LUND UNIVERSITY
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The Nexus of FDI – Absorptive Capacity and GDP growth in Sub-Saharan Africa

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Within 10 years the outlook on Africa has shifted from a continent of destitute to the potential next new emerging market. This study is relevant in this regard to investigate to what extent SSA countries are reaping the benefits of foreign investment inflows and the absorptive capacities necessary to benefit from FDI. A cross sectional analysis was done on 34 countries in Sub-Sahara Africa for the period 1980 to 2012 using secondary data collected from the World Bank and UNCTAD. The findings further emphasize the ambiguity in empirical studies on the effects of FDI on economic growth.

Key words: Absorptive Capacity, Foreign Direct Investment, Sub-Sahara Africa, and Economic Growth

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Introduction

FDI is the transfer of capital stock, knowledge and technology between countries that often occurs through multinational enterprises (MNEs) operating across boarders. According to economic theory FDI helps economic growth by raising capital and labor productivity as well as capital stock, contingent upon the host country's absorptive capacity (absorbtive capacity being a country's ability to imitate and assimilate new technologies). Technological transfer (and thus FDI) is vital for developing countries to achieve growth through convergence since they lack the conditions to innovate themselves. The interplay between FDI and absorptive capacity is therefore the determinant of convergence (Helpman and Grossman, 1991; Barro and Sala-i-Martin 1995). According to Dunning (2000), the emergence of large new markets for example China and India has resulted in the increased of market seeking FDI, in particular for telecommunications (Dunning, 2000). On the other hand resource based FDI has been less impressive as a result of advancement in technology that have miniaturized production processes and brought the increased use of synthetic materials. Global reduction in transport costs means greater opportunities for FDI seeking efficient production chains. The emergence of new large markets was in conjunction with the maturity of the knowledge based economy, increased integration of international economic and financial activity and the liberalization of cross-border markets in combination with the floating of major currencies (Dunning, 2000; Narula and Dunning, 2000). Furthermore governments and local institutional authorities had becoming more aware of the need to align their infrastructure and social capabilities along with incentivized policy reform to capture FDI inflows (Dunning, 2000).

Most empirical studies on the relationship between FDI and economic growth indicate that any positive impact of FDI on growth is indirect – through interactions with factors such as infrastructure, openness, human capital and property rights. For example a study by Alfredo et al (2006) finds that countries with better developed financial systems reap greater benefits from FDI implying that the state of a country's financial development is a nodal point through which FDI affects GDP as financial system determines the allocation of a country's resources, hence growth. Other studies testing the relationship between human capital, infrastructure and openness with FDI and growth find positive associations to growth (Roger 2004; Balasubramanyam et al 1996; Boresztein et al 1995). Few studies have been conducted showing the impact of FDI and

absorptive capacity on growth in Sub-Saharan Africa (SSA) and most of the existing studies finding no direct affect of FDI on growth (Adams, 2009; Adeniyi et al 2012). Scholars that are opposed to the idea that FDI leads to economic growth argue that resources are in fact underutilized especially since much of the FDI flow to developing countries goes to natural resources and that there is weak multiplier effect between sectors. However Lall and Nuralla (2004) argue that this does not apply to all FDI and that four qualitative aspects of MNEs need to be considered that influence the impact of their FDI on the host country: competence and scope of MNE subsidiaries, motive and scope on investment (extraction-seeking, looking for new markets, etc), MNE linkages and the nature of their assets. At the micro level, technological transfer (by MNEs) benefits local firms and labor as they engage in competition, business partnerships, training programs and experience (Kokko 1992 ch3). The host country's laws and regulations as well as the level of competition among firms affect the level of transfer. MNEs will therefore bring in technologies based on incentives placed upon them by local competition and favorable laws and regulation.

FDI global trends are highly skewed. Between 1970 -1994 FDI flows to developing regions increased from 5 billion to 173 billion yet three-quarters of these funds went to only 10 countries, mostly in Asia and Latin America, with the least amount going to SSA (Human Development Report, 1996). One reason for this can be found in Narula (2004) where it is explained that the absence of past industrialization in SSA, which in itself is the result of lack of local absorption in for example human capital, infrastructure, and dynamic business climate has constrained SSA from the ability to master foreign technology and compete on a global level. This coincides with absorptive capacity as path-dependent or self-reinforcing: accumulation of capacity now leads to speedier accumulation later (Cohen and Levinthal, 1990). By the same token, countries with initially low absorptive capacities can be 'locked out' of technological advancement. By 1980's Africa had become less open than any other place in the world, but more importantly to note is that the gap between SSA and the second least open region (The Middle East) was larger then the gap between The Middle East and the rest of the world (Collier and Gunning, 1999) Governments in SSA have either – implemented ineffective policies, coined as "sins of commission" by Collier and Gunning (1999) or failed to provide adequate infrastructure, coined as "sins of omission" or both. In today's globalized market, "good governance and

appropriately designed institutions" such as property rights, the quality and independence of judiciary, bureaucratic capacity and appropriate regulatory structures have become extremely important for economic growth (Rodrik, 2003:8). Acemoglu et al presented the case of Botswana where due to law and order - an indicator for good governance, resulted in a situation where the country's per capital income grew at 7.7 percent annually between 1965 and 1998 (Acemoglu et al, 2001). The IMF has also recognizes the importance of good governance and that is why the IMF promotes macroeconomic stability and sustained noninflationary growth in member countries (Abed and Gupta, 2002). The involvement of the IMF in governance issues is born from the general consensus by academics and policy makers that the absence of accountability or strong institutions will result in low economic performance and growth (Abed and Gupta, 2002). Therefore Good governance remains an important national asset to a country because investors have a list of national markets to choose from when making investment decisions. Hence, good governance can enhance the attractiveness of one country to investments.

