Roads to Investment

Implications of Infrastructure Development Aid on Private and Foreign Investment in Sub-Saharan Africa

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Abstract

Investing in infrastructure as a means to foster investment and development in aid recipient countries has been a priority of bilateral and multilateral donor institutions in recent years, with infrastructure related aid commitments accounting for 58 percent of the total amount of worldwide donor commitments.

This thesis investigates the question whether infrastructure related foreign aid significantly contributed to the attractiveness of Sub Saharan African countries for foreign and private investment, analyzing the impact in a region that is considered to host both, the least infrastructure endowment as well as the lowest investment rates worldwide. The panel data cross-country analysis conducted applies the method of disaggregated aid flows, as well as addresses the problem of potential endogeneity of aid and investment variables by the use of the GMM estimation technique. The results show that foreign aid has not achieved its targets of fostering investment in SSA as a means to spur growth. Furthermore, it could show that the negative rent-seeking effects that are considered to result from non-infrastructure targeting commitments are influencing investment decisions, especially for the case of private investment, even when political conditions are considered. For the case of FDI, the impact was not as robust, but showed that infrastructure aid is negatively affecting investment inflows in the case of better governance and disregarding governance indicators, supporting the idea of a rent-seeking effect.

Keywords: Foreign Aid, Infrastructure, Investment, Sub Saharan Africa

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1. Introduction

Since the beginning of the disbursement of development aid after the 2nd World War, foreign aid, or Official Development Assistance, has evolved to be a major contributor to many developing economies' budgets. In 2007, the total amount of bilateral and multilateral commitments accounted for 124,954 million US $ - more than ten times the GDP of the African country of Uganda (OECD, 2009).

Due to this large amount, foreign aid has been in the crossfire of criticism for as long as it has been granted. Researchers as early as 1963 analyzed that aid can even lead to negative impacts for the recipient country (Frank, 1963) whereas proponents - among them the multilateral and bilateral donor agencies themselves - defended their actions vigorously (World Bank, 1998). Even though it seems to be a moral obligation for developed countries to help those who are not as wealthy, the way this help is given and the effects of it have had diverse impacts on the recipients. "White elephants," aid-induced Dutch disease effects, as well as the support of corrupt and inhuman governments are only some of the major points brought forward by critics.[1]

Despite the criticism, the total amount of foreign aid has been rising again in recent years, provoking the further discussion of aid effectiveness. Much has changed, organizations learned from prior mistakes and try to adapt their projects in order to help developing countries to help themselves and catch up to the more industrialized world. Still, the outcomes of the aid effectiveness literature cannot agree on a positive impact of aid on development, and new ways of evaluating aid activities are needed to help donors assess their work more thoroughly.

One new empirical way of evaluation takes the criticism from economists as well as donor institutions into account, who claim that the very different outcomes in the assessment of aid impacts was due to the problem of the utilization of only one aggregate aid measures in empirical testing, but diverse effects in the recipient countries. Newer research therefore aims at providing a more detailed view on aid that might yield more stable explanations (World Bank, 2002; Mavrotas, 2002).

A newer strand of literature addressed this issue in providing further evidence for the effectiveness of aid - by disaggregating it into its diverse components. Among them are Clemens et. al (2004) as well as Harms and Lutz (2006), Todo and Kimura (2007) and Selaya and Sunesen (2008). These researchers proposed various ways

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[1] See Robinson/Torvik, 2005 for a discussion of the "White Elephants" problem, Van Wijnbergen, 1985 and Adam/Bevan, 2004 on aid-induced Dutch disease effects in developing countries as well as Svensson, 2000 and Alesina/Weder, 2002 for criticism on aid disbursement to corrupt governments

in which the aid effectiveness can be inspected more thorough through analyzing different aspects of aid commitments, arguing that, when evaluating the influence of foreign aid in developing countries, it is important to assess the factors that are actually considered by the donor institutions to target development subjects. One of the areas that has received considerable attention by these authors is investment as a means to spur economic growth. Here, it is especially infrastructure and infrastructure related projects that are considered to enable developing countries to bridge the gap towards the industrialized world through attracting private capital and investors, both domestic and foreign and through this spur economic growth (OECD, 2002/2006). The intuition is easy; if there is a road to transport products, electricity, a more educated and healthy workforce to produce, and wage earners who can buy, investments will be made and the economy grows. Development agencies worldwide have realized that by providing the basics for increased investment in developing countries, they help establishing further development. Aid commitments in the infrastructure sector, accounting for 58 percent of the worldwide total, indicate the importance of this sector (OECD, 2009).

It is therefore necessary to examine infrastructure aid commitments in regards to how far they influence some of the goals foreign aid tries to achieve; namely in how far infrastructure related foreign aid really helps a country to attract investments, one of the prerequisites of economic development.

This study will follow the stated criticism and disaggregate aid, namely into infrastructure aid and non-infrastructure aid, in order to examine the impact foreign aid had in the last 13 years on investment decisions in Sub Saharan Africa - the continent known to host the weakest infrastructure endowment as well as the lowest investment rates in the world. The choice for this particular region is steered by the evidence that SSA has maintained a special status in the aid literature. Cross-country growth regressions could show that the region was differing from other developing countries, thus indicating that examining this region alone would give interesting insights for the substandard development performance of SSA (Barro, 1991).

The focus of this study will lie on two aspects that have been elaborated by donor agencies as strongly important aspects of economic development[2]: private investment, the overall investment in a country excluding the public sector as well as

2 Donor policies guidelines on the necessity of fostering private investment and FDI have been published by OECD "Promoting private investment for development - The Role of ODA" (2006), and "Foreign Direct Investment for Development: Maximizing Benefits, Minimizing Costs," (2002). In addition, the World Bank "World Development Report 2005" focused on the importance of investment support for development

the more disaggregate measure of foreign direct investments. Even though the two areas are overlapping, they are considered to target two very different aspects of development and are therefore important to compare. Where private investment is an indicator for the overall investment climate in the country, foreign direct investment is often considered to be a source of progress through technological advancements and spillover effects (Lim, 2001).

Addressing this issue is relevant in various ways. Firstly, it will give more insights to the aid effectiveness discussion, applying a new technique through the disaggregation of aid. Secondly, it will help to answer the question of whether or not official development assistance (ODA) is spurring investments in the aid recipient country. Thirdly, the outcome will indirectly help assessing the impact foreign aid had on the Balance-of-Payment and dependency on donor support in a recipient country - if ODA indeed helps a country to attract significant amounts of investment, it will eventually make them more self-sufficient, and independent from donor assistance.

The goal of this research therefore is to answer the question: Did Infrastructure foreign aid contribute to the attractiveness of Sub Saharan African countries for foreign and private investment?

The study will proceed as follows:

Chapter 2 will explain the link between infrastructure, investment, aid and development. Chapter 3 will then provide an overview of the recent discussion on foreign aid effectiveness and its role in promoting investment and growth. Chapter 4 will point out the special case of Sub Saharan Africa that has often been in the center of attention of aid economics. The empirical framework and model for the study will be developed Chapters 5 & 6, followed by chapter 7 in which the empirical results will be illustrated and outcomes discussed. Chapter 8 presents the conclusion and provides policy implications of the outcome as well as suggestions for further research.

2. Infrastructure, Investment and Development

Before assessing the relationship between infrastructure related foreign aid and investment, it is necessary to explain the influence that infrastructure as well as investment and foreign aid exert on the economic development in aid recipient countries. This is especially important since the indirect effect of infrastructure on development via investment is one of the key aspects of this study and therefore needs to be explained in more detail.

2.1. Infrastructure and Economic Development

When starting to assess the impact and necessity of infrastructure for developing countries, it is important to recall what "infrastructure" stands for, what it includes, as well as the reasons why infrastructure is such an essential aspect of our daily lives. Infrastructure incorporates much more than the road that leads from A to B. Indeed, looking at the definition in the "Economist Dictionary of Economics", infrastructure is defined as "the economic arteries and veins, Roads, ports, railways, airports, power lines, pipes and wires that enable people, goods, commodities, water, energy and information to move about efficiently. Increasingly, infrastructure is regarded as a crucial source of economic competitiveness" (Economist.com, 2009). Only listing those elements stresses the importance of infrastructure for every aspect of life.

Moreover, it indicates that without infrastructure, not only would our everyday life be highly constrained, but engaging in national and international trade would also be seriously hampered. The endowment with proper infrastructure services can thus be considered not only as playing an imperative role for countries that aim at integrating themselves into the world markets, but also for fostering domestic investments and trade.

It is therefore no wonder that the theoretical literature started to explore infrastructure's influence on the economy as early as 1970, with a seminal paper of Arrow and Kurz that analyzed the outcomes of public capital on output using different financing schemes. Building upon this research was Barro (1990) who examined the contributions of public capital to production by applying an endogenous growth model. Even though the theoretical research on the topic was growing after Arrow and Kurz (1970), it took some time until the empirical literature addressed the issue as well.

This was only done after Aschauer delivered a first empirical examination of the importance of infrastructure in his seminal paper *"Is Public Expenditure Productive?"*

in 1989. In his analysis of the influence of public sector capital accumulation on the productivity of the US economy, he concluded that public investments increase private-sector output. This led to his further empirical research on the influence of infrastructure on economic growth (Aschauer, 1989)

Since then, a great number of economists have addressed the topic, both on the macroeconomic level conducting cross-country analyses, as well as the microeconomic level looking at only one sector or one country. Estache (2004) provides an overview of the studies conducted, assessing the implications of infrastructure on growth and productivity. He summarizes that "infrastructure matters most in low-income countries or in low-income regions in richer countries," (Estache, 4) a fact that underlines the importance of infrastructure investments for the envisaged aims of foreign development aid. Briceño et. al (2004) conclude similarly, adding that further infrastructure investments are needed in developing countries to address the high numbers of poor within their population.

Analyzing the topic by using microeconomic data, Musisi (2006) examined the influence of infrastructure on output and productivity, looking at firm-level data on a country base. He finds "that small firms benefit in particular," (Musisi, 42) from infrastructure, and shows that public infrastructure correlates positively with firm value added. Similarly, Deninger and Okidi (2003) assess the factors that were essential for growth and poverty reduction in Uganda in the 1990s examining household panel data. They find that, beneath other important factors, improved access to "health care, electricity and infrastructure […] have been a critical determinant of households' ability to increase their income and reduce the risk of falling into poverty" (Deininger/Okidi, 2).

Today, as a result of the research conducted, the empirical literature has come to the conclusion that, given the right prerequisites, infrastructure is playing an important role when it comes to promoting growth (Calderon/Serven, 2008). Nevertheless, the magnitude of infrastructure's impact varies with the definitions of infrastructure applied in each study (Prud'homme, 2004).

Besides the analysis of the direct impact of infrastructure on growth, arguments arose that infrastructure might also influence growth indirectly through its provision of the basis for investment.

Figure 1 shows the ways in which infrastructure can contribute to economic growth, as indicated by Prud'homme (2004), supporting the assumption that infrastructure is affecting growth indirectly via investment. To thoroughly assess the steps in which

the infrastructure-growth relationship works, it is therefore necessary to also examine the non-direct effects.

Figure 1: How Infrastructure Contributes to Development
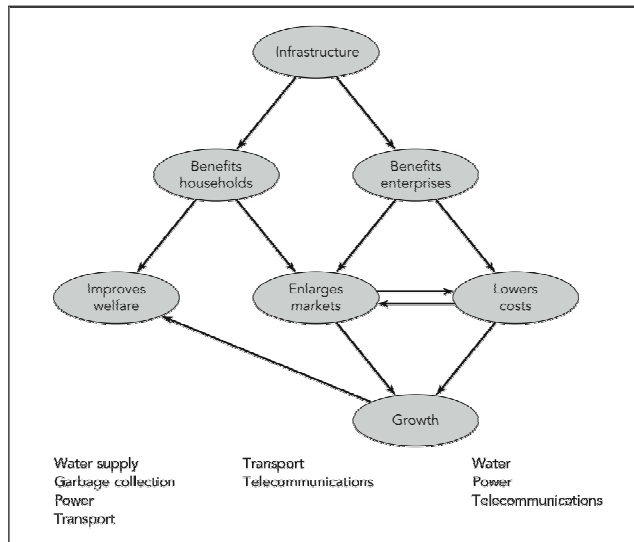
Source: Prud'homme, 2004, 162

The graph gives an indication as to how the provision of infrastructure helps to benefit enterprises and enlarge markets, supporting the idea that infrastructure is entailing investment and along with it, growth.

Root and Ahmed (1979) were among the first to investigate the assumption that infrastructure is important to attract investment flows and with this spur growth for the case of foreign investments. The authors could confirm that the intuition of bad infrastructure increasing the cost of firms and thus hindering investment is indeed right. This was later supported by the study of Schneider and Frey (1985) for less developed countries as well as in the influential research conducted by Wheeler and Moody in 1992, who analyzed the influencing parameters of FDI, finding that especially the quality of infrastructure is influential for investment.

Basu and Srinivasan (2002) as well as Asiedu (2006) furthermore provided empirical evidence for the beneficial effects of infrastructure on FDI inflows, especially for Sub Sahara Africa. In addition to that, Ndulu (2005) identified infrastructure not only as an important factor for FDI inflows, but also detected that countries with a more developed infrastructure featured a stronger impact of FDI on growth.

Even though the necessity of infrastructure for investment and economic growth has been verified, it still constitutes a strong obstacle for developing countries. For the case of Sub-Saharan African countries, Calderon and Serven (2008) estimate the investments needed for establishing just the basic infrastructure to amount to "15

percent of GDP in the low-income countries of East and Central Africa, […] and between 7 and 8 percent of GDP for Southern Africa's low and middle income countries" (Calderon/Serven, 28). For some of these countries, this would be almost as much as the total government revenue, which are "well below 20 per cent of GDP" (Calderon/Serven, 28).

2.2. Linking Investment and Growth

Given the positive impact infrastructure has on investment, it is in a next step necessary to examine if this increased investment is causing growth in developing countries, thus achieving the target of donor institutions.

The relationship between investment and growth has been the topic of empirical research in economics for many years. Not only have economists investigated if there is a tie between the two factors, but they have also aimed at interpreting the influence of different sources of investment, in particular those of foreign, public and private investment.

The investment-growth nexus was initiated in the 1950s with the introduction of the so-called accelerator theory (Serven/Solimano, 1992). The theory saw investment as "a linear proportion of changes in output," (Serven/Solimano, 97) arguing that increasing demand fosters increasing investment which in turn accelerates economic growth. An influential study by Papanek (1973) recommended separating the different ways of possible investment in order to enable the examination of the outcome of each single component on the growth process in developing countries. In doing so, he found that both foreign inflows and foreign aid play an important role in explaining growth, leading to a variety of studies following this advice and examining the aid-investment relation, which typically focuses on either of the two variables: private and foreign investment (Hansen/Tarp, 2001).

Later on, in 1990, Barro investigated the relationship between investment and economic growth in an endogenous growth model, concluding, "per capita growth and the investment ratio tend to move together," (Barro, 422) and thus supporting the hypothesis of a positive impact of investment on growth. The empirical research that followed these influential studies then examined the relationship between investment and growth by looking at different investment modes, focusing on either private investment or foreign direct investment in particular.

2.2.1. Private Investment

Khan and Reinhart initiated the empirical research on the relationship between private investment and growth in 1990. They examined the impacts of public and private investment on economic growth in 24 developing countries, discovering that private investment indeed has a stronger impact on growth than public, especially in the long term (Khan/Reinhard, 1990). Their results were substantiated by further research from Ojo/Oshikoya (1995) who in exploring the determinants of long-run economic growth in Sub-Saharan Africa found that "growth is positively related to the share of investment in GDP" (Ojo/Oshikoya, 172). Investigating this relationship on a country scale, Ghura (1997) also found a strongly positive impact of private investment on growth for the case of Cameroon.

