indicator are estimates based on a multitude of underlying indicators. Therefore, we must not ignore the standard error associated with these estimates when using the index figures to make claims about the effect of

governance indicators on our dependent variable of choice.

Description of Variables[3]

Each of the six Kaufmann-Kraay indicators attempts to quantify a specific characteristic of governance and to provide a measure of the relative difference among nations with respect to these dimensions.

The first of the Kaufmann-Kraay indicators is Voice and Accountability (VA). This aggregate indicator measures a nation's ability to participate in the selection of its government. It also examines the level of freedom offered to the nation's citizens, focusing primarily on freedom of expression and freedom of media. A government that is more closely associated with principles of democracy will score higher on this governance quality test. All of the governance indicators are aggregated from sub-indicators. In this case, some sub-indicators under the umbrella of VA include the level of military participation in politics as well as democratic accountability.

The next governance indicator is Political Stability and The Absence of Violence (PSN), which measures the perceived probability that the current government will be overthrown by violent means, such as domestic violence or terrorism. The quality of a nation's government and its ability to fundamentally develop sound policies for its constituents presupposes a certain level of integrity in the proceedings. The citizens have to trust the leaders and the leaders have to have confidence that their constituents will follow their command. The dual nature of trust is an important characteristic for the sustenance of a government. Sub-indicators that comprise this aggregate indicator

[3] Components that make up each of the six individual Kaufmann-Kraay governance indicators can be found in Table 11.

include internal conflict, external conflict, ethnic tensions, and government stability.

A third indicator is Government Effectiveness (GE). GE measures the quality of public and civil services and the degree to which the government operates independently from potential political pressures. This indicator measures the integrity of the government with respect to policy commitment. Does a particular government develop sound policies and does it uphold these promises through execution? As we have seen in past indicators, the integrity of national leaders plays a prominent role in determining whether a country exhibits strong governance. Without sound leadership, it is virtually impossible to *sustain* economic growth. A key sub-indicator of this aggregate index is bureaucratic quality, which refers to the quality of policymaking.

The next governance indicator is Regulatory Quality (RQ), which measures the government's ability to develop policies that can lead to effective development and promotion of the country's private sector. While the quality of a nation's public sector is an important determinant of economic potential, the strength of the private sector is also important in capital development and modifications in infrastructure. Poor governments are often those which inhibit private sector growth by placing business initiatives under the public sector umbrella. An important indicator used in the development of this aggregate indicator is Investment Profile, referring to the quality of the private sector due to sound government policymaking.

The fifth governance indicator is Rule of Law (RL). RL measures the extent to which national citizens have confidence in abiding by the rules of society. It captures the strength of the police force and law enforcement units, measuring the likelihood of crime and violence in a particular region. In addition to the police force and the court system,

RL captures the quality of contract enforcement. An important characteristic of a sound government is one that develops a set of rules and regulations, enforces these rules and regulations, and limits crime and violence in their country. A sub-indicator Law and Order falls under the umbrella of RL.

The last governance indicator used for the purposes of this study is Control of Corruption (CC). CC measures the extent to which the government uses its position of power to satisfy private interests. This category includes corruption in both its minor and major forms. Often times, corrupt governments misuse the power that they inherit and use their positions to satisfy their individual desires at the expense of moving the country in the right direction. A sub-indicator of this aggregate indicator is Corruption.

In addition to these six Kaufmann-Kraay governance indicators, I also consider the effect of the corruption perception index (CPI), which was used in Sachs et al (2004). Unfortunately, the lack of data availability for this particular variable inhibits the power of the analysis. The inclusion of this variable in any empirical analysis leads to the omission of a number of countries that play a critical role in maintaining the integrity of the analysis. For example, reducing the sample size in a regression from 112 to 29 will likely result in a sample of countries that is not representative of the original set. Developed by Transparency International, the CPI uses lagged variables and different data sources to develop an aggregate indicator that measures the *perceived* corruption in a particular country. Perception may matter with respect to foreign aid, since donor nations would be more reluctant to send monetary assistance to a nation when they perceive that the incentive structure is not in place to ensure that the government officials are rewarded for making prudent decisions on behalf of their nation.

The next chapter discusses prior literature and data sources for my questions that address the effect of developmental assistance on institutions and growth.

V. AID, INSTITUTIONS, AND GROWTH

The effectiveness of foreign aid, specifically official development assistance (ODA), has long been a source of contention among economists and policy officials. The purpose of ODA is to supplement lagging economies with financial assistance to spur development and increase capital accumulation. As mentioned earlier, however, increasing foreign aid has been associated with a decrease in national savings and many believe that the infusion of ODA into a developing nation can have a detrimental impact on growth. In this chapter, I explore the effectiveness of official development assistance in fueling economic growth. Specifically, I examine whether institutional quality plays a role in determining the effectiveness of ODA. Developing nations with high institutional quality should be more capable of effectively managing inflows of developmental assistance designed to stimulate their struggling economy.

According to a World Bank Policy Report (1998), aid can be the midwife to good institutions. They argue that the key to improving the standard of living in developing economies is to combine financial support with help to create local knowledge so that governments can improve the quality of their public services. Institutions play an integral role in providing public services like healthcare, social welfare, agricultural extension, and rural infrastructure provision. Proper allocation of aid inflows will allow local governments to strengthen, helping the delivery of public services. In order to examine the role played by financial aid in increasing economic growth, I first review prior literature in this area.

Aid, Institutions and Growth – Prior Literature

The relationship between foreign aid and economic growth is a complex one. Easterly (2003) and Burnside and Dollar (2000) argue that foreign aid can enhance economic growth if the recipient nation has "sound macroeconomic policies." As the government plays a large role in establishing and enforcing economic policies, the strength of economic policy is a direct reflection of the strength and integrity of the national government. Burnside and Dollar (2000) argue that foreign aid should be concentrated in those nations which have sound macroeconomic policy and strong governments "genuinely committed to improving public services and infrastructure." They argue that foreign aid spurs economic growth and improvements in social indicators only in countries with good governments. Easterly (2003) also argues that aid agencies face incentive problems and that assistance programs need to be designed so that the recipient nations have an incentive structure to closely follow the directions of the foreign aid agreement.

Belsey and Burgess (2003) take a look at poverty trends on a global scale to examine the effectiveness of developmental assistance. They identify where the poor are located around the world and track how their numbers have changed over time in an attempt to understand the relationship between economic growth, income distribution and poverty reduction. Belsey and Burgess (2003) stress the importance of domestic reforms over misguided transfers of foreign development assistance. They argue that, in order to reduce global poverty, domestic governments need to take on more responsibility and undergo reformation. Foreign aid and debt relief can have some impact in alleviating poverty issues around the world, but in the end, the burden lies on domestic governments.

Change must be brought about internally.

More recently, Duc (2006) has explored the effects of foreign aid on economic growth in developing countries. He claims that there is significant empirical evidence pointing to the fact that increases in foreign aid to a developing nation is detrimental to its economic growth. In particular, Duc (2006) suggests a number of factors that may be attributed to this poor relationship between aid and growth in sub-Saharan Africa, including the "fungibility of aid, aid dependency, bad economic management, corruption, and poor coordination and cooperation among aid agencies, etc." Duc argues that, in a region like sub-Saharan Africa, where corruption is widely prevalent throughout member nations, aid dependency is really high and must be fought by the implementation of well-targeted programs intended to improve the quality of human capital and the integrity of the relations between the donor and recipient nations.

My study will attempt to clarify the relationship between financial aid and growth by empirically determining specific governance attributes associated with improvements in financial aid utilization. This could provide a foundation for the policy conclusions of studies like Sachs et al (2004) that calls for massive aid infusion and Duc (2006) that advocates targeted financial aid strategies.

Easterly (2006) investigates the effectiveness of developmental assistance and wonders whether or not providing such assistance may be a mistake. He lays the foundation for his analysis by identifying three assumptions supporting the idea that developmental assistance will be effective in stimulating poor economies. First, he assumes that we know what type of actions successfully achieve economic development. Second, the implementation of these actions will be made possible by monetary

assistance and financial advice. Third, we know who "we" are as donors—whether we are World Bank officials, UN leaders, national government leaders, etc. Based on these three assumptions, Easterly hypothesizes that we feel very confident in the potential effectiveness of development assistance mechanisms. Easterly concludes that unfortunately these assumptions are not correct. Because the assumptions break down upon analysis and we do not know what types of actions will help developmental assistance stimulate economic growth, aid inflows are a "mistake". Easterly believes that if we depart from the belief that we can accomplish development through assistance, financial aid could accomplish piecemeal steps aimed at accomplishing tasks for which demand is heavy.

Aid, Institutions, and Growth—Legal Origin

The relationship between aid, institutions and growth is complex. If institutions are so important to the development of economic success, as many studies find, the target of reform should be fixing poor institutions. Obviously, if it were a simple matter to fix poor institutions, the problem would have already been solved and institutional quality would be "high" all over the world. Unfortunately, the fundamentally ingrained and complex nature of many institutions makes them resistant to change. One characteristic of a nation's institutions that can play a role in their development and malleability that has recently gained attention is the legal origin of a nation. There are five commonly specified legal origins that lay the foundation for the governance of society around the world: French, British, Socialist, German, and Scandinavian. A nation's political, social, and economic institutions depend to a significant extent on their legal origin. For example it has been empirically determined that countries with a British legal origin tend to have

higher institutional quality than those with a French legal origin.

La Porta, Lopez-de-Silanes et al (1997) argue for the importance of legal origin in the determination of institutional quality. They suggest that rules set forth by political institutions and the enforcement of these rules vary systematically by legal origin. Since institutional quality is generally defined by the extent to which citizens' property rights are protected and how well the written rules that govern society are enforced, it is possible that legal origin can significantly influence institutional quality. In particular, the English civil code differs significantly from the French and German civil codes in the rights afforded to private investors. The English civil code gives citizens more private freedom to transact and thus has a positive effect on financial development. This model has proven to be more successful in facilitating sustained economic growth relative to other models. The French and German civil codes have traditions that focus more on the power of the state and less on the rights of the individual investor. International differences in financial development and institutional structure can be traced back to these legal origin differences. La Porta et al (1997) have shown that the influence of legal origin has spread through means such as colonization and imitation.

Acemoglu et al (2001) consider differences in colonial settlement. In regions where the mortality rates were dramatically high, European powers set up extractive colonies designed to take advantage of a region's endowment of natural resources without subjecting their own people to the maladaptive features of the physical environment. On the other extreme, when attractive places to settle were found, Europeans set up colonies that encouraged investment and properly enforced the rule of law. These basic underpinnings of institutions have persisted over time and can be seen in

the composition of the institutions today. Acemoglu et al (2001) point out that institutional quality is not predetermined by colonial origin, but rather that this is just one of many factors affecting institutional development and quality. The knowledge of a developing nation's legal origin can give us valuable insight into the likely structure of their institutions and the potential for institutional and policy reform. In my study, I incorporate cross-sectional variations in legal origin in examining the relationship between aid, institutions and growth.

Aid, Institutions, and Growth—Policy Environment

A growing body of research has determined that aid has a positive effect on economic growth, subject to a good policy environment. Burnside and Dollar (2000) conclude that aid has a positive impact on economic growth in developing countries with good fiscal, monetary, and trade policies. In the presence of poor policies, they find no evidence of a positive impact of aid on economic growth. Any tendency for aid to reward good policies is overwhelmed by aid donor's pursuit of their own strategic interests. They speculate that if more aid were to be allocated towards policy improvement rather than to buttress donor interests, the mean growth rate in developing countries would increase.

Hansen and Tarp (2000) take a closer look at Burnside and Dollar's (2000) claim regarding the impact of foreign aid on economic growth. They point out that recent literature, like Burnside and Dollar (2000), suggest that aid will only work if it is spent on the right countries with low inflation, small budget deficits, openness to trade, strong rule of law, and a competent bureaucracy—i.e. one with a good overall policy environment. Hansen and Tarp (2000) conclude that aid does not always have a positive impact on

economic growth in good policy environments. Rather, economic policies have an impact on the marginal productivity of aid. The effect of foreign aid or official development assistance on economic growth is subject to diminishing returns.

Rajan and Subramanian (2005) note that aid is often sent to developing countries in response to poor performance. They attempt to correct for this bias and perform a cross-sectional and panel analysis of foreign aid on economic growth. Unlike previous authors who claim that there is empirical evidence to support the hypothesis that foreign aid has a direct effect on economic growth, Rajan and Subramanian (2005) conclude that there is no evidence supporting this hypothesis – i.e., there is no evidence that foreign aid works more effectively in better policy or geographic environments. They don't close the door to aid in the future, but emphasize that the aid apparatus must be restructured or rethought. Currently, efforts are being made to understand aid mechanisms throughout the developing world. Policy makers and donor nations are looking to improve aid effectiveness in the developing world so that developmental assistance inflows received by third-world nations can be effectively used to grow the lagging economy.

Radalet (2006) investigates the effect of foreign aid on economic growth and tries to determine whether or not it is conditional upon a good policy environment. He examines aid magnitudes and looks to see who gives aid and who receives aid. He explores previous literature, divided between the stream of thought that aid doesn't have a significant effect on growth in any environment and the stream of thought that aid does have a significant effect on economic growth in certain environments. Radelet (2006) concludes that there is good reason to believe that people generally overestimate the effects of aid on economic growth. Aid had been less effective in spurring economic

growth than is often expected. Radelet (2006) finds that aid can keep bad governments in power for a longer time and undermine incentives for saving. He proposes that a more important role be taken by the leaders of the recipient nations to design programs for aid inflows that can effectively stimulate the economy. While there is no systematic evidence that changing aid mechanisms will improve its impact on sustained economic growth, establishing clearer goals for aid will likely help.

Bobba and Powell (2007) suggest that, since it matters for aid allocation, politics could also matter for aid effectiveness. They hypothesize that aid may be used to obtain political allegiance. Bobba and Powell believe that political allegiance is likely associated with a closer relationship between aid donor and aid recipient. Therefore, aid recipients will be more likely to buy goods and services from the donor nation that financed their ability to consume. Bobba and Powell conclude that foreign aid can be beneficial to economic development and growth. This effectiveness can occur independently from the policy environment of the recipient nation. They also warn that aid's effectiveness on economic growth could be a secondary effect and conclude that aid is used to buy political allegiance. According to the authors, the leading determinant for aid effectiveness is the donors' allocation policies.

Burnside and Dollar (2004) perform an empirical analysis designed to test the effects of foreign aid and institutions on economic growth. They note that most previous research argues that aid does not have a systematic, beneficial effect on economic growth. Using a data set covering a more recent time period (1990s), Burnside and Dollar look to find more empirical evidence to support their previous claim that aid's impact on economic growth is determined by the institutional quality and policy environment.

Burnside and Dollar (2000) conclude that aid has a positive effect on growth when developing countries have sound fiscal, monetary, and trade policies in place. While critics found holes in their argument over the next few years, Burnside and Dollar (2004) restructure the argument and use new data to shed light on foreign aid's true impact on growth.

Burnside and Dollar (2004) state that there has been a division in the field regarding the true effects of foreign aid on growth in the developing world. Some economists believe that aid works in any environment and the infusion of foreign inflows stimulates all economies. Others believe that aid doesn't work anywhere, suggesting we should look into the elimination of monetary developmental assistance.

While economists are divided in their views on foreign aid, Burnside and Dollar (2004) point out that there is widespread agreement that economic institutions and policies are key determinants of long-run growth. Hall and Jones (1999) argue that differences in capital accumulation and productivity are related to differences in social infrastructure. Social infrastructure refers to the institutions and policies set forth by national governments that create the environment where skills are developed, capital accumulation takes place, and output is produced. Since capital accumulation and productivity are key factors in determining output per worker in an economy, social infrastructure is a main growth determinant. Economists may not agree about the extent to which certain institutions impact growth in particular regions of the world, but the general idea that institutions are involved in enhancing or inhibiting growth is well accepted.

Another stream of research that has generated a relative consensus among

economists deals with the effect of foreign aid on institutions and policies. Aid does not systematically affect institutions and policies in a positive way. In fact, if foreign aid is given to a country with poor institutions and policies, it is very likely that, instead of stimulating institutional and policy reform, the aid will inhibit reform. So, while there is general agreement that institutions and policies affect growth and aid does not have a universal, positive effect on institutions and policies, there is a debate regarding the causal effect of aid on economic growth subject to institutions and policies.

Burnside and Dollar (2004) hypothesize that aid has a positive impact on growth in good policy and institutional environments. In their previous paper, they developed their own definition of institutional quality, but in this paper they changed their institutional quality definition to conform to the Kaufmann, Kraay, and Zoido-Lobaton index (KKZ) used in literature. They use the KKZ index as a measure of the extent to which institutions and policies create an environment that stimulates factors associated with economic growth.

In the next chapter, I present my sample selection, variable measurement and description and empirical tests on my extensions of Burnside and Dollar (2004)

VI. EMPIRICAL ANALYSIS

I extend Burnside and Dollar's (2004) study by updating it to a more recent time period as well as modifying its changing the empirical specifications. While Burnside and Dollar (2004) look at data between 1990 and 1999, I analyze the data for the same variables between 1996 and 2005. I replicate all other features of their model for my time period. I specify variables to match the Burnside and Dollar (2004) variable specifications as closely as possible. To deal with the endogenous right-hand side variables in the empirical models, I use the same set of instrumental variables and perform a two-stage least squares (2SLS) regression to generate my IV estimation.

The first model (Table 5, BD 2004) looks at aid, institutions, and economic growth subject to diminishing returns of aid. Hansen and Tarp (2000) introduce the idea that aid has positive effects on growth in all policy and institutional environments subject to diminishing returns. This claim is empirically extended by Burnside and Dollar (2004). Evidence of diminishing returns to aid in the model is inferred if the coefficient on the foreign aid term is positive and the coefficient on the foreign aid-squared term is negative. Burnside and Dollar (2004) find that there is a negative coefficient on aid and a positive coefficient on aid-squared, which is the opposite of what they would find under diminishing returns, but that the results are not significant. They claim that, even allowing for diminishing returns, there is no evidence that aid has an unconditionally positive effect on economic growth.

The second model (Table 6, BD 2004) looks at aid, growth, and institutions in the 1990s and includes an interaction term between aid and institutions. From the empirical

analysis conducted over the 1990s, Burnside and Dollar (2004) claim that "other than regional growth patterns, the thing we have most confidence in from the 1990s is that the combination of good institutions and foreign aid supports rapid growth in the developing world." The interaction of aid and institutions offers us insight into the combined effect of the two variables on economic growth. A significant finding tells us that, rather than either foreign aid or institutional quality being solely responsible for changes in economic growth, both must be involved in the equation. We would then be able to claim that foreign aid significantly and positively impacts economic growth in the developing countries where institutional quality is high.

Sample Selection and Data

To determine whether institutional quality is associated with economic growth in developing countries after controlling for structural differences, I use Burnside and Dollar (2004) as a starting point. My empirical models are built from Burnside and Dollar's (2004) analysis of the effect of institutional quality and aid on economic growth. I replicate and extend their paper, using variable definitions and empirical specification that are consistent with theirs. I first investigate whether the Burnside and Dollar (2004) results, which focus on the 1990's, are applicable to a more recent time period, 1996-2005. I chose to begin my analysis in 1996 partially because data on several variables in my study is more readily available subsequent to this time. To test for the stability and consistency of their findings over time, I use the Burnside and Dollar's (2004) list of 124 countries (Table 1A). Next, I use a broader mix of 148 developed and developing countries (Table 1B) to examine whether the effects of institutional quality and ODA on

growth in are statistically significant for these other countries. Finally, I extend Burnside and Dollar (2004) in two ways. First, I introduce legal origin into the model, because it has been shown in previous literature to be an important determinant of economic growth. Second, I explicitly consider cross-sectional differences in the policy environment, specifically trade, fiscal and monetary policies as important determinants of economic growth.