1.1 Purpose

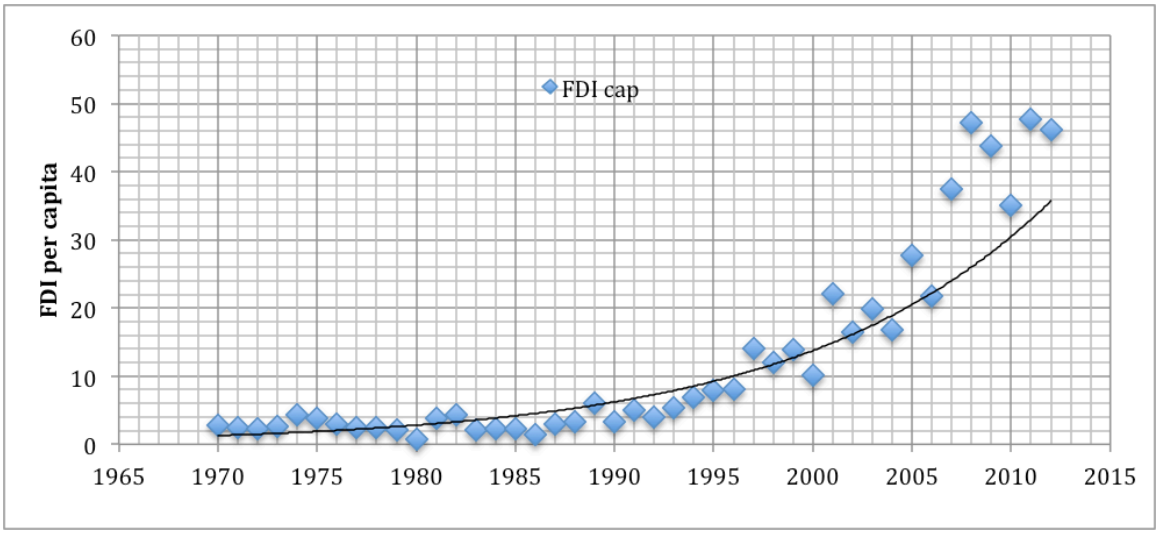
The purpose of this study is to shed light on the nexus consistently discussed in theory and empirical work between foreign direct investment, absorptive capacity and economic growth, with a regional focus of Sub-Saharan Africa (SSA). Recent figures show an increase in foreign investments in the region. On average for SSA FDI per capita has steady increased since the 1990's as seen in figure 1 below. However, despite this growth, SSA is still trailing behind other developing and regions. Figures 2, 3 and 4 show the trends of FDI per capita, FDI as a percentage of GDP and FDI as a percentage of World FDI for various sub-regions in SSA relative to East Asia and South America. Between 1970 and 1990 all regions maintained a per capita FDI of below 50 US dollars (current exchange rate and prices) and began to see growth in per capita FDI from then onward, with the largest taking place in Latin America, while Eastern and Western Africa on the other hand remained with sluggish growth. The Southern part of Africa and Eastern Asia show a similar trend in FDI per capita growth past 1990, however Southern Africa's FDI per capita has been rather volatile, as can be seen in figure 2 with persistently large troughs and peaks every two years. This volatility is also seen in Southern Africa's figures on FDI as a percentage of GDP (see figure 3), note that all regions show a steady increase in their FDI/GDP ratios after

1990. An interesting observation to make is that Eastern Africa has the largest growth in their FDI/GDP ratio yet remained with sluggish per capita FDI growth over the same period. Where we see a major difference between SSA regions and the other two developing regions is their respective share of world FDI. FDI for all SSA sub regions remain below zero and 2 percent over the period 1970 – 2012 with sight peaks in the 70's. Compounded as a region SSA's peak in FDI as a percentage of World took place in 1970 and has been deterioration since, this is in part due to the emergence of markets in the Asia. FDI as a percentage of GDP remained low at below 1% and had a slight peak in 1990 following by a steady increase to date (the same increase is viewed in the FDI as a percentage of World FDI).

Given these trends in FDI and theory that states FDI to be positively associated with economic growth this study looks to investigate the relationship between FDI and growth across 34 countries in SSA over the period 1980 - 2012[1] whilst controlling for factors that may influence the relations, referred to as absorptive capacities. Sub – periods 1980 – 1995 and 1997 – 2012 where also added to the analysis in order to better reflect the trends seen in the raw data, whereby FDI seems to have had a sluggish growth in the 80's which later pick up in the 90's – this also allows for the discussion of lag effects, in that, an upsurge in FDI in one period may only show its effects of growth in the next. Subsequently three robust OLS regression analyses for the there periods are conducted, with an expectation of positive association between FDI and growth, based on the theory. Furthermore, additional variables to reflect the absorptive capacity of a country are added. There are three sets of absorptive capacity in this study; 1) The ability to learn – secondary school enrollment ratios are used here to proxy human capita 2.) Accessibility to technological know-how and processes – trade/GDP ratios and telephone lines per 100 and 3.) Ability to assimilate new technology and process – indicators for financial sector development and good governance are used here based on previous research. [2]

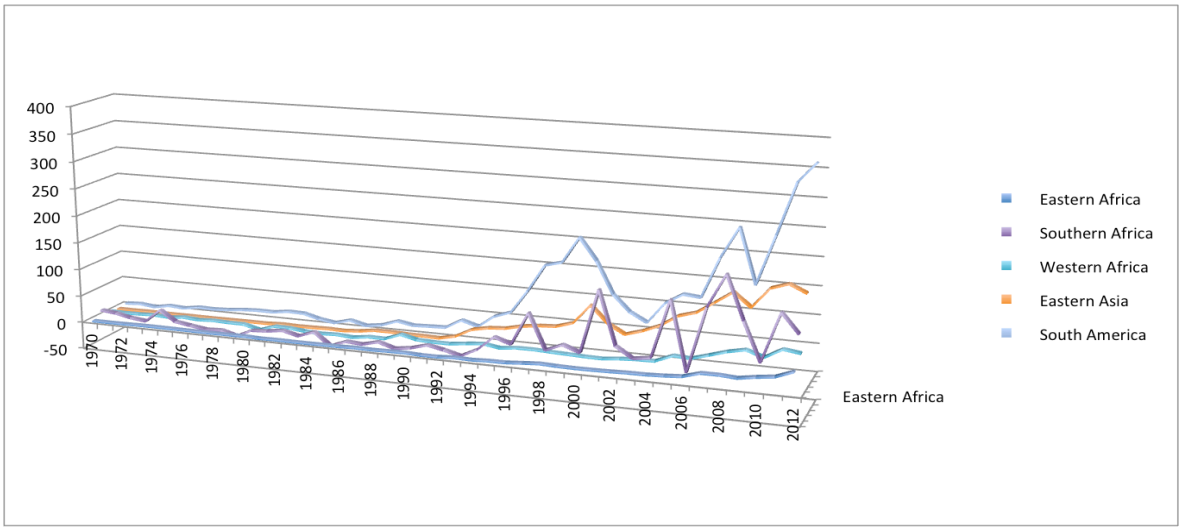
[1] This study could not consider earlier years than 1980 due to the availability of Data
[2] Detailed expectations of the association between the variables is explain in section 3