Khan and Kumar (1997) later supported these findings for a larger sample, applying a neoclassical growth model to a sample of 95 developing countries over the period 1970-1990. They could detect that it is especially a stable macroeconomic environment, the development of human capital and a further openness to trade that helps to increase private investment and with this to stimulate economic growth over the long run (Khan/Kumar, 1997). Their research was later extended by the study of Bouton and Sumlinksi (2000) to an even larger sample, the results supporting the previous outcome.

2.2.2. Foreign Direct Investment

Research on foreign investment found that it impacts economic growth specifically through positive spillover effects. As Lim (2001) summarizes, " FDI's contribution to growth comes from its role as a conduit for transferring advanced technology from the industrialized to the developing economies." (Lim, 3) This rationale has been proven correct by many empirical researchers; nevertheless, the positive influence was always conditional upon the economic environment.

Blomström et al. (1994) for example confirmed a positive effect of FDI on growth, but found that the host country has to provide a sufficient level of wealth for this relationship to hold. Similarly, Borensztein et al. (1998) empirically investigated the effects FDI had on 69 developing countries, finding that "FDI is an important vehicle for the transfer of technology, contributing relatively more to growth than domestic investment" (Borensztein, 115). They furthermore revealed that the effect of FDI is dependent upon other factors, especially the level of human capital. Mello (1997) concludes that the FDI-growth relation is influenced by the size of the technological gap between the two participating countries and Alfaro et. al (2001) consider the

financial market as the important factor for the impact FDI has on a developing countries' growth. Carcovic and Levine (2002) later supported this conditionality upon other variables for the positive FDI impacts on growth in applying dynamic panel data methods to assess the FDI-growth relationship.

Especially for the case of Sub Saharan Africa, Lumbila (2005) analyzed this relationship for the period 1980-2000. Applying a similar model to the one designed by Borensztein et. al (1998) but extending it with the variables infrastructure, risk and governance, he could support the findings of the above mentioned authors (Lumbila, 2005). Not only did he find that FDI has a positive impact on growth in SSA, but he also identified that human capital, stable macroeconomic performance, better infrastructure networks, as well as lower country risk are influencing factors for the relationship between FDI and economic growth.

Given the positive impacts that are expected to result from private and foreign direct investment on economic growth in developing countries, it is reasonable to investigate the effects of infrastructure aid on these two modes of investment. A positive effect of infrastructure related aid on investment would confirm the rationale of donors that the support of infrastructure projects will spur development in recipient countries through its impact on investment and thus help them achieving their main objectives.[3]

3. On Foreign Aid or Official Development Assistance

Ever since it was introduced, there has been vast criticism on the outcomes of foreign aid activities. Scholars started criticizing the good intentions behind foreign aid as early as 1963, when Frank studied the rational behind US assistance to Brazil, finding that it led to Brazilian development which in turn benfited the US (Frank, 1963/69). Bauer (1991) in later years summarized the criticism by stating "aid does not descend indiscriminately on the population at large, but goes directly to the government. Because aid accrues to the government it increases its resources, patronage, and power in relation to the rest of society," and that "foreign aid has also enabled many governments to pursue policies that plainly retard economic growth and exacerbate poverty" (Bauer, 45-46).

These results caused further empirical research on the effects of foreign aid. Predominately, researchers examined the effectiveness of foreign aid with regards to

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3 According to the World Bank, economic growth is one of the key determinants to reduce poverty. "To create economic opportunities; and help poor people to take advantage of these opportunities," (World Bank Group, 2) is considered one of their main objectives.

economic growth, political systems in recipient countries and poverty reduction[4]. The outcomes were highly diverse, ranging from positive impact of aid on growth in stable political environments (Burnside/Dollar, 2000) to the discovery of a negative relationship between the two factors (Boone, 1996).

Disregarding the findings of Bauer (1991) and Boone (1996), most institutions today agree with the conclusion of Burnside and Dollar; aid has a positive effect on growth, given that policies and institutions in a country are good (Burnside/Dollar, 2000). Still, this outcome is not agreed upon in the econometric literature and scholars are still criticizing the fashion in which the authors conducted their research, providing analyses that show that variations in the definitions of the variables lead to the opposite outcome (Easterly et al., 2003) or giving evidence for the positive effects of ODA even in constraint and undemocratic environments (Hansen/Tarp, 2001; Harms/Lutz, 2006).

Addressing these diverging outcomes, the World Bank in 2002 stated in its report "A case for Aid: Building a Consensus for Development Assistance" that "the evidence on the effectiveness of aid has at times been ambiguous - but this is because early research failed to distinguish between different types of aid and recipients" (World Bank, 93). Arguing about the heterogeneity of ODA and the varying purposes of ODA disbursements, they conclude that ODA itself has different purposes, not all of which aim at supporting economic development in the recipient country (World Bank, 1992). Therefore, ODA should rather be disaggregated into its components and economic research should then analyze the impact of those detailed measures on the various aspects of donor activities to assess the impacts of foreign aid. Nevertheless, it was not until the 2000's that the idea of "all aid is not the same" (Gibson, 2005) was brought forward empirically.

Pioneers in the implementation of this new aspect of assessing aid impacts were Clemens et. al (2004) who explored the different effects of foreign aid on economic growth. Distinguishing between long-term aid, which aims at supporting development and institutions, emergency and humanitarian aid, and so-called short-term aid which includes "aid flows that might reasonably be expected to stimulate growth in four years," (Clemens et. al, 37) they observe a positive and robust relationship between the short-term measure of aid and economic growth, suggesting that indeed a differentiation between the aspects of foreign aid can lead to more robust outcomes.

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4 Among others, Boone (1996), Alesina/Weder (2002) as well as Knack (2000, 2004) provide empirical evidence on the relationship between aid and the political system

Their results were supported by the research of Harms and Lutz (2006) who, distinguishing between grants, technical cooperation, multilateral and bilateral aid find that "a higher level of aid-financed infrastructure attracts more private foreign investment" (Harms/Lutz, 16). Selaya and Sunesen (2008) came to a similar conclusion by finding that aid invested in social infrastructure projects has a positive effect on FDI but not on "aid invested in physical capital" (Selaya/Sunesen, 9).

Todo and Kimura (2007) are taking a similar approach and assess the effect foreign aid has on foreign direct investments in less developed countries. Contrary to the other authors, they observe neither a positive infrastructure effect of foreign aid for physical infrastructure nor a negative rent-seeking effect for aid targeting non-infrastructure purposes (Todo/Kimura, 2007). Nevertheless, they explore that aid improves FDI through a vanguard effect.[5] They found that this effect is especially prevailing for the case of Japanese foreign aid, an outcome that was supported by Blaise (2005) and Hien (2008).

Even though the existing empirical literature on the effects of disaggregated measures of ODA is not very extensive, it could prove that the distinction between different aid aspects could reveal additional outcomes of foreign aid and its impact that could previously not be detected due to the aggregate aid variables applied. It is therefore important to extend the empirical research in this field to enable donors to better assess the impact of their activities.

3.1. Foreign Aid and Infrastructure

The positive impacts of infrastructure in developing countries mentioned earlier have caused donors to integrate infrastructure finance into their strategies to support the growth process in developing countries. The World Bank dedicated its 1994 World Development Report to the topic of "Infrastructure for Development" and the OECD acknowledged the topic as one of the four crucial aspects for pro-poor growth in their 2006 publication "Promoting Pro-Poor Growth: Policy Guidance for Donors." Still, the infrastructure gap is widening and Sub Saharan African countries are lagging more and more behind in the growth process (Estache et al., 2004).

Supporting infrastructure projects as part of foreign aid activities has always played a role in development finance. Building infrastructure is both time and cost intensive, two factors that make it difficult for developing country governments to stem the

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5 The vanguard effect describes the situation where foreign aid from a particular donor country fosters FDI inflows into the host country by donor country businesses, but not from other countries. (Todo/Kimura, 2007)

financing of infrastructure projects on their own. It is therefore no wonder that foreign aid has always been the largest contributor to infrastructure finance after to the recipient countries' governments (Estache et al., 2004). Nevertheless, the expectations of increased privatization activities as well as additional further engagement of the private sector in infrastructure led to a decrease in the amount of these contributions in the 1990s (Briceno et al., 2004).

Unfortunately, the private sector fell short of these expectations with contributions that were strongly volatile, which in turn led to an overall decline in infrastructure spending. For the 1990s, DFID estimates calculated that the private sector accounted for 20-25 percent of infrastructure spending. According to Estache (2004) the private sector participation has not changed significantly over the years and "accounts for only 10–15 percent of estimated investment needs. In addition, most of these investments have gone to energy and telecommunications (in terms of sectors) and to Latin America, East Asia, and (to a lesser extent) Eastern Europe (in terms of regions) (Estache, 2004). Hence, Sub Saharan Africa attracted even less private infrastructure investments than the developing country average, making it even more reliant on the provision by the public sector and especially foreign donors.

3.2. Foreign Aid and Investment

The literature review so far has already explained the reasons as to why foreign aid in the infrastructure sector is important in supporting economic growth via investment. The impact foreign aid has on investment inflows in developing countries has been controversially discussed in the aid literature with no clear outcomes. The main focus of the research was always either the influence of aid on FDI inflows as a vehicle to spur growth in the host country, or the impact of aid on private investment in a country in total. Even though the more recent literature on the disaggregation of aid has focused so far on the aid-FDI nexus, private investment should not be ignored when assessing the question as to how infrastructure aid is affecting investment.

The rationale behind this is the ongoing discussion about aid being either the gap-filler between desired investments and existing inadequate savings, thus helping a country in overcoming shortages, or as only supporting the public sector and therefore crowding out private investments (Snyder, 1996). The latter assumption was especially supported by the findings of Hadjimichel et al. (1995) who, investigating a Sub Saharan African sample, could prove that aggregate aid was strongly connected to government consumption, but could only find mixed outcomes

for private investment. Looking at developing countries, Snyder (1996) found an even more negative impact, concluding that "countries which receive larger aid allocations experience lower subsequent levels of private investment" (Snyder, 735). This rather negative view was supported by the Dutch Disease literature, which saw foreign aid as causing Dutch Disease and thus hampering investment.[6]

Despite these negative findings, positive results of foreign aid's impact on private investment have been identified as well, especially for the case of Sub Saharan Africa. Levy (1988) found a positive impact of aid on investments in Sub Saharan Africa as did Mosley et al. (1987). Again, since there is not yet a general consensus about the impact of aid on private investment and since infrastructure is considered to foster investment, examining the impact of infrastructure aid on investment will reveal more recent and more focused information on this.

The literature on FDI and foreign aid is as ambiguous as for private investment. Root and Ahmed mention foreign aid as one of the determinants of FDI in their 1979 study on investment, even though they did not find a significant impact. Karakaplan (2005) investigated the relationship for the case of least developed countries, finding an overall positive impact, especially in countries with less political risk. Contrary to these findings is the outcome of Harms and Lutz (2006) who concluded that foreign aid is having a stronger and more positive effect on FDI inflows in countries with heavier regulatory burdens.

Two additional studies address the influence of disaggregated aid flows to developing countries, namely Selaya/Sunesen (2008) for "complementary aid" and its impact on FDI, finding an overall positive impact of their aid measure in attracting foreign investment inflows whereas Todo and Kimura (2007) find no significant "infrastructure effect" of infrastructure aid within their sample.

Since both private investment and FDI have evolved as two important aspects on the path to economic growth, the influence of aid on these two investment measures has been examined in economic literature. Nevertheless, since the impact of aggregate aid has in both cases been ambiguous, the examination of a more disaggregated measure of aid, including the infrastructure aid commitments, will therefore give new evidence for the influence of aid targeting these aspects of development.

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6 Research on the aid-induced dutch disease effect include: Van Wijnbergen (1985), White/Wignaraja (1992), Adam/Bevan (2004)

4. The case of Sub Saharan Africa

Comparing Sub Saharan Africa's infrastructure endowment with the average of all developing countries reveals an alarming picture. SSA has fewer kilometers of accessible roads than other developing countries, only 24% of the population has access to electricity (against 58% in developing countries in total), as little as 34% can use rural roads and 65% access proper sanitation, not to speak of health services or access to communication means (African Development Bank, 2009). In all aspects, the region is far below the average of developing countries, indicating how precarious the situation is.

A look at the map of Africa reveals why infrastructure is considered a major constraint for development for many Sub Saharan African countries. Contributing to the low infrastructure endowment are certainly the geographical disadvantages, from which most of the SSA countries suffer. 15 of the 48 Sub-Saharan African countries are landlocked, which results in difficulties for trade, especially given that transport opportunities, e.g. all-season useable roads and railways, are generally low, leading to high transport costs within countries and across borders. A study by Limao and Venables (2001) revealed that the high disadvantages in transport costs within SSA that result from this lack of infrastructure are far beyond those faced by competing developing countries such as those in North Africa or South Asia. The results are higher prices and less availability of products, which in turn hampers the competitiveness of African products, both within the region and abroad.

Reasons for the low infrastructure endowment are manifold. But the most obvious and proven ones include the high investment cost in SSA (see Sala-i-Martin et al., 2004), a very slow capital accumulation (Hoeffler, 1999), and the constraints due to geographical disadvantages that prevent investors to engage in infrastructure development (Ndulu, 2005).

The low endowment, combined with the slow development of infrastructure furthermore leads to the weak performance of investment growth in SSA, that was also far below the average of developing countries. Devarajan et al. (2002) explained that the average investment in SSA for the period 1960 to 1994 was as low as 9.4% of GDP, compared to a share of 15.6% in other developing countries. Figure 2 shows the development after 1994; even though the investment rate rose slightly, it maintains lower than the developing countries' average. Still, a growth process towards the end of the period under review can be detected, similar to the rise of aid commitments in the infrastructure sector. The figure also shows the volatility as well as the low amount of foreign inflows.

It is therefore the action of governments that is needed for the provision of at least basic infrastructure, especially since private involvement in infrastructure is generally low and strongly focused on the sectors that are profitable, namely the telecommunications sector (Estache, 2004). Unfortunately, since African governments are often credit constrained and heavily indebted, they are simply not able to provide the much needed infrastructure themselves. It therefore seems to fall within the challenges for donor agencies to support infrastructure development in these countries (Jerve/Nissanke, 2008).

Figure 2: Aid and Investment Flows to SSA 1995 - 2007
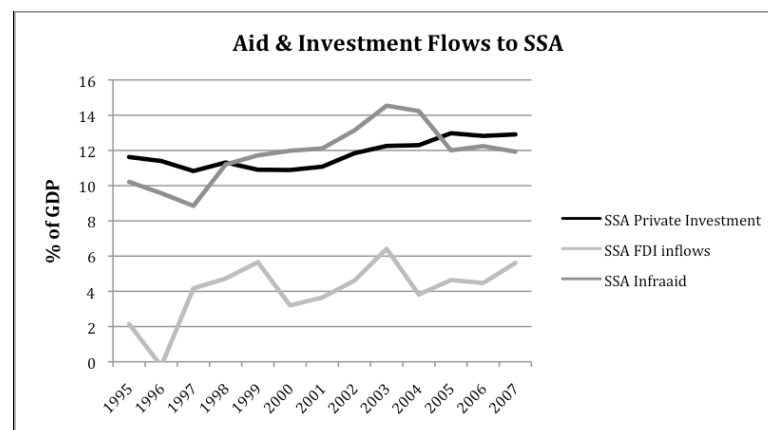
Source: OECD CRS Database

Even though the consequences of the relationship between low infrastructure endowment and low productivity as well as economic growth have been the topic of much economic research[7], the problem still maintains and it is argued that the so-called infrastructure-gap could indeed be widening even further, due to the disadvantages of SSA (Jerve/Nissanke, 2008). Aggravating these obstacles were diminishing commitments for infrastructure projects from donors in the 1990s. Estache (2004) notes that overall "infrastructure commitments from multilateral development banks fell from $18.0 billion in 1996 to $13.5 billion in 1999" (Estache, 9). Figure 3 shows that this was also reflected in the infrastructure related aid commitments to SSA. Only at the end of the 1990s was infrastructure aid rising again. This was, nevertheless, not as strong as the overall aid commitments rose during this time.