The countries I use for my empirical investigation are selected with the view to obtaining greater variability in dependent and independent variables so as to increase the power of the empirical tests. In addition to 24 OECD (Organization for Economic Cooperation and Development) countries that generally exhibit high, sustained levels of growth, I examine 95 developing nations. Of the set of developing nations (Figure 4 provides a breakdown of the nations in my study), 34 are in Sub-Saharan Africa (SSA), 13 are in the Middle East and North Africa (MENA), 27 are in Europe and Central Asia (EURCA), 21 are in East Asia and the Pacific (EPAC), and 29 are in Latin America (LATIN). These developing countries were chosen due to their World Bank classification as low-income, developing nations. Approximately 50% of the developing nations in my dataset (see Figure 4) come from the Middle East and the African continent (mainly SSA nations). While Burnside and Dollar (2004) draw a similar proportion of their countries from this region of the world (Figure 4), many of the countries they choose to study in Africa are not in the tropical sub-Saharan region. With the exception of Botswana and Mauritius, all of my sub-Saharan countries are drawn from Sachs' (2004) investigation on tropical sub-Saharan Africa.

In different regions of the developing world, structural barriers and institutional

systems are quite distinct. Including countries from different regions of the developing world potentially helps us determine what truly enhances or inhibits the effectiveness of foreign aid by increasing variability in the explanatory variables. The inclusion of the 24 OECD nations, countries so richly endowed that they donate foreign aid rather than receive it, increases variability in my dependent variable (average annual per capita GDP growth rate) as well as the independent variables.

In my extension of Burnside and Dollar (2004), I re-examine two models central to their analysis on aid, institutions and growth. The first model tests whether or not ODA has a positive effect in all institutional environments, and whether it is subject to diminishing returns. Burnside and Dollar (2004) introduce an aid-squared term to measure potential diminishing returns to ODA. They also use a second model with institutional quality, ODA, and a term interacting the two variables. While their findings aren't particularly significant in the base model (which is replicated in Table 4), they find a significant, positive coefficient on the aid-institution interaction term when removing outliers (Table 6) from their study. Since the world has changed dramatically over the past six years, it will be beneficial to examine whether this evidence of a relationship between aid, institutions, and growth still holds.

The core elements of my empirical model are derived from Burnside and Dollar (2004). The left-hand side variable measures the average annual per capita growth rate in GDP on a percentage basis. From 1996-2005, the mean value for this variable is 2.24% in Burnside and Dollar's (2004) dataset (Table 2A) and 2.82% for the 119 countries in my sample (Table 2B). In both cases, standard deviations are higher than the mean value, reflecting the dispersion in this variable that can be attributed to the heavy concentration

of developing nations in the samples. As I am interested in the factors which are associated with average growth levels that have been sustained in a country, a cross-sectional analysis is appropriate. Using average growth rates abstracts from short term fluctuations.

Burnside and Dollar (2004) examine the claim made by Hansen and Tarp (2000) that aid has a positive effect on growth in all policy environments. They argue, however, that this effect is subject to diminishing returns. Their core model involves four important explanatory variables that are related to economic growth.

First, the log of initial income measures the log of real GDP per capita in the first year of their study. Levels of initial income vary significantly from one country to the next and significantly affects how fast or slowly a country grows within a given time period. Additionally, the log of initial income (LNY96) is included in the model because previous literature claims that, in the long run, incomes converge. Since I am dealing with a 10-year time period, the evidence for whether or not national incomes converge in this time frame is not as clear. Therefore, I look at the Burnside and Dollar (2004) specification (testing the aid-institution interaction effect) both with and without the log of initial income. The mean values for the log of initial income in the Burnside and Dollar (2004) sample and in my sample are 3.27 and 3.20 respectively (Tables 2A and 2B). If I assume that incomes tend to converge over a ten-year period, then countries with lower initial incomes will have higher growth potential in the cross-sectional study.

Second, institutional quality (AVG6) is the average of the six Kaufmann-Kraay governance indicators. The mean value for AVG6 in the Burnside and Dollar (2004) dataset is 0.05 and the observations range from -1.88 to 1.86 (Table 2A). The mean value

for AVG6 in my sample is -0.11, with observations in a fairly similar range from -2 to 1.86 (Table 2B). It is important to emphasize that this standard deviation for this variable is larger than other variables due to the way it is defined. The value for each of the six indicators in any given year is an estimate based on individual observations made by a diverse group of sources on a given country. We are essentially looking at an average of an average. Effective institutions create the environment within which an economy can generate and accumulate capital and eventually grow.

The third and fourth variables that are central to the Burnside and Dollar (2004) model relate to foreign aid, or official developmental assistance (ODA). The third variable is ODA inflows for a given developing nation as a percentage of that nation's GDP. For countries in our sample that are aid donors, this variable is assigned a value of 0 since there is no developmental assistance flowing into the country. In Burnside and Dollar's (2004) dataset, the average amount of aid is 1.29% of the GDP (Table 2A), whereas in my sample, the average amount of aid is 6.61% of GDP. There are a few countries found only in my sample that are highly dependent on official development assistance, the largest (Marshall Islands) having aid inflows account for 56.58% of GDP (Table 2B). In both cases, the average value is weighed down by the fact that all aid donors are assigned a value of 0. Taken together, the summary statistics indicate that my sample has a lower average growth rate, poorer institutional quality and higher levels of developmental aid in comparison with the data used by Burnside and Dollar (2004). This is not surprising since my study focuses more strongly on the most impoverished regions of the world like SSA countries.

The fourth variable in the model differs depending on the purpose of the analysis.

Aid is measured as the level of ODA as a percentage of a country's real GDP for a particular year. For the model that looks for positive effects of aid subject to diminishing returns, I include an aid-squared (AIDGDPSQ_AVG) term since I predict, consistent with Burnside and Dollar (2004) that the positive effect of aid on growth will diminish as aid inflows increase. Evidence of diminishing returns will be seen if there is a significant, positive coefficient on the aid term and a robust, negative coefficient on the aid-squared term.

To address endogeneity issues, Burnside and Dollar (2004) use a set of instrumental variables that has been developed in empirical analyses of cross-sectional growth models. There are eight instrumental variables. First, LOGTOTPOP measures the log of the total population in a country during the initial year of the study (in my case, 1996). Second, LOGTOTPOPSQ measures the square of LOGTOTPOP. Third, LATIT measures the distance from the capital of a country to the equator by the degree of latitude. Fourth and fifth, ENGFRAC measures the percentage of a country's population that speaks English and EURFRAC measures the percentage of a country's population that speaks a major European language. While Burnside and Dollar's (2004) sample has means of 10% and 27% respectively (Table 2A) for ENGFRAC and EURFRAC, my sample (Table 2B) reports means of 8% and 26% for these two instrumental variables. The countries I examine seem to have heavier concentrations of people speaking their native language. Sixth through eighth, LATIT, ENGFRAC, and EURFRAC are interacted with LOGTOTPOP giving us three variables: POPENG (the interaction of the population variable with ENGFRAC), POPEUR (the interaction of the population variable with EURFRAC), and POPLATIT (the interaction of the population variable

with LATIT). There is no evidence of association between these instrumental variables and the right-hand side endogenous variables, but there is evidence that these variables are correlated with economic growth rates.

Burnside and Dollar (2004) Replication: Aid, Growth, and Diminishing Returns

When looking at data ranging from 1990 to 1999, Burnside and Dollar (2004) find no evidence of an unconditional positive link between aid and economic growth, even when allowing for diminishing returns in this effect. In their OLS regression, they find a significantly negative coefficient for the aid variable and a significantly positive coefficient for the aid-squared variable, which are both contrary to their predicted sign[4]. Further, their findings are not robust to their instrumental variable specification to counter potential endogeneity issues. In fact, when performing a two-stage least squares regression (2SLS) involving their set of instrumental variables, their results for the log of initial income and institutions (which were initially significant) are no longer significant. Burnside and Dollar (2004) also find no evidence suggesting that institutional quality or levels of initial income plays a significant role in determining growth rates.

The Burnside and Dollar (2004) model that I extend over time is as follows:

$$GROWTH9605 = \beta_0 + \beta_1*LNY96 + \beta_2*AVG6 + \beta_3*AIDGDP\_PCTAVG + \beta_4*AIDGDPSQ\_AVG + \beta_5*EAP + \beta_6*SAR + \beta_7*FSU + \varepsilon_i \quad (7)$$

Consistent with Burnside and Dollar (2004) I measure GROWTH9605 as the

[4] To see an aid effect on growth subject to diminishing returns, the coefficient on aid needs to be significant and positive, while the coefficient on aid-squared needs to be significant and negative. The negative coefficient on aid-squared tells us that, as aid increases, the positive effect of aid decreases.

average annual growth rate of real GDP per capita between 1996 and 2005 (World Bank statistical database). The three regional dummy variables capture developing countries in the East Asia and Pacific (EAP), South Asia (SAR), and the Former Soviet Union (FSU) as categorized by the World Bank.

I also define explanatory variables to align closely with the B&D definition. Burnside and Dollar (2004) define the log of initial income (LNY90) as the log of real GDP per capita in 1990 (the first year of their period of study), measured in constant 1996$. To closely match this definition, I define the log of initial income (LNY96) as the log of real GDP per capita in 1996 (the first year of my period of study). Since they measure GDP per capita in constant 1996$, they essentially time-average the value of the money to investigate the average annual real per capita growth rate over the decade. Consistent with this approach, I look at real GDP per capita in constant 2000$.

Since the Kaufmann-Kraay governance indicators were developed in 1996, Burnside and Dollar (2004) are unable to incorporate this variable in the first half of their study. Arguing that the indicators do not possess much variability over time, Burnside and Dollar (2004) determine that the institutional variables measured in 1996 serve as an adequate proxy for institutional quality over the decade. Instead of using a single-year measure for institutional quality, I use the average of the six Kaufmann-Kraay governance indicators over the period from 1996-2005. In other words, I first take the average of the six indicators in year i (where i goes from 1 to 7). This gives me seven values for the average of the six indicators. Then, I take the average of these seven values. This captures seven years worth of data on institutional quality. I consider this average of governance indicators to be a more appropriate representation of institutional

quality because it captures how institutions have responded to unexpected catastrophes (financial disasters, natural disasters, etc.) or sudden good fortune. For example, not only did the East Asian financial crisis in 1998 play a possible role in shaping the institutional quality of several countries in the region, it also gave us an opportunity to examine how institutions potentially display strength and resolve to keep their country moving in a positive direction in the face of an adverse situation.

In examining foreign aid, Burnside and Dollar (2004) are specifically concerned with official development assistance (ODA) inflows. The effect of ODA outflows on aid donors is not consequential to their analysis, so they determine that each aid donor should have an ODA of 0 (since they have no aid inflows). Like Burnside and Dollar (2004), I also look at annual ODA as a percentage of GDP and calculate the average annual developmental assistance inflows from 1996 to 2005.

The instrument set used in IV estimation is the same one used by Burnside and Dollar (2004) and is common in cross-sectional growth empirics. The only instrumental variable that is time dependent is the log of total population, for which I use the log of total population in 1996 rather than the log of total population in 1990 used by Burnside and Dollar (2004). This difference affects every instrumental variable that contains the population term. This includes the interaction and squared terms in which population is contained. The two-stage least squares regression (2SLS) treats LNY96, AVG6, AIDGDP_PCTAVG and AIDGDPSQ_AVG as endogenous variables and uses the instrument set as described above. I use IV estimation because I am unsure about the direction of causality assuming I obtain significant results in my OLS regression. Foreign aid and institutional quality could cause economic growth, but it could also be the case

that higher economic growth causes changes in foreign aid and institutional quality. My focus in this study is to examine whether the first direction of causality exists, while considering reverse causality possibilities.

When extending Burnside and Dollar's (2004) model of aid's effect on economic growth to years 1996 to 2005, I do not find evidence to support that aid has a positive effect on growth and is subject to diminishing returns. Contrary to expectations, but consistent with Burnside and Dollar (2004), I find a negative coefficient (0.85 - significant at the 5% level with a T-statistic of -2.10) on the aid variable (Table 3). When controlling for regional dummy variables, the significance of the effect of aid on economic growth drops out in the OLS estimation (Table 3). In the OLS estimation that doesn't control for regional indicators, the coefficient on LNY96 is negative and significant at the 10% level (Table 3), suggesting that there is an association between low initial income and high economic growth. I find no significant results when considering the endogeneity of the right-hand side variables and using the same set of instrumental variables used by Burnside and Dollar (2004), with the lone exception being the dummy variable representing countries in the Former Soviet Union (FSU). Since only 2% of the countries in the Burnside and Dollar (2004) sample are located in the FSU region, there is reason to believe that no more than a couple of countries drive the result. For the most part, significant results found in the OLS regressions are washed away by the instrumental variable (IV) estimation. There is insufficient evidence that aid has a positive effect on economic growth in all institutional environments. Furthermore, there is no evidence that an effect is subject to diminishing returns. The recent data also suggests that there is no evidence of an effect of institutions on economic growth, in

accordance with the findings of Burnside and Dollar (2004). Two countries, Taiwan (China) and Barbados, are dropped from the above analysis[5]. The omission of these two countries should not play a significant role in the degree to which this model extends Burnside and Dollar (2004) over time. We can conclude that, over time, there has been nothing to suggest that this unconditional positive link between aid and growth suggested by Hansen and Tarp (2000) exists.

The Effect of Aid and Institutions on Growth

Burnside and Dollar (2004) also examine the joint effect of aid and institutions in stimulating economic growth. While aid or institutions may not have significant, isolated effects on economic growth, the combination of high levels of ODA and high institutional quality could increase levels of economic growth. If results of this interaction term are indeed significant, then we can interpret this coefficient to measure the effect of aid on economic growth conditional on a quality institutional environment. When looking at developing nations in the 1990s, Burnside and Dollar (2004) find a significant (at the 10% level), positive effect of the aid-institution interaction term on economic growth when dropping the dummy variables describing different regions. In fact, their results become even more significant (at the 5% level) when they identify and remove two outliers, Haiti and Equatorial Guinea, that each report rapid economic growth and very poor institutions in the 1990s. This finding is no longer sensitive to the inclusion of the regional dummy variables in the regression model. Based on their empirical results, Burnside and Dollar (2004) conclude that aid positively affects economic growth

[5] Taiwan is now administered by the Republic of China and is no longer an independent country. The entry for Barbados in the WDI has no data for the log of initial income variable (World Development Indicators, 2006).

in a quality institutional environment.

Instead of including the aid-squared term, this model includes a term interacting official development assistance inflows with institutional quality (AIDAVG6):

$$GROWTH9605 = \beta_0 + \beta_1*LNY96 + \beta_2*AVG6 + \beta_3*AIDGDP\_PCTAVG + \beta_4*AIDAVG6 + \beta_5*EAP + \beta_6*SAR + \beta_7*FSU + \varepsilon_i \quad (8)$$

The interaction term, AIDAVG6 assesses the combined effect of ODA inflows and institutional quality on economic growth. A positive coefficient on this variable would provide evidence that developmental assistance combined with high quality institutions is conducive to economic growth. An internal modification of institutional structures and systems is needed before the aid recipient can see the true benefits of developmental assistance inflows.

Table 4 contains the results of my extension of Burnside and Dollar's (2004) model, shown in equation (8) above (now including the AIDAVG6 term). The positive coefficients on AIDAVG6 (0.58 without regional dummy variables, 0.53 with regional dummy variables) are both significant at the 5% level. This indicates that there is evidence of an association between the interaction of aid and institutions and the average annual per capita growth rates of nations in Burnside and Dollar's (2004) sample. To explore this relationship further, I control for endogeneity concerns by introducing the set of instrumental variables used in the previous model and run a two-stage least squares (2SLS) regression. When instrumenting for the endogenous variables in this model, the positive coefficients on AIDAVG6 become statistically insignificant (Table 4). There is no evidence that the correlation witnessed between AIDAVG6 and GROWTH9605 in the OLS estimation implies that the direction of causation runs from AIDAVG6 to

GROWTH9605. In other words, there is no evidence that the interaction of foreign aid and effective institutions lead to higher levels of sustained economic growth. Burnside and Dollar (2004) find similar effects when they run the model with the 124 countries in their study. Again, there is no reason to believe that the omission of Taiwan and Barbados from my analysis affects the degree to which the Burnside and Dollar (2004) model is replicated and extended over time.

Burnside and Dollar (2004) identify and remove two outliers—Haiti and Equatorial Guinea – and find interesting results on the combined effects of foreign aid and institutions as described above. In order to extend Burnside and Dollar's (2004) analysis over time, I remove Equatorial Guinea from my country list, but cannot remove Haiti. With data from a new time period, Equatorial Guinea is still a notable outlier with an average governance rating (AVG6) of -1.30 and an average annual growth rate (GROWTH9605) of 20.34%. The mean values for these two variables are 0.05 and 2.16% respectively. On the other hand, Haiti's average annual growth rate from 1996 to 2005 was -0.4% compared to 12.13% between 1990 and 1999. Perhaps, Haiti's poor institutions caught up with it over time and periods of turbulence and significant political and economic events during recent years had lasting effects. Whatever the reason, Haiti can no longer be considered an outlier and is, in fact, an influential observation in the more recent study. Since Haiti's exclusion is problematic, I consider the model simply without Equatorial Guinea.

When the Equatorial Guinea observation is removed from the sample, the positive effect of institutions (AVG6) is significant at the 1% level, with a positive coefficient of 1.67 with and without regional dummy variables (Table 6). The coefficients on the aid

variable (AIDGDP_PCTAVG) and the log of initial income (LNY96) are statistically significant at the 1% level without regional dummy variables. When regional dummy variables are added to the OLS estimation, the significance of the aid variable disappears, but the coefficient on LNY96 is still negative and significant at the 1% level. The OLS estimations tell us there is strong evidence of a positive association between institutional quality and economic growth. There is also evidence of a strong, negative association between initial income levels and economic growth, suggesting conditional convergence of incomes over a 10-year time horizon. However, there is no evidence of a joint effect of aid and institutions on economic growth. These results do not consider potential endogeneity effects. When instrumental variables are included in a 2SLS regression, the effect of the aid variable on economic growth is no longer significant even when regional indicators are omitted from the estimation. However, the coefficients on the log of initial income and institutional quality remain highly statistically significant. This indicates that while there may not be evidence suggesting that aid has an effect on growth in positive institutional environments, the data implies that institutional quality may have a direct effect on economic growth, regardless of the level of developmental assistance flowing into a given country. Also, the evidence is consistent with the idea that incomes converge over a 10-year period and lower initial income levels predict higher growth rates.