Figure 1 FDI per capita SSA



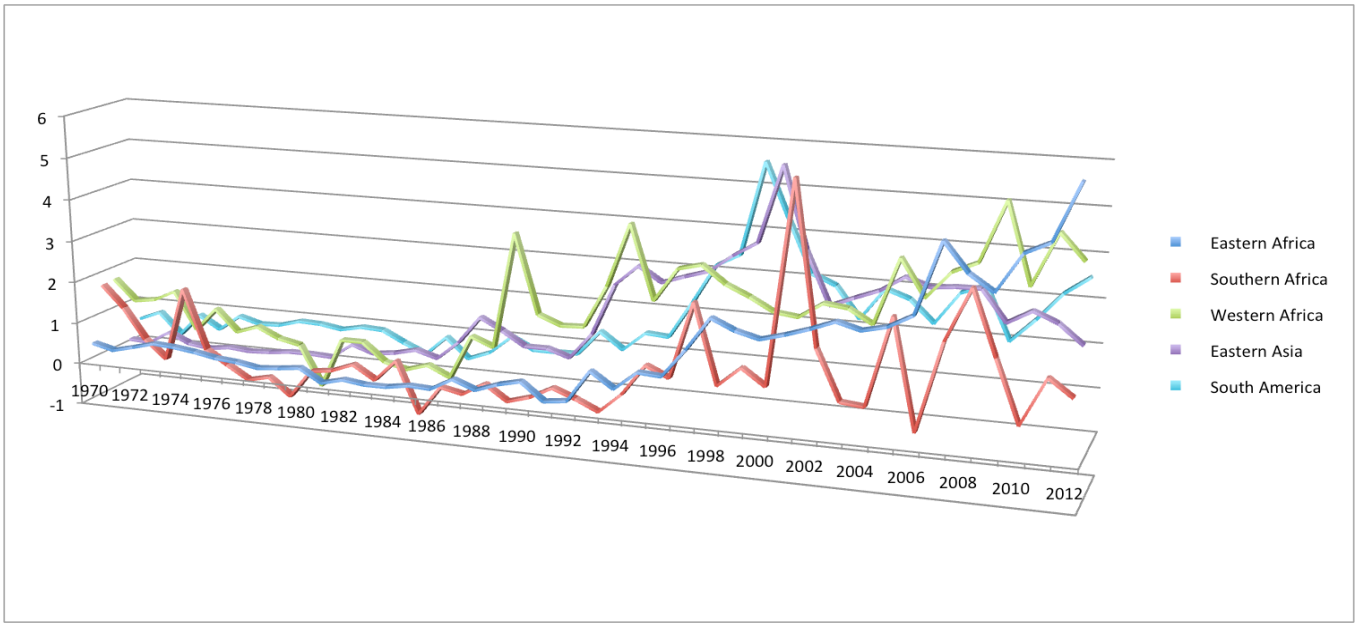
Source: author's from UNCTAD data

Figure 2 FDI per capita



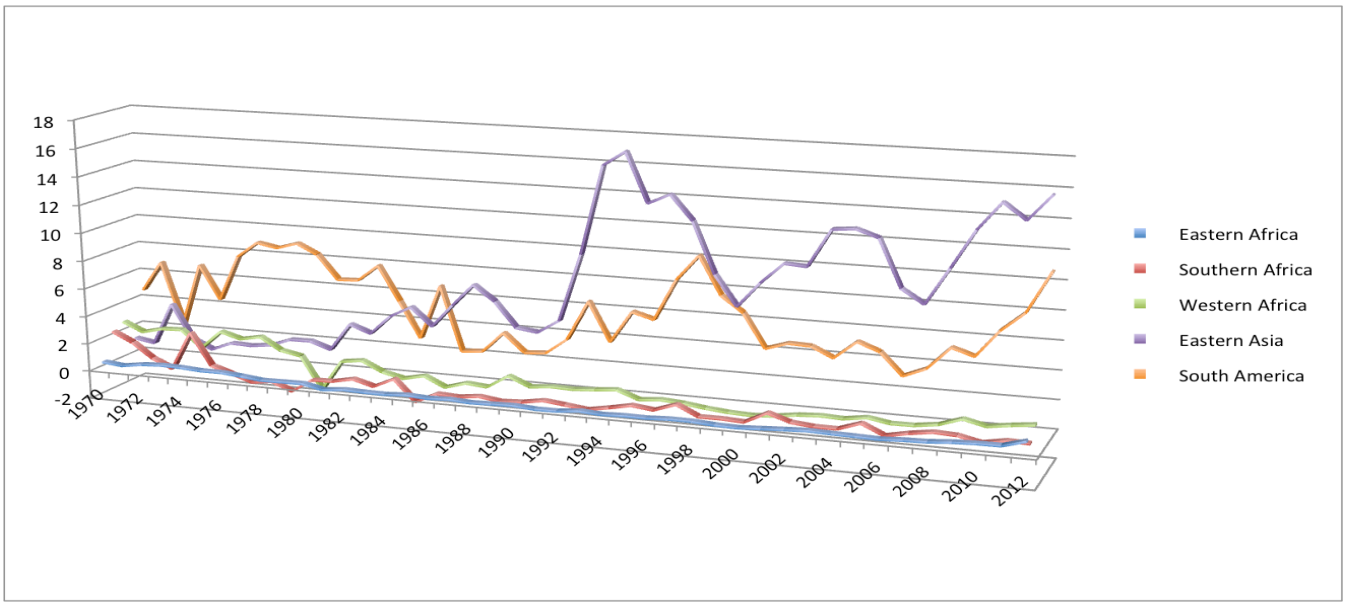
Source: author's from UNCTAD data

Figure 3 FDI % GDP



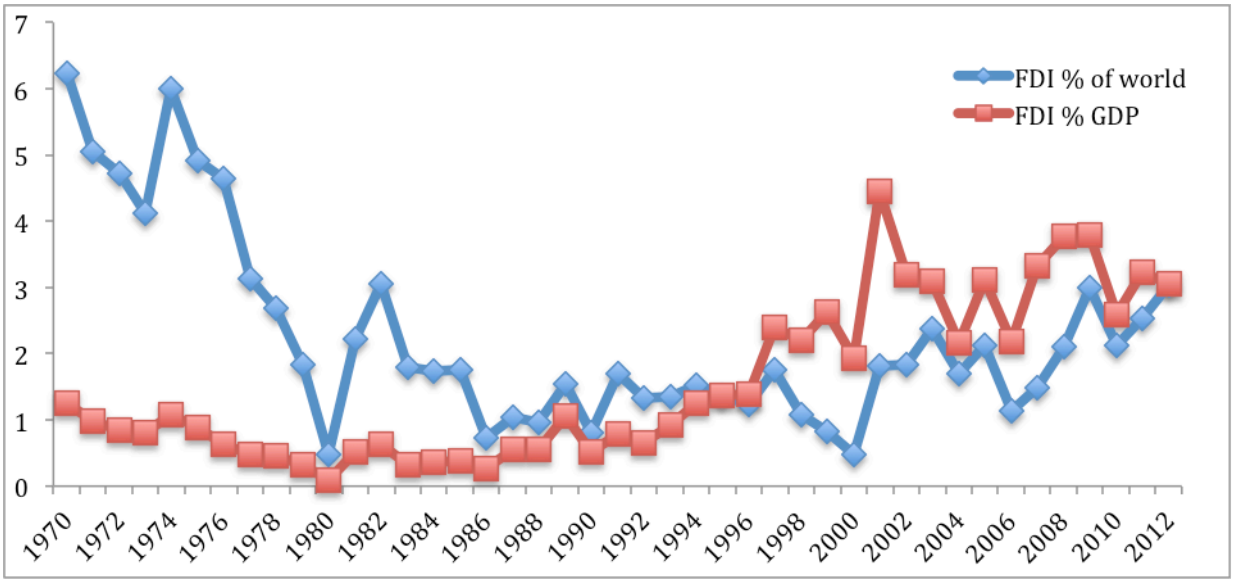
Source: author's from UNCTAD data

Figure 4 FDI % of World FDI



Source: author's from UNCTAD data

Figure 5 SSA FDI percentage of World and FDI percentage of GDP



Source: author's from UNCTAD data

1.2 Outline

The paper is divided as follows: Section 2 discusses the main theoretical and empirical background on foreign direct investment, absorptive capacity and their association with economic growth. Included in this section is an outline of previous studies done on the subject, and more specifically research done on Sub-Sahara Africa (SSA). Section 3 presents the empirical analysis, with subsections: data collection, descriptive statistics of the data and methodology and results. Section 4 contains of the analysis of the results with respect to the theoretical background and previous studies presented in section 2 and finally concluding remarks in section 5