As Jerve and Nissanke argue in their report "Aid Effectiveness to Infrastructure: A Comparative Study of East Asia and Sub-Saharan Africa" (2008), this can mainly be seen as a consequence of the development agenda in the 1960s to 1990s, which centered on alternating aspects of development, but not infrastructure. Fortunately,

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7 See for example Briceno et al. (2004), Estache (2004)

as they note, the infrastructure failure in the 2000s has finally received the necessary attention again, a fact that is reflected in the increasing aid commitments to the sector.

But the changing focus in the decades before 1990 is not the only explanation for the "neglect" of infrastructure aid in SSA countries. An additional reason is the failure of many infrastructure projects in the past, where infrastructure aid was spent on so-called "white elephants." These were public infrastructure projects that were too big, too costly or badly priced and were object to too little regulation, overall being "interpreted as projects with a negative social surplus" (Robinson/Torvik, 198). These negative experiences were coupled with a shift in paradigms, away from infrastructure and towards more social services and training in the 1990s, as can also be seen when examining Figure 3 (Ndulu, 2005).

Figure 3: Aid Commitments to SSA between 1995 and 2007
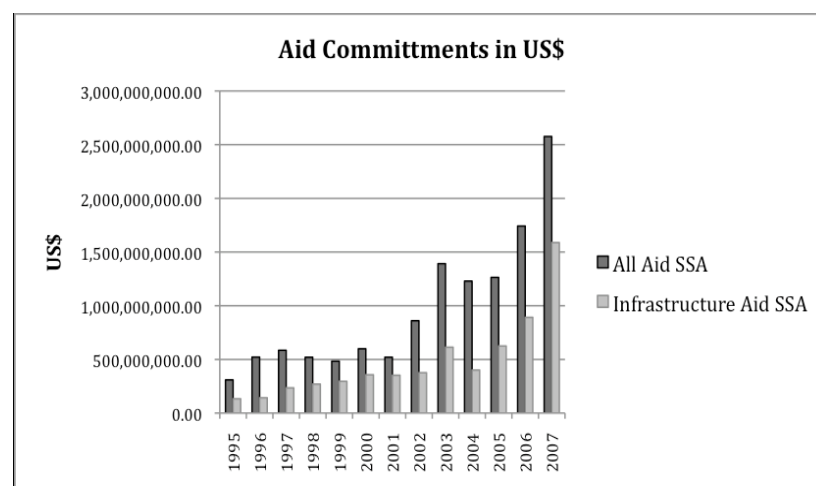
Source: OECD CRS Database

Today, infrastructure is again gaining ground in the development policies discussion. Not only is the positive impact of infrastructure on various aspects of development, such as economic growth and poverty reduction acknowledged, but also its role in attracting investment is receiving attention from important development institutions, including the World Bank (2006), the UK Commission for Africa (2005), AfDB (2008) and bilateral institutions such as the German Development Bank (KfW, 2009) and the Japanese Bank for International Cooperation (see Jerve/Nissanke, 2008). In addition, both bilateral and multilateral donors have learned from their mistakes. The economic rates of return for infrastructure projects have increased, "not least from a change in procedures, including the establishment of so-called road funds, the inclusion of private partners and the start of reforms in recipient countries" (Ndulu, 232).

It is acknowledged that the continent needs a large amount of additional funding in infrastructure if it wants to break free of the vicious circle of under-development. AfDB forecasts assume that in the areas of energy, transport, sanitation and telecommunications alone, "the continent should allocate approximately US\$ 38 billion each year, […] from 2005 to 2015, to enable the continent achieve the Millennium Development Goals for these sectors" (AfDB, 2009). Researchers as well as developing agencies argue that increasing these investments are important to raise the low investment rate in SSA and with this support the growth process (OECD, 2002/2006).

Of course, having in mind the "white elephants" of the 1970s and 1980s, one has to evaluate how much the donor community can do and how much the countries can absorb and implement, given their resources. In addition, it has to be examined how much influence infrastructure projects really have on Sub-Saharan African countries. In other words " How effective was infrastructure foreign aid up until now?" It is therefore necessary to undertake an evaluation of the impacts that infrastructure aid has had in the last decade in SSA countries, especially given the discussion of scaling up aid in this sector.

5. Theoretical Background

Chapters 2- 4 gave a thorough overview on the theoretical and empirical literature that assessed the impacts of aid and investment on growth, as well as pointed out the special case of Sub Saharan Africa. Having deduced the necessity of analyzing the relationship between infrastructure, aid and investment in Sub Saharan Africa more in-depth, the study will now turn towards the empirical analysis of this relationship by explaining the econometric approach in more detail.

5.1. The disaggregation of Foreign Aid Variables

The existing literature on the advantages that result from the disaggregation of overall aid has already been discussed in chapter 3 and shall not be repeated here. Still, it is necessary to take a close look at ODA and its diverse purposes to understand why the disaggregation is necessary.

The heterogeneity of aid has been considered as one of the key problems in aid-effectiveness theories. The most influential studies on aid effectiveness are centered on a single figure for aid - either total aid commitments or total aid disbursements. In practice, though, the aid literature as well as the donor community distinguishes

between different aid categories targeting different aspects of development. Mavrotas (2002) names five different categories for aid:

- project aid

- programme aid

- technical assistance

- food and commodity aid

- humanitarian aid.

The general argument in dividing these different categories is that due to the different ways in which they operate, they comprise different time frames and targets. For example, project aid is considered to be having a long-term effect, resulting in economic growth, whereas food aid and humanitarian aid are disbursed to achieve very short-term impacts, satisfying urgent and basic needs (Mavrotas, 2002). Similarly, Clements et al. (2004) as well as Selaya/Sunesen (2008) suggest that the disaggregation of aid is necessary to improve the analyses of the influence of foreign aid. These authors argue that aid to more diverse sectors should be examined rather than the more limited aid categories proposed by Mavrotas. Their approach makes use of the categorization of the OECD Creditor Reporting Database.

This database distinguishes between 12 different sectors of aid, including social and economic infrastructure, production sectors, multisector and commodity aid, general actions relating to debt as well as humanitarian aid. Furthermore, it includes disbursements for administration costs, NGO support, refugee assistance as well as unallocated aid. Within these 12 sectors, the disaggregation goes even further, providing 233 different purposes for aid distribution. (OECD, 2009) This division of purposes is the foundation of more recent aid-disaggregation literature. The opportunities that arise from this provision of the diverse fractions of aid commitments are manifold. Not only can the direct impacts of each of the sub-sectors be assessed in more detail, but it also enables the researcher to assess the commitments of all multi and bilateral donors.

Naturally, the availability of the database raises the question why aid theory has not explored the disaggregation of aid flows, taking a closer look at the outcomes on diverse variables. According to Clements et. al (2004), this is due to the limited year coverage of the dataset, which covers up until now only the years 1995 to 2007. Still, there are advantages and disadvantages related to this. A longer timeframe potentially helps in analyzing long-term effects, "but can greatly increase noise and impede attribution of growth events to causal aid events in the distant past"

(Clements et al., 11). Therefore, the choice for a shorter timeframe but disaggregated aid data might just shed some more light on the ties between aid and the dependent variable.[8]

5.2. Determinants of Investment

Investment decisions are conditional upon diverse underlying factors. Not only is the provision of adequate infrastructure necessary, but there are also other influencing aspects that affect investors.

The economic literature on the determinants of investment inflows has been established early and is vast, not only for developed but also for developing countries. Despite the plethora of research, authors have not settled on one basic investment equation. It is rather that determinants of investment are tested with different parameters and varying outcomes. Nevertheless, there is agreement on basic areas that have to be taken into account when research on investment is performed.

The examination of an infrastructure ODA – Investment relationship has to take the parameters that have been found influential in the previous empirical investment literature into consideration and test their outcome in the existing study. A thorough assessment of the literature on investment decisions reveals furthermore that there are differences in the determinants of foreign and domestic private investment. It is therefore necessary to take a closer look at the variables considered influential for both foreign direct and domestic private investment and delineate the similar and diverging ones.

Market Size and Market Potential

Root and Ahmed analyzed the determinants of FDI in developing countries as early as 1979, identifying the influence of the political stability on FDI decisions, but also the significant impact of market size and market potential. The argument behind this, as UNCTAD (1998/2000) in their "World Investment Reports" stated, is that investors oftentimes invest in developing countries to serve the host market, therefore preferring countries with larger market sizes and potential. This intuition was verified by various scholars alongside Root and Ahmed (1979), including Schneider and Frey (1985), Wheeler and Mody (1992) and Nunnenkamp and Spatz (2004). Measures for market size and market potential include GDP, GDP per capita or GDP growth.

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8 A detailed listing of included commitments can be found in Appendix Table 1.

Market potential and market size variables also seem to influence private investment. Income per capita, enabling the population to increase their savings rate and thus to increase their capital base for investments has also been attested to have a positive effect on private investment. Oshikoya (1994) and Greene and Villanueva (1991) found that countries with higher income per capita could save more, resulting in more capital to finance investments.

Macroeconomic Stability

Greene and Villanueva (1991) as well as Oshikoya (1994) found that inflation rates, as indicators for macroeconomic stability are important in explaining private investment decisions. Greene and Villanueva's study concluded that higher inflation rates negatively affected the investment decisions in 23 developing countries, proving that inflation rates are indeed playing a crucial role in explaining domestic private investment. Karakaplan (2005) argues that inflation is also an influential determinant of macroeconomic stability for foreign investors.

In addition to the inflation rate, especially for the case of private investment, the external debt overhang influences decisions via its macroeconomic effect. High external debt burdens are considered to cause uncertainty due to the unpredictability of prospective changes in foreign interest rates and terms of trade as well as limiting funds as a consequence of high debt repayments (see Oshikoya, 587). Borensztein (1989), Serven and Solimano (1993) as well as Oshikoya (1994) could proof the negative impact of the external debt overhang for private investment.

The rationale behind including these measures is that large external debt gives reason for uncertainties and for macroeconomic instability. Part of this uncertainty is a result of the fact that the size of these payments may depend on "future levels of world interest rates, terms of trade, the purchasing power of exports and the ability to reschedule debt" (Oshikoya, 586). In addition to this, large external debts diminish the funds available for domestic investment, which cannot be increased due to constraints on international credit markets as a result of the high debt burden (Borensztein, 1989).

Policy Variables

Where the influence of market potential and size on investment has been accepted almost unanimously, the research on the influence of the policy variables on investment decisions has revealed mixed outcomes, ranging from strong significance (Root/Ahmed, 1979; Scheider/Frey, 1985) to no significance at all (Wheeler/Mody, 1992; Albuquerque et. al, 2004), especially for the case of FDI inflows.

For private investment in developing countries, policy is considered to play an important role for the investment decision. While Rodrik examined the linkages between policy uncertainty and private investment for developing countries, finding that the impact policy has on investment is conditional on the variable chosen and can be completely insignificant (Rodrik, 1989), other scholars, such as DeHaan and Siermann (1998), Besley (1995) and Dawson (1998) argue that policy variables, including economic freedom, institutional quality and the stability of a government are necessary for creating an investment environment. Especially with regards to the more recent discussion about the effectiveness of aid in more stable political environments, as was postulated by the World Bank in its 1998 report "Assessing Aid" and the seminal work of Burnside and Dollar (2000), the inclusion of a policy variable is a relevant step for the assessment of an aid-investment relationship.

Furthermore, the openness to trade as a proxy for the trade policies followed by a country, usually measured as imports + exports as a share of GDP, is considered to be influential for investment decisions in a country as well. For the case of FDI, Morrisset (2000) argued that a higher trade share is considered to show that trade is less restricted and is a sign for higher competitiveness of the host country. Assessing the determinants of FDI for a set of 29 Sub Saharan African countries, the scholar found that trade openness is a very strong determinant of FDI inflows for the region conlcuding that the significance of the trade openness variable "confirms the arguments that trade liberalization leads to a more general reduction in administrative barriers and improve the business environment in the host economy […] as well as conveys the right signal to the international business community" (Morriset, 12-13). These findings are supported by Asiedu (2000), who also observed the significance of the openness variable, not only for developing countries but also when looking at only SSA economies, showing the necessity of the inclusion of this variable in ODA - FDI regressions considering Sub Saharan African economies.

For the case of private investment, empirical testing could prove the advantages resulting from trade openness as well. Levine and Renelt (1992) found that especially variables such as the export and import to GDP ratio, other openness variables and terms of trade shocks are having a robust relation to the investment shares. (Levine/Renelt, 959) Their findings were supported by the research of Baldwin/Seghezza (1995).

Financial System Development

For the case of developing countries, Serven and Solimano (1992) as well as Erden and Holcombe (2005) showed the strong influence of credit availability for the private

sector, demonstrating the significance of the variable especially in developing countries.

The influence of this variable is indeed very intuitive, especially for African countries, where local investors might not be able to access international credit markets and thus need domestic credit facilities in order to invest. As Oshikoya puts it: "for private enterprises, bank credit remains the most important source of investment financing" (Oshikoya, 584). Credit availability can thus be considered a crucial determinant in explaining private investment, proven by a wide range of researcher on the topic.[9]

Apart from private investment, the development of the financial system is also important for foreign investments. Investors have been found to be interested in the development of the business environment in the host country, a strong indicator being the depth of the financial markets (Karakaplan, 2005). The rationale behind this is that developed financial markets facilitate the day-to-day business for the investing company, thus a more established financial system is considered as attracting FDI inflows.

The depths of the financial system can be measured in the ratio of private credit to GDP (Alburquerque, 2004) as well as in the ratio of M2 to GDP (Karakaplan, 2005). Even though it is sometimes argued that foreign investors will finance themselves in the host country with credit and retained earnings from their home markets, (Oshikoya, 2004) it can be argued that investors still need credit and a minimum of structured business environment to conduct their day-to-day operations.

Human Capital

A variable that has been proven to be of influence for FDI attractiveness, but has not yet been thoroughly examined with regards to private investment decisions is human capital. Noorbakhsh et al (2001) investigated the influence human capital has on the inflows of FDI, finding that a more educated workforce in a country is strongly attracting FDI inflows. The intuition behind this is easily understandable; If there is a qualified workforce, more complex products can be produced, giving a country the opportunity to compete for – and probably receive – more FDI inflows. Besides the intuition, theoretical literature has also come to the consensus that human capital is influencing FDI flows. Lucas (1990) speculated about low human capital causing low FDI-inflows in least developed countries, whereas Zhang and Markusen (1999) as well as Dunning (1988) offered models where higher human capital is attracting FDI

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9 Research that found this variable to be influential include: Vogel & Buser (1976), Blejer & Khan (1984), Gupta (1984) and Oshikoya (1994)

inflows. Nunnenkamp (2002), in testing changes in the determinants of FDI over the last 30 years, found that especially in the recent decade "efforts to provide better education and training would […] likely induce higher FDI flows," (Nunnenkamp, 36) providing evidence that the importance of human capital in FDI decisions has even increased in recent years. On the other side, Harms and Lutz (2003) could not find any significant impact of human capital variables on FDI inflows, therefore arguing that it strongly depends on the choice of human development variables for them to be significant.

6. Empirical Research

Following the line of arguments that for aid-recipient countries, infrastructure aid will be one of the crucial variables in explaining investment, this variable will be included as influential variable to the regressors that have already been detected as influential determinants of investment.[10] This way, one can explain the influence of the variable by assessing its significance as well as the additional impact it exerts on the control variables.