Burnside and Dollar (2004) also consider the potential effects of aid and institutions on growth when removing the log of initial income variable (LNY90 in BD (2004) model and LNY96 in my model). They defend this omission by pointing out that previous literature has provided mixed evidence for convergence over a period as short as a decade. They find that AIDAVG6 is the only statistically significant variable when they

run the IV estimation without the log of initial income variable.

$$GROWTH9605 = \beta_0 + \beta_1*AVG6 + \beta_2*AIDGDP\_PCTAVG + \beta_3*AIDAVG6 + \beta_4*EAP + \beta_5*SAR + \beta_6*FSU + \varepsilon_i \quad (9)$$

When I extend the model to analyze the decade between 1996 and 2005, I find significant, positive joint effects of aid and institutional quality on economic growth (GROWTH9605) in the OLS regressions. These coefficients are significant at the 5% level and suggest that a one-unit increase of the interaction term (AIDAVG6) results in an estimated average annual per capita growth rate increase of .63% when regional indicators are omitted and an increase of .57% when they are included. The significance of these results, however, drops when I conduct the IV estimation using the same instrument set as Burnside and Dollar (2004). While there is evidence that aid and institutions are associated with economic growth in this environment, there is no significant evidence that the interaction of developmental assistance and institutional quality predicts or *causes* higher economic growth. One can conclude that the effects of institutional quality in augmenting the impact of foreign aid on economic growth in developing nations have worn off over the past six years. Perhaps the effects of institutional quality on aid and economic growth were exaggerated based on the definition of variables in the Burnside and Dollar (2004) study. By defining the institutional quality variable as the average of the six Kaufmann-Kraay governance indicators in 1996, Burnside and Dollar (2004) do not capture fluctuations that exist in the variable over time. When this method for measuring governance indicators is developed by Kaufmann et al in 1996, it was not nearly as sophisticated as it is now. In

2005, the measurement for governance indicators was based on a more diverse array of sources and the estimates captured a wider range of characteristics related to each one of the six aggregate indicators.

Aid, Growth, and Institutions controlling for Legal Origin

While Burnside and Dollar (2004) test for the effects of aid and institutions on economic growth, they do not consider whether the strength of their effects are sensitive to other factors associated with institutional development and, consequently, economic growth. The way in which governments institute and enforce rules amongst its society can be influenced, to a significant extent on the legal origin of a country.

There is a considerable literature suggesting that legal origins of countries contribute to economic growth because they determine the type of institutions that these countries inherited (La Porta et al, 1997, 1998, 1999). Differences in legal origin might therefore proxy for diversity among institutions (Acemoglu et al (2002)). Of the legal origins most commonly analyzed – French, German, British and Socialist – the British legal origin is found to be most beneficial for economic growth, followed in order by the German legal origin and the French legal origin (Beck, Demirguc-Kunt, and Levine (2004)). I therefore include legal origins as an explanatory variable in my growth regressions.

The model that I will test is an extension of the two Burnside and Dollar (2004) models used in earlier empirical analysis. Along with the components of the base model, I control for legal origin in the extended model:

$$GRGPCAVG = \beta_0 + \beta_1 * LNGDP96 + \beta_2 * AVG6 + \beta_3 * AIDPCTGDP + \beta_4 * AIDPCTGDPSQ + \beta_5 * FRENLAW + \beta_6 * BRITLAW + \beta_7 * SOCLAW + \beta_8 *$$

$$GERLAW + \beta_9 * OECD + \beta_{10} * EURCA + \beta_{11} * MENA + \beta_{12} * SSA + \beta_{13} * EPAC + \varepsilon_i \quad (10)$$

There are five legal origins and every nation falls under one of these five. FRENLAW or French legal origin and BRITLAW, or British legal origin, are the two most common among the five civil codes. Out of the 108 countries for which legal origin data is gathered for this analysis (NationMaster.com (2007)), approximately 53% have a French legal origin while another 19% have a British legal origin (Table 2B). Past literature has shown that countries with a British legal origin generally have a higher growth rates than countries with a French legal origin, ceteris paribus (Acemoglu et al (2002), Beck et al (2004), La Porta et al (1999)). The other three legal origins are the Socialist legal origin, SOCLAW, the German legal origin, GERLAW, and the Scandinavian legal origin, SCANLAW. Since these are the only legal origins a country could possibly have, I drop SCANLAW in our model. Accordingly, when all the other legal origin dummies are 0, I will be looking at the effect on economic growth of the Scandinavian legal origin.

In this model, I also have regional dummy variables that are different from Burnside and Dollar's (2004) classification, due to my expanded data set. Five of the six regional dummies that capture all countries in the sample are included in equation (10) above. The sixth region is Latin American (LATIN). Significant results for regional dummy variables will show that, when institutional quality and developmental assistance are equal across regions, other factors not explicitly included in the model that distinguish one region from another are associated with cross-sectional differences in growth rates.

The empirical model illustrated in equation (10) looks at the effects of legal origin on aid, institutions, and growth. Specifically, it investigates Hansen and Tarp's (2000)

claim that aid has positive effects on growth in all institutional environments subject to diminishing returns after controlling for nations' legal origins. Empirical results show insignificant coefficients on all four endogenous variables in the OLS estimations that control for legal origin (two estimations—one with regional indicators and one without). Most notably, the insignificance of coefficients on the aid and aid-squared terms in this environment indicates that there is no evidence of a positive association between aid and economic growth subject to diminishing returns (Table 7A). However, when controlling for endogeneity issues in Table 7B, the negative coefficient on the aid term becomes significant at the 5% level. The coefficient on the aid-squared term remains insignificant. While there is evidence suggesting that lower amounts of official developmental assistance (AIDGDP) may stimulate economic growth, there is no evidence that aid positively impacts economic growth in all institutional environments subject to diminishing returns.

In the next pair of OLS estimations (Table 7A), I remove the legal origin dummy variables and look at Burnside and Dollar's (2004) base specification with my sample of countries. The OLS coefficient estimations for my four endogenous variables are insignificant regardless of whether or not regional dummy variables are included. When addressing endogeneity concerns in the 2SLS estimation that omits the regional dummy variables, the coefficient on institutional quality is highly positive and significant at the 5% level and the coefficient on the log of initial income is highly negative and significant at the 5% level (Table 7B). This result suggests that institutional quality positively affects economic growth and that there is evidence of conditional convergence (negative effect of the log of initial income variable). When considering potential diminishing return

effects of aid, there seems to be an isolated effect of institutional quality on economic growth. There is no evidence of an effect of aid on growth subject to diminishing returns, which is consistent with Burnside and Dollar's (2004) finding.

In the next set of OLS estimations, I drop the aid-squared term and examine the separate effects of aid inflows and institutional quality on economic growth (Table 7A). When I omit the regional and legal origin dummy variables, I find a statistically significant, negative effect (-0.70) of aid inflows on economic growth (Table 7A). There is evidence that aid inflows are negatively correlated with economic growth, which carries policy implications. When the regional indicators are included in the model, the significance of the aid coefficient disappears, but the negative coefficient on the log of initial income becomes significant at the 5% level (Table 7A). When I instrument for the endogenous variables to examine whether anything can be said about the direction of the effect in this relationship (i.e. does aid inflows predict less economic growth or does lower economic growth suggest that a country will receive more in developmental assistance?), the three endogenous variables (initial income, institutions, and aid) all become statistically significant in the model that drops both legal origin variables and regional dummy variables. The coefficient on the log of initial income is highly negative and significant at the 10% level, suggesting that countries with lower initial incomes are predicted to have higher estimated growth rates (evidence of conditional convergence). The positive coefficient on institutional quality is significant at the 5% level and the negative coefficient on the aid variable is significant at the 10% level. In a controlled environment where we consider the effects of legal origin and regional dummy variables, there is no evidence of effects of aid or institutional quality on economic growth. When

we drop these restrictions from our model, the isolated effects of aid and institutional quality on economic growth are picked up. Based on these empirical results, we can conclude that foreign aid inflows likely have a negative impact on economic growth. Institutional quality, similarly, has a positive impact on economic growth in the predetermined environment mentioned above. Poor institutions can be changed easily under some legal origins (like the British), but not so much under others (like the French). The effectiveness of aid might be dependent on the legal origin and institutional quality of a developing nation, but we will look at the interaction effects of aid and institutions a little later. This means that economic development and growth may not necessarily be achieved through targeted infusions of developmental assistance as Jeffrey Sachs (2004) suggests; if anything, my empirical results are consistent with the argument that aid could be detrimental to economic growth, possibly because it discourages the internal development of political, social, and economic institutions.

The final set of OLS estimations consider the effects of institutional quality on economic growth without controlling for aid inflows (Table 7A). In the OLS estimation that controls for regional indicators, but omits legal origin variables, the coefficient on the log of initial income is significant and negative, suggesting that there is an association between countries with lower levels of income and higher average annual growth rates. When instrumenting for the two endogenous variables (initial income and institutions), the coefficient on institutional quality is positive and significant at the 10% level only when the model controls for both legal origin variables and regional dummy indicators (Table 7B). While there is reason to believe from previous regressions that there is a positive association between institutional quality and economic growth, the direction of

causality is unclear.

The tropical sub-Saharan African region is an interesting case study as it is an extremely impoverished region. Its local economies are in such poor condition that Sachs (2004) wonders how these countries can possible rise out of their "poverty trap". Figure 5G illustrates one of the contributing factors to poor economic growth in this region. The graph shows differences in institutional quality (AVG6) by region based on the countries observed in my sample. Figure 5G shows that SSA has, on average, the lowest levels of institutional quality among all regions of developing nations in the study. Countries in the EURCA region (Europe and Central Asia) seem to be associated with higher levels of economic growth, all else being equal. This is consistent with Figure 5G, which illustrates that the EURCA region has the highest level (least negative) of institutional quality among the four regions of developing nations in the study. Along with differences in institutional quality, this region differs from other regions of the developing world in the extent to which structural variables (disease burden, education, wars, etc.) affect economic prospects. While structural deficiencies play a role in determining SSA's growth rate, institutional quality in the region lags behind that of the rest of the world and creates an environment under which sustaining economic growth is relatively difficult.

Generally, the insignificance of coefficients in this model is not surprising. A quick look at Figures 1B, 2B, and 3B shows a random scatter of observations when aid, institutions, and economic growth are plotted against one another. Figure 1B is particularly noteworthy because the plot appears to show no evidence of a linear relationship between institutional quality (AVG6) and economic growth (GRGPCAVG). Hence, there are limitations when one tries to fit a linear model to this sample of data.

The next model looks at how the legal origin dummy variable impacts the study of a joint aid-institution effect on economic growth.

$$GRGPCAVG = \beta_0 + \beta_1 * LNGDP96 + \beta_2 * AVG6 + \beta_3 * AIDPCTGDP + \beta_4 * AIDAVG6 + \beta_5 * FRENLAW + \beta_6 * BRITLAW + \beta_7 * SOCLAW + \beta_8 * GERLAW + \beta_9 * OECD + \beta_{10} * EURCA + \beta_{11} * MENA + \beta_{12} * SSA + \varepsilon_i \quad (11)$$

The only changes from equation (10) to equation (11) are the omission of the aid-squared term and the inclusion of an interaction term (AIDAVG6) measuring the joint effect of aid and institutions on economic growth. The aid-squared term from the previous model is replaced with this interaction term. This model will test the effects on aid and institutions on economic growth and determine whether the inclusion of legal origin dummies changes the nature of this relationship.

In general, while including legal origins in the model increases its explanatory power (R-Squares increase from 0.31 to 0.4—Table 7A), the legal origins dummy variable is not statistically significant, except for the SOCLAW dummy which is positive and significant.

When I control for regional variables and drop the legal origin dummy variables in the OLS estimation, I find a negative coefficient on AIDAVG6 (-0.12) that is statistically significant at the 1% level (Table 8). This suggests that there is a small, negative association between the interaction of aid and institutions and economic growth. Either an increase in aid inflows or a rise in institutional quality results in higher levels of economic growth, but not both taken together. Perhaps, aid and institutions are seen as substitutes in explaining economic growth. When the regional indicators are dropped from the model, the negative coefficient on the aid variable is statistically significant at the 5% level (Table 8), suggesting a negative association between aid and economic

growth in this environment. The coefficient on institutional quality (1.17) is statistically significant at the 5% level and the coefficient on the aid-institution interaction variable is negative and highly significant (Table 8). This last observation based on the model that omits legal origin variables is particularly noteworthy. A negative joint effect of aid and institutions suggests that, even when institutional quality is relatively high, aid inflows are negatively associated with growth in a developing economy. Even though the magnitude of the coefficient on institutions is greater than that on the aid variable, the negative effect of aid seems to outweigh the positive effect of institutional quality. When instrumenting for the endogenous variables in this model, the significance found in the OLS estimation disappears, suggesting that growth may be driving the effectiveness of aid in good institutional environments. In the IV estimation of the model that omits legal origin and regional variables, a positive effect of institutional quality is significant at the 10% level, indicating that there is some evidence that institutional quality alone is a better predictor of economic growth than aid or the interaction of aid and institutions (Table 8).

When using the set of instrumental variables used by Burnside and Dollar (2004) to handle issues of endogeneity in some right-hand-side variables, all of the coefficients that were previously statistically significant become insignificant. While the model suggests that there is an association between aid, institutions, and growth, there is a lack of evidence supporting the claim that the combination of aid inflows and good institutional quality predict sustained economic growth. Rather, there is slightly more compelling evidence that, in a restricted model that omits legal origin and regional indicators, institutional quality has a direct effect on growth, regardless of the aid inflows into a developing nation. When legal origin is included in the model, there is no evidence

suggesting that a combination of aid inflows and high institutional quality predicts a rise in sustained levels of economic growth. I infer from the above analysis that while legal origins might not directly be significantly associated with growth, it likely has an impact on a country's institutions and governance structures, which are associated with growth.

Aid, Growth, and Institutions controlling for Policy Environment

In addition to legal origin, a nation's policy environment likely impacts its ability to grow. The policy environment is composed of trade policy, fiscal policy, and monetary policy. The trade policy variable, TRADE2000, is the sum of exports and imports over the real GDP. It is a measure of trade openness. Economists argue that trade openness can increase per capita incomes and incomes of poor nations if trade policies consider developing country interests. A growing consensus based on the recent body of economic literature suggests that trade openness has a direct, positive effect on per capita growth rates in the developing world (Edwards (1998); Frankel and Romer (1999); Matusz and Tarr (1999); Rodrik (1999)). The monetary policy variable, M2GDP, measures the amount of money and quasi money (M2) in a nation's economy as a percentage of its GDP.]The rate at which M2 grows in an economy has direct implications on the growth rate of GDP in that country. Outreville (1999) notes that the size of a nation's financial intermediary sector can be measured by the ratio of money and quasi money to GDP. M2GDP is a numerical representation of the development of a country's financial system. If a developing country experiences high inflation, then the development of their financial system suffers. Studies like King and Levine (1993) have shown that M2GDP has a significant, positive association with economic growth. High inflation lowers

M2GDP ratios because people reduce their M2 money and shift to real or foreign exchange assets. Finally, a measure of fiscal policy, SURP, is included to examine a nation's cash surplus or deficit (as a percentage of GDP). Sound fiscal policies are generally characteristic of high quality institutions. If a country's leaders are incapable of instituting proper fiscal policy and maintaining appropriate levels of surplus or carrying a deficit when necessary, then they fail to set the proper environment under which sustained economic growth can occur.

The first model examines the effect of policy environment variables when studying the potential diminishing returns of aid:

$$GRGPCAVG = \beta_0 + \beta_1 * LNGDP96 + \beta_2 * AVG6 + \beta_3 * AIDPCTGDP + \beta_4 * AIDPCTGDPSQ + \beta_5 * M2GDP + \beta_6 * SURP + \beta_7 * TRADE2000 + \beta_8 * OECD + \beta_9 * EURCA + \beta_{10} * MENA + \beta_{11} * SSA + \varepsilon_i \quad (12)$$

Similar to the model with legal origins, this model (equation (12)) studies the effects of regional dummy variables. If I find significant effects of aid and/or institutional quality on economic growth, it may be attributed to the policy environment. In other words, the effect of aid and institutions on economic growth could exist only in certain policy environments (i.e. countries in which policies are sound). When examining the effectiveness of aid (particularly, whether institutional quality impacts the effectiveness of aid), a broad base of research points to policy environments (Burnside and Dollar (2000); Easterly (2003)). Policies are easier to reform than institutions. A poor policy environment supported by strong political and economic institutions can generally be corrected, whereas it is often difficult to change the fundamental nature of institutions if institutional quality is weak.

The endogenous variables in our model are not significant in the OLS estimations

that test for two types of aid-growth relationships: a linear and a nonlinear relationship (with the introduction of the aid-squared term). When regional variables are included in the model, the coefficient on SURP is statistically significant at the 1% level, suggesting an association between economies that are running a cash surplus and average annual per capita economic growth. The significance of the coefficient drops when regional dummy variables are eliminated from the model. Regional indicators significantly increase the explanatory power of these models. In Table 9, when regional variables are included in the model, the R-squared is .46 or .48 depending on whether or not the aid-squared term is included. When these regional indicators are dropped from the model, the R-squared value drops significantly down to .04 or .05 depending on other restrictions in the model. The coefficient on the EURCA (countries in Europe and Central Asia) is positive and highly significant at the 1% level. Institutional and policy environments in this region may be associated with higher levels of sustained economic growth than environments in other regions of the developing world.

When instrumenting for the four endogenous variables in the model (three in the model that looks for a linear relationship between aid and growth), the coefficients on the log of initial income, institutional quality, and the aid variable become statistically significant at the 5% level in the most restrictive model—the one that drops the aid-squared term and the regional dummy variables. In a strong policy environment, institutional quality has a strong, positive, direct impact on economic growth, while aid inflows have a significant, negative impact on growth. The evidence further points in the direction of institutions. The impact of aid inflows is not nearly as lasting as a dramatic alteration of the institutional structure in a developing nation. The insignificance of the

estimated coefficients on the aid-squared term does not support the hypothesis that aid is subject to diminishing returns, other things being equal.

The final model looks at the policy environment in the model examining the joint effects of aid and institutions on economic growth.

$$GRGPCAVG = \beta_0 + \beta_1 * LNGDP96 + \beta_2 * AVG6 + \beta_3 * AIDPCTGDP + \beta_4 * AIDAVG6 + \beta_5 * M2GDP + \beta_6 * SURP + \beta_7 * TRADE2000 + \beta_8 * OECD + \beta_9 * EURCA + \beta_{10} * MENA + \beta_{11} * SSA + \varepsilon_i \quad (13)$$

The OLS estimations of this model yield statistically insignificant coefficients on AIDAVG6, both when I control for regional dummy variables and when I drop them from the regression (Table 10). This suggests that there is no association between aid inflows, institutional quality and economic growth after controlling for policy environment. The coefficient on the aid variable is positive and significant at the 10% level, but the significance of this coefficient drops when I instrument for the endogenous variables. While I can not say that aid helps stimulate economic growth in developing nations, there is evidence of an association between the variables. Consistent with results we have seen in previous empirical specifications, the coefficient on EURCA is highly statistically significant and positive (Table 10). This trend has been evident throughout the models in which my dataset was used to test the empirical specification. It is clear that higher levels of institutional quality combined with other determining characteristics make the Europe and Central Asian region of developing countries more likely to move out of their low-income status. Additionally, the measure of fiscal policy (SURP) is statistically significant at the 5% level when regional variables are included in the regression. Therefore, there is evidence of an association between fiscal policy and economic growth.