2 Theoretical Background

There is a general consensus that FDI promotes economic growth, that is does so by both contributing to capital accumulation and by increasing country's total factor productivity via technological transfers in the form of spillovers – production processes and techniques, organizational and managerial skills, ideas and new variety of capital goods. Therefore FDI can be seen as a composite bundle of capital stocks, know-how and technology. There is further general consensus in the theory that absorptive capacities, which are defined as *factors that enhance the*

ability for countries to imitate and assimilate technological change in a meaningful way, are necessary for a country to attract and reap the benefits of foreign investment. However, the divergence exists on the lack of consistency in empirical research results, in particular, whether spillover effects are inevitable and whether the importance placed on specific absorptive capacity factors is warranted. This section outlines the main theoretical and empirical work surrounding the interconnectivity between FDI, absorptive capacity and economic growth**.**

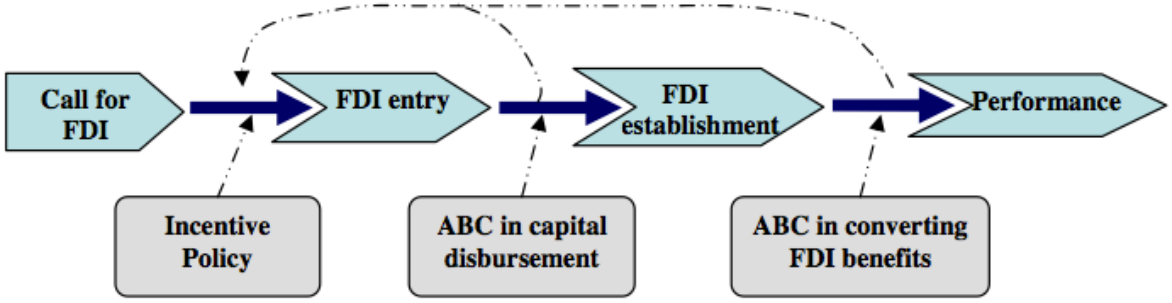
2.1 Foreign Direct Investment, Absorptive Capacity and Economic Growth Nexus

New growth theories postulate that economic growth in developing countries is dependent on the extent to which countries are able to imitate and assimilate new technologies. Foreign direct investment is therefore seen to be one of the mediums for technological transfer to take place (Helpman and Grossman, 1991; Barro and Sala-i-Martin 1995). In particular, this transfer is explained at a micro economic level as between multinational enterprises (MNE's)/MNE affiliates and domestic firms, in the form of technological spillovers which may be through imitation, linkages (truncated operations) and training. However it is argued that these spillovers can only take effect when/if the host country has specific characteristics. These characteristics are summarized in the literature as absorptive capacities that, with all things equal, would result in increased productivity of both labor and capital (Borensztein et al. 1998, Nugyen et al. 2008). The transfer of technology is of great importance for developing countries because most lack the necessary ingredients required for innovation, that is, infrastructure in education, well functioning markets and socio-economic stability (Adams, 2009). This by definition makes them learner countries that would follow the path of growth/convergence explained in Abramowitz's (1986) "catch up hypothesis". In presenting his catch up hypothesis of how economic convergence occurs, Abramowitz (1986) shows that it is the technological gap and its subsequent narrowing that will provide the "productivity leap" needed for countries to experience economic catch up. It is this process of narrowing the technological gap that presents the backdrop for the discussion of the interplay between foreign direct investment and absorptive capacities both at the macro/national level and micro/firm level.

Cohen and Levinthal (1990) are notably the principals in the research and theory regarding absorptive capacities, though the concept indeed appears in earlier works for example in Abramowitz (1986) where it is instead referred to as "social capabilities". Cohen and Levinthal (1990) describe the cognitive structure of absorptive capacity as path-dependent, in that the accumulation of absorptive capacity in one period affects a country's ability to accumulate more capacity in the next period. This conclusion is based on research that shows that prior knowledge has an effect on individual's ability to input more information making the acquisition of knowledge self-reinforcing. It is argued that this can affect the expectations of firms, as firm would use the state of a country's absorptive capabilities to predict with some degree of confidence the future commercial potential of the industry. In addition, by this reasoning it is possible for countries to essentially become "locked out" of the process of technological advancement since the lack of absorptive capacity would determine the extent of foreign capital inflows and the advanced technological know-how that comes with it. In the same regard Abramowitz (1986) notes the path dependency of "social capabilities". Specifying that the technological gap faced by developing countries is not by chance, it should be understood instead as an accumulation of past failures to strengthen social capacities, which he enters into the catch up theory model as technical (education) and institutional (political, commercial, industrial and financial) competences. Therefore a country's state of technical and institutional competences governs its technological choice and can possibly strains its ability to adopt more advanced technologies. Nugyen et al. (2008) present the concept of systemic absorptive capacity, that is to say, absorptive capacity should be viewed as part of a broader knowledge base of whole industries and their environment: firms and consumer networks, social and cultural context, institutional and organizational framework, infrastructure, knowledge creating and diffusing institutions. This does not mean the factors are methodically organized, but instead, these factors interact with each other forming a system of feedback effects. Consequently, the efficiency of economic actors (foreign and domestic firms) depends on how capably these factors interact with each other. Furthermore, the set of common habits, routines, established practices and rule of law regulate how the various factors and actors interact. The same characteristic of a systemic approach to absorptive capacity can be used in discussing feedback effects between FDI and absorptiveness. Any direct influence of FDI on economic growth in turn enhances a country's absorptive capacity and therefore further increases the ability to attract greater quality and quantity FDI. An illustration of these interactions

can be seen in *figure 6* where the path of FDI from project development stages to final implementation are dependent on absorptive capacities (ABC) that feed into the process at various stages (Nugyen et al. 2008). Nugyen et al. (2008) discuss 2 stages in FDI: 1) bringing FDI to practice – a call for funds, project developments, disbursement of funds, And 2) converting the benefits of the FDI into host country competences. Absorptive capacity in the context of FDI is considered as the assimilation or integration of FDI in the host country's economy in a "meaningful" manner, which according to Nugyen et al. (2008) means it is unquestionable that the host country would need to develop the absorptive capacity of domestic firms, physical infrastructure, technology, R&D and institutions.