In order to follow the literature properly, this study will first regress a basic model without aid variables and then include infrastructure aid into the regression. This way, it is possible to find out about the significance of the variables as well as the influence of including infrastructure aid into the regression.

6.1. Data

6.1.1. Dependent Variables

The literature part of this study demonstrated that it is necessary to integrate variables into the regression that have been proven to be robust in predicting investment. Otherwise, the full influence of the aid variable on investment decisions in the examined Sub Saharan African countries could not be observed. The data for these variables is from the World Bank World Development Indicators Database 2008 if not indicated otherwise.

Private Investment

Private investment data is sourced from the African Development Indicators Database. This data follows the efforts of the IFC compilation "Trends in Private Investment in Developing Countries" from 2000. Total private investment here is

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10 For a discussion of the influential control variables, see chapter 5.2.

defined "as the difference between total gross domestic investment (from national accounts) and consolidated public investment," (Everhart/Sumlinski, 29) in order to give a more detailed insight to private investment in the examined countries. The measure is provided in constant US$ to enable a better comparability over time and presented as percentage of GDP, controlling for country productivity.

Foreign Direct Investment (FDI)

FDI is defined as the inflows of foreign investments into the country in every given year using data from the World Development Indicators 2008 database. To enable a better comparability to private investment, the data was deflated to constant 2000 US$. Since this data is not widely available, the current US$ values have been converted by the method proposed by Todo/Kimura (2007) as well as Azemar/Desbordes (2007), by multiplying the current US$ FDI inflows with the ratio of GDP in constant terms to GDP in current terms. This procedure is applied to "control for the country's productivity and the size of the market" (Harms/Lutz, 2006), and has been applied in economic research on FDI determinants.[11]

Per definition, foreign direct investment in this thesis is defined as "net inflows of investment to acquire or maintain a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments," as was defined by the World Bank (2009).

6.1.2. Regressors

Infrastructure Aid

The measures for infrastructure related aid are taken from the OECD Creditor Reporting System (CRS) Database, which gives the detailed flows of ODA commitments of bilateral as well as multilateral institutions, distinguishing between 233 different purposes of ODA.[12]

In this research, "infrastructure ODA" will be defined as the sum of commitments in the areas of "economic infrastructure" and "social infrastructure." The sum of these measures will be created in order to obtain a cumulative "infrastructure ODA" variable for each country in the sample. To create this key regressor, the ratio of the

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11 For example Todo/Kimura(2007), Selaya/Sunesen (2008)

12 For a detailed list of the purpose codes , please refer to http://stats.oecd.org/Index.aspx?DatasetCode=CRSNEW

variable to GDP will be calculated and applied to the dataset in order to maintain the comparability with the dependent variables.

Otheraid

This variable comprises complementary aid commitments that are directed towards areas that are not infrastructure related as defined by the CRS database. Similar to the infrastructure ODA measure, the variable will be deducted from the OECD CRS database and comprise all aid commitments that are not disbursed for the areas of economic and social infrastructure. Excluded are furthermore the commitments that target "actions relating to debt" (activities coded 600 in the CRS database), as well as "administrative costs of donors" (activities coded 900 in the CRS database) as was proposed by Todo/Kimura (2007). These measures do not target projects within the host country and should therefore not affect investment decisions. Again, the ratio of other aid to GDP will be taken to facilitate the comparability.

Governance

The governance and political indicators that have previously been tested regarding their influence on investment decisions include political stability, rule of law and governance.[13] The measures for these variables are provided by the dataset of Kaufmann et al. (2008).[14] This dataset combines the governance indicators from various sources, thus offering "a consensus view shared by diverse institutions and enterprises [as well as] allows to clearly distinguish between different aspects of *governance*." (Harms/Lutz, 6) The dataset allows the investigation of detailed aspects of governance based on an identical estimation technique, therefore enabling the comparison of the impact of these different variables.

The Kaufmann indicators assign values ranging from -2.5 to 2.5, a higher score indicating a better performance. Since this range would aggravate the interpretation of the outcome, this study follows Harms and Lutz (2006), who rebased the indicators to a range between zero and five in order to obtain only positive values.

Since the indicators measure different aspects of governance, they are strongly correlated with each other. Examining the partial correlation matrix of the three governance indicators under observation, which can be found in Appendix Table 7, reveals correlation coefficients between the parameters which are all larger than 0.5 and positive. Including all the three indicators into the regression would therefore

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13 See chapter 5.2. for the discussion of relevant literature testing the variables

14 The complete dataset can be downloaded at http://info.worldbank.org/governance/wgi/index.asp

make the estimation suffer from multicollinearity. To prevent biased results due to this effect, econometric and empirical literature suggests to not include them together in one regression (see Murray, 2006; Todo/Kimura, 2007).

Control Variables

As was already deducted in chapter 5.2, the regression will include additional control variables. They comprise credit as a share of GDP, the openness to trade proxy exports + imports divided by GDP, the CPI based inflation rate, the purchasing-power-parity adjusted GDP per capita, the broad money variable M2 as a share of GDP, the ratio of external debt service to exports of goods and services as well as the gross enrollment rate in secondary schooling as a proxy for human capital. Especially because some of these variables are correlated with each other, preliminary testing will be conducted to derive those variables and exclude them for the assessment of aid's influence on investment.

It is necessary to note that the lagged dependent variable is included as a control variable as well. This is applied following to the empirical literature on investment determinants. The previous amounts of investments, both in the case of foreign as well as private investment, are considered to influence the actual decision making processes. The variable was found to be of significance in each of the empirical studies on the topic and it is therefore essential to add this variable to the regression.[15]

A detailed explanation of the control variables can be found in Appendix Table 11.

6.1.3. Sample Data

The panel data will include 40 Sub Saharan African countries over the period 1995-2007. All of these countries are considered low- or low-middle income. The sample only includes countries with a size larger than 1 million inhabitants and due to a lack of available data, Somalia had to be exclude from the model as well.[16] The time span resembles the data availability for the detailed listing of commitments by bilateral and multilateral donors that was necessary to establish the model, as was provided by the OECD CRS database. Furthermore, since not all data is available for each variable in each time period, the data is unbalanced.

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15 see Dehn (2001), Oshikoya (1994) and Erden/Holcombe (2005) for the case of private investment as well as Karakaplan (2005), Harms/Lutz(2003) for the case of FDI

16 For a detailed list of the countries included, please refer to Appendix Table 2.

Given that data availability limited the dataset to 13 years, the panel includes yearly data, not averages as have been suggested in recent empirical literature. This choice has the advantage of accounting for the volatility of the infrastructure aid payments as well as enables the estimations to include an adequate amount of observations.

6.2. Econometric Framework

This chapter will describe the econometric model as well as the methods used to examine the relationship between infrastructure ODA and investment in Sub Saharan Africa. The model will be estimated by applying the panel data approach with two different econometric methods - Ordinary Least Squares (OLS) as well as Generalized Methods of Moments (GMM). This way, it will be possible to account for potential biases in the estimators and proof the robustness of the estimates.

The use of panel data - meaning the combination of cross-section and time series data - for the estimations offers distinct advantages and has therefore been widely applied in empirical aid literature.[17] These advantages include the increase in sample size, resulting in the advantage of more valid outcomes, as well as the fact that panel data helps to "overcome some omitted variable biases that might plague a single cross-section" (Murray, 680). Applying panel data therefore not only enables the study to overcome potential disadvantages but also helps to make the results comparable to other cross-country studies on the impact of foreign aid.

6.2.1. The empirical model

Although empirical literature has addressed the topic of investment in developing countries, chapter 5.2 already showed the diversity in the choice of variables which influence investment, indicating that there is no general consensus about the specification and the choice of regressors (Dehn, 2000). It is therefore crucial to take great care on the way the regression is estimated. Since Oshikoya (1994) already conducted research on private investment determinants in Sub Saharan Africa the general model for private investment follows his recommended model. According to these outcomes, the impact of the exchange rate and the terms of trade are not very robust as determinants of private investment in his African sample. Similar conclusions were supported by preliminary testings on the regression estimates. They are therefore also excluded from the basic model.

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17 see chapters 2-4 for the discussion of cross-country studies, all applying panel data

In the case of foreign direct investment, this study will, following the recommendation of Dehn (2000), construct a basic equation for the dependent variable based on the empirical literature on cross-country investment determinants utilizing the widely applied flexible accelerator model by Bond et al. (1997).

Chapter 5.2 elaborated on the determinants of each of the two investment equations, explaining which factors are necessary to include in the estimations. Following the review, two basic equations are therefore constructed that include the discussed variables. The equations follow the standard specifications on investment determinants.[18]

The general model for private investment will be:

(1) $privinvest_{it} = \alpha + \beta_1\ privinvest_{it}(-1) + \beta_2\ inflation_{it} + \beta_3\ credit\_gdp_{it} + \beta_4\ GDPpcPPPp_{it} + \beta_5\ openness_{it} + \beta_6\ debtex_{it} + \beta_7\ X_{it}' + \eta_i + \eta_t + \varepsilon$

The general model for FDI inflows will have the following composition:

(2) $fdi_{it} = \alpha + \beta_1\ fdi_{it}(-1) + \beta_2\ credit\_gdp_{it} + \beta_3\ GDPpcPPP_{it} + \beta_4\ m2_{it} + \beta_5\ open_{it} + \beta_6\ inflation_{it} + \beta_8\ Schooling_{it} + \beta_9\ X_{it}' + \eta_i + \eta_t + \varepsilon$

where the subscript i refers to a given country and the subscript t denotes the year of observation. Similarly, η_i & η_t are the country and period-specific unobserved effects and ε denotes the error term.

These two basic regressions cover the fields that are considered to be influencing the dependent variables, namely:

Privinvest (-1): the one year lag of private investment as a share of GDP

Fdi(-1): the one year lag of FDI as a share of GDP

Inflation: CPI based inflation rate

credit_gdp: domestic credit to the private sector as a percentage of GDP

GDPpcPPP: per capita GDP, purchasing power parity adjusted

Openness: ratio of imports and exports to GDP

Debtex: ratio of external debt service payments to exports of goods and services

X' is a vector for the political risk variables including: governance, political stability and rule of law

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18 See Hadjmichel & Ghura (1995) as well as Serven (1997) for standard specifications on private investment and Karakaplan (2005) for specifications on FDI

Schooling: the gross enrollment rate in secondary education

After the basic estimation reveals the important determinants explaining investment decisions in SSA, infrastructure aid and other aid will be added to the basic scenarios in a second and third step. To facilitate the interpretation of the results, variables that have proven to be of no significance for the estimation will be excluded from the regression then. The differences between regressions (1) and (2) result from the literature on investment determinants and have been thoroughly discussed in chapter 5.

Since panel data is applied in both cases, it is necessary to control for unobserved country- and time specific effects which can result from potential correlation with the right-hand side variables, leading to biased coefficients if they are not accounted for. In the case of OLS estimations, it is therefore necessary to include fixed or random country- and time-specific effects. To determine the correct choice of effects, the Hausman test for misspecification will be applied. This procedure tests the null hypothesis of no correlation with the other regressors and rejecting the H0 leads to the application of fixed effects, the acceptance to the use of random effects, which will then be applied to the regression (Wooldrige, 2001).

6.2.2. Estimating techniques: Accounting for potential Endogeneity

Discussions about the potential endogeneity of aid variables date back to Papanek (1972) and many researchers today agree to the need to account for the problem of endogenous aid variables when they assess aid-investment or aid-growth relationships.[19]

Endogeneity exists when one or more of the explanatory variables are correlated with the error term. If simultaneity between the explanatory variables exists, this leads to potential unobserved country-specific effects in the error term that are correlated with the variations in several of the regressors, thus making the variable being considered endogenous (see Wooldridge, 535). In the case of foreign aid, this endogeneity is expected due to the assumed simultaneity especially between aid, investment and macroeconomic variables (Wooldrige, 2001). Analyzing aid-investment regressions, this can be due to the fact that shocks affecting foreign aid as well as GDP correlate with shocks that affect FDI inflows, but also because "income […] and FDI flows are likely to be determined simultaneously" (Todo/Kimura, 7). Combined, this leads to endogeneity and the related econometric problems.

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19 Literature on the endogeneity of aid includes: Hansen/Tarp (2000), Harms/Lutz (2003), Daalgard et al. (2004)

If the estimators are expected to be endogenous and therefore the coefficients to be biased, it is necessary to apply an econometric estimation technique that yields consistent estimators even though explanatory variables might be endogenous and correlated with the error term (Hansen/Tarp, 2001). The method used in economic literature to deal with exactly these problems in panel data analysis is the Generalized Method of Moments (GMM) estimator. This estimator was proposed in a seminal work on cross-country panel data analysis by Aranello and Bond (1991). It is considered especially applicable when "the panel of countries is considered as a collection of cross-country regressions" (Hansen/Tarp, 10)[20] and "exploits the time-series variation in the data, accounts for unobserved country-specific effects, allows for the inclusion of lagged dependent variables as regressors, and controls for endogeneity of all the explanatory variables" (Carcovic/Levine, 197).

Dehn (2000) as well as Serven (2002) have argued that the Arellano-Bond GMM estimator yields more robust coefficients and has "distinct advantages over the pooled OLS and FE estimators" (Dehn, 14) in investment regressions. Nevertheless, the criticism was raised that the estimator leads to a loss of information, especially in its application for developing countries and in the case that "the regressors display persistence over time" (Serven, 7). These arguments have to be taken serious. Still, since endogeneity of one or more of the variables is considered to constitute a problem in investment regressions, and since the argument that GMM provides better results than OLS in this context is valid, GMM will be applied in this study as well. To account for the criticism and as a robustness check, this study will add the OLS results for the investment estimations. Nevertheless, endogeneity is most probably an issue with this data; GMM will be the estimation method with the strongest focus on.

In order to apply GMM, it is necessary to know about the instruments used in performing this estimation technique. Is the amount of instruments used similar to the parameters that are estimated, then the sum of weighted errors will be equal to zero. Nevertheless, one has to test for over-identification. This can be detected by looking at the sum of the weighted errors, if this sum is significantly different from zero, one has to re-assess the amount of instruments in order to prevent over-identification and the negative effects related to this. The test to apply is the Hanson-Singleton J-test. Rejecting the null hypothesis is the indicator for the fitting of the instrumental variables (Pindyck/Rubinfeld, 1998). Following the research by Karakaplan (2005),

20 Hansen and Tarp (2000) offer arguments to consider when applying the GMM estimator which include the loss of information

the lagged endogenous as well as exogenous regressors will be applied as instrumental variables in order to amend for the potential endogeneity.

6.2.3. Estimates

In order to evaluate if the intuition of the positive effect of infrastructure aid on investment is correct, assessing the partial correlations acts as a good first indicator. As can be seen in Appendix Tables 5 and 6, the results from the partial correlation between foreign investment as well as private investment and aid suggest that the influence of infrastructure aid on foreign investment is stronger and more positive than on private investment. However, even though the correlation coefficients are very weak, the hypothesis of the positive relationship remains, and the coefficients of infrastructure aid should therefore be positive for both investments models.