When I perform a two stage least squares regression and introduce the set of instrumental variables (treating the policy variables as exogenous), all coefficients of endogenous variables in the model are insignificant (Table 10). There is no evidence suggesting that, in a controlled policy environment, the combination of aid inflows and high institutional quality has any direct effect on economic growth. In fact, there is no evidence that sound fiscal policy directly causes economic growth even though the OLS estimation suggests that there is an association between the fiscal policy measure (SURP) and average annual per capita growth.

VII. CONCLUSIONS AND POLICY IMPLICATIONS

Many economists and politicians advocate increased foreign aid to help stimulate lagging economies of third world countries. In the Washington Post, Paul Blustein (2002) reports that, by 2006, members of the European Union (EU) would be donating 0.4% of their GDP in aid to the developing world compared to 0.1% by the United States. The article also states that President George Bush supports a proposal that would increase assistance to developing nations by 14% over the then current levels of $11 billion. Leaders of aid-donating countries often assume that providing developmental aid will produce results if the aid recipient is held accountable for the allocation of the funds and if the infusion of assistance is well-targeted. Prominent economists such as Sachs also advocate massive aid infusions as prescriptions to lift very poor nations out of a cycle of poverty. On the other hand, other economists claim that aid is only effective in countries that have strong institutions and governance systems. Empirical results on the relationship among aid, institutions and growth have been mixed and inconclusive.

In this study, I build upon recent empirical work by Burnside and Dollar (2004) to examine whether aid or official developmental assistance (ODA) is associated with economic growth. I also examine the role played by the quality of a nation's institutions in mediating the relationship between aid and growth. My empirical analysis suggests that official developmental assistance (ODA) is not necessarily the way to lift a country out of a chronic cycle of low growth. In fact, my findings suggest that there might be a detrimental effect as ODA inflows are negatively correlated with average annual growth rates.

Table 12 provides a summary of my empirical results in comparison with those contained in Burnside and Dollar (2004). I present comparative summaries of Burnside and Dollar's (2004) main findings in Table 12-Model A and the results of my replication using a more recent time period in Table 12-Model B. Similar to Burnside and Dollar, I find that (1) aid is not positively associated with growth, nor do I find evidence of diminishing returns; and (2) institutional quality is positively associated with economic growth. In contrast to Burnside and Dollar (2004), however, my results show that (1) in some models, aid has a negative association with growth; (2) there are no joint aid-institution effects on growth.

I extend Burnside and Dollar (2004) by using a wider global sample of countries and explicitly considering legal origin. Table 12- Model C summarizes results based on the inclusion and exclusion (DR-restricted and I-restricted) of legal origin variables. The restricted models closely replicate parameters in the Burnside and Dollar (2004) model to my larger set of countries. When legal origin is included in the model, coefficients on the endogenous variables are insignificant. When legal origin in excluded from the model, (1) institutional quality is positively associated with growth, like in Burnside and Dollar (2004) and (2) aid and growth are negatively associated, in contrast to their findings.

Table 12- Model D summarizes the results when I extend Burnside and Dollar (2004) by incorporating policy environment variables. The restricted models consider the effects of the endogenous variables when removing regional variable controls. In both cases, the coefficients on the endogenous variables are generally insignificant, leading me to believe that when policy environment controls are instituted, there is no evidence of association between aid, institutions, and economic growth. Despite considering a

different time period and a global sample, my results are largely consistent with Burnside and Dollar (2004).

Policy implications based on my empirical analyses must be made with caution as there are significant limitations. Growth and change typically occur in nations slowly and over a long period of time. Any model that seeks to capture these effects has to consider time series effects of the determinants of growth. It is also possible that refining growth models and using better proxies to measure constructs like institutional quality, corruption, and policy environment might lead to different insights than the ones obtained in this paper.

Subject to the caveats in interpretation, my analysis suggests that institutional quality is a driver of economic growth. Therefore, reforms that will potentially have positive effects on growth will likely have to be made internally. My research does not support the policy recommendation of massive infusions of foreign aid as suggested by Sachs (2004); in fact, it could have the opposite effect of being detrimental to economic growth in the long run by possibly making the target nations aid-dependent, thus deterring the development of strong local institutions.

Inequality of economic growth among nations is a pressing issue that has humanitarian, political, economic and social consequences. Proposals to help nations overcome dire poverty are varied and conflicting. Empirical research can provide support for different courses of action. My research suggests that simply pumping in more aid to developing nations is probably not the answer. Instead, helping developing nations improve the quality of their institutions and governments will likely be an important step in lifting them out of their poverty trap.

Table 1A: List of Countries in the Burnside and Dollar (2004) Dataset—used in Burnside and Dollar (2004) time extension models

Algeria	DZA	Ecuador	ECU	Kenya	KEN	Romania	ROM
Argentina	ARG	Egypt, Arab Rep.	EGY	Korea, Rep.	KOR	Rwanda	RWA
Australia	AUS	El Salvador	SLV	Latvia	LVA	Senegal	SEN
Austria	AUT	Equatorial Guinea	GNQ	Lebanon	LBN	Seychelles	SYC
Bangladesh	BGD	Ethiopia	ETH	Lesotho	LSO	Slovak Republic	SVK
Barbados	BRB	Fiji	FJI	Luxembourg	LUX	Slovenia	SVN
Belarus	BLR	Finland	FIN	Madagascar	MDG	South Africa	ZAF
Belgium	BEL	France	FRA	Malawi	MWI	Spain	ESP
Belize	BLZ	Gabon	GAB	Malaysia	MYS	Sri Lanka	LKA
Benin	BEN	Gambia, The	GMB	Mali	MLI	St. Kitts and Nevis	KNA
Bolivia	BOL	Germany	GER	Mauritania	MRT	St. Vincent and the Grenadines	VCT
Botswana	BWA	Ghana	GHA	Mauritius	MUS	Sweden	SWE
Brazil	BRA	Greece	GRC	Mexico	MEX	Switzerland	CHE
Burkina Faso	BFA	Guatemala	GTM	Morocco	MAR	Syrian Arab Republic	SYR
Burundi	BDI	Guinea	GIN	Mozambique	MOZ	Taiwan, China	TWN
Cameroon	CMR	Guinea-Bissau	GNB	Namibia	NAM	Tanzania	TZA
Canada	CAN	Guyana	GUY	Nepal	NPL	Thailand	THA
Cape Verde	CPV	Haiti	HTI	Netherlands	NLD	Togo	TGO
Central African Republic	CAF	Honduras	HND	New Zealand	NZL	Trinidad and Tobago	TTO
Chad	TCD	Hong Kong, China	HKG	Nicaragua	NIC	Tunisia	TUN
Chile	CHL	Hungary	HUN	Niger	NER	Turkey	TUR
China	CHN	Iceland	ISL	Nigeria	NGA	Uganda	UGA
Colombia	COL	India	IND	Norway	NOR	Ukraine	UKR
Comoros	COM	Indonesia	IDN	Pakistan	PAK	United Kingdom	GBR
Congo, Dem. Rep.	ZAR	Iran, Islamic Rep.	IRN	Panama	PAN	United States	USA
Congo, Rep.	COG	Ireland	IRL	Papua New Guinea	PNG	Uruguay	URY
Costa Rica	CRI	Israel	ISR	Paraguay	PRY	Venezuela, RB	VEN
Cote d'Ivoire	CIV	Italy	ITA	Peru	PER	Vietnam	VNM
Czech Republic	CZE	Jamaica	JAM	Philippines	PHL	Yemen, Rep.	YEM
Denmark	DNK	Japan	JPN	Poland	POL	Zambia	ZMB
Dominican Republic	DOM	Jordan	JOR	Portugal	PRT	Zimbabwe	ZWE

Table 1B: Countries used in dataset for Burnside and Dollar (2004) model parameter extension

Albania	ALB	*Cote d`Ivoire*	*CIV*	Iraq	IRQ	*Mozambique*	*MOZ*	*St. Vincent and the Grenadines*	*VCT*
Algeria	*DZA*	Croatia	HRV	*Ireland*	*IRL*	Myanmar	MMR	Sudan	SDN
Angola	AGO	*Czech Rep*	*CZE*	*Italy*	*ITA*	*Netherlands*	*NLD*	Suriname	SUR
Argentina	ARG	*Denmark*	*DNK*	*Jamaica*	*JAM*	*New Zealand*	*NZL*	*Sweden*	*SWE*
Armenia	ARM	Djibouti	DJI	*Japan*	*JPN*	*Nicaragua*	*NIC*	*Switzerland*	*CHE*
Australia	*AUS*	Dominica	DMA	*Jordan*	*JOR*	*Niger*	*NER*	*Syria*	*SYR*
Austria	*AUT*	*Dominican Republic*	*DOM*	Kazakhstan	KAZ	*Nigeria*	*NGA*	Tajikistan	TJK
Azerbaijan	AZE	*Ecuador*	*ECU*	*Kenya*	*KEN*	North Korea	PRK	*Tanzania*	*TZA*
Belarus	*BLR*	*Egypt*	*EGY*	Kiribati	KIR	*Norway*	*NOR*	*Thailand*	*THA*
Belgium	*BEL*	*El Salvador*	*SLV*	*Korea, Rep.*	*KOR*	Oman	OMN	Timor-Leste	TMP
Belize	*BLZ*	Eritrea	ERI	Kyrgyzstan	KGZ	Palau	PCI	*Togo*	*TGO*
Benin	BEN	Estonia	EST	Laos	LAO	*Panama*	*PAN*	Tonga	TON
Bolivia	*BOL*	*Ethiopia*	*ETH*	*Latvia*	*LVA*	*Papua New Guinea*	*PNG*	*Trinidad and Tobago*	*TTO*
Bosnia-Herzegovina	BIH	*Fiji Islands*	*FJI*	*Lebanon*	*LBN*	*Paraguay*	*PRY*	*Tunisia*	*TUN*
Botswana	BWA	*Finland*	*FIN*	Liberia	LBR	*Peru*	*PER*	*Turkey*	*TUR*
Brazil	*BRA*	*France*	*FRA*	Libya	LBY	*Philippines*	*PHL*	Turkmenistan	TKM
Bulgaria	BGR	Georgia	GEO	Lithuania	LTU	*Poland*	*POL*	*Uganda*	*UGA*
Burkina Faso	*BFA*	*Germany*	*DEU*	*Luxembourg*	*LUX*	*Portugal*	*PRT*	*Ukraine*	*UKR*
Burundi	*BDI*	*Ghana*	*GHA*	Macedonia, FYR	MKD	*Romania*	*ROM*	*United Kingdom*	*GBR*
Cambodia	KHM	*Greece*	*GRC*	*Madagascar*	*MDG*	Russia	RUS	*United States*	*USA*
Cameroon	*CMR*	Grenada	GRD	*Malawi*	*MWI*	*Rwanda*	*RWA*	*Uruguay*	*URY*
Canada	*CAN*	*Guatemala*	*GTM*	*Malaysia*	*MYS*	Samoa	SAM	Uzbekistan	UZB
Central African Republic	*CAF*	*Guinea*	*GIN*	Marshall Islands	MHL	*Senegal*	*SEN*	Vanuatu	VUT
Chad	*TCD*	*Guyana*	*GUY*	*Mauritania*	*MRT*	Serbia and Montenegro	YUG	*Venezuela, RB*	*VEN*
Chile	*CHL*	*Haiti*	*HTI*	*Mauritius*	*MUS*	Sierra Leone	SLE	*Vietnam*	*VNM*
China	*CHN*	*Honduras*	*HND*	*Mexico*	*MEX*	*Slovak Rep*	*SVK*	*Yemen, Rep.*	*YEM*
Colombia	*COL*	*Hungary*	*HUN*	Micronesia, Fed. Sts	FSM	Somalia	SOM	*Zambia*	*ZMB*
Congo, Dem. Rep.	*ZAR*	*Iceland*	*ISL*	Moldova	MDA	*Spain*	*ESP*	*Zimbabwe*	*ZWE*
Congo, Republic of	*COG*	*Indonesia*	*IDN*	Mongolia	MNG	*St. Kitts and Nevis*	*KNA*		
Costa Rica	*CRI*	*Iran*	*IRN*	*Morocco*	*MAR*	St. Lucia	LCA		

NOTE: Countries italicized are found in both samples (Table 1A and Table 1B)

Table 2: Description of Variables used in all analyses

Variables for Burnside and Dollar (2004) sample with my data, 1996-2005

GROWTH9605	Average annual growth rate of real GDP per capita, 1996-2005 (World Development Indicators, Statistical Database, 2006)
LNY96	Log of real GDP per capita in constant 2000$, 1996 (World Development Indicators, Statistical Database, 2006)
AVG6	Average of 6 governance indicators, 1996-2005 (Kaufmann, Kraay, and Mastruzzi, 2006)
AIDGDP_PCTAVG	Average annual ODA (% of average annual real GDP), 1996-2005 (World Development Indicators, Statistical Database, 2006)
AIDGDPSQ_AVG	AIDGDP_PCTAVG squared
AIDAVG6	Interaction of AIDGDP_PCTAVG and AVG6 (Aid*Institutions)
EAP	Dummy [=1 if country is in East Asia & Pacific (developing region defined by the World Bank)]
SAR	Dummy [=1 if country is in South Asia (developing region defined by the World Bank)]
FSU	Dummy [=1 if country is in the Former Soviet Union]

My Sample

GRGPCAVG	Average annual growth rate of real GDP per capita, 1996-2005 (World Development Indicators, Statistical Database, 2006)
LNGDPPC96	Log of real GDP per capita in constant 2000$, 1996 (World Development Indicators, Statistical Database, 2006)
AVG6	Average of 6 governance indicators, 1996-2005 (Kaufmann, Kraay, and Mastruzzi, 2006)
AIDPCTGDP	Average annual official development assistance (ODA) (% of average annual real GDP), 1996-2005 (WDI Database, 2006)
AIDPCTGDPSQ	AIDPCTGDPSQ squared
FRENLAW	Dummy [=1 if country has a French legal origin] (Source: NationMaster.com)
BRITLAW	Dummy [=1 if country has a British legal origin] (Source: NationMaster.com)
SOCLAW	Dummy [=1 if country has a Socialist legal origin] (Source: NationMaster.com)
GERLAW	Dummy [=1 if country has a German legal origin] (Source: NationMaster.com)
SCANLAW	Dummy [=1 if country has a Scandinavian legal origin] (Source: NationMaster.com)
M2GDP	Money and quasi money (M2) as a % of GDP (World Development Indicators, Statistical Database, 2006)
SURP	Cash surplus/deficit (as a % of GDP) (World Development Indicators, Statistical Database, 2006)
TRADE2000	(Exports + Imports) / GDP (% of GDP), 2000 -- Measure of trade openness (World Development Indicators, Statistical Database, 2006)
OECD	Dummy [=1 if country is a member of the Organization of Economic Co-operation and Development (OECD)]
EURCA	Dummy [=1 if country is a part of the Europe and Central Asia region of developing nations] (World Bank definition)
MENA	Dummy [=1 if country is a part of the Middle East and North Africa region of developing nations] (World Bank definition)
SSA	Dummy [=1 if country is a part of the Sub-Saharan African region of developing nations] (World Bank definition)
EPAC	Dummy [=1 if country is a part of the East Asia and the Pacific region of developing nations] (World Bank definition)
LATIN	Dummy [=1 if country is a part of the Latin American region of developing nations] (World Bank definition)

Instrumental Variables used in both analyses

LNPOP96	Log of Population, 1996 (World Development Indicators, Statistical Database, 2006)
LNPOP96SQ	"LNPOP90" squared
DISTEQ	Distance from the equator, measured as absolute value of latitude of the capital (www.mapsofworld.com/lat_long)
ENGFRAC	% of population in the country speaking English (Hall and Jones, 1999)
EURFRAC	% of population in the country speaking a major European language (Hall and Jones, 1999)
POPDIST	Interaction of LNPOP90 and DISTEQ
POPENG	Interaction of LNPOP90 and ENGFRAC
POPEUR	Interaction of LNPOP90 and EURFRAC

Table 2A: Summary Statistics for Dataset with Table 1A Countries, 1996-2005

Variable	Observations	Mean	Std. Dev	Min	Max
GROWTH9605	123	2.24	2.49	-3.39	20.34
LNY96	122	3.27	0.71	2.05	4.56
AVG6	124	0.05	0.9	-1.88	1.86
AIDGDP_PCTAVG	123	1.29	1.82	0	9.16
AIDGDPSQ_AVG	123	4.95	11.6	0	83.9
AIDAVG6	123	-0.65	1.35	-8.27	1.32
EAP	124	0.07	0.26	0	1
SAR	124	0.04	0.2	0	1
FSU	124	0.02	0.15	0	1

Instrumental Variables

Variable	Observations	Mean	Std. Dev	Min	Max
LNPOP96	123	16.05	1.79	10.62	20.92
LNPOP96SQ	123	260.73	56.72	112.75	437.65
DISTEQ	124	24.73	17.22	0	64
ENGFRAC	124	0.1	0.27	0	1
EURFRAC	124	0.27	0.4	0	1
POPDIST	123	400.77	284.44	0	947.5
POPENG	123	1.41	4.03	0	17.42
POPEUR	123	4.3	6.43	0	18.88

Table 2B: Summary Statistics for Dataset with Table 1B Countries, 1996-2005

Base Model Variables and components of Institutional Quality (AVG6)

Variable	Observations	Mean	Std. Dev	Min	Max
GRGPCAVG	146	2.82	3.29	-3.39	26.06
LGDPPC96	141	3.20	0.68	1.77	4.56
AVG6	148	-0.11	0.91	-2	1.86
AIDPCTGDP	145	6.61	10.23	-0.03	56.58
AIDPCTGDPSQ	145	147.63	446.00	0	3200.9
AIDGDP_KKZINTERACT	145	-3.31	7.58	-49.76	13.5
VA	148	-0.05	1.01	-2.11	1.54
PSN	148	-0.16	0.97	-2.6	1.48
GE	148	-0.09	1.00	-1.99	2.29
RL	148	-0.14	0.99	-2.03	2.07
CC	147	-0.12	1.01	-1.6	2.47
RQ	147	-0.10	0.95	-2.39	1.71

Policy Environment, Legal Origin, and Regional Indicators

Variable	Observations	Mean	Std. Dev	Min	Max
M2GDP	126	43.26	31.96	0	177.92
SURP	101	-1.55	3.67	-18.54	11.93
TRADE2000	132	39.52	30.51	6.99	206.77
FRENLAW	108	0.53	0.50	0	1
BRITLAW	108	0.19	0.40	0	1
GERLAW	108	0.14	0.35	0	1
SOCLAW	108	0.10	0.30	0	1
SCANLAW	108	0.04	0.19	0	1
OECD	148	0.16	0.37	0	1
EURCA	148	0.18	0.39	0	1
MENA	148	0.09	0.28	0	1
SSA	148	0.23	0.42	0	1
EPAC	148	0.14	0.35	0	1
LATIN	148	0.20	0.40	0	1

Instrumental Variables

Variable	Observations	Mean	Std. Dev	Min	Max
LOGTOTPOP	148	3.00	2.39	-3.91	8.21
LOGTOTPOPSQ	148	14.69	16.53	0.03	67.48
LATIT	144	26.80	17.61	0.15	64.10
ENGFRAC	132	0.08	0.25	0	1
EURFRAC	132	0.26	0.40	0	1
POPEUR	132	1.38	2.34	-0.01	8.20
POPENG	132	0.36	1.20	-0.002	6.02
POPLATIT	144	74.17	68.48	-81.60	282.49