Figure 6

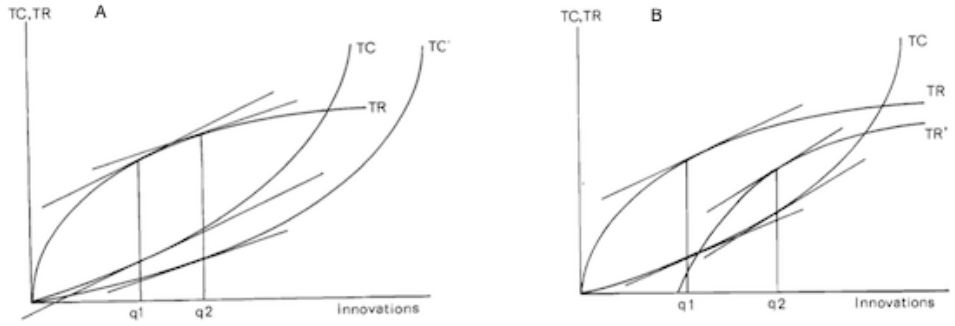


Source: Nugyen et al. (2008)

Whilst the availability of data does not allow for this study to incorporate the firm level aspects of FDI – absorptive capacity and growth nexus, the theory in this regard is still important for understanding the workings at the national level. At the micro/firm level of the discussion, technology transfer regulations and local content laws are an example of impugning regulation that would hinder the profit maximizing behavior of multinational enterprises (MNE's) and ultimately deter investment (Kokko 1992 ch3). There are four ways according to Kokko (1992 ch3) that transfers occur between MNE's and local firms: demonstration/imitation, competition, structure of truncated MNE and training effect. Therefore FDI can benefit the economy by technological transfers through competition, business engagement with local firms and labor through training programs, learning by doing and accumulating experiences. Kokko (1992 ch.3) discusses that at any given time a multinational enterprise/affiliate (MNE) will only import technology into the country of operation up to the point where marginal cost equals marginal revenue. Kokko (1992 ch.3) illustrates this aspect of the theory as seen in figure *2A* which shows

the production possibility and profit maximizing quantity where the parallel isoquants are tangent to the total cost (*TC*[3]) and total revenue (*TR)*, therefore the MNE would import innovations up to quantity *q1*. Figure *2A* and *2B* also enable the illustration on how MNE's would react given a change in the absorptive capacities of a country. If for instance a country were to remove impugning regulations such as stringent local content laws this could have the effect of reducing the total cost of the MNE as illustrated by a shift down and rightward of the TC curve in figure *2A*. The lower marginal costs presented by the new TC curve means the MNE can now import more technologies at a new profit maximizing quantity, *q2*. As previously noted, the presence of competition from local firms in a country is one of the absorptive capacity factors that would enhance their ability to increase the transfer of more advance technology.

Figure 7



Source Kokko 1992

In figure *2B* the availability of competition from local firms would affect the MNE by reducing its monopolization of the market and subsequently its revenues - this is illustrated by a shift in the MNE's total revenue curve down and rightward (see figure *2B*) the new total revenue curve has an increased marginal revenue thereby it is in the interest of the MNE in response to domestic competition by importing more advanced technologies at quantity *q2.* Kokko (1992) ties this in with the theory of endogenous spillovers, where it is argued that the strength of the MNE relative to the local firms and industry will dictate the quantity and quality of technological spillovers. Strong foreign firms and weak local firms tend to create circumstances where spillovers are less likely since the MNE would have monopolization of the market with less incentive to import more advance technologies, less labor mobility between the MNE and local firms and less

[3] The factor prices, absorptive capabilities, economic development and regulations determine the marginal cost of technology transfer (Kokko 1992 ch3)

capability for the local firm to emulate the production process being used by the MNE. Weak foreign firms and strong local firms create an environment of competition, which puts pressure on the industry and forces increased productivity, technological shifts and spillovers. A perfect situation would be to have equally dexterous firms, which would lead to a two-way exchange, intra-industry exchange and a virtuous circle of competitive innovation and spillovers – however this hardly happens Kokko (1992).

Gross and Helpman (1991) and Romer (1990) model technological change as endogenous and so does Kokko (1992) as technological change is illustrated to be an outcome of competition between the MNE affiliates and domestic competition, in the same light technological change is explained by the former mentioned as an outcome of competition between innovators and imitators – therefore there is no simple relationship between MNE's, spillovers and local firms. Kokko (1992, ch.6) tests if productivities of MNE's and Local firms are simultaneously determined, hypothesizing that they are and that competition between the two is an independent spillover effect in addition to the "traditional" spillovers that take place for example via imitation and training. Kokko (1992, ch.6) models two equations where the affiliate MNE is a function of capital intensity, industry concentrations, labor quality, foreign share of industry AND completion from local firm (productivity is used as the proxy) simultaneously the local firm is a function of capital intensity, industry concentrations, labor quality, foreign share of industry AND completion from affiliate MNE (proxied by productivity). Results show that to a large extent spillovers are endogenously determined. Therefore second best policies need to be implemented by governments to correct for the lack of strong local firms in that industry. Kokko (1992, ch.6) in his empirical study (33 host countries of USA majority owned MNE's) on technological transfer and MNE's found evidence supporting the theory illustrated in *figure 2*. The Level of domestic competition matters in determining the importation of technology by the affiliate MNE, along with the existence of constraining laws and regulations e.g. tech transfer laws. Kokko (1992, ch.6) also found that local levels of education had a positive effect on transfers of licensed technology but an uncertain effect for capital equipment. From this we can understand that governments play a large part in determining if a country will reap positive benefits from FDI by their readiness to implement policies to increase the local capacities – education and regulations. It is also important to note, as emphasized by Kokko (1992), that MNE's will do little to increase the importation of more technological advanced processes if they operate in isolation due to lack of local

competition. Governments could get involved here by subsidizing completion through training programs.

Lall and Narula (2004) describe the increase in FDI globally as a result of a shift in governments' policy from inward–looking import substitution policy to outward–looking export oriented. The shift has been a result of inefficient outcomes of the prior inward-looking policy as well as the shown success of export-oriented strategies in Asia. However, the removal of restrictive FDI regulations and a shift to outward-looking policies by governments in the developing world does not mean the fundamental environment to attract FDI has been created. Governments still require political will to implement policies that would enhance local absorptive capacities (Lall and Narula, 2004). When a country has import-substitution policies MNE's tend to set up truncated[4] facilities, the larger the truncation the lower spillover effects – whereas when policies of liberalization are adopted MNE's tend to buildup new affiliates and upgrade existing subsidiaries (Lall and Narula, 2004).

There are some scholars that disagree with the notion that FDI is positively associated with economic growth, arguing that FDI results in the under utilization of production forces with further implications of weak multiplier effect from one sector to the other, this is a particularly important discussion in regard to countries in Africa and Latin America where FDI flows have historically been heavily geared towards natural resource sectors with few prospects for technological transfer and spin off industries (Pigato, 2000; Adams 2009). Others skeptics of FDI's influence on economic growth argue that FDI will have negative effects on productivity at the firm level since it will only be the MNE's that increase productivity leaving domestic firms to struggle behind. However, Lall and Narula (2004) refute this, arguing that increase in FDI mobility has not reduced the need for local capabilities. In fact Lall and Narula (2004) argue the contrary. The entry level for attracting non-extractive FDI had risen and investors are searching for countries with high local capabilities, which include the existence of sufficient industry knowledge. Whilst it is difficult to refute the stance taken by Pigato (2000), the path to economic growth through outward-looking export-oriented policies and large influxes of foreign direct investment has indeed worked, in for instance in Asia (Lull and Narula, 2004). Furthermore, proponents of the positive association between FDI and growth acknowledge that despite the

[4] Truncated facilities are miniature replicas of the parent firm however with less production scale and few if not only one component of value added activity

Washington consensus, which states, ceteris paribus, FDI generates positive effects on economic growth and development via positive externalities on local firms, FDI is not *sine qua non* for development (Narula, 2004). By stipulating an inevitable causational relationship between FDI and development we would be assuming that all MNE's activity would result in positive externalities, which is not the case. Additionally, this would mean empirical work should be interested only on the quantitative aspect of FDI, however there are important qualitative aspects that must be considered. Four qualitative aspects can be outlined that need to be taken into consideration when viewing or projecting the effect that FDI will have in the host country (Lall and Narula, 2004; Narula and Dunning)