A further interesting finding that can be derived from the partial correlations is the negative correlation coefficient between the *otheraid* variable and private investment, in contrast to its positive correlation with foreign investments. It is therefore interesting to identify how strong these variables' influence is when other impacts are controlled for. Since investment decisions are influenced by more than one aspect, the control variables are important factors to give an overall picture of investment determinants in addition to the variables that are the focus of this study. Therefore, based on the discussion of the influencing variables in section 5.2 of this thesis, the coefficients are considered to have the following signs:

Table 1: Expected impact of the explanatory variables

Variables	Influence on Private Investment	Variables	Influence on FDI
infraODA(-1)	+	infraODA(-1)	+
infraODA(-2)	+	infraODA (-2)	+
Otheraid(-1)	-	Otheraid (-1)	-
Otheraid(-2)	-	Otheraid (-2)	-
Credit Availability	+	Credit Availability	+
Inflation	-	M2	+
GDPpcPPP	+	GDPpcPPP	+
Trade Openness	+	Schooling	+
External debt	-	Inflation	-
Governance	+	Trade Openness	+
		Governance Variables	+

The coefficient of infrastructure related aid should be positive in both estimations, which is the core hypothesis of this study. Following the findings of Selanya/Sunesen (2008) for the case of FDI, it is assumed that the additional aid not distributed for infrastructure activities will have a negative effect on foreign investment, despite the outcome of the partial correlation. Furthermore, the variables that were chosen as

proxies for the financial market development (M2, credit availability), for the size and development of the market itself (GDPpcPPP) as well as for the openness of the economy to foreign trade are considered to have a positive, investment-attracting impact.

Negative influence will be exercised from a higher inflation rate as well as a higher external debt burden of the host country. Schooling as a proxy for the human capital in a country and the level of education of the workforce is furthermore assumed to be positive. Nevertheless, the coefficient turned out to be insignificant in many economic studies on investment; therefore these findings would also be in line with related literature (Selaya/Sunesen, 2008; Hansen/Tarp, 2001).

7. Estimation and Empirical Results

Chapter 7 will now examine the relationship between infrastructure aid, non-infrastructure aid, and investment empirically. Following the model that was derived, the empirical estimation will proceed in three steps for each of the two investment modes under review. First, the basic regression excluding aid variables will be examined to evaluate the general fitting of the control variables, then the variables for infrastructure aid and non-infrastructure aid will be added to the estimation.

Adding those variables separately is important to prove the necessity of disaggregating all aid commitments into its elements and examine the possible crowding-out effect between different aid measures, as was suggested by the research of Selaya/Sunesen (2004), Clements et. al (2004) and Todo/Kimura (2007).

In order to perform the regressions, it is necessary to start testing for the necessary period and country specific effects to be applied in the regression. These can be random or fixed, depending on the outcome of the Hausman misspecification test.

For the case of the endogenous private investment variable, similar to the findings of Dehn (2000), the results of the Hausman test on misspecification confirms that country-specific fixed effects in addition to the applied period effects should be used instead of the random effects specification. The same outcome holds for the case of FDI, therefore I will provide the results from the fixed effects model in addition to the GMM estimator.

7.1. Private Investment

7.1.1. Basic Estimation

The estimation starts with the OLS and GMM estimations of the general estimation (1) to inquire about the relationship between the suggested controls and the dependent variables. Specification tests for each of the models include the DW statistic for OLS estimations as well as the tests for instrument validity (Sargan J-Test) for the GMM estimation.

Table 2: Basic regression without aid measures

Dependent Variable: Private Investment as a share of GDP								
Estmation Method	OLS	GMM	OLS	GMM	OLS	GMM	OLS	GMM
C	0.605 (2.574)**		0.60 (2.597)**		0.633 (2.649)***			
Private Investment (-1)	0.511 (5.129)***	0.159 (1.708)*	0.504 (5.159)***	0.122 (1.251)	0.510 (5.129)***	0.183 (1.916)*	0.511 (5.163)***	0.149 (1.549)
Inflation	0.04941 (3.056)***	-0.092 (-1.033)	0.043 (2.404)**	-0.138 (-1.455)	0.046 (2.804)***	-0.072 (-0.785)	0.048 (3.025)***	-0.129 (-1.424)
Credit_GDP	0.102 (1.890)*	0.466 (3.274)***	0.085 (1.619)	0.302 (2.296)**	0.112 (2.084)**	0.309 (2.544)**	0.100 (1.889)*	0.274 (2.017)**
GDPpcPPP	-0.088 (-2.459)**	-0.470 (-5.159)***	-0.095 (-2.604)***	-0.442 (-4.572)***	-0.090 (-2.501)**	-0.435 (-4.359)***	-0.077 (-1.916)*	-0.417 (-4.015)***
Debtex	-0.005 (-1.458)	-0.024 (-1.069)	-0.002 (-0.622)	-0.002 (-0.064)	-0.007 (-0.153)	0.004 (0.184)	-0.003 (-1.309)	0.002 (0.121)
Openness	0.103 (1.637)	0.160 (2.914)***	0.114 (1.762)*	0.196 (3.42)***	0.103 (1.632)	0.185 (3.365)***	0.098 (1.504)	0.158 (2.703)***
Governance			0.024 (1.792)*	0.062 (1.791)*				
Political Stability					-0.008) (-1.460)	0.022 (1.249)		
Rule of Law							0.017 (1.405)	0.034 (1.004)
OBS	243	170	243	170	243	170	242	167
R-squared	0.76		0.76		0.76		0.76	
DW Stat	1.93		1.94		1.93		1.93	
J Stat		0.88		0.82		0.62		0.75

Note: White heteroskedasticity consistent standard errors are applied. Numbers in parentheses are the t-ratios. The OLS estimations are with fixed country and period effects, as was suggested by the Hausmann test. The IV's for the GMM estimates are the further lags of the left and right hand side variables. *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level. For the J-Statatistic, the p-values are presented.

Table 2 reports the outcomes of estimation (1) and depicts the significance of the core control variables. With the exception of the external debt variable, all coefficients are significant in more than one of the regressions, supporting the choice of regressors. It is therefore not necessary to alter the regression significantly. The external debt coefficient's insignificance is an interesting finding, indicating that the strong external debt burdens that usually exist for Sub Saharan African countries are not strongly affecting the investment decisions of the private sector. Since no strong influence between the external debt service ratio and infrastructure related aid is expected (debt rescheduling is not included in the aid variable), external debt will be excluded from the subsequent regressions.

It is interesting to note that the governance indicators for political stability as well as the rule of law are not significantly affecting private investment. Even though it seems that solely governance is influencing private investors, the propensity of donors to give foreign aid to countries with a better policy environment implies that the influence of the two variables that have now been found insignificant should increase when aid variables are included in the regression (World Bank, 1998). Rule of law and political stability will therefore maintain part of the estimations to assess if, as Burnside/Dollar (2000) found, foreign aid is indeed having more impact in better policy environments.

An additional interesting finding is that the per capita income variable GDPpcPPP is strongly significant, but negative in its impact. This outcome is different to the expectations and needs to be analyzed further. For the case of FDI, Asiedu (2000) found a similar outcome in her analysis for SSA countries. She traced this outcome back to the fact that a negative per capita income variable corresponds with the idea that investments in capital-scarce countries, with low per capita income, yield higher returns. Therefore, "GDP per capita should be inversely related to FDI" (Asiedu, 111). This outcome was supported by the research of Edwards (1990) and Jaspersen et. al (2000). The results from the basic regression points to a similar outcome for private investment, suggesting that the returns to private investment are higher in countries with lower per capita income, thus investment in these countries will be higher, giving an explanation for the negative sign of the GDPpc variable. Still, especially for the case of private investment, no extensive research on this negative per-capita income measure has been conducted. Further research on this particular outcome will be necessary to see if the rationale is indeed similar to that for foreign investment inflows.

7.1.2. Infrastructure Aid Effects

The core coefficients that are analyzed in this estimation are the variables for infrastructure aid, which are important for supporting or refuting the main assumption of this thesis. Since infrastructure projects are considered to be costly as well as time consuming, and can normally only be taken advantage of once they are completed, the variable is lagged up to two years to account for these circumstances. The general assumption behind this is that a project that started one or two years ago would at this point be in its construction phase and therefore has an impact on the investment decision. Unfortunately, the partial correlation tables again show that there is a strong correlation between the infrastructure aid commitments with a one

and two year lag. The variables therefore have to be presented separately to avoid biased results due to multicollinearity.

Furthermore, to prevent the already discussed problems that occur due to the potential endogeneity of aid in the OLS estimation, the method suggested by Rajan/Subramajan (2005), who use "lagged values of aid instead of instrumenting for contemporaneous values" (Rajan/Subramajan, 12) will be applied. With the strategy of lagging the aid variable instead of using other instrumental variables mentioned above, the outcomes are expected to be similar to the GMM outputs. Nevertheless, since the economic literature on aid has argued that not only aid, but also other variables may suffer from endogeneity, it is indeed necessary to perform the estimation with the GMM method as well. In applying this method, the instrumental variables selected for the process are the further lags of the dependent variables as well as those of the remaining control variables.

Table 3: Estimation of model (1) including infrastructure Aid

Dependent Variable: Private investment as share of GDP

Estimation method	OLS	GMM	OLS	GMM	OLS	GMM	OLS	GMM
C	0.554 (2.224)**		0.563 (2.315)**		0.573 (2.239)**		0.449 (1.572)	
Private Investment (-1)	0.511 (5.196)***	0.185 (1.959)*	0.504 (5.218)***	0.113 (1.159)	0.511 (5.208)***	0.200 (2.079)**	0.511 (5.236)***	0.184 (2.059)**
Infraaid_GDP(-1)	**0.095 (1.213)**	**-0.039 (-0.311)**	**0.076 (0.949)**	**-0.049 (-0.409)**	**0.099 (1.363)**	**-0.009 (-0.075)**	**0.081 (0.998)**	**-0.063 (-0.523)**
Inflation	0.041 (2.979)***	-0.145 (-1.538)	0.037 (2.501)**	-0.170 (-1.794)*	0.036 (2.587)**	-0.077 (-0.839)	0.041 (2.943)***	-0.149 (-1.744)*
Credit_GDP	0.094 (1.787)*	0.319 (2.483)**	0.080 (1.546)	0.285 (2.243)**	0.099 (1.909)*	0.243 (2.085)**	0.094 (1.822)*	0.303 (2.379)**
GDPpcPPP	-0.084 (-2.195)**	-0.401 (-4.896)***	-0.091 (-2.389)**	-0.430 (-5.266)***	-0.084 (-2.186)**	-0.199 (-2.563)**	-0.074 (-1.729)*	-0.280 (-3.790)***
Openness	0.106 (1.678)*	0.181 (3.238)***	0.115 (1.796)*	0.196 (3.531)***	0.105 (1.671)*	0.224 (4.073)***	0.099 (1.539)	0.162 (2.906)***
Governance			0.024 (1.658)*	0.085 (2.410)**				
Political Stability					-0.008 (-1.413)	-0.003 (-0.133)		
Rule of Law							0.016 (1.325)	0.091 (2.635)***
OBS	245	142	245	142	245	142	244	142
R-squared	0.76		0.77		0.76		0.76	
DW Stat	1.94		1.95		1.95		1.940527	
J Stat		0.68		0.97		0.2		0.7

Note: White heteroskedasticity consistent standard errors are applied. Numbers in parentheses are the t-ratios. The OLS estimations are with fixed country and period effects, as was suggested by the Hausmann test. The IV's for the GMM estimates are the further lags of the left and right hand side variables. *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level. For the J-Statistic, the p-values are presented.

Table 4: Estimation of model (1) including infrastructure Aid - lagged two periods

Dependent Variable: Private investment as a share of GDP

Estimation Method	OLS	GMM	OLS	GMM	OLS	GMM	OLS	GMM
C	0.756 (2.599)**		0.75123 (2.697)***		0.808 (2.825)***		0.691 (2.049)**	
Private Investment (-1)	0.469 (3.996)***	0.175 (1.727)*	0.461 (3.956)***	0.125 (1.287)	0.469308 (4.032)***	0.262 (2.751)***	0.470 (3.997)***	0.156 (1.667)*
Infraaid_GDP(-2)	**0.107 (0.829)**	**0.104 (0.868)**	**0.098 (0.803)**	**0.070 (0.597)**	**0.122 (0.952)**	**0.159 (1.323)**	**0.102 (0.760)**	**0.008 (0.067)**
Inflation	0.045 (1.535)	-0.051 (-0.514)	0.0386 (1.261)	-0.148 (-1.623)	0.036 (1.142)	-0.049 (-0.553)	0.044 (1.539)	-0.149 (-1.659)*
Credit_GDP	0.120 (2.068)**	0.278 (2.443)**	0.108 (1.981)**	0.299 (2.496)**	0.127 (2.300)**	0.299 (2.586)**	0.120 (2.096)**	0.323 (2.502)**
GDPpcPPP	-0.113 (-2.523)**	-0.358 (-4.20)***	-0.122 (-2.726)***	-0.372 (-4.465)***	-0.117 (-2.670)***	-0.210 (-2.810)***	-0.106 (-2.116)**	-0.339 (-4.007)***
Openness	0.121 (1.771)*	0.185) (3.054)***	0.032 (1.802)*	0.077 (2.222)**	0.123 (1.801)*	0.215 (3.779)***	0.118 (1.665)*	0.138 (2.301)**
Governance			0.135 (1.957)*	0.178 (3.154)***				
Polstab					-0.014 (-1.895)*	-0.010 (-0.575)		
Rule of Law							0.009 (0.573)	0.081 (2.306)**
OBS	223	119	223	143	223	143	222	141
R-squared	0.76		0.76		0.76		0.76	
DW Stats	2.03		2.04		2.05		2.02	
J Stat		0.44		0.64		0.18		0.72

Note: White heteroskedasticity consistent standard errors are applied. Numbers in parentheses are the t-ratios. The OLS estimations are with fixed country and period effects, as was suggested by the Hausmann test. The IV's for the GMM estimates are the further lags of the left and right hand side variables. *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level. For the J-Statatistic, the p-values are presented.

The first interesting outcome when looking at tables 3 and 4 is that the coefficient for infrastructure aid does not have a robust positive impact on private investment decisions. Neither with nor without governance indicators are the variables affecting private investment significantly. Although this is in conflict with the expectations stated in this thesis, it is still important to examine if this outcome maintains when the non-infrastructure aid variable is included in the regression. Still, this outcome is similar to that of Todo/Kimura (2007) who also assessed the effect of infrastructure aid, in their case on foreign direct investments, and could find no infrastructure aid effect on FDI inflows either. The findings obtained here certainly substantiate their outcomes further for the case of private investment.

The results obtained validate the inclusion of the control variables from section 7.1. They all have the expected signs, except for inflation. This variable is exerting diverging results when the two estimation methods are considered. Overall, its influence is not very stable, ranging from positive to negative influences. This outcome can be interpreted as one sign that endogeneity of the variables exists, but can also be caused by the correlation with other regressors.

Both openness to trade and the availability of additional credit is influencing private investment decisions positively, even more so when the estimation controls for endogeneity. Furthermore, the prior investments have a strongly positive influence

on the current investment decisions as well. Similar to the outcome of the basic regressions, the per capita GDP coefficient is robust and significant, but negative. Again, this outcome suggests that investors are expecting higher returns to capital in lower-income countries, therefore investment will be higher than in countries with a higher per capita GDP measure. Furthermore, it can be seen that especially the governance as well as the rule of law variable are exerting a positive influence on the size of investment, whereas the impact of political stability is not robust.

Although the addition of the infrastructure aid variable has not led the goodness-of-fit indicator R-squared to rise significantly when compared to the basic regression, it has not reduced it either. The measure is stable at .76 and .77, indicating a very good fitting of the variables. For the GMM estimations, the Sargan J-statistic rather than the R-squared measure describes the goodness-of-fit of the instrumental variables. The J-statistic always rejects the null hypothesis of non-overidentifying restrictions, thus providing evidence for the fitting of the instruments applied.

7.1.3. Effects of Infrastructure Aid and Other Aid

In a further step, the regression discussed above is now extended by the measure otheraid. This way, not only can the full effect of foreign aid be captured, but also will the hypothesis that infrastructure aid and non-infrastructure aid are exerting different effects on investment be tested.