Table 3: Burnside and Dollar (2004) Extension: Diminishing Returns Model, 1996-2005

DEPENDENT VARIABLE: Average annual growth rate of GDP per capita, 1996-2005 (GROWTH9605)

	OLS		IV	
	1	2	3	4
Log per capita GDP 1996 (LNY96)	-1.50	-1.16	-0.93	1.65
	(-1.93)*	(-1.40)	(-0.45)	(0.61)
Institutions (AVG6)	0.86	0.86	1.02	-0.03
	(1.73)*	(1.75)*	(0.70)	(-0.02)
Aid/GDP (AIDGDP_PCTAVG)	-0.85	-0.58	-0.62	-0.13
	(-2.10)**	(-1.34)	(-0.35)	(-0.07)
Aid/GDP squared (AIDGDPSQ_AVG)	0.06	0.04	0.08	0.15
	(1.18)	(0.73)	(0.22)	(0.36)
EAP		0.59		1.77
		(0.68)		(1.34)
SAR		0.35		2.72
		(0.29)		(1.30)
FSU		3.99		5.44
		(2.76)***		(2.75)***
Constant	7.89	6.39	5.62	-4.10
	(2.89)***	(2.15)**	(0.80)	(-0.43)
N	122	122	122	122
R-Squared	0.08	0.14		

DATA SOURCE: World Development Indicators, World Bank Database, 2006

T-statistics in parentheses below coefficients
*** Significant at 1% Level
** Significant at 5% Level
* Significant at 10% Level

Table 4: Burnside and Dollar (2004) Extension: Aid-Institution Interaction, 1996-2005

DEPENDENT VARIABLE: Average annual growth rate of GDP per capita, 1996-2005 (GROWTH9605)

	OLS		IV	
	1	2	3	4
Log per capita GDP 1996 (LNY96)	-0.99	-0.73	-1.16	1.18
	(-1.33)	(-0.94)	(-0.58)	(0.48)
Institutions (AVG6)	0.48	0.51	0.89	0.01
	(0.93)	(0.99)	(0.63)	(0.01)
Aid/GDP (AIDGDP_PCTAVG)	-0.11	-0.01	0.11	0.69
	(-0.49)	(-0.06)	(0.24)	(1.15)
Aid*Institutions (AIDAVG6)	0.58	0.53	0.89	0.62
	(2.21)**	(2.07)**	(1.23)	(0.82)
EAP		0.62		1.41
		(0.74)		(1.25)
SAR		0.51		2.11
		(0.43)		(1.15)
FSU		3.98		5.00
		(2.82)***		(2.82)***
Constant	5.97	4.81	6.42	-2.42
	(2.33)**	(1.78)*	(0.95)	(-0.28)
N	122	122	122	122
R-Squared	0.10	0.16		

DATA SOURCE: World Development Indicators, World Bank Database, 2006

T-statistics in parentheses below coefficients
*** Significant at 1% Level
** Significant at 5% Level
* Significant at 10% Level

Table 5: Burnside and Dollar (2004) Extension: Table 4 with No LNY96, 1996-2005

DEPENDENT VARIABLE: Average annual growth rate of GDP per capita, 1996-2005 (GROWTH9605)

	OLS		IV	
	1	2	3	4
Institutions (AVG6)	-0.08	0.12	0.13	0.61
	(-0.28)	(0.41)	(0.23)	(0.93)
Aid/GDP (AIDGDP_PCTAVG)	0.05	0.11	0.22	0.59
	(0.28)	(0.61)	(0.47)	(1.13)
Aid*Institutions (AIDAVG6)	0.63	0.57	0.91	0.80
	(2.45)**	(2.24)**	(1.25)	(1.10)
EAP		0.72		1.21
		(0.86)		(1.17)
SAR		0.86		1.53
		(0.77)		(1.12)
FSU		4.09		4.74
		(2.93)***		(2.85)***
Constant	2.60	2.28	2.54	1.70
	(9.26)***	(7.36)***	(4.81)***	(2.31)**
N	123	123	123	123
R-Squared	0.09	0.16		

DATA SOURCE: World Development Indicators, World Bank Database, 2006

T-statistics in parentheses below coefficients
*** Significant at 1% Level
** Significant at 5% Level
* Significant at 10% Level

Table 6: Burnside and Dollar (2004) Extension: Table 4 with no Equatorial Guinea, 1996-2005

DEPENDENT VARIABLE: Average annual growth rate of GDP per capita, 1996-2005 (GROWTH9605)

	OLS		IV	
	1	2	3	4
Log per capita GDP 1996 (LNY96)	-2.25	-1.77	-5.09	-4.25
	(-4.15)***	(-3.30)***	(-2.73)***	(-2.20)**
Institutions (AVG6)	1.67	1.67	3.33	2.72
	(4.76)***	(5.12)***	(2.52)**	(2.29)**
Aid/GDP (AIDGDP_PCTAVG)	-0.77	-0.40	-0.59	-0.47
	(-2.76)***	(-1.45)	(-1.50)	(-1.12)
Aid*Institutions (AIDAVG6)	0.05	0.02	0.92	0.90
	(1.45)	(0.63)	(1.50)	(1.61)
EAP		0.99		0.28
		(1.76)*		(0.34)
SAR		0.71		-0.82
		(0.91)		(-0.62)
FSU		4.53		3.53
		(4.83)***		(2.76)***
Constant	8.48	8.01	19.94	16.98
	(4.78)***	(4.16***	(3.20)***	(2.53)**
N	121	121	121	121
R-Squared	0.22	0.36		

DATA SOURCE: World Development Indicators, World Bank Database, 2006

T-statistics in parentheses below coefficients
*** Significant at 1% Level
** Significant at 5% Level
* Significant at 10% Level

Table 7A: Role of Legal Origin in the Diminishing Returns Model, 1996-2005: OLS Estimation

DEPENDENT VARIABLE: Average annual growth rate of GDP per capita, 1996-2005 (GRGPCAVG)
NOTE: Asterisks next to column heading numbers indicate that the constant is significant and positive (otherwise, it is not significant)

	1	2	3*	4*	5	6	7*	8*	9*	10*	11*	12*
LNGDPPC96	-0.66	-0.46	-1.43	-1.50	-0.42	-0.35	-1.92	-1.54	-1.48	-0.70	-1.43	-0.63
	(-0.49)	(-0.43)	(-1.37)	(-1.55)	(-0.35)	(-0.37)	(-2.28)**	(-1.98)	(-1.62)	(-1.05)	(-1.84)*	(-0.92)
AVG6	0.42	0.30	0.64	0.68	0.39	0.28	0.76	0.69	0.63	0.41	0.61	0.35
	(0.70)	(0.50)	(1.20)	(1.20)	(0.65)	(0.47)	(1.49)	(1.30)	(1.12)	(0.75)	(1.21)	(0.66)
AIDGDP	0.02	-0.00	0.02	-0.07	0.08	0.03	-0.04	-0.70				
	(0.14)	(-0.03)	(0.20)	(-0.78)	(1.37)	(0.52)	(-1.51)	(-2.35)**				
AIDGDPSQ	0.00	0.00	-0.00	-0.00								
	(0.40)	(0.24)	(-0.79)	(-0.06)								
FRENLAW	-0.29	-0.50			-0.27	-0.49			-0.36	-0.53		
	(-0.23)	(-0.38)			(-0.21)	(-0.37)			(-0.28)	(-0.41)		
BRITLAW	-0.32	-0.69			-0.29	-0.66			-0.37	-0.71		
	(-0.25)	(-0.51)			(-0.23)	(-0.49)			(-0.29)	(-0.53)		
SOCLAW	0.28	3.07			0.35	3.09			0.22	3.01		
	(0.17)	(1.99)**			(0.22)	(2.02)**			(0.14)	(1.98)**		
GERLAW	0.20	2.14			0.22	2.15			0.27	2.11		
	(0.15)	(1.58)			(0.16)	(1.59)			(0.20)	(1.57)		
OECD	0.86		1.07		0.77		1.20		1.14		1.11	
	(0.76)		(1.20)		(0.69)		(1.38)		(1.06)		(1.27)	
EURCA	3.58		3.51		3.56		3.41		3.39		3.50	
	(3.79)***		(5.33)***		(3.80)***		(5.28)***		(3.63)***		(5.43)***	
MENA	0.94		0.27		0.93		0.22		0.90		0.27	
	(0.99)		(0.33)		(0.98)		(0.27)		(0.95)		(0.32)	
SSA	-0.48		-0.54		-0.44		-0.64		-0.55		-0.66	
	(-0.47)		(-0.67)		(-0.44)		(-0.80)		(-0.55)		(-0.82)	
EPAC	1.42		0.29		1.47		0.17		1.21		-0.10	
	(1.41)		(0.37)		(1.48)		(0.22)		(1.23)		(-0.14)	
N	108	108	141	141	108	108	141	141	108	108	141	141
R-Squared	0.40	0.27	0.31	0.05	0.39	0.28	0.31	0.05	0.38	0.27	0.29	0.01

Table 7B: Role of Legal Origin in the Diminishing Returns Model, 1996-2005: IV Estimation

DEPENDENT VARIABLE: Average annual growth rate of GDP per capita, 1996-2005 (GRGPCAVG)
NOTE: Asterisks next to column heading numbers indicate that the constant is significant and positive (otherwise, it is not significant)

	13	14	15	16*	17	18	19	20*	21	22	23	24
LNGDPPC96	-3.62	-6.29	-6.89	-10.54	-5.07	-6.36	-2.12	-7.32	-1.41	-0.04	-0.95	-1.42
	(-1.05)	(-1.20)	(-0.91)	(-2.16)**	(-1.30)	(-1.40)	(-0.48)	(-1.88)*	(-0.65)	(-0.03)	(-0.24)	(-0.81)
AVG6	2.13	3.64	4.21	5.80	4.06	3.66	2.60	4.54	2.06	0.36	2.18	1.79
	(0.92)	(1.32)	(1.41)	(2.28)**	(1.92)*	(1.41)	(1.24)	(2.04)**	(1.77)*	(0.32)	(1.13)	(1.31)
AIDGDP	-0.79	-0.39	-0.63	-1.41	-0.46	-0.42	-0.09	-0.38				
	(-2.16)**	(-0.36)	(-0.91)	(-1.59)	(-1.48)	(-1.50)	(-0.68)	(-1.78)*				
AIDGDPSQ	0.04	-0.00	0.03	0.05								
	(1.30)	(-0.03)	(0.80)	(1.20)								
FRENLAW	0.06	0.49			0.94	0.48			0.43	0.10		
	(0.04)	(0.31)			(0.57)	(0.32)			(0.37)	(0.08)		
BRITLAW	-0.25	-0.23			-0.15	-0.24			-0.03	0.01		
	(-0.19)	(-0.15)			(-0.10)	(-0.17)			(-0.02)	(0.01)		
SOCLAW	2.87	4.19			4.86	4.20			3.23	4.29		
	(1.01)	(2.25)**			(1.71)*	(2.31)**			(1.71)*	(2.87)***		
GERLAW	0.50	1.35			0.99	1.35			0.63	1.78		
	(0.34)	(0.90)			(0.58)	(0.91)			(0.52)	(1.49)		
OECD	0.04		-0.25		-1.31		-1.51		-0.79		-1.65	
	(0.02)		(-0.11)		(-0.61)		(-0.95)		(-0.52)		(-1.09)	
EURCA	2.19		2.47		1.35		3.50		2.32		3.80	
	(1.57)		(1.36)		(0.92)		(2.88)***		(2.44)**		(3.48)***	
MENA	1.25		0.78		1.01		0.88		1.11		0.97	
	(1.26)		(0.84)		(0.87)		(1.00)		(1.33)		(1.15)	
SSA	0.23		-2.73		2.45		0.93		0.45		0.98	
	(0.08)		(-0.51)		(0.91)		(0.36)		(0.27)		(0.39)	
EPAC	1.16		-0.18		1.01		1.23		1.82		4.96	
	(0.86)		(-0.08)		(0.63)		(0.84)		(1.67)*		(0.37)	
N	101	101	126	126	101	101	126	126	101	101	126	126
R-Squared												

Table 8: Role of Legal Origin in the Aid-Institution Interaction Model, 1996-2005

DEPENDENT VARIABLE: Average annual growth rate of GDP per capita, 1996-2005 (GRGPCAVG)

	OLS[6]				IV			
	1	2	3*	4*	5	6	7	8*
LGGDPPC96	-0.44	-0.38	-1.43	-1.29	-2.80	-3.59	-2.02	-6.83
	(-0.36)	(-0.38)	(-1.72)*	(-1.66)	(-0.68)	(-0.98)	(-0.40)	(-1.79)*
AVG6	0.42	0.30	1.17	0.78	2.29	2.67	2.53	4.24
	(0.61)	(0.46)	(2.27)**	(1.46)	(0.92)	(1.10)	(0.93)	(1.94)*
AIDGDP	0.07	0.02	-0.07	-0.09	-0.04	0.12	-0.08	-0.54
	(0.95)	(0.30)	(-2.45)**	(-2.78)**	(-0.10)	(0.23)	(-0.26)	(-1.58)
AIDAVG6	-0.01	-0.01	-0.12	-0.07	0.43	0.45	0.01	-0.19
	(-0.09)	(-0.09)	(-2.93)**	(-1.82)*	(1.17)	(0.80)	(0.04)	(-0.57)
FRENLAW	-0.26	-0.47			0.57	0.21		
	(-0.20)	(-0.35)			(0.36)	(0.14)		
BRITLAW	-0.29	-0.65			-0.50	-0.44		
	(-0.23)	(-0.48)			(-0.34)	(-0.31)		
SOCLAW	0.38	3.12			4.06	4.56		
	(0.23)	(1.98)**			(1.48)	(2.50)**		
GERLAW	0.23	2.17			0.68	1.38		
	(0.17)	(1.58)			(0.42)	(0.97)		
OECD	0.74		0.13		-0.16		-1.46	
	(0.62)		(0.14)		(-0.07)		(-0.74)	
EURCA	3.55		3.48		1.99		3.54	
	(3.73)***		(5.54)***		(1.35)		(2.44)**	
MENA	0.94		0.36		0.76		0.89	
	(0.98)		(0.45)		(0.68)		(0.99)	
SSA	-0.44		-0.74		2.54		0.98	
	(-0.44)		(-0.95)		(1.02)		(0.34)	
EPAC	1.48		0.65		1.70		1.27	
	(1.47)		(0.85)		(1.05)		(0.74)	
N	108	108	141	141	101	101	126	126
R-Squared	0.39	0.27	0.35	0.07				

DATA SOURCE: World Development Indicators, World Bank Database, 2006

NOTE: Asterisks next to column heading numbers indicate that the constant is significant and positive

[6] T-statistics in parentheses, ***Significant at 1% Level; **Significant at 5% Level; *Significant at 10% Level

Table 9: Role of Policy Environment in the Diminishing Returns Model, 1996-2005

DEPENDENT VARIABLE: Average annual growth rate of GDP per capita, 1996-2005 (GRGPCAVG)

	OLS				IV			
	1	2	3	4	5	6	7	8
LNGDPPC96	0.07	-0.73	-0.90	-1.48	4.15	1.55	-3.34	-9.49
	(0.05)	(-0.55)	(-0.59)	(-1.06)	(0.42)	(0.33)	(-0.36)	(-1.96)**
AVG6	0.47	0.61	0.61	0.77	-1.86	-0.23	2.25	5.33
	(0.70)	(0.93)	(0.78)	(0.99)	(-0.33)	(-0.09)	(0.47)	(2.09)**
AIDGDP	0.36	0.08	0.22	-0.03	1.32	-0.28	1.51	-0.91
	(1.60)	(1.06)	(0.81)	(-0.31)	(0.48)	(-1.12)	(0.65)	(-2.20)**
AIDGDPSQ	-0.01		-0.01		-0.11		-0.14	
	(-1.32)		(-0.97)		(-0.59)		(-1.09)	
M2GDP	0.01	0.01	-0.00	-0.00	-0.02	-0.02	-0.03	-0.03
	(1.03)	(1.03)	(-0.07)	(-0.12)	(-0.64)	(-0.87)	(-1.18)	(-1.93)*
SURP	0.22	0.20	0.12	0.11	-0.08	-0.01	-0.05	-0.11
	(2.85)***	(2.63)***	(1.36)	(1.21)	(-0.29)	(-0.06)	(-0.21)	(-0.82)
TRADE2000	-0.00	0.00	0.00	0.00	0.01	0.01	-0.01	-0.02
	(-0.02)	(0.03)	(0.14)	(0.03)	(0.33)	(0.59)	(-0.37)	(-0.93)
OECD	-0.98	-0.60			0.99	-0.03		
	(-0.67)	(-0.42)			(0.21)	(-0.01)		
EURCA	3.84	3.93			3.39	4.49		
	(4.48)***	(4.58)***			(0.95)	(2.76)***		
MENA	0.49	0.62			0.14	1.92		
	(0.42)	(0.52)			(0.03)	(1.27)		
SSA	-1.10	-1.02			4.16	2.94		
	(-0.98)	(-0.90)			(0.73)	(1.04)		
EPAC	0.96	0.73			2.08	2.06		
	(0.81)	(0.62)			(0.56)	(1.05)		
Constant	1.05	3.95	5.86	2.73	-12.32	-3.22	15.75	38.70
	(0.20)	(0.82)	(1.09)	(0.44)	(-0.35)	(-0.19)	(0.47)	(2.23)
Observations	83	83	83	83	77	77	77	77
R-squared	0.48	0.46	0.05	0.04				

DATA SOURCE: World Development Indicators, World Bank Database, 2006

T-statistics in parentheses below coefficients; ***Significant at 1% Level ** 5% Level *10% Level

Table 10: Role of Policy Environment in the Aid-Institution Interaction Model, 1996-2005

DEPENDENT VARIABLE: Average annual growth rate of GDP per capita, 1996-2005 (GRGPCAVG)

	OLS[7]		IV	
	1	2	3	4
LNGDPPC96	-0.99	-0.46	-6.67	2.59
	(-0.70)	(-0.35)	(-0.91)	(0.48)
AVG6	0.30	0.11	3.76	-1.30
	(0.37)	(0.16)	(0.96)	(-0.36)
AIDGDP	0.08	0.16	0.26	-0.08
	(0.75)	(1.75)*	(0.16)	(-0.15)
AIDAVG6	0.15	0.12	1.03	0.27
	(1.62)	(1.55)	(0.72)	(0.45)
M2GDP[8]	-0.00	0.01	-0.03	-0.02
	(-0.18)	(1.15)	(-1.44)	(-0.89)
SURP	0.12	0.20	0.10	0.01
	(1.39)	(2.75)***	(0.29)	(0.05)
TRADE2000	-0.00	0.00	-0.03	0.01
	(-0.22)	(0.05)	(-1.01)	(0.63)
OECD		-0.05		1.03
		(-0.03)		(0.30)
EURCA		4.03		4.86
		(4.73)***		(2.57)**
MENA		0.49		1.88
		(0.41)		(1.19)
SSA		-0.79		3.72
		(-0.70)		(1.09)
EPAC		0.57		2.40
		(0.49)		(1.10)
Constant	6.69	2.87	22.84	-7.10
	(1.39)	(0.59)	(0.76)	(-0.36)
N	83	83	77	77
R-squared	0.07	0.48		