I. Competences and scope of the MNE subsidiaries: the initial MNE strategy matters, and how this strategy interacts with local capabilities
II. The motive for the investment: 1.) Extraction-seek (natural resources) 2.) Looking for new markets 3.) Restructuring its existing foreign production or 4.) Implementing new strategy of building assets[5]. Developing countries usually attract MNE's that hold all these motives except the last (implementing new strategy of building assets). This poses a problem and conforms to Pigato's (2000) concerns with FDI because an MNE motivated by the implementing new strategies of building assets yield the highest transfer/spillovers of technology and competences. Lall & Narula (2004) and Narula & Dunning (2000) argue that the responsibility lies with the host country's governments to stimulate the ideal absorptive capacities that would attract such MNE's, through which FDI and its spillovers can be assimilated into local competences.
III. MNE Linkages: the operation and size of truncated MNE's matter the larger the gap between MNE technology and the host country technology, the lower the intensity of truncated operations and subsequent potential for technological spillovers
IV. Nature of MNE assets

The literature also discusses that the relationship between FDI and growth depends excessively in the scope of the study in question and in particular the regression specifications. However it is

[5] These 4 mentioned motives are synonymous to those outlined by Dunning's OLI theory (2000). In the context of the OLI theory this would be ownership competitive advantage augmentation, where MNE's seek to augment their competitive advantage by shifting part of their production process abroad.

argued that this ambiguity merely increases the likelihood that it is the other factor that matter and that the lack of recorded spillover effects in empirical work is merely due to the omission of absorptive capacities factors in the research.

2.2 Previous studies

Theoretically as discussed above, FDI should promote economic growth by bringing into a country capital and the prospect of technological spillovers from MNE's to local firms. Most empirical studies find that FDI does not have a direct contribution to growth but rather that if FDI has a positive impact on the economy, it is facilitated through other factors: human capital, infrastructure, openness, property rights, political risk and inadequate laws and regulations as constraints to foreign direct investment. Hermes and Linsins (2002) argue this tendency of divergence in the empirical literature as an outcome of omitted variables. As such the lack of consideration taken by previous studies to incorporate absorptive capacity has resulted in the somewhat ambiguity in the FDI- growth nexus. Subsequent studies have therefore acknowledged the importance of absorptive capacity variables, particularly by way of interaction variables, to counter the lack of association seen between FDI and economic growth in earlier studies.

The most cited work on the underpinnings of FDI success is Borensztein at al. (1998). In particular for the importance of human capital as an absorptive capacity requirement for FDI where their main conclusion in their research is that countries have threshold levels of minimum human capital that must be surpassed for greater positive association to be seen between FDI and growth. Balasubramanyam et al. (1996) site openness to trade as a factor that affects a country's ability to attract and reap the benefits of growth from FDI. Using the Bhagwati hypothesis[6], and show that countries with EP strategy would gain the most form FDI since IS strategy would disport local productive away from that which the countries has comparative advantage, furthermore IS strategies will reduce competition for both local and foreign firms, making the

[6] EP is the strategy where the average effective exchange rate on exports and average effective exchange rate on imports are equal (un biased neutral trade) where as IS strategy is the case in which average effective exchange rate on imports exceeds average effective exchange rate on exports (import substitution) – the Bhagwati hypothesis is that countries with EP strategy will have greater economic growth – essentially, a country with trade liberalization will have high growth (Balasubramanyam et al., 1996)

business environment non conducive for FDI inflows and their subsequent benefits. Their study finds this to be the case and conclude that trade openness is a promoter of positive association between FDI and growth.

Alfaro et al. (2006) look at the linkage between FDI, a countries state of financial development and economic growth. Conducting a cross-sectional study on the period 1975 – 1995 for 71 countries, they find that well developed financial systems are positively associated with greater gains from FDI, which is consistent with results found by Hermes and Linsins (2003). Where they find that financial development is one of the most important circumstances needed for FDI to flourish. Financial systems will enhance the efficient allocation of resources and therefore improve the absorptiveness of a country with respect to FDI. Using cross-section data on 67 countries and the Sala-i-Martin 1997 robustness of variable approach they conclude that the level of efficiency in a country, in this case proxied by financial development, is the pathway through which FDI impacts GDP and not directly from FDI to GDP. They also test using different variables and find the same positive and significant results further solidifying their conclusion that efficiency is the node of association between FDI and growth. They find insignificant regional dummy variables, which signifies that there conclusion holds for all developing countries. The background to their position as well as that of Alfaro et al. (2006) is that spillovers, to a substantial extent, depend on the availability of finances and the state of countries financial options. Not only does the cost of doing business become reduced for the MNE's but local firms also require local financial backing in order to assimilate the new technologies gained from the entrance of FDI. That is, local firms need capital to implement the new production process or workers training programs. Furthermore, the opportunity for backward linkages i.e. the emergence of new local industries complimentary to the MNE's would not be possible without the availability of financing. Rogers (2004) asks if "countries that are better at absorbing technology from abroad via FDI are able to experience faster productivity growth?" The study contributes to existing empirical literature that test openness to trade, financial infrastructure and human capital effects on economic growth through FDI (Balasubramanyam et al. 1996; Alfaro et al. 2006; Boresztein et al. 1995) by adding absorptive capacity proxies: study abroad, telecommunications and publications. He uses both standard growth model specification, Barro & Sala-i-Martin (BSM) and Sach-Warner (S-W), where the latter puts more weight on trade openness and the former on human capital, and runs a series of cross section regressions on a group of developing countries that

include countries from Africa, Asia and Latin America with data from 1960 – 1995. Rogers find that the results from using different growth model specifications differ. In the S-W specification the study abroad variable is positive and significant whilst the other two variables have no impact on growth. The BSM specification has the opposite results where study abroad has little explanatory power yet telecommunications and publications have a positive association with growth.

Few empirical studies have been done on the interconnectivity of FDI, absorptive capacity and economic growth for the SSA region specifically. This may be in part to the low relative flows of FDI to the region in the decades prior to 1990. From the empirical studies on the topic at hand most find that FDI does not affect economic growth directly. Adams (2009), conducts a study on 42 countries with pooled panel data from 1990-2003, he tests 2 vector variables: **1)** Stock of human capital, degree of openness, gross domestic investment, and foreign direct investment **2)** determinants of growth from cross-country growth studies such as government consumption, inflation rate, geographical location and political risk. His study finds that domestic investment has a positive impact in economic growth where as FDI's impact is dependent on the type of regression analysis chosen. Furthermore, when testing FDI impact on domestic investment at first the impact is negative then it turns positive in the following period. This is explained as an indication that initially FDI has a crowding out effect and suggests that FDI therefore contributes to economic growth via total factor productivity. Adams (2009) discusses further that the results vary depending on the specification used, i.e. the ordinary panel regression shows positive correlation between FDI and growth, yet the Fixed Effects specification yields insignificant results. Adams (2009) attributes this insignificance to the lack of financial sector development and the lack of other absorptive capacities. Which he then uses as the basis for recommending of targeted FDI policies and structural economic shifts. Kamara (2013), researches the channels through which FDI may contribute to growth in SSA. He investigates 4 factors in particular: human capital, financial development, infrastructure and institutions with the research question: "do these host country factor combine with FDI to improve its effects on economic growth in SSA?" Kamara (2013) hypotheses for all 4 factors are: factor X will promote the growth effects of FDI on SSA. Using a dynamic panel data model, Kamara (2013) find for SSA differ to those of Borensztein et al. (1998) on the role of human capital on growth, the negative effects of human capital on growth found by Kamara (2013) is explained by differing specifications of the two