The results from including otheraid into the regression now shed a very different light on the outcomes of aid's impacts. Even though infrastructure aid lagged one period is positive, it is still not significant. The variable for non-infrastructure aid, on the other hand, is stable and significantly negative. A similar outcome was found by Todo/Kimura (2007) as well as Selaya/Sunesen (2008), who all found that there should be a positive infrastructure-aid related effect and a negative effect of the non-infrastructure aid commitments, being evidence for a rent seeking effect in the recipient country. Still, Selaya/Sunesen (2008) found the infrastructure effect to be offsetting the rent-seeking effects, thus resulting in an overall positive outcome. The outcome obtained here is contrary to these findings and shows that even though infrastructure and non-infrastructure aid have contrary effects on investment decisions, non-infrastructure aid has an offsetting negative effect on potential positive infrastructure impacts. While this outcome is not in line with the overall literature on the topic, it is still supporting the idea that diverse effects result from different types of aid committments.

Table 5: Estimation of model (1) including infrastructure Aid & Otheraid

Dependent Variable: Private investment as a share of GDP

Estimation Method	OLS	GMM	OLS	GMM	OLS	GMM	OLS	GMM
C	0.534 (2.247)**		0.541 (2.366)**		0.492 (1.857)*		0.434 (1.573)	
Private Investment (-1)	0.504 (5.249)***	0.1989 (2.067)**	0.495 (5.267)***	0.121 (1.186)	0.469 (4.705)***	0.243 (2.51)**	0.504 (5.291)***	0.192 (2.0001)**
Infraaid_GDP(-1)	0.151 (1.358)	0.016 (0.137)	0.134 (1.202)	0.0002 (0.002)	0.151 (1.332)	0.037 (0.322)	0.138 (1.196)	0.013 (0.109)
Otheraid_GDP(-1)	**-0.158 (-3.197)***	**-0.182 (-1.865)***	**-0.174 (-3.451)***	**-0.232 (-2.299)***	**-0.152 (-2.675)***	**-0.231 (-2.367)***	**-0.159 (-3.144)***	**-0.206 (-2.184)***
Inflation	0.051 (3.486)***	-0.078 (-0.815)	0.048 (3.213)***	-0.125 (-1.266)	-0.026 (-1.201)	-0.038 (-0.402)	0.051 (3.369)***	-0.06 (-0.645)
CREDIT_GDP	0.096 (1.825)*	0.263 (2.245)**	0.079 (1.536)	0.342 (2.411)**	0.116 (2.209)**	0.321 (2.769)***	0.095 (1.850)*	0.251 (2.175)**
GDPpcPPP	-0.078 (-2.149)**	-0.263 (-2.957)***	-0.087 (-2.409)**	-0.322 (-3.456)***	-0.07 (-1.767)*	-0.215 (-2.629)***	-0.067 (-1.679)*	-0.227 (-2.728)***
Open	0.113 (1.786)*	0.221 (4.015)***	0.125 (1.933)*	0.229 (3.995)***	0.134 (1.836)*	0.225 (3.999)***	0.107 (1.644)	0.198 (3.407)***
Governance			0.028 (1.863)*	0.099 (2.814)***				
Political Stability					-0.010 (-1.999)**	0.003 (0.159)		
Rule of Law							0.017 (1.291)	0.086 (2.54)**
OBS	245	142	245	142	242	142	244	140
R-squared	0.77		0.77		0.76		0.77	
DW Stat	1.95		1.97		1.93		1.95	
J Stat		0.56		0.95		0.54		0.82

Note: White heteroskedasticity consistent standard errors are applied. Numbers in parentheses are the t-ratios. The OLS estimations are with fixed country and period effects, as was suggested by the Hausmann test. The IV's for the GMM estimates are the further lags of the left and right hand side variables. *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level. For the J-Statatistic, the p-values are presented.

Table 6: Estimation of model (1) including infrastructure Aid & Otheraid- lagged two periods

Dependent Variable: Private Investment as share of GDP

Estimation method	OLS	GMM	OLS	GMM	OLS	GMM	OLS	GMM
C	0.763 (2.35)**		0.755 (2.687)***		0.809 (2.837)***		0.698 (2.071)**	
Private Investment (-1)	0.471 (3.735)***	0.198 (1.956)*	0.462 (4.067)***	0.096 (0.919)	0.469 (4.147)***	0.232 (2.436)**	0.472 (4.135)***	0.184 (1.894)*
Infraaid_GDP(-2)	0.101 (0.610)	0.121 (1.036)	0.094 (0.666)	0.143 (1.263)	0.119 (0.802)	0.211 (1.688)*	0.095 (0.618)	0.053 (0.445)
Otheraid_GDP(-2)	**0.019 (0.230)**	**-0.022 (-0.197)**	**0.010 (0.148)**	**0.074 (0.667)**	**0.006 (0.080)**	**-0.030 (-0.276)**	**0.018 (0.241)**	**-0.081 (-0.76)**
Inflation	0.044 (1.405)	-0.079 (-0.794)	0.038 (1.271)	-0.111 (-1.119)	0.0356 (1.143)	-0.066 (-0.765)	0.043 (1.558)	-0.109 (-1.302)
Credit_GDP	0.120 (1.860)*	0.219 (1.782)*	0.108 (1.977)**	0.168 (1.388)	0.127 (2.275)**	0.436 (3.171)***	0.120 (2.084)**	0.282 (2.327)**
GDPpcPPP	-0.115 (-2.317)**	-0.322 (-3.686)***	-0.122 (-2.743)***	-0.36 (-4.248)***	-0.117 (-2.717)***	-0.199 (-2.479)**	-0.108 (-2.163)**	-0.251 (-3.098)***
Openness	0.121 (1.594)	0.231 (3.627)***	0.135 (1.943)*	0.213 (3.563)***	0.123 (1.792)*	0.168 (2.875)***	0.118 (1.659)*	0.173 (2.896)***
Governance			0.032 (1.809)*	0.087 (2.296)**				
Political Stability					-0.014 (-1.754)*	-0.013 (-0.702)		
Rule of Law							0.008 (0.578)	0.068 (1.909)*
OBS	223	119	223	119	223	145	222	143
R-squared	0.76		0.76		0.76		0.75	
DW Stats	2.02		2.04		2.05		2.01	
J Stat		0.59		0.49		0.45		0.71

Note: White heteroskedasticity consistent standard errors are applied. Numbers in parentheses are the t-ratios. The OLS estimations are with fixed country and period effects, as was suggested by the Hausmann test. The IV's for the GMM estimates are the further lags of the left and right hand side variables. *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level. For the J-Statatistic, the p-values are presented.

Examining the second year lag, the results change. Here, the negative effect of otheraid is not significant anymore, nor is the outcome of the infrastructure parameter. Still, the opposing signs maintain. This outcome indicates that further lags in the infrastructure measure are not resulting in significant changes in the outcome. Nevertheless, the control variables show similar results as before.

These results demonstrate that for the case of private investment, the impact of infrastructure aid commitments by donors is not significant. Still, while infrastructure aid is at least not affecting investment decisions negatively, so do the non-infrastructure aid commitments, revealing a negative rent-seeking effect resulting from foreign aid. By looking at the relationship between infrastructure aid and FDI inflows, this paper will now examine if these outcomes also hold true for this investment method.

7.2.   Foreign Direct Investments

Following the insignificant impacts of infrastructure aid on private investment in the host countries in total, the infrastructure aid- FDI relationship will now be studied in order to investigate the differences and similarities between the aid variable and the investment measures.

7.2.1. Basic Estimation

As can be seen from Table 7, most regressors are significant in at least one of the estimation versions, and will therefore be included in the second estimation process as well. Nevertheless, the M2 measure enters the regression insignificant. Since the credit availability is a further indicator for the development of the financial sector, the M2 variable will therefore be excluded from the following regressions to simplify the interpretation and minimize problems resulting from multicollinearity.[21]

Similar to the outcomes of the basic regression for private investment, the governance variable is the only policy variable that enters the regressions significantly. Maintaining the other two indicators follows the same rationale as for the case of private investment; to assess if aid will have a stronger impact in more stable political environments.

The specification measures R-squared and the J-statistic support the good fitting of the variables. Values around .71 are high, especially for the case of investment

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21 The correlation coeffecient between credit_gdp and M2 is 0.54.

equations.[22] In addition, the J-statistic shows that the chosen instrumental variables fit well in the GMM estimation.

Table 7: Basic Regression without Aid measures

Dependent Variable: FDI as a share of GDP							
Estimation Method	OLS	GMM	OLS	GMM	OLS	GMM	OLS	GMM
C	0.457 (1.157)		0.549 (1.219)		0.449 (1.120)		0.459 (1.191)	
FDI_GDP(-1)	0.677 (7.711)***	0.112 (4.999)***	0.681 (7.836)***	-0.038 (-0.917)	0.676 (7.706)***	-0.036 (-0.694)	0.675 (7.726)***	0.055 (1.359)
Credit_GDP	0.146 (2.134)**	-0.031 (-0.518)	0.134 (1.892)*	0.014 (0.185)	0.147 (2.158)**	0.061 (0.642)	0.146 (2.166)**	0.215 (2.575)**
GDPpcPPP	-0.083 (-1.309)	-0.132 (-1.912)*	-0.102 (-1.376)	-0.156 (-2.06)**	-0.080 (-1.221)	-0.155 (-1.783)*	-0.082 (-1.287)	-0.059 (-0.796)
Openness	0.109 (2.586)**	0.051 (3.265)***	0.112 (2.551)*	0.032 (2.178)**	0.109 (2.591)**	0.220 (3.033)***	0.111 (2.523)**	0.057 (2.508)**
M2	-0.077 (-1.064)	-0.025 (-0.622)	-0.089 (-1.216)	0.245 (3.153)***	-0.074 (-0.992)	0.024 (1.579)	-0.072 (-1.028)	0.107 (1.260)
Inflation	-0.002 (-3.118)***	-0.0412 (-48.32)***	-0.002 (-2.965)***	-0.037 (-35.491)***	-0.002 (-3.135)***	-0.039 (-23.839)***	-0.002 (-3.131)***	-0.035 (-10.97)***
Schooling	0.022 (0.697)	0.357 (6.100)***	0.021 (0.700)	-0.062 (-1.427)	0.0205 (0.6323)	-0.036 (-0.716)	0.021 (0.673)	0.031 (0.386)
Governance			0.027 (1.495)	0.025 (1.854)*				
PolStab					-0.004 (-0.486)	0.007 (0.609)		
RuleLaw							-0.006 (-0.328)	0.0006 (0.029)
OBS	280	114	280	107	280	107	279	107
R-squared	0.71		0.72		0.72		0.72	
DW stat	2.38		2.39		2.39		2.37	
J Stat		0.8		0.85		0.86		0.36

Note: White heteroskedasticity consistent standard errors are applied. Numbers in parentheses are the t-ratios. The OLS estimations are with fixed country and period effects, as was suggested by the Hausmann test. The IV's for the GMM estimates are the further lags of the left and right hand side variables. *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level. For the J-Statatistic, the p-values are presented.

7.2.2. Infrastructure Aid Effects

Examining, the results from the analysis of the determinants of foreign investment inflows show that the influence of infrastructure ODA is again not as clear-cut as was expected. Both, OLS and GMM estimations show negative signs for infrastructure aid lagged one period. Even though this outcome is only significant when the rule of law indicator is included, this clearly indicates that there is at least no positive impact of infrastructure aid on FDI inflows. This outcome is similar when the second year lagged values are examined. Here, the negative impact is even more significant, both when governance is not and when it is considered.

This finding is clearly contrary to the hypothesis stated in this study, as well as to the outcomes found for private investment. Although the robustness is not very strong, there seems to be fundamental difference in the impact of infrastructure aid on different investment decisions in Sub Saharan African countries. The outcome is even more puzzling when considering that infrastructure aid was expected to have a strongly positive influence on investment.

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22 R-squared measures in the literature on investment determinants range from .11(Selaya/Sunesen 2008) to .85 (Dehn, 2000)

Table 8: Estimation of model (2) including infrastructure Aid

Dependent Variable: FDI as a share of GDP Estimation Method	OLS	GMM	OLS	GMM	OLS	GMM	OLS	GMM
C	0.481 (1.235)		0.587 (1.177)		0.472 (1.189)		0.487 (1.279)	
FDI_GDP(-1)	0.674 (7.505)***	0.048 (1.949)*	0.679 (6.785)***	0.056 (1.780)*	0.673 (7.491)***	-0.149 (-2.469)**	0.672 (7.527)***	0.085 (4.09)***
Infraaid_GDP(-1)	**-0.054 (-0.994)**	**-0.103 (-1.494)**	**-0.067 (-1.051)**	**-0.058 (-0.846)**	**-0.052 (-0.932)**	**-0.019 (-0.363)**	**-0.051 (-0.956)**	**-0.109 (-2.077)**
Credit_GDP	0.114 (1.944)*	0.122 (1.849)*	0.096 (1.404)	0.103 (0.871)	0.116 (1.966)*	0.232 (2.813)***	0.116 (1.963)*	0.023 (0.224)
GDPpcPPP	-0.085 (-1.359)	-0.021 (-0.244)	-0.107 (-1.29)	-0.169 (-2.453)**	-0.083 (-1.261)	-0.161 (-1.565)	-0.084 (-1.336)	-0.069 (-0.919)
Openness	0.1044 (2.476)**	0.055 (2.758)***	0.107 (2.178)**	0.076 (2.593)**	0.104 (2.484)**	0.033 (2.419)**	0.108 (2.45)**	0.056 (2.077)**
Inflation	-0.002 (-3.186)***	-0.047 (-23.69)***	-0.002 (-2.686)***	-0.042 (-17.515)***	-0.002 (-3.199)***	-0.039 (-13.67)***	-0.002 (-3.193)***	-0.045 (-30.295)***
Schooling	0.019 (0.615)	-0.099 (-1.633)	0.017 (0.515)	-0.026 (-0.399)	0.017 (0.557)	-0.074 (-1.077)	0.018 (0.598)	-0.025 (-0.558)
Governance			0.029 (1.384)	0.044 (2.503)**				
Polstab					-0.004 (-0.549)	0.016 (1.255)		
Rulelaw							-0.008 -(0.461)	0.057 (2.417)**
OBS	278	108	278	107	278	107	277	108
R-squared	0.72		0.72		0.72		0.71	
DW Stat	2.38		2.40		2.38		2.37	
J-Stat		0.54		0.34		0.78		0.49

Note: White heteroskedasticity consistent standard errors are applied. Numbers in parentheses are the t-ratios. The OLS estimations are with fixed country and period effects, as was suggested by the Hausmann test. The IV's for the GMM estimates are the further lags of the left and right hand side variables. *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level. For the J-Statistic, the p-values are presented.