DATA SOURCE: World Development Indicators, World Bank Database, 2006

[7] T-statistics in parentheses; * Significant at 10% level,** Significant at 5% level, *** Significant at 1% level

[8] M2GDP, SURP, and TRADE2000 (the Policy Environment variables) are treated as exogenous in the model

Table 11: Components of Six Kaufmann-Kraay Governance Indicators

Voice and Accountability (VA)	
Civil liberties	Institutional Permanence
Political rights	Representativeness
Travel	Political Process
Imprisonments	Civil Society
Military in Politics	Independent Media
Democratic Accountability	

Political Stability_ No Violence (PSN)	
Military Coup Risk	Extremism
Major Insurgency/Rebellion	Internal Conflict
Political Terrorism	External Conflict
Political Assassination	Ethnic Tensions
Civil War	Civil unrest
Major urban riot	Terrorism
Country terrorist threat	

Government Effectiveness (GE)	
Government instability	Policy consistency
Government ineffectiveness	Forward Planning
Institutional failure	Bureaucracy
Bureaucratic quality	Government and Administration

Rule of Law (RL)
Enforceability of Private contracts
Enforceability of Government contracts
Law and Order
Losses and Costs of Crime
Judicial Independence

Control of Corruption (CC)
Different measures of corruption
Public trust in politicians' financial honesty
Internal causes of political risk
Losses and costs of corruption
Frequency of corruption

Regulatory Quality (RQ)
Regulations- Exports, Imports, Other
Ownership of Business by Non-Residents
Ownership of Equities by Non-Residents
Unfair competition
Unfair trade
Investment profile
Tax Effectiveness
Legislation

DATA SOURCE: Kaufmann, Kraay, Mastruzzi (2006)

Table 12: Summary of Empirical Results

MODEL A
Burnside and Dollar (2004)

Endogenous Vars	Dim Ret	Interact	DR-Restricted	I-Restricted
AVG6	(+++, 0)	(+++, 0)	(+++, 0)	(+++, 0)
AIDGDP	(0, 0)	(0, 0)	(--, 0)	(0, 0)
AIDGDPSQ	(0, 0)		(+, 0)	
AIDAVG6		(0, 0)		(0, +)

MODEL B
Burnside and Dollar (2004) with my time data

Endogenous Vars	Dim Ret	Interact	DR-Restricted	I-Restricted
AVG6	(+, 0)	(+++, ++)	(+, 0)	(+++, ++)
AIDGDP	(0, 0)	(0, 0)	(-- , 0)	(---, 0)
AIDGDPSQ	(0, 0)		(0, 0)	
AIDAVG6		(0, 0)		(0, 0)

MODEL C
Legal Origin Parameter Extension

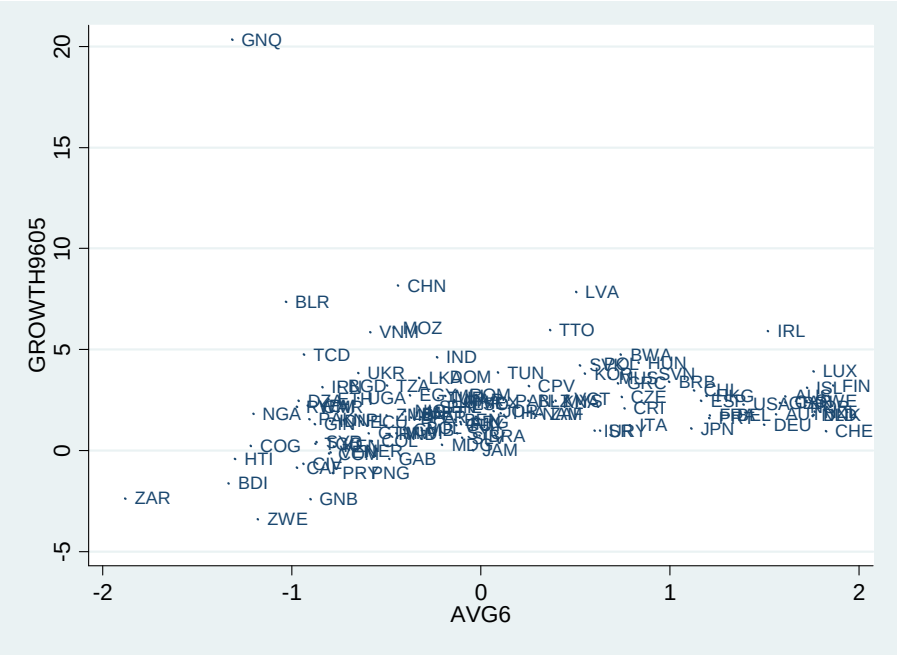
Endogenous Vars	Dim Ret	Interact	DR-Restricted	I-Restricted
AVG6	(0, 0)	(0, 0)	(0, ++)	(+, +)
AIDGDP	(0, --)	(0, 0)	(--, -)	(--, 0)
AIDGDPSQ	(0, 0)			
AIDAVG6		(0, 0)		(--, 0)

MODEL D
Policy Environment Parameter Extension

Endogenous Vars	Dim Ret	Interact	DR-Restricted	I-Restricted
AVG6	(0, 0)	(0, 0)	(0, ++)	(0, 0)
AIDGDP	(0, 0)	(+, 0)	(0, --)	(0, 0)
AIDGDPSQ	(0, 0)			
AIDAVG6		(0, 0)		(0, 0)

(OLS, IV)	(Significance for OLS estimation, Significance for IV estimation)
0	No significance
+	Significant and positive at the 10% level
++	Significant and positive at the 5% level
+++	Significant and positive at the 1% level
-	Significant and negative at the 10% level
--	Significant and negative at the 5% level
---	Significant and negative at the 1% level
Dim Ret	Diminishing Returns (DR) model—AID and AIDSQ
Interact	Aid-Institution Interaction (I) model
DR-Restricted	DR model without legal origin and/or regional variables (in the case of the Models B and D, model without regional variables)
I-Restricted	I model without legal origin and/or regional variables (in the case of Models B and D, I model without regional variables)

Figure 1A: Institutional Quality and Economic Growth (Burnside and Dollar (2004) Countries)



Outlier (Equatorial Guinea (GNQ)) removed from sample

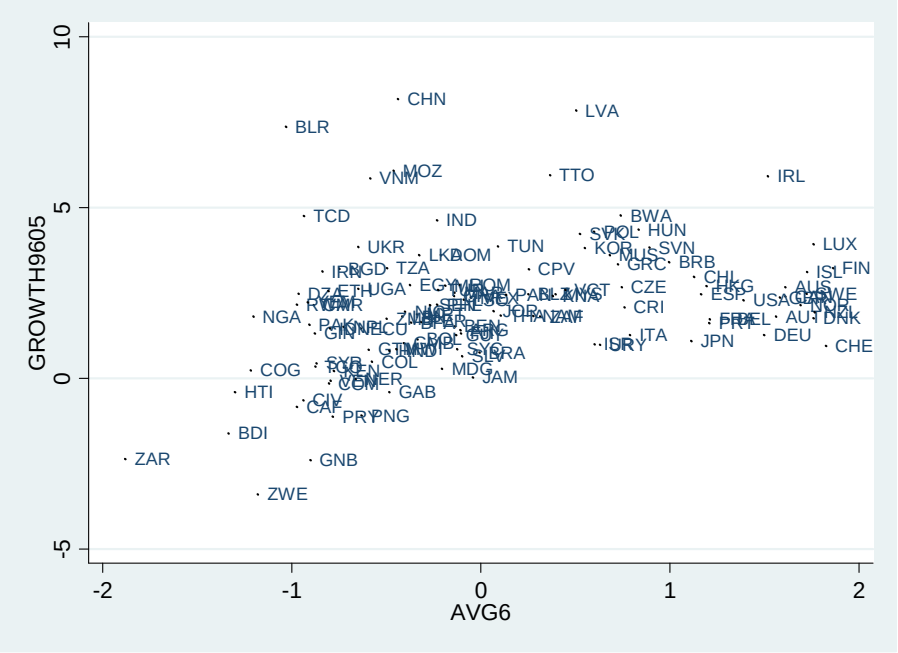
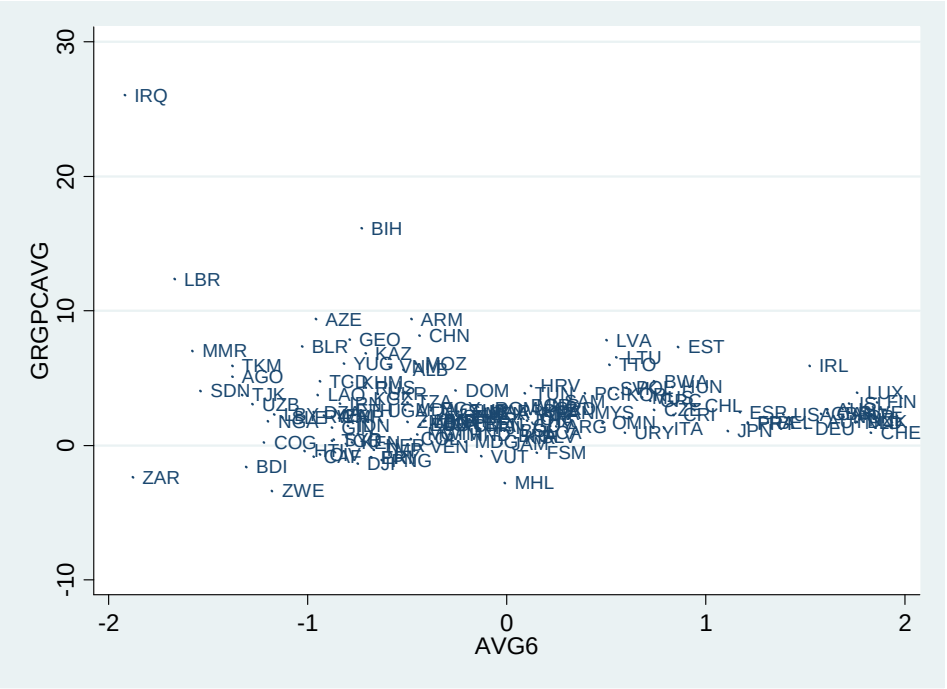


Figure 1B: Relationship between Institutional Quality and Economic Growth (My Countries)



Removal of Outliers (Iraq (IRQ), Bosnia and Herzegovina (BIH), and Liberia (LBR))

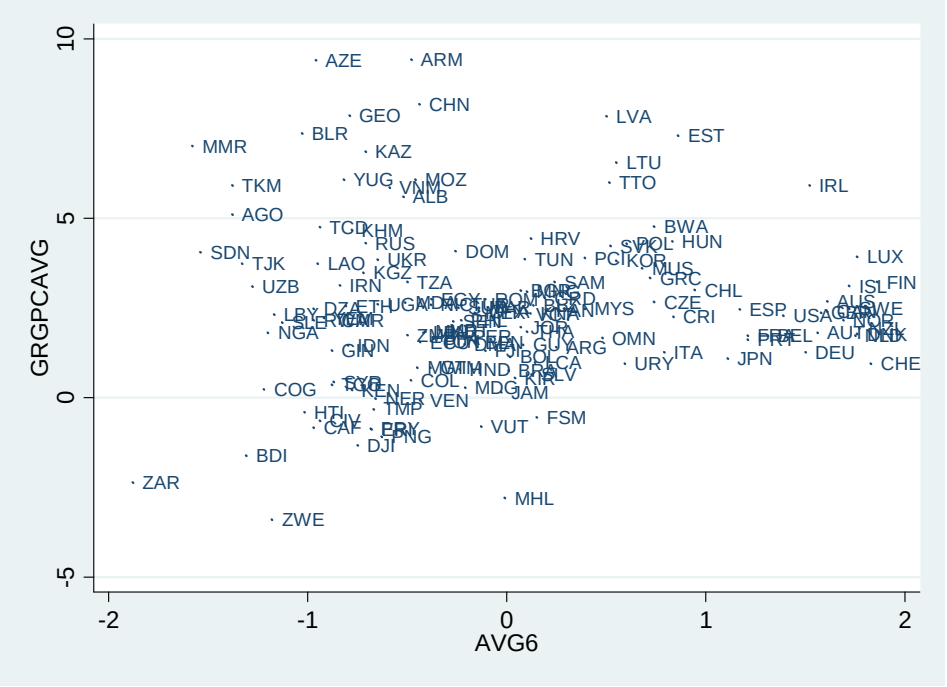
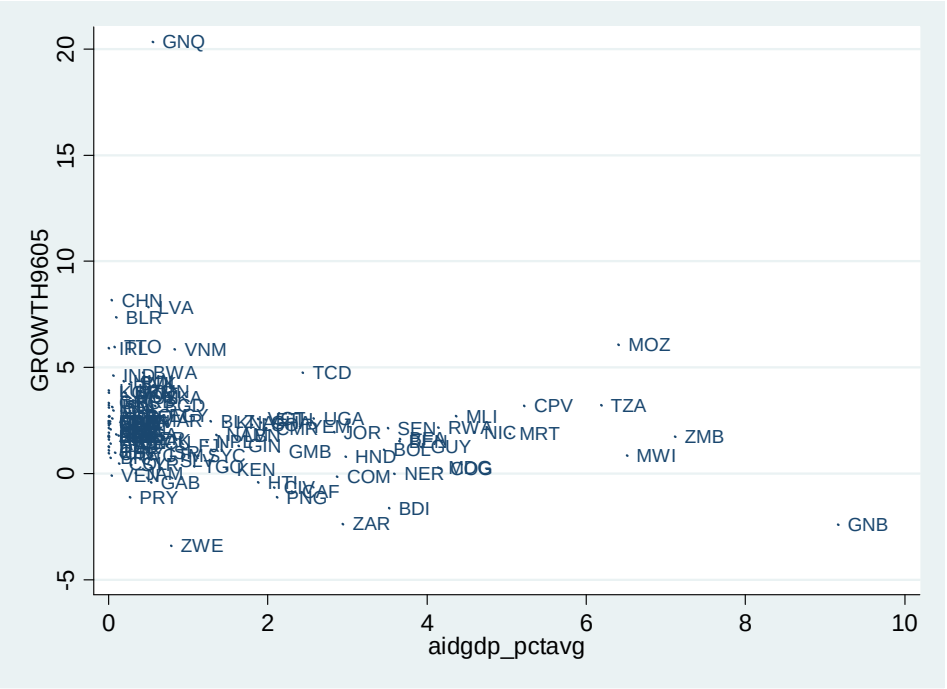
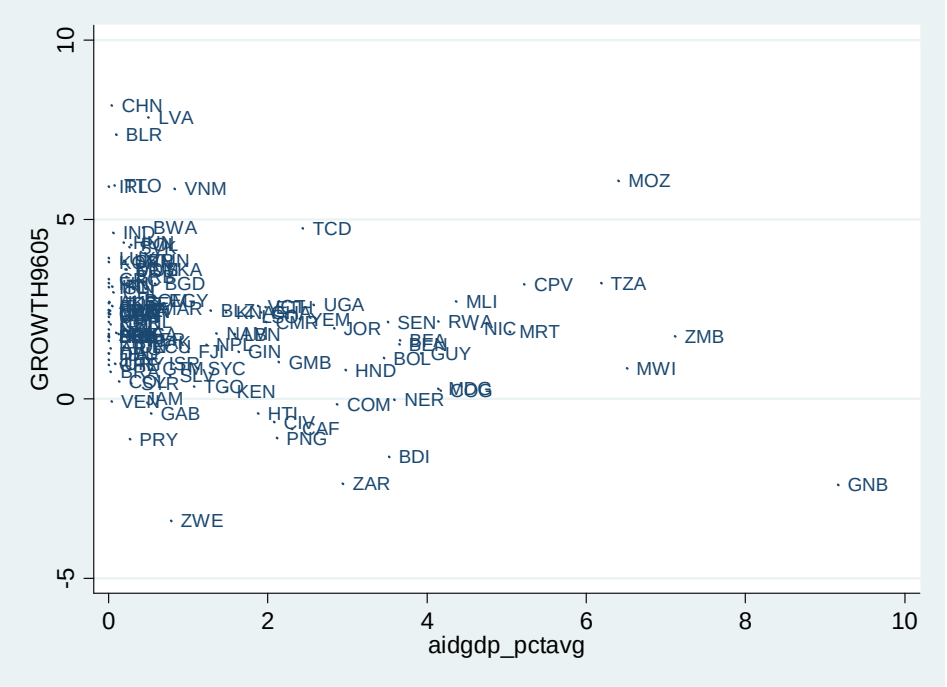


Figure 2A: Relationship between Official Development Assistance (ODA) and Economic Growth (Burnside and Dollar (2004) Countries)[9]

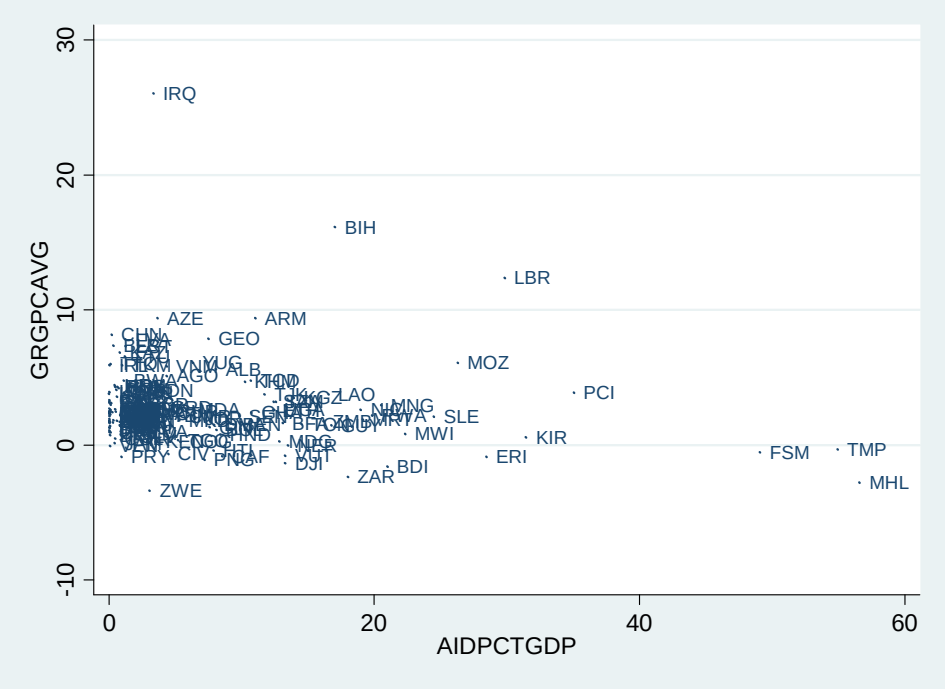


Removal of Outlier (Equatorial Guinea (GNQ)) from the sample



[9] The concentration of observations near the y-axis on this scatterplot is partly attributed to the 24 OECD countries that are aid donors rather than aid recipients. Therefore, their aid inflows are zero.