studies but also Kamara (2013) argues two factor that may be specific for SSA in reducing the impact of human capital on growth, namely, brain drain and the lack of use of domestic competences by MNE's. Adeniyi et al. (2012) using IMF financial statistics from 1970 to 2005 pick 3 variables to proxy financial development: 1) total domestic bank credits to GDP ratio 2) liquid liabilities (M3/GDP) 3) Credit to private sector. They use a VEC model to investigate the financial sector development and economic growth nexus for West Africa. They find that financial sector development as the intervening variable on the FDI-growth relationship to be non-influential for most West African countries. The implication of their study, according to them, is to deter uniform policy across countries. The findings are in stark contrast to the findings by Hermes and Linsins (2003) & Alfaro et al. (2006) discussed previously. Olusanya (2013) does a granger causality test of the impact of FDI and GDP in Nigeria 1970 – 2010 data, in addition to the causality test for the whole period, the author de-aggregates the period into 2 sub periods (1970-1986, 1986-2010) which allows for analysis of absorptive capacities factors. In this case the research looked into the effects of shifts in policy, where 1970-1986 represents the pre-deregulated period in Nigeria whilst 1986-2010 was the era of deregulation and outward-looking policy shifts. Olusanya (2013) finds a causal relationship between GDP and FDI, in the direction GDP → FDI for the pre-deregulation period. No causal effect is found between 1986 and 2010. Despite no casual effect between FDI and GDP between 1986 and 2010, granger causal relationship is found for the whole period 1970-2010 in the direction GDP → FDI. Olusanya (2013) concludes that strong economic growth, as seen in Nigeria over the past decade, fuels the increase in foreign direct investment, a finding not dissimilar to that of.

As seen in the preceding discussion, the results from empirical studies on the nexus of FDI – absorptive capacities and economic growth are mixed. Theory is concrete on the notion that FDI economic growth affects growth. Yet it is clear that results from empirical research vary depending on regional selection, variable selection and model specifications.

3 Empirical Analysis

This study conducts an OLS cross sectional analysis of FDI – absorptive capacity and GDP growth for 34 SSA countries over the period 1980 – 2012, with sub periods 1980 – 1995 and 1997 – 2012. Sub periods were picked based on the motivation discussed the section 1. This section contains a brief on the data collection and limitations, statistical description, methodology used and finally the results.

3.1 Data Collection

All data used in the analysis, except for FDI data, was collected from three World Bank databases – World Development Indicators database (WDI), World Wide Governance Indicators project (WGI) and the World Bank Financial Structure database. Data on FDI was collected form the United Nations Conference on Trade and Development database (UNCTAD). The data consists of: *Gross Domestic Product (GDP) per capita, Gross Capital formation (GCF) as a percentage of GDP, Secondary School gross enrollment (SSE), Consumer Price Index (CPI) and population growth (annual)* – these are a set of agreed upon variables that make up the baseline model for economic growth. Variables of interest for the study are: *Foreign Direct Investment per capita (FDI), Trade as a percentage of GDP, Financial Sector Development indicators (M2 (quasi money as a percentage of GDP), domestic credit to private sector (percentages) and bank Credit to Bank deposit ratio (percentage), Good Governance and Institutional development indicators (Governance effectiveness, corruption control, rule of law, regulatory quality and political stability) and Telecommunications (telephone lines per 100 people)*

The sample of countries was reduced from a full SSA sample of 47 to the 34 used in this study based on data availability. The sample of 34 countries for the most part has balanced data for all the variables except for CPI, Secondary School Enrollment and Good Governance indicators. Averages for the three periods were still taken for CPI and Secondary School Enrollment based on precedent in doing so from previous empirical studies on SSA. Good Governance and Institutional development was not available for the first half of the period (1980 – 2012). In this case CPI and

trade as a percentage of GDP are looked upon, as stand-in indicators for good governance (macroeconomic soundness through CPI and macroeconomic management through trade as a percentage of GDP). Furthermore the variable for telecommunications (telephone lines per 100 people) poses some concerns. Telephone lines per 100 people is consistently used in the literature as a way to gage the extent of a countries communications network but also give a sense of a country's infrastructure – however, it is often noted as will be done here that this variable may seem redundant in light of technological advancements in the sector. Essentially a "leap frogging" effect has been witnessed in many developing countries. According to the 2013 World Economic Forum Report "Delivering Digital Infrastructure" mobile telephony usage is projected to grow at a rate of 21% between 2012 and 2016. Ideally, variables such as growth in mobile telephony usage, growth in internet usage or the Network readiness index[7] would seem to better reflect the developments in the region in this regard, however due to the lack of reliable data (that spans the period of the study) means the study can not formally through the OLS analysis take into consideration these developments. As such the study is limited to telephone lines per 100 people, which as we will see in the data has had slow growth over the period. Further problems arise with usage of enrollment ratios as opposed to completion rates, as an indication of a countries human capital, more so for the SSA region as it is marred with high drop out rates.

3.2 Descriptive Statistics

GDP per capita

Time series data for GDP per capita from 1980 – 2012 were used to calculate GDP per capita growth[8] over the whole period and the two sub periods. Mean growth over the whole period was 0.004 with a range between -0.0384 and 0.396 (*table 1*). The range in GDP per capita between the countries is large as can be seen in table 1 with countries at the low end such as Burundi at 191 US dollars per capita in 1980, South Africa and Namibia on the top end at 5335 US dollars and 3305 US dollars respectively and Gabon at the maximum 7763 UD dollars per capita. 1997 GDP per capita decreased both on the bottom and top end, from 191 US dollars to 151 US dollars and from

[7] Network readiness Indicator developed by a team of researchers at World Economic Forum consists of infrastructure and digital content, affordability, skills, individual usage, business usage, government usage, economic impact and social impact. There are10 years worth of index data available for some of the countries but not all, therefore could not be used here.

7763 US dollars to 7561 US dollars, although within the sample there have been some increases in GDP per capita as evident in the increased mean. Some examples are Swaziland that had a per capita GDP in 1980 of 1190 US dollars increased to 2151 US dollars in 1997 and Botswana from 1842 US dollars to 4452 US dollars.