Table 9: Estimation of model (2) including infrastructure Aid - lagged two periods

Dependent Variable: FDI as a share of GDP Estimation Method	OLS	GMM	OLS	GMM	OLS	GMM	OLS	GMM
C	0.836 (1.485)		0.891 (1.263)		0.824 (1.244)		0.878 (1.724)*	
FDI(-1)	0.623 (6.605)***	0.202 (2.716)***	0.627 (5.678)***	-0.157 (-2.978)***	0.622 (5.739)***	-0.148 (-1.430)	0.622 (6.589)***	0.063 (2.116)**
Infraaid_GDP(-2)	**0.052 (0.819)**	**-0.113 (-1.8)**	**0.047 (0.638)**	**-0.199 (-2.267)**	**0.054 (0.697)**	**0.015 (0.158)**	**0.047 (0.750)**	**-0.085 (-1.087)**
Credit_GDP	0.165 (2.719)***	0.164 (1.479)	0.152 (2.144)**	0.101 (1.007)	0.166 (2.366)**	0.225 (1.703)*	0.167 (2.808)***	0.138 (1.512)
GDPpcPPP	-0.149 (-1.645)	-0.27 (-2.111)**	-0.162 (-1.391)	-0.196 (-2.085)**	-0.147 (-1.326)	-0.192 (-1.889)*	-0.152 (-1.738)*	-0.158 (-1.749)*
Open	0.135 (2.916)***	0.034 (1.965)*	0.1396 (2.518)**	0.052 (2.271)**	0.136 (2.561)**	0.046 (1.133)	0.139 (2.904)***	0.066 (2.923)***
Inflation	-0.011 (-1.047)	-0.038 (-11.017)***	-0.011 (-0.913)	-0.032 (-12.18)***	-0.011 (-0.94)	-0.041 (-7.984)***	-0.012 (-1.101)	-0.042 (-21.56)***
Schooling	0.038 (0.795)	0.010 (0.168)	0.033 (0.614)	-0.063 (-0.862)	0.038 (0.629)	-0.057 (-0.653)	0.039 (0.797)	0.034 (0.744)
Governance			0.024 (0.845)	0.116 (3.541)***				
Polstab					-0.003 (-0.208)	0.02 (1.36)		
Rulelaw							-0.015 (-0.567)	0.040 (1.809)*
OBS	242	104	242	108	242	112	242	104
R-squared	0.71		0.71		0.7		0.7	
DW Stat	2.17		2.18		2.17		2.17	
J-Stat		0.39		0.38		0.39		0.28

Note: White heteroskedasticity consistent standard errors are applied. Numbers in parentheses are the t-ratios. The OLS estimations are with fixed country and period effects, as was suggested by the Hausmann test. The IV's for the GMM estimates are the further lags of the left and right hand side variables. *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level. For the J-Statistic, the p-values are presented.

This outcome was not expected and is contrary to the recent empirical findings of positive impacts of disaggregated aid on FDI. Supporting this outcome is the study by Todo/Kimura (2007) who found that there is no effect of infrastructure aid on FDI inflows into developing countries - still they did not find negative impacts.

The control variables show some variations between OLS and GMM estimation, which supports the assumption of endogeneity already discussed. Credit availability as well as trade openness are, in both cases, significant and with the expected sign, supporting the expectations that the availability of local credit and a stronger openness to trade within the host country attracts foreign investment. Inflation is also significant and negative, similar to the expectations of a higher inflation rate bearing more risk for the investor; thus hampering foreign investment inflows.

Per capita GDP, as a parameter for the development of the country, is also robust to different political risk indicators and estimation techniques. Similar to the private investment regression, the variable does not have the expected sign, but is negative for all calculations. This outcome, even though not expected, is supported by the findings of Edwards (1990), Jaspersen et. al (2000), and Asiedu (2000) who all found that there is a negative relationship between per capita income and FDI inflows in developing countries, and SSA in particular. They provide two reasons for this outcome. One is that "investment in capital scarce countries yields higher results," (Asiedu, 111) therefore an inverse relationship between GDPpcPPP and FDI is expected. The second reason is the fact that FDI in SSA is predominately resource seeking (Zarsky, 2005). For the case of resource-seeking investments, the size of the host country market is not relevant for the investor since products will be exported and not sold in the host market. Furthermore, since countries with lower per capita income are considered to also have lower labor costs, therefore attracting resource-seeking investments, a negative relation between the GDP per capita variable and FDI should not be surprising.

The lagged FDI variable is supporting the notion that previous investment inflows are spurring further investments. This is even more so when good governance and a better rule of law are present, suggesting that FDI follows previous FDI inflows in countries with a better governance environment.

It has been argued in recent literature that the schooling variable is an important factor in explaining FDI inflows, but the coefficient is not significant in any of the regressions. For the non-significance of the schooling variable, which is contrary to the expectations of a better educated workforce making the country more attractive to FDI, similar evidence has been found in the recent empirical literature on the aid-

FDI relationship, for example the study by Selaya/Sunesen (2008), Harms/Lutz (2006) and Karakaplan (2005). Potential explanations for this result can be inferred when examining the composition of FDI flows to SSA. Asiedu (2000) finds that for the region, resource-seeking FDI is strong. Zarsky (2005) supports this outcome by revealing that more than 50 percent of the FDI inflows to the region target the natural resource sector. Since especially FDI in the primary sector is not in need of a highly educated and skilled workforce, the non-significance of the schooling variables becomes understandable and has to be expected in the further analysis as well.

7.2.3. Effects of Infrastructure Aid and Other Aid

Including otheraid into the regressions supports the hypothesis that different targets for aid disbursement impact investment differently. Although both aid variables are not robustly significant in more than one regression, they exert opposing signs when they are. Otheraid is negative, whereas infrastructure aid is having a positive sign. This outcome prevails when the second year lag is examined, but can only be found when rule of law is included. This supports the outcome already obtained from the private investment analysis that the rent seeking effect dominates the positive infrastructure effect, still, this effect is weak and only occurs when the rule of law is considered. The outcome suggests that, for the case of Sub Saharan Africa, the effects of aid on FDI inflows are very weak and rather supports the notion that the factors are not strongly influencing them at all. Nevertheless, it becomes obvious that infrastructure aid's impact on foreign investment is a lot more volatile than was expected. The results are not as clear as was hypothesized.

Including the otheraid term also does not alter the robustness of the control variables significantly, especially for the one-year lagged version. Credit availability, per capita GDP, as well as openness to trade are all robust and significant, all having the signs that were discussed in the preceding chapters. In addition, the inflation measure is again significant and negative in all of the estimations. Again, the governance and rule of law are influencing the inflow of FDI, but not a higher political stability; this is especially the case for the two years lagged variable.

It should therefore be concluded that infrastructure aid is not significantly influencing the FDI variable, but it is showing a negative effect when the rule of law improves in the recipient country, thus suggesting that in this case, the rent-seeking effect of foreign aid dominates.

Table 10: Estimation of model (2) including infrastructure Aid & Otheraid

Dependent Variable: FDI as a share of GDP

Estimation Method	OLS	GMM	OLS	GMM	OLS	GMM	OLS	GMM
C	0.489 (1.238)		0.593 (1.316)		0.479 (1.194)		0.499 (1.293)	
FDI_GDP(-1)	0.676 (7.652)***	-0.092 (-1.702)*	0.681 (7.768)***	0.028 (0.393)	0.675 (7.631)***	-0.077 (-1.306)	0.674 (7.666)***	0.044 (0.644)
Infraaid_GDP(-1)	**0.005 (0.026)**	**-0.068 (-0.396)**	**-0.014 (-0.077)**	**-0.142 (-0.713)**	**0.011 (0.056)**	**-0.007 (-0.038)**	**0.017 (0.093)**	**0.212 (1.264)**
Otheraid_GDP(-1)	**-0.029 (-0.374)**	**-0.002 (-0.022)**	**-0.026 (-0.349)**	**0.005 (0.068)**	**-0.031 (-0.391)**	**-0.032 (-0.426)**	**-0.033 (-0.441)**	**-0.127 (-2.13)****
Credit_GDP	0.116 (1.965)*	0.262 (3.072)***	0.098 (1.601)	-0.017 (-0.106)	0.118 (1.984)**	0.242 (2.546)**	0.119 (1.997)**	0.118 (0.702)
GDPpcPPP	-0.087 (-1.373)	-0.093 (-0.911)	-0.108 (-1.452)	-0.182 (-2.303)**	-0.084 (-1.276)	-0.131 (-1.015)	-0.086 (-1.353)	-0.144 (-1.728)*
Openness	0.105 (2.573)**	0.067 (2.919)***	0.108 (2.528)**	0.077 (2.712)***	0.105 (2.584)**	0.067 (2.414)**	0.109 (2.612)***	0.069 (2.22)**
Inflation	-0.002 (-3.321)***	-0.046 (-10.98)***	-0.002 (-3.148)***	-0.044 (-8.514)***	-0.002 (-3.329)***	-0.045 (-7.643)***	-0.002 (-3.324)***	-0.038 (-11.99)***
Schooling	0.019 (0.656)	-0.066 (-0.861)	0.018 (0.618)	-0.008 (-0.127)	0.019 (0.596)	-0.072 (-0.835)	0.019 (0.641)	0.011 (0.153)
Governance			0.0282 (1.529)	0.089 (3.110)***				
Polstab					-0.004 (-0.573)	0.009 (0.488)		
Rulelaw							-0.009 (-0.591)	0.078 (2.675)***
OBS	278	112	278	111	278	112	277	108
R-squared	0.72		0.72		0.71		0.71	
DW Stat	2.38		2.40		2.39		2.38	
J-Stat		0.84		0.6		0.85		0.77

Note: White heteroskedasticity consistent standard errors are applied. Numbers in parentheses are the t-ratios. The OLS estimations are with fixed country and period effects, as was suggested by the Hausmann test. The IV's for the GMM estimates are the further lags of the left and right hand side variables. *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level. For the J-Statatistic, the p-values are presented.

Table 11: Estimation of model (2) including infrastructure Aid & Otheraid - lagged two periods

Dependent Variable: FDI as a share of GDP

Estimation Method	OLS	GMM	OLS	GMM	OLS	GMM	OLS	GMM
C	0.877 (1.493)		0.927 (1.263)		0.840 (1.424)		0.951 (1.759)*	
FDI_GDP(-1)	0.627 (6.682)***	-0.117 (-2.518)**	0.630 (5.708)***	0.184 (3.956)***	0.623 (6.660)***	-0.175 (-3.059)***	0.625 (6.665)***	0.043 (1.722)*
Infraaid_GDP(-2)	**0.339 (1.526)**	**0.156 (0.794)**	**0.332 (1.295)**	**-0.177 (-0.809)**	**0.364 (1.526)**	**0.112 (0.563)**	**0.358 (1.629)**	**0.165 (1.272)**
Otheraid_GDP(-2)	**-0.124 (-1.519)**	**-0.082 (-1.184)**	**-0.123 (-1.293)**	**0.008 (0.087)**	**-0.132 (-1.540)**	**-0.089 (-1.332)**	**-0.136 (-1.713)***	**-0.097 (-1.986)***
Credit_GDP	0.169 (2.846)***	0.175 (2.872)***	0.158 (2.322)**	0.166 (1.600)	0.174 (2.899)***	0.183 (3.024)***	0.174 (3.029)***	0.152 (1.929)*
GDPpcPPP	-0.156 (-1.638)	-0.179 (-1.728)*	-0.167 (-1.378)	-0.198 (-1.757)*	-0.148 (-1.5)	-0.176 (-1.687)*	-0.160 (-1.758)*	-0.078 (-0.738)
Openness	0.115 (3.346)***	0.041 (3.282)***	0.118 (2.904)***	0.044 (1.740)*	0.113 (3.382)***	0.023 (1.773)*	0.119 (3.275)***	0.059 (2.296)**
Inflation	-0.009 (-0.798)	-0.043 (-9.589)***	-0.009 (-0.687)	-0.032 (-8.924)***	-0.009 (-0.848)	-0.039 (-7.556)***	-0.009 (-0.851)	-0.042 (-18.066)***
Schooling	0.043 (0.861)	-0.021 (-0.324)	0.038 (0.682)	-0.058 (-0.858)	0.041 (0.750)	0.009 (0.144)	0.044 (0.87)	0.022 (0.569)
Governance			0.023 (0.807)	0.091 (4.263)***				
Polstab					0.009 (-0.012)	0.013 (1.391)		
Rulelaw							-0.026 (-1.127)	0.043 (1.979)*
OBS	242	108	242	108	242	108	242	104
R-squared	0.71		0.71		0.71		0.71	
DW Stat	2.17		2.18		2.17		2.17	
J-Stat		0.61		0.4		0.72		0.37

Note: White heteroskedasticity consistent standard errors are applied. Numbers in parentheses are the t-ratios. The OLS estimations are with fixed country and period effects, as was suggested by the Hausmann test. The IV's for the GMM estimates are the further lags of the left and right hand side variables. *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level. For the J-Statatistic, the p-values are presented.

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7.3. Difference in impacts of Aid on Investment Variables

The results obtained in the empirical part of this study give interesting insights on the relationship between infrastructure aid and investment in Sub Saharan African countries. It is therefore crucial to interpret them and analyze the outcomes obtained for each of the investment variables.

One of the first and important results was obtained in the basic estimations, namely the fact that the "African dummy" that has been found in many aid-effectiveness studies indeed seems to show that SSA is different when compared with other developing countries.[23] This became especially apparent in the the fact that many of the variables that are considered to impact investment, for example M2, schooling, and the debt overhang, have not shown any significance in the SSA sample.

In addition, the behavior of the GDP per capita coefficient, which was negative throughout the estimations, seems to be an oddness that exists especially for the case of Sub Saharan Africa and has been found by previous researchers such as Asiedu (2000) and Karakaplan (2005). This indicates that in SSA, a higher per capita income impedes investment rather than fostering it, a results that holds true for both observed investment options. As was already explained, answers to this puzzling outcome can be found in the higher returns on capital that are expected in countries with lower per capita income as well as in the fact that FDI inflows in the case of SSA are non-market seeking and are more interested in cost advantages than the size of the host market (Edwards, 1990; Asiedu, 2000).

Analyzing the outcomes of the core variables, this study revealed that infrastructure related ODA is having very little positive effects on the two investment modes. Even though recent literature suggested at least a positive impact on the FDI inflows, this study's findings support the outcome of Todo/Kimura (2007), who could also find no significant effect of infrastructure aid, neither when examined alone nor when combined with non-infrastructure aid or policy variables.

Looking at the infrastructure aid variable alone, the outcomes differ significantly between private investment and FDI. Where the infrastructure aid commitments do not affect private investment at all, FDI inflows are negatively affected by this type of aid in the cases of improved governance and when no governance indicator is taken into consideration. Here, rent-seeking effects resulting from infrastructure aid prevail, similar to the findings of Todo and Kimura who summarized that "foreign aid for

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23 The "Africa dummy" is the regional dummy in cross-country growth regressions for the SSA region that is considered to capture the unexplainable but SSA specific effects in the performance of the continent. (Calderon/Serven, 2008; Burger/du Plessis, 2002)

infrastructure has a positive infrastructure effect as well as a negative rent-seeking effect while foreign aid for non-infrastructure only has a rent-seeking effect" (Todo/Kimura, 7). This effect encourages unproductive activities, which in turn reduce the marginal product of capital in the recipient country (Todo/Kimura, 2007), thus resulting in lower investment inflows.

Examining the effect both infrastructure and non-infrastructure aid combined have on investment, it can be found that the implications for private and foreign investment are not as diverse as before. For the case of private investment, the non-infrastructure aid commitments are negatively influencing investment decisions in all specifications, supporting the idea of a rent-seeking effect, whereas infrastructure aid is having no influence at all. FDI inflows demonstrate a similar effect when non-infrastructure aid is examined, but here the outcome is not as robust and can only be detected when the situation of better rule of law in the host country is considered. In all other cases, there was no effect observable for neither one of the aid or government variables.

When both types of aid commitments are observed, it can be seen that, particularly for private investment, the rent-seeking effects of non-infrastructure aid are dominating in Sub Saharan African countries. What are the consequences of this? The rent-seeking effect is considered to make companies within the country compete more for the rents that result from the foreign aid payments than to engage in activities that are increasing their own productivity, for example research or training. Therefore, the competition for aid discourages the further investments in the country (Todo/Kimura, 2007). As could be seen in the empirical part, it is not the infrastructure aid itself that is fostering this rent-seeking effect in the case of private investment, but the non-infrastructure aid commitments in SSA. Still, since the rent-seeking effects dominate, the negative outcome maintains.