Figure 2B: Relationship between Official Development Assistance (ODA) and Economic Growth (My Countries)



Removal of Outliers (Iraq (IRQ), Bosnia and Herzegovina (BIH), Liberia (LBR)) from sample

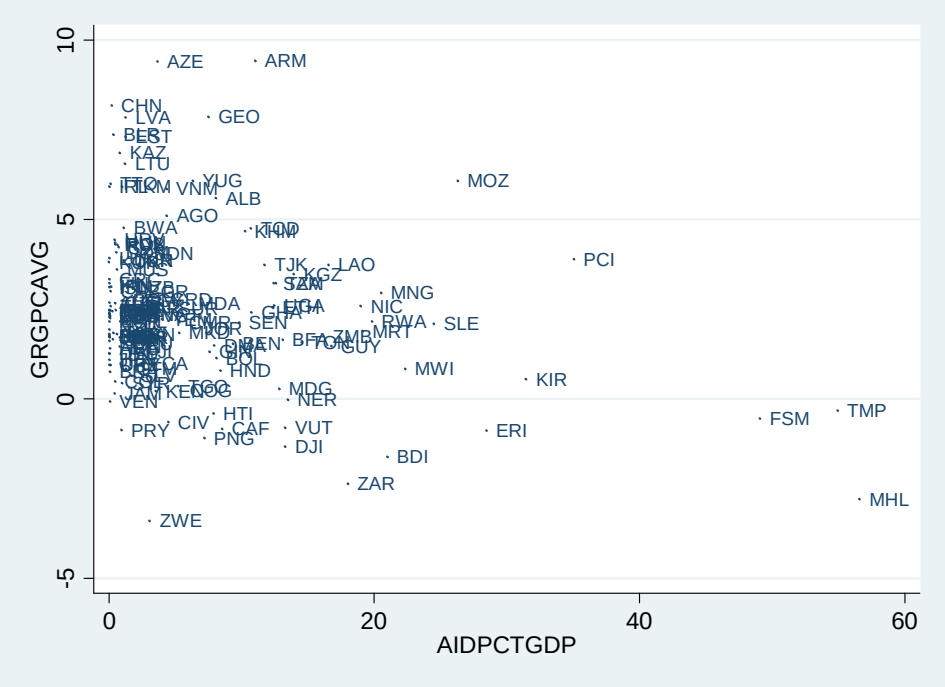
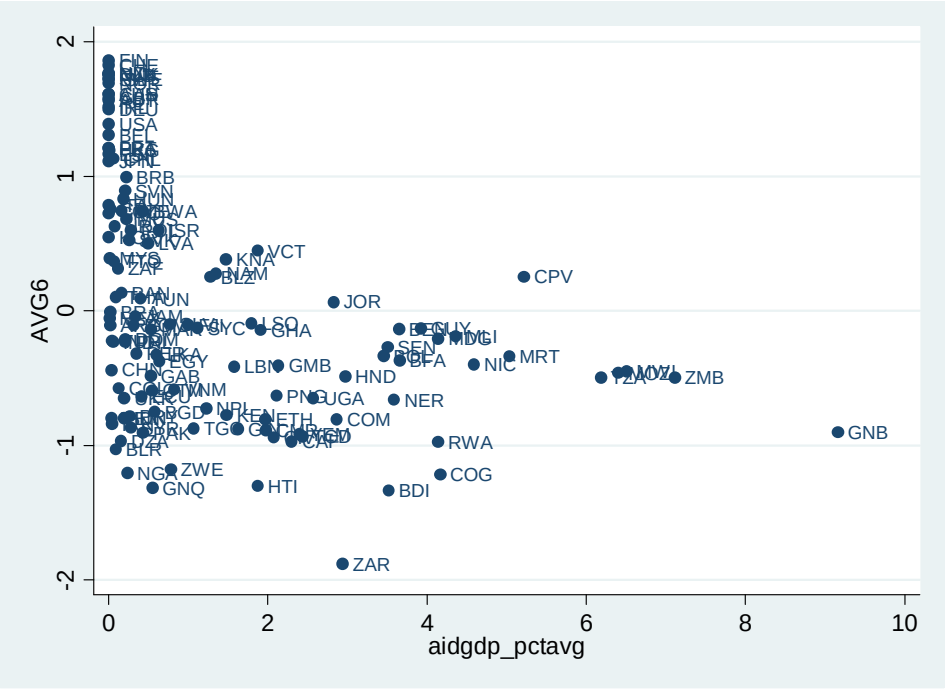


Figure 3A: Relationship between Official Development Assistance (ODA) and Institutional Quality (AVG6)—Burnside and Dollar (2004) Countries



Removal of Aid Donors from sample

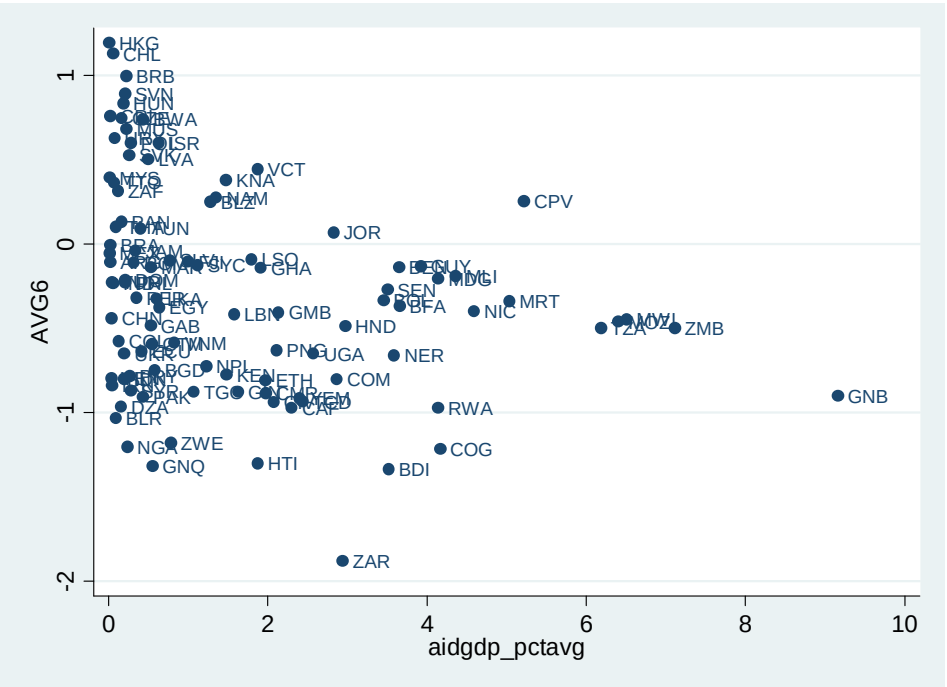
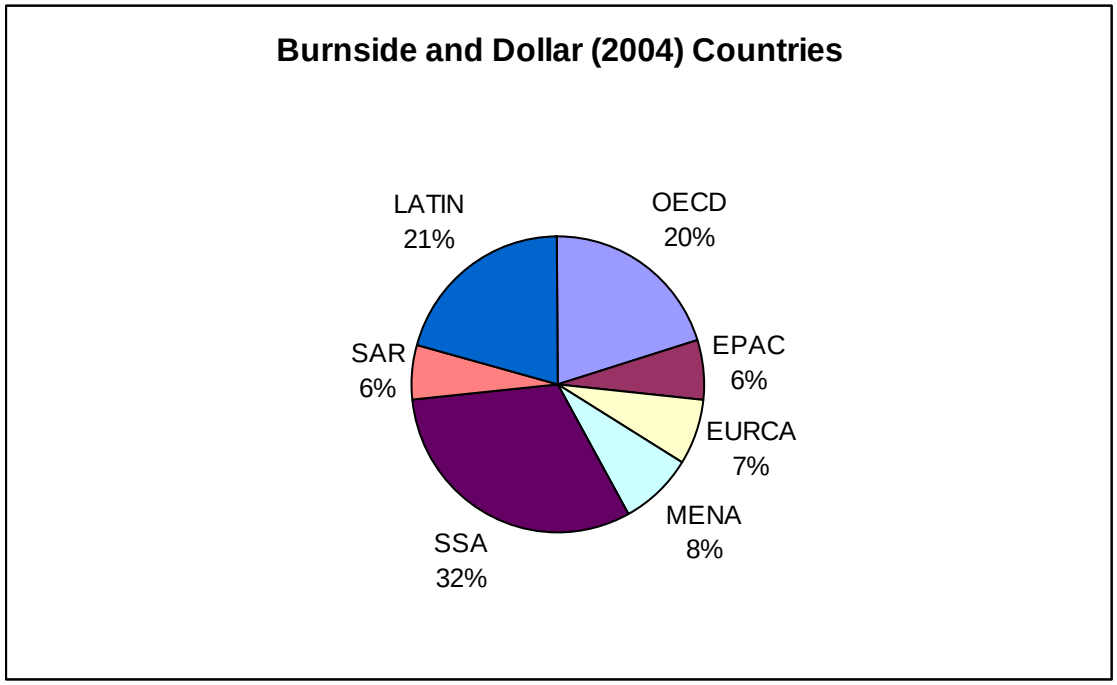


Figure 3B: Relationship between Aid and Institutional Quality in My Dataset

Removal of Aid Donors (AIDPCTGDP = 0) from sample

Figure 4: Country Composition



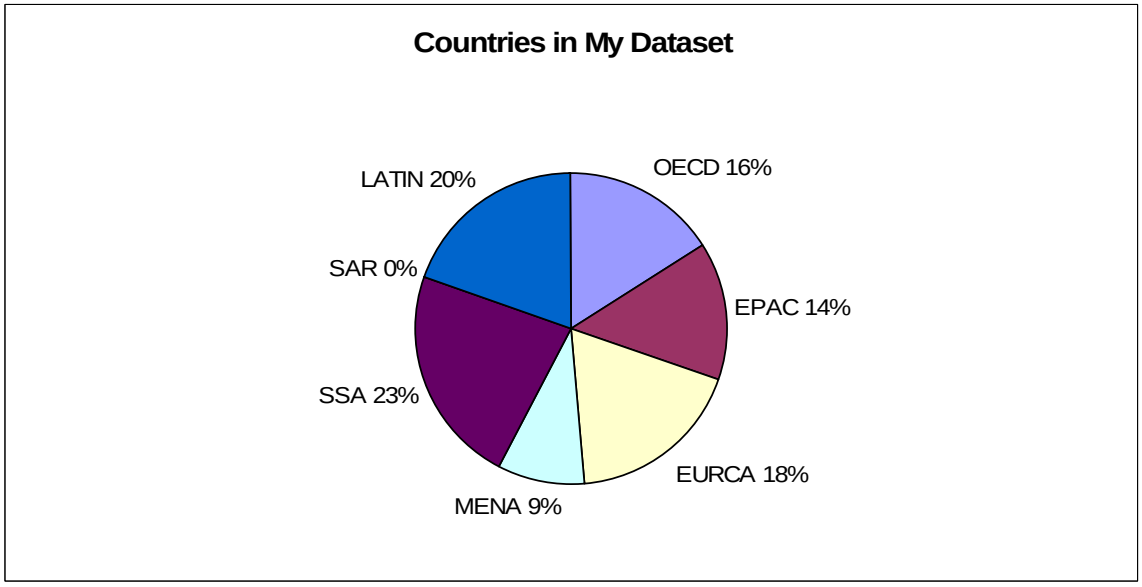


Figure 5A: Voice and Accountability (VA) by Region, 1996-2005: Average Governance Indicator

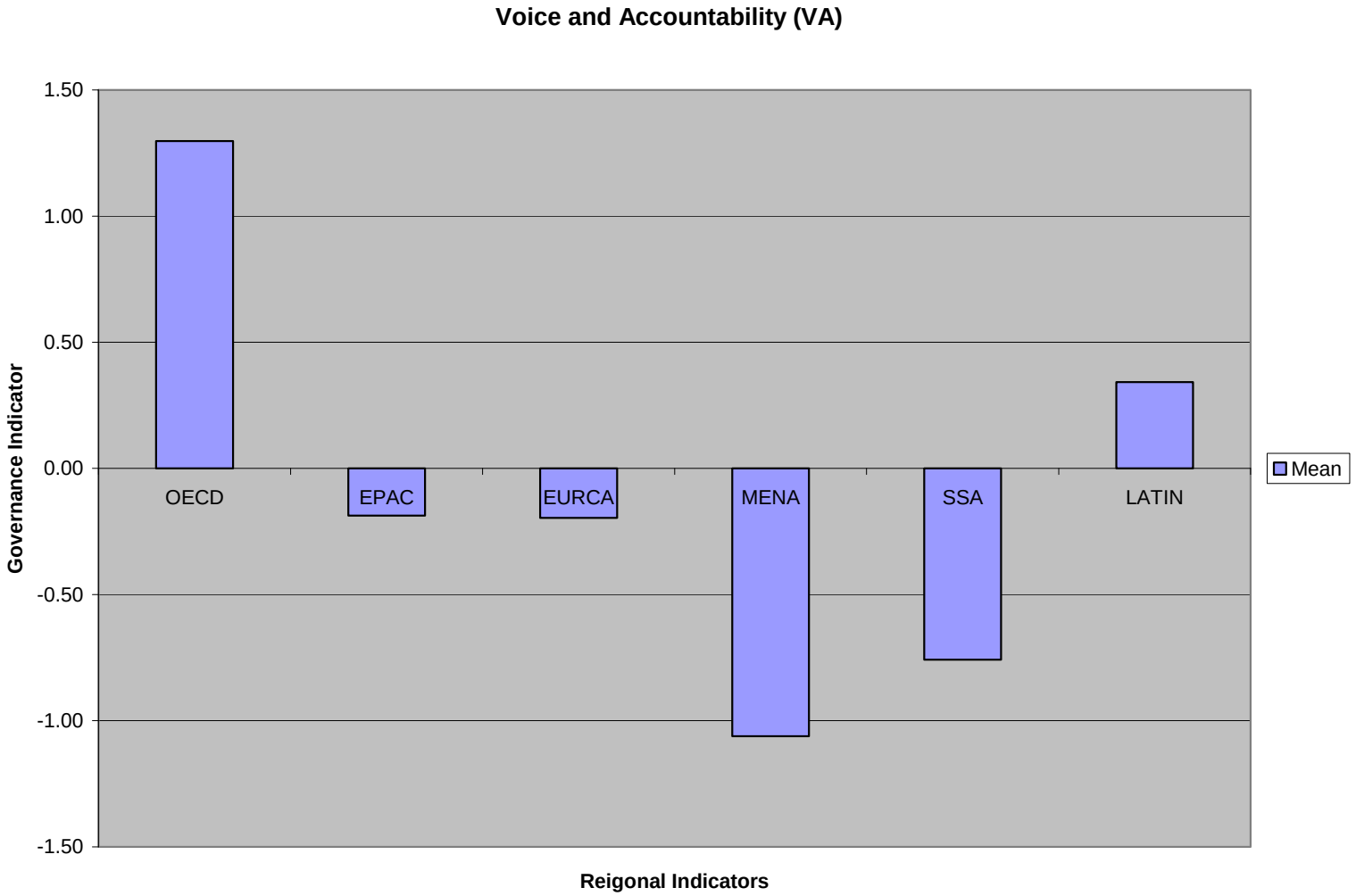


Figure 5B: Political Stability_No Violence (PSN) by Region, 1996-2005: Average Governance Indicator

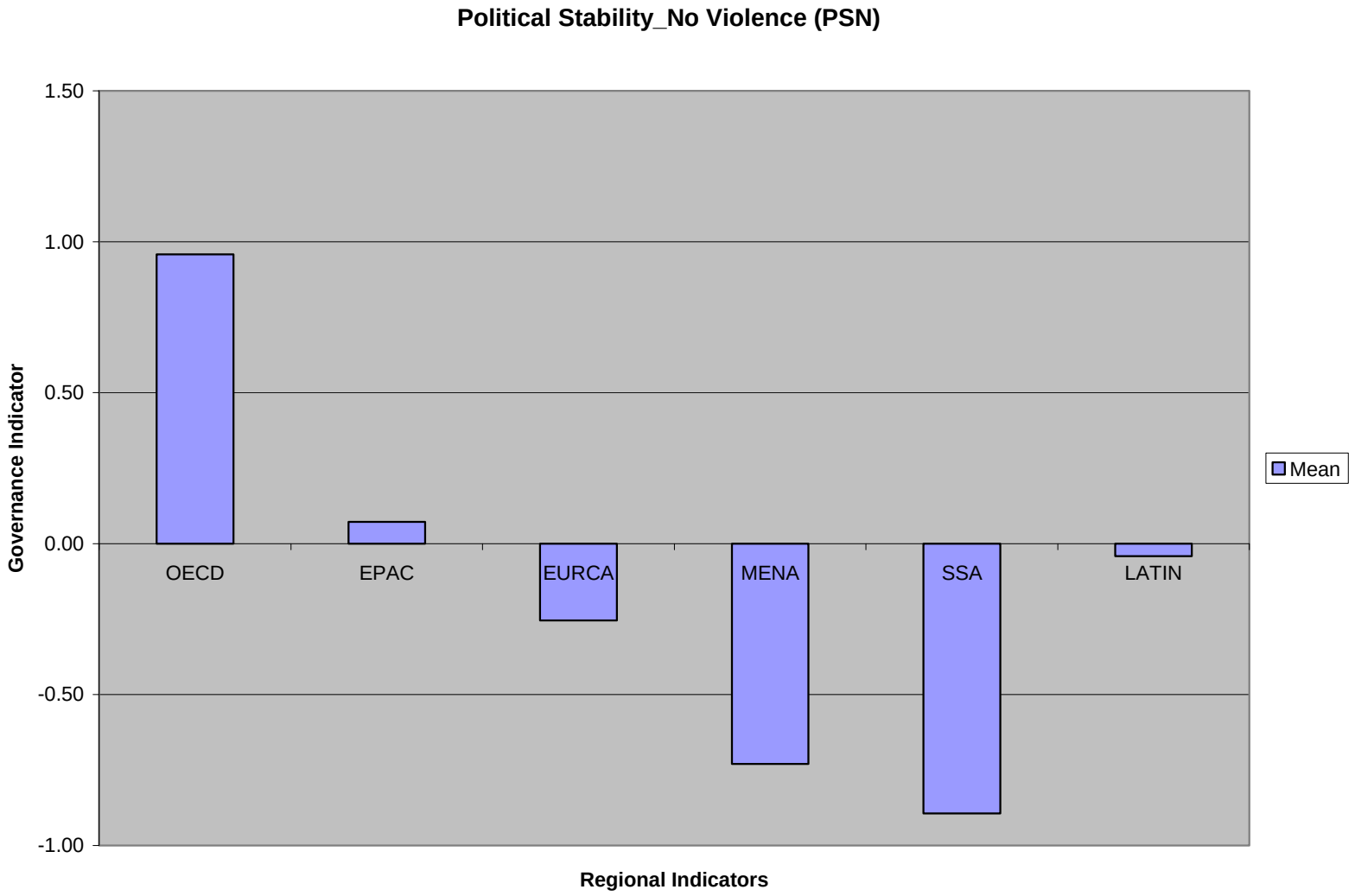


Figure 5C: Government Effectiveness (GE) by Region, 1996-2005: Average Governance Indicator