Table 1

Variable	*Obs.*	*Mean*	*Std. Dev.*	*Min*	*Max*
GDP per capita growth 1980 - 2012	34	0.0040	0.0165	-0.0384	0.0396
GDP per capita growth 1980 - 1995	34	-0.0044	0.0226	-0.0508	0.0573
GDP per capita growth 1997 - 2012	34	0.0151	0.0207	-0.0494	0.0529
GDP per capita 1980	34	1080.33	1552.10	191.78	7763.17
GDP per capita 1997	34	1168.70	1658.99	151.06	7561.03

Gross Capital formation as a percentage of GDP: Gross capital formation (GCF) consists of additions to the fixed assets of the economy plus net changes in the level of inventories[9]. Fixed assets include land improvements, industrial plants, machinery, and equipment purchases. GCF also includes all constructions (roads, schools, offices, hospitals, and private residential dwellings, commercial and industrial buildings). In table 2 we see the mean GCF is 19% of GDP with a range between 10% in the Central African Republic and 43% in Lesotho over the whole period 1980 – 2012. We also see in table 2 that the mean, minimum and maximum GCF are lower in the period 1997 to 2012 than that of the whole period showing a reduction of GCF as a percentage of GDP for most countries during this time.

Secondary School gross enrollment (SSE): Measures the ratio of total enrollment, irrespective of age, to the population of the age group that officially corresponds to the level of education shown. Across SSA there has been a shift towards universal primary school (free or heavily subsidized school of at least 8 years), which has led to large increases in enrollment figures for the region.

This has translated into large increases in SSE for the region, where countries have seen in many cases a doubling in their enrollment ratios. However despite these improvements SSE figures in

[9] Inventories are stocks of goods held by firms to meet temporary or unexpected fluctuations in production or sales, and "work in progress" *(World Bank Development indicators)*

SSA remain low. Figure 6 shows that, of the 16 countries that have both 1980 and 2012 figures 10 have a SSE of 40% and below, with countries such as Burkina Faso, Burundi and Niger recording SSE of less than 10%. The range on the averages for 1980 - 2012 within the group of 34 countries is high considering the max (85%) and min (8%) as seen in table 2.

Table 2

Variable (WP:1980 - 2012, P1:80 - 95, P2: 1997 -2012	***Obs.***	***Mean***	***Std. Dev.***	***Min***	***Max***
Gross Capital formation WP	34	19.296	6.658	10.872	43.671
Gross Capital formation P1	34	19.557	8.391	7.639	50.217
Gross Capital formation P2	34	18.832	6.311	8.530	34.611
Secondary School Enrollment WP (gross)	34	30.120	17.942	8.150	85.603
Secondary School Enrollment WP (gross)	34	24.176	15.995	4.315	69.502
Secondary School Enrollment WP (gross)	34	39.170	22.528	9.964	100.779
Consumer Price Index WP	34	41.706	176.219	3.064	1037.318
Consumer Price Index P1	30	85.890	376.582	4.250	2077.274
Consumer Price Index P2	34	81.136	418.159	1.793	2445.965

CPI annual percent: a measure of the inflation in a country reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services, It is often used as a proxy for macroeconomic soundness since high inflation rates create uncertainty, rise in cost of living and other impediments to the process of growth. In table 2 we see that CPI ranges form 1037% to 3.06% with a mean of 41%.

Foreign Direct Investment per capita (FDI)

FDI includes the three following components: equity capital, reinvested earnings and intra-company loans. Data on FDI flows are presented on net bases (capital transactions' credits less debits between direct investors and their foreign affiliates). Net decreases in assets or net increases in liabilities are recorded as credits, while net increases in assets or net decreases in liabilities are recorded as debits. Hence, FDI flows with a negative sign indicate that at least one of the three components of FDI is negative and not offset by positive amounts of the remaining components. These are called reverse investment or disinvestment (*source UNCTAD*). Mean per capita FDI is 26.6 US dollars between 1980 and 2012 (table 3) with a large range from 34 cents to 167 dollars. From table 3 we also see that the period 1980 to 1995 constituted a period of low FDI per capita

relative to the subsequent period 1997 to 2012. Plotting LN FDI per capita[10] for 1980 to 2012 on LN GDP per capita figures shows a positive relationship between the two (see figure 7).

Table 3

Variable	*Obs.*	*Mean*	*Std. Dev.*	*Min*	*Max*
FDI per capita 1980 - 2012	34	26.657	35.936	0.340	167.825
FDI per capita 1980 - 1995	34	7.415	11.138	-1.824	49.291
FDI per capita 1997 - 2012	34	47.477	67.457	0.239	324.485

Figure 8

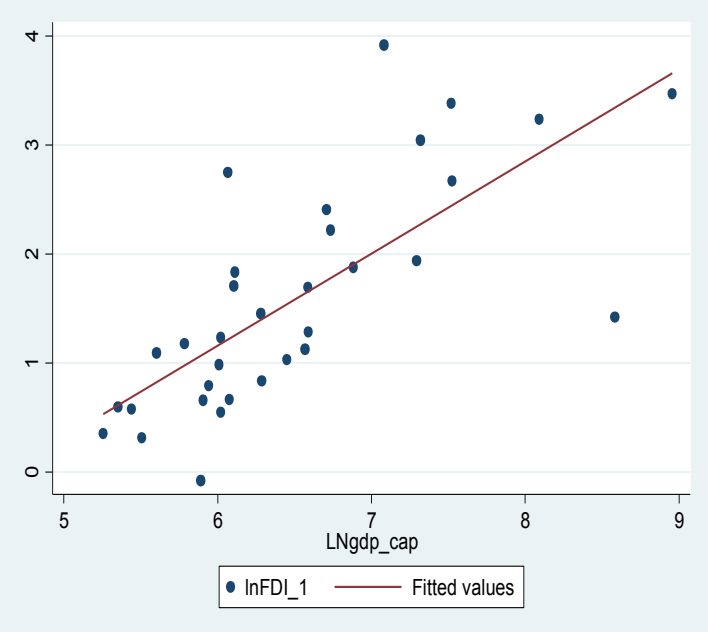
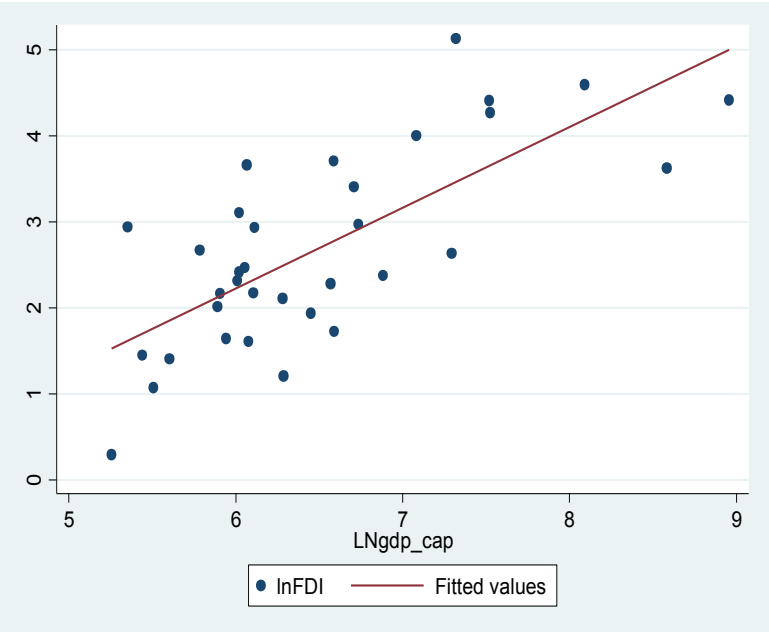