For the case of FDI, this is different. Here, the results show that, though foreign investments are believed to bring spillover effects and with it economic growth to a country, foreign aid's impact in attracting further FDI does almost not exist, and when it does, it is impeding inflows. On the other hand, the robustly negative outcome for the non-infrastructure aid measure obtained in the private investment analysis could not be detected. This indicates that for private investment, rent seeking occurs rather for foreign aid targeting non-infrastructure sectors, whereas for FDI, this effect is more related to infrastructure aid commitments themselves. This outcome for the case of FDI is interesting, since both descriptive statistics as well as recent literature suggest it to be otherwise. The partial correlations indicated that excluding other

factors, infrastructure aid should have a positive effect on FDI but not on private investment (see Appendix Table 3 and 4). In addition, especially the findings of Selaya and Sunesen (2008) suggested the positive relationship between infrastructure aid and FDI, even when the political environment is not considered.

Furthermore, the empirical part showed that aid commitments in the infrastructure sector are not reacting differently in countries with better governance indicators as was suggested by Karakaplan (2005), nor when governance was not considered at all. Still, the governance indicators are not having a deteriorating effect on investment decisions either, an outcome obtained by Harms/Lutz (2006). This is different for the case of foreign direct investment where the impact is negative, but only in the case of a better rule of law, supporting the outcome of Harms/Lutz (2006) for the case of this governance indicator.

Although recent literature only examined the relationship between disaggregated aid flows and foreign direct investment, this study shows that private investment should receive more attention, in particular since this investment method is yielding more clear-cut results in the empirical examination. Especially for less developed regions, such as Sub Saharan Africa, where domestic investment rates are oftentimes higher than foreign investment inflows, it is important to take a closer look both investment schemes to assess the impact of foreign aid. Nevertheless, the results of this study suggest that the way in which foreign aid commitments are disbursed in Sub Saharan Africa need a reassessment. This is especially important to note since these negative outcomes have been obtained for a period in which donors should have learned from the mistakes of previous decades. Unfortunately, this study indicates that this is not the case.

Of course, the different control variables that have to be integrated into the regression for foreign and domestic investment prevent a variable-to-variable discussion of the regression elements. Still, especially when looking at the governance variables, their similar impact on domestic and foreign investment becomes evident. Good governance and a better rule of law are impacting investment decisions in both cases, whereas the political stability of a country is not exerting influence. This also shows that the influence of governance variables in investment decisions cannot be rejected.

For the case of the additional regressors, the availability of credit as well as the openness to trade raises the attractiveness of the host country to investment. On the other side, inflation diminishes its attractiveness. It is furthermore interesting to see that the investment conducted in the preceding period is affecting private

investments a lot stronger than foreign ones. This can certainly be traced back to the high volatility of investment inflows into Sub Saharan Africa compared to the more stable private investments.

In summary, one can observe that investment is reacting differently to infrastructure aid, but overall, the rent-seeking effect of aid commitments dominates in both cases of investment. Moreover, the non-existence of a positive impact of infrastructure ODA in attracting private investment should advise donor agencies that the way they engage in infrastructure projects is still not resulting in overall positive impacts, at least not in Sub Saharan Africa. Neither for the area of private investment nor for foreign investment inflows has their infrastructure support in the last 13 years resulted in significant positive outcomes.

8. Conclusion

Although many publications have addressed the necessity of infrastructure as well as foreign aid in Sub Saharan Africa as a means to support investment, and with this, economic growth, no empirical research has yet focused on the explicit relationship between investment and foreign aid for infrastructure. This study aims at bridging this gap for Sub Saharan Africa, a region that is considered to have both the least infrastructure endowments, as well as the lowest investment shares compared to other developing regions. Analyzing whether the intended outcomes of donors were actually achieved, namely, whether or not infrastructure aid raises investment activities, this research extends the existing literature on the aid-investment nexus by looking at both private investment and foreign investment inflows.

In applying panel data regressions on a Sub Saharan African sample using both OLS and GMM estimation techniques, the outcome on the two investment measures that were observed are diverging and disappointing. For the case of private investment, no influence of the infrastructure aid commitments could be explored. This outcome was stable for commitments granted one and two years before the final investment took place. Not even indicators for more stable governmental environments could alter that outcome. Furthermore, the negative rent-seeking effect of non-infrastructure related aid commitments could be detected and was robust for all estimations conducted.

For the case of FDI inflows, results were ranging from no influence to a negative relationship with infrastructure aid commitments. This outcome was not suggested by recent empirical literature, with the majority of studies, especially those focusing on the disaggregation of aid measures, finding a positive relationship. Potential explanations for this outcome can be found in the extraordinary low amount of FDI inflows into SSA over the last 15 years when compared with other developing countries. However, the outcome also fuels the criticism on the strategies of the foreign aid sector that have not led to any significant positive impacts.

In addition, this study provided further support for the strand of literature suggesting that it is important to distinguish between different aspects of aid disbursements by revealing that the two included aid measures showed opposing impacts on investment. Further research with the focus on different aspects of donor strategies should be conducted to identify the influence foreign aid has in other sectors of donor activities. Thus, donors will be able to evaluate their performance as well as the significance of their work.

The obtained results suggest further policy implications. To begin with, since overall, infrastructure related ODA is not having a positive effect on Sub Saharan African countries, it is necessary to assess why this problem maintains. The question here is whether infrastructure aid is still too low in the region, or the projects are not chosen wisely enough. A next step should therefore be a more detailed and in-depth analysis of the implication of infrastructure aid and investment on a country scale. This will allow projects with stronger impacts to be detected, as well as commitments that might have resulted in negative rent-seeking to prevent the support of additional "white elephants."

For the case of foreign direct investments, it is certainly necessary to assess why the related ODA payments have yielded a negative impact and how this can be altered. Potential threshold levels for positive impacts of infrastructure aid on FDI should be assessed as well as evaluations on a country-to-country base that can identify best practices and projects that were necessary to attract FDI in order to bring this knowledge forward to countries with a weaker FDI performance.

In assessing aid impacts on private investment and FDI, this research addressed the two most frequently used investment measures in both, the empirical aid effectiveness literature as well as the donor agency publications. Nevertheless, other aspects of investment and the effects of disaggregated aid measures should be examined in the future, on country, regional, as well as international scales. In a second step, research should then examine whether and how this aid-investment relationship affects economic growth in the host countries.

In conducting further research, it will be possible to assess the diverse impacts of the ODA performance, and with this help donors in directing foreign aid more effectively. In doing so, more insights will be obtained to evaluate donor activities and detect those that only have negative, rent-seeking effects. Only when these problems are addressed can the main goal of aid be achieved, which is to help recipient countries to eventually overcome the existing obstacles, and close the gap to the more industrialized world.

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Appendix

Appendix Table 1: List of the codes of included OECD commitments related to infrastructure

Sector Code	Sector Name	Sector Code	Sector Name
100	**I. SOCIAL INFRASTRUCTURE & SERVICES**	**200**	**II. ECONOMIC INFRASTRUCTURE & SERVICES**
120	I.2. Health	210	II.1. Transport & Storage
121	I.2.a. Health, General	220	II.2. Communications
122	I.2.b. Basic Health	230	II.3. Energy
130	I.3. Population Pol./Progr. & Reproductive Health	240	II.4. Banking & Financial Services
140	I.4. Water Supply & Sanitation	250	II.5. Business & Other Services
150	I.5. Government & Civil Society		
160	I.6. Other Social Infrastructure & Services		

Appendix Table 2: Countries included in the sample

Angola	Democratic Republic of Congo	Liberia	Rwanda
Benin	Eritrea	Madagascar	Senegal
Botswana	Ethiopia	Malawi	Sierra Leone
Burkina Faso	Gabon	Mali	South Africa
Burundi	The Gambia	Mauritania	Sudan
Cameroon	Ghana	Mauritius	Tanzania
Central African Republic	Guinea	Mozambique	Togo
Chad	Guinea-Bissau	Namibia	Uganda
Republic of Congo	Kenya	Niger	Zambia
Cote D'Ivoire	Lesotho	Nigeria	Zimbabwe

Appendix Table 3: Private Investment and Aid to the Infrastructure Sector
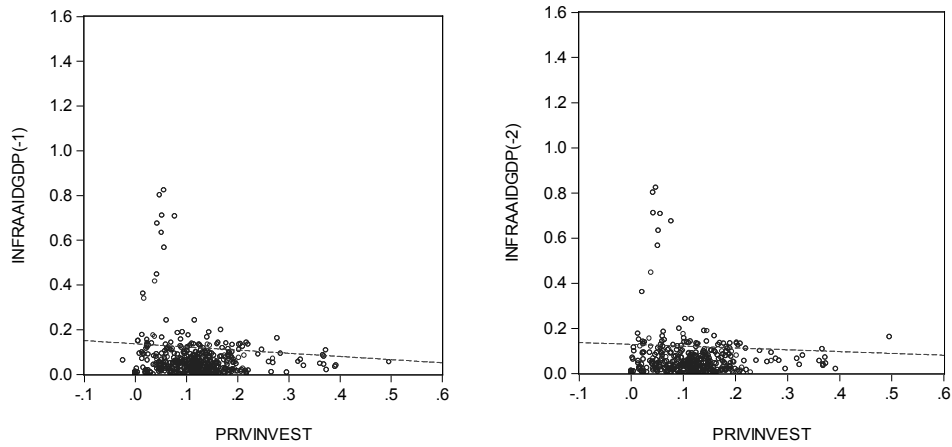
Appendix Table 4: FDI and Aid to the Infrastructure Sector
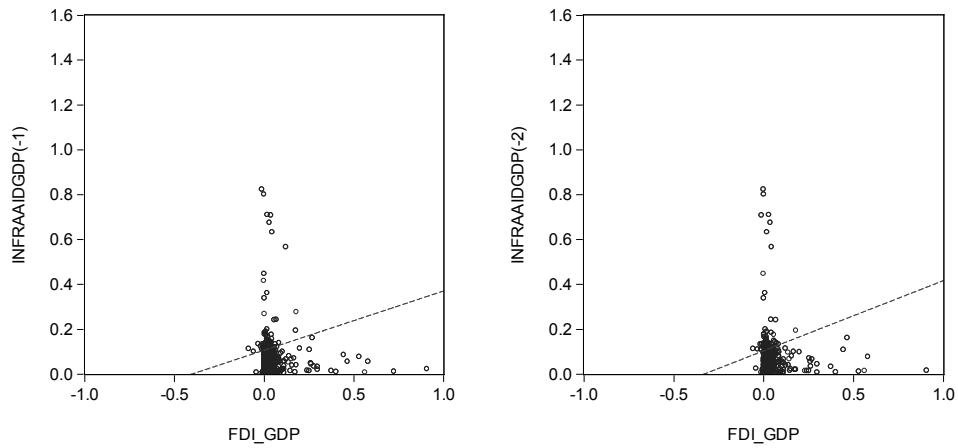
Appendix Table 5: Partial Correlations between Private investment and Aid Variables

	PRIVINVEST	INFRAAIDGDP(-1)	INFRAAIDGDP(-2)
PRIVINVEST	1		
INFRAAIDGDP(-1)	-0.17	1	
INFRAAIDGDP(-2)	-0.15	0.98	1

	PRIVINVEST	OTHERAID_GDP(-1)	OTHERAID_GDP(-2)
PRIVINVEST	1		
OTHERAID_GDP(-1)	-0.16	1	
OTHERAID_GDP(-2)	-0.14	0.98	1

Appendix Table 6: Partial Correlation between Foreign Direct Investment and Aid Variables

	FDI_GDP	INFRAAIDGDP(-1)	INFRAAIDGDP(-2)
FDI_GDP	1.000		
INFRAAIDGDP(-1)	0.086	1.000	
INFRAAIDGDP(-2)	0.085	0.98	1.000

	FDI_GDP	OTHERAID_GDP(-1)	OTHERAID_GDP(-2)
FDI_GDP	1.000		
OTHERAID_GDP(-1)	0.088	1.000	
OTHERAID_GDP(-2)	0.089	0.93	1.000

Appendix Table 7: Partial Correlation between Governance Variables

	GOVERNANCE	RULELAW	POLSTAB
GOVERNANCE	1.000		
RULELAW	0.823	1.000	
POLSTAB	0.702	0.783	1.000

Appendix Table 8: Summary Statistics for key variables

	Observations	Mean	Median	Maximum	Minimum	Std. Dev.
Main Variables:						
FDI	268	0.030	0.018	0.465	-0.086	0.049
Private Investment	268	0.128	0.122	0.496	0.013	0.067
Infraaid_GDP	268	0.114	0.057	1.979	0.001	0.299
Otheraid_GDP	268	0.219	0.058839	5.250	0.0002	0.801
Control Variables:						
Inflation	268	0.095	0.059	1.328	-0.096	0.142
Credit_GDP	268	0.192	0.105	1.608	0.0002	0.276
GDPpcPPP	268	7.065	6.799	9.561	5.794	0.894
Openness	268	0.654	0.599	1.744	0.179	0.290
Schooling	268	3.189	3.217	4.56	1.644	0.663
Political Risk Measures:						
Governance	268	1.823	1.779	3.381	0.606	0.593
Political Stability	268	1.859	2.041	3.546	0.077	0.896
Rule of Law	268	1.784	1.813	3.427	0.434	0.636

Appendix Table 9: Correlation of main variables and private investment

	Privinvest	Infraaid_GDP	Inflation	Credit_GDP	GDPpcPPP	Openness
Privinvest	1.000					
Infraaid_GDP	-0.126	1.000				
Inflation	-0.298	-0.039	1.000			
Credit_GDP	0.130	-0.107	-0.123	1.000		
GDPpcPPP	0.346	-0.106	-0.193	0.495	1.000	
Openness	0.459	0.222	-0.041	0.123	0.384	1.000

Appendix Table 10: Correlation of main variables and foreign direct investment

	FDI	Infraaid_GDP	Credit_GDP	GDPpcPPP	Inflation	M2	Openness	Schooling
FDI_GDP	1.000							
Infraaid_GDP	0.122	1.000						
Credit_GDP	-0.127	-0.051	1.000					
GDPpcPPP	-0.036	-0.142	0.459	1.000				
Inflation	0.024	-0.021	-0.054	0.026	1.000			
M2	-0.068	0.239	0.547	0.242	-0.047	1.000		
Openness	0.386	0.159	0.124	0.440	0.173	0.249	1.000	
Schooling	-0.006	0.056	0.569	0.755	-0.069	0.383	0.454	1.000

Appendix Table 11: Data Sources and Definitions

Privinvest	Gross outlays by the private sector on additions to its fixed domestic assets as a share of GDP Source: WDI Online
FDI	Net FDI inflows in current US $ divided by the ratio of GDP in constant US$ to current US$ Source: WDI Online
infraODA	Sum of Social Infrastructure and Economic Infrastructure commitments by all donors to each sample country as share of GDP Source: OECD CRS Database

Otheraid	Sum of aid commitments by all donors to each sample country less commitments for social and economic infrastructure, actions relating to debt and administrative costs of donors as a share of GDP
	Source: OECD CRS Database
External Debt	The ratio of external debt service to exports of goods and services
	Source: WDI Online
Credit_GDP	Financial Resources to the Private Sector, incl. loans, purchases of nonequity securities, trade credits and other account receivable.
	Source: WDI Online
Inflation	Annual percentage of inflation in consumer prices.
	Source: WDI Online
GDPpcPPP	Ln(GDP per Capita, PPP adjusted in international \$)
M2	Money and quasi money in current local currency units as a percentage of GDP
	Source: WDI Online
Schooling	Ln(Gross Secondary School Enrollment Rates)
Open	$= \dfrac{X_{it} + I_{it}}{GDP_{it}}$
	Source: WDI Online
X_t	Exports of goods and Services in US \$
	Source: WDI Online
I_t	Imports of Goods and Services in US \$
	Source: WDI Online
Polstab	Political Stability index, adjusted with the maximum negative value
	Source: Kauffmann et. al. (2008)
RuleLaw	Rule of Law index, adjusted with the maximum negative value
	Source: Kauffmann et. al. (2008)
Governance	Quality of Governance index, adjusted with the maximum negative value
	Source: Kauffmann et. al. (2008)