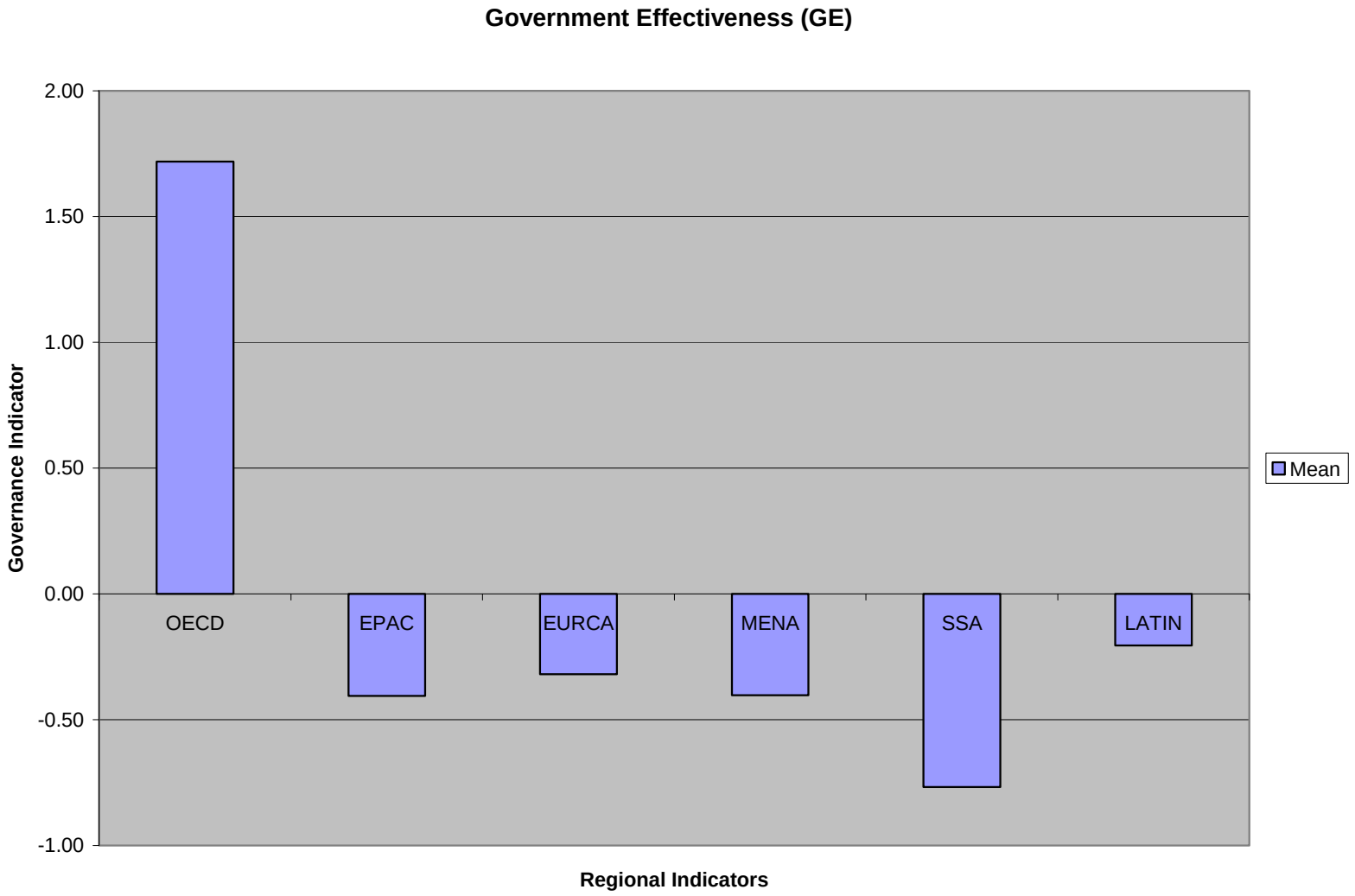


Figure 5D: Rule of Law (RL) by Region, 1996-2005: Average Governance Indicator

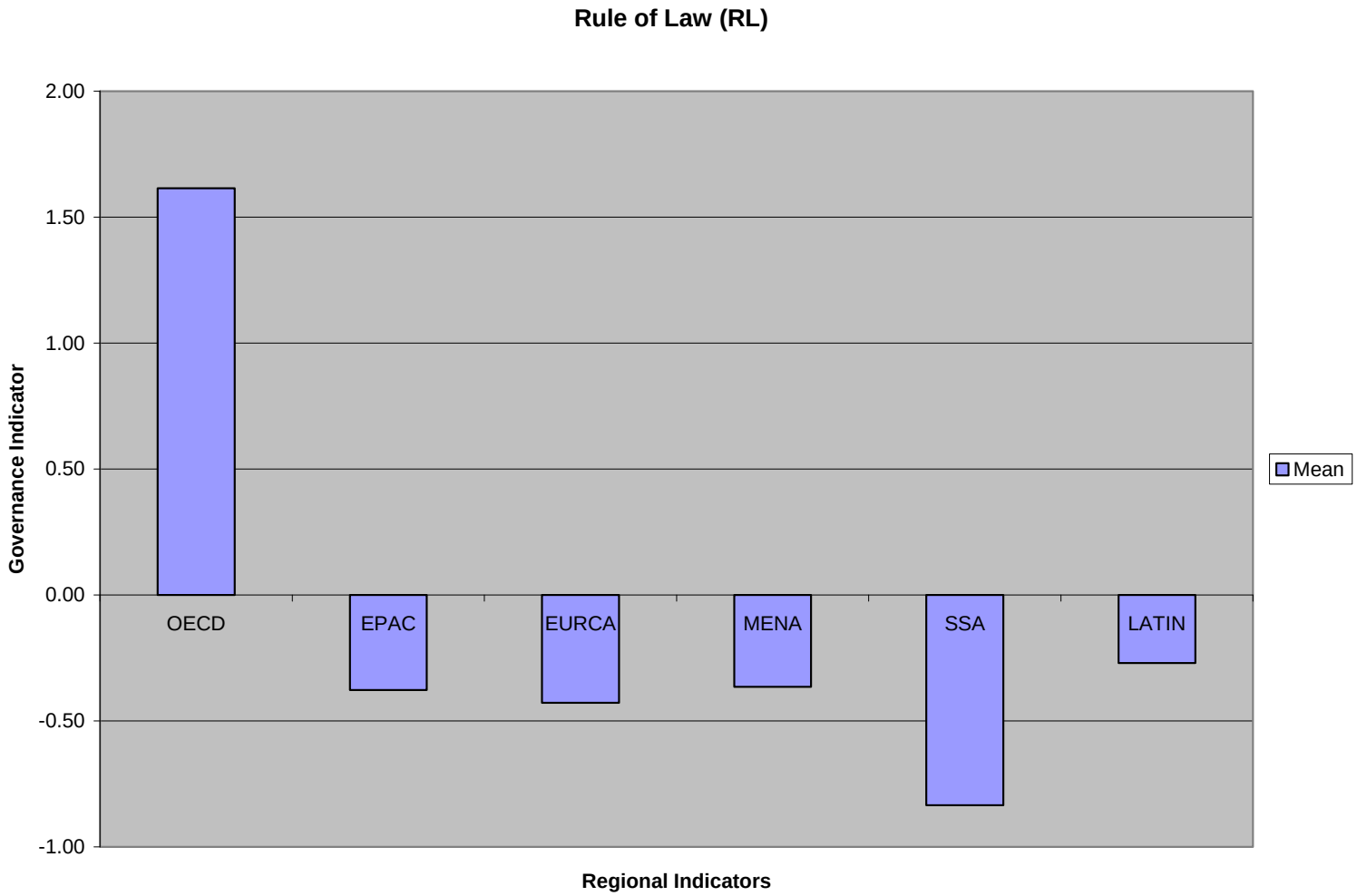


Figure 5E: Control of Corruption (CC) by Region, 1996-2005: Average Governance Indicator

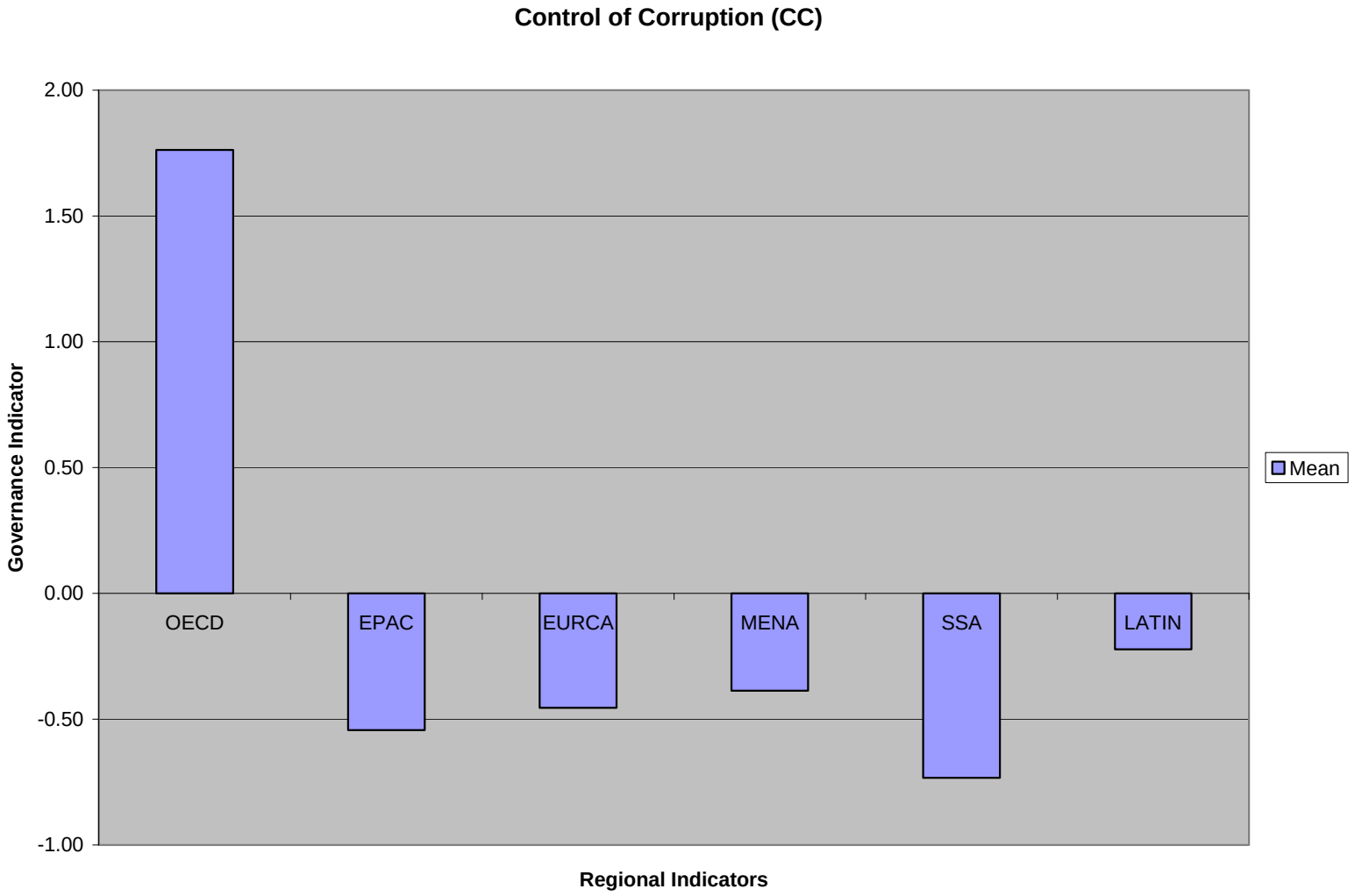


Figure 5F: Regulatory Quality (RQ) by Region, 1996-2005: Average Governance Indicator

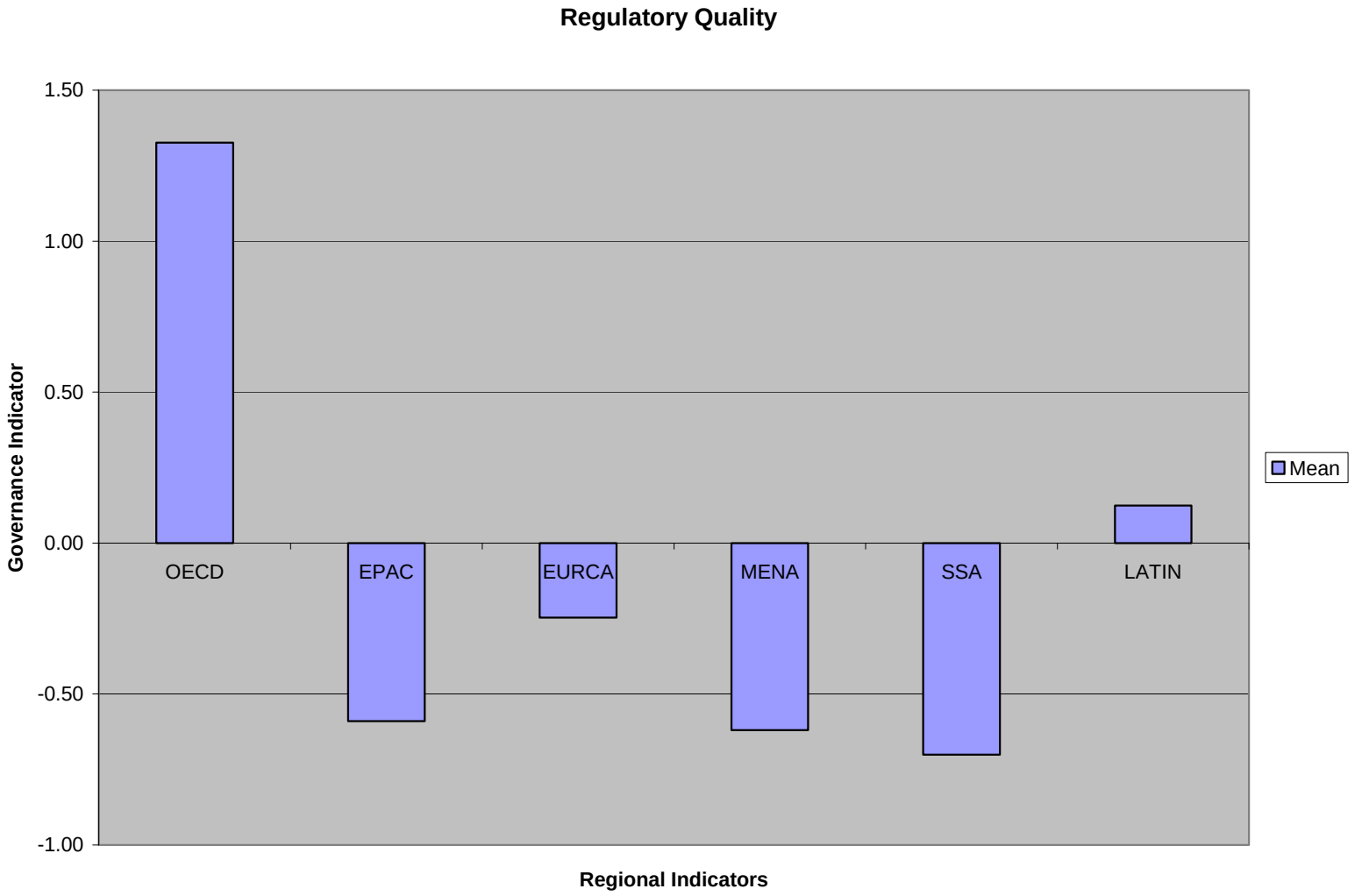
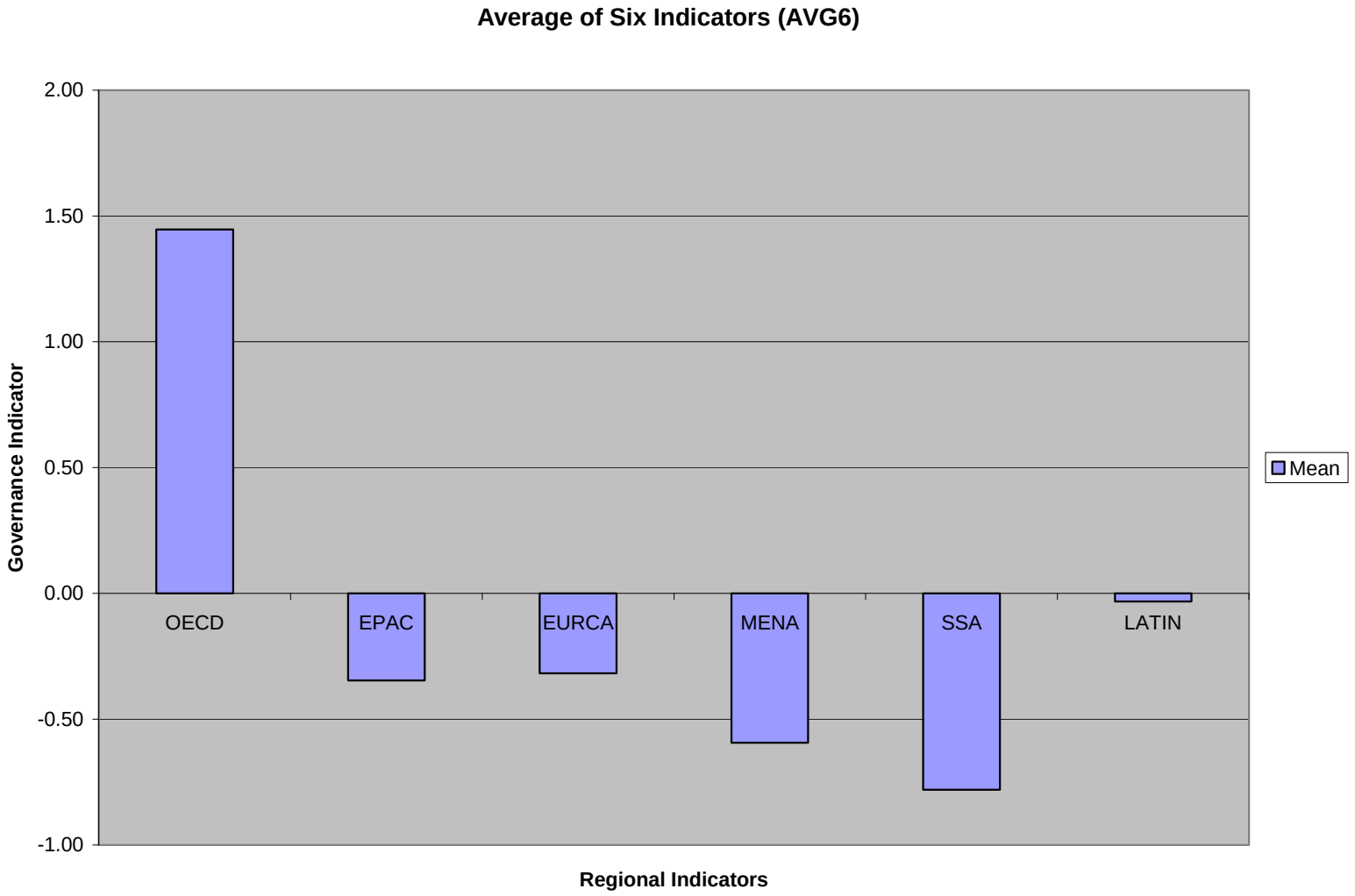


Figure 5G: Average of Six Governance Indicators (AVG6) by Region, 1996-2005: Average Governance Indicator



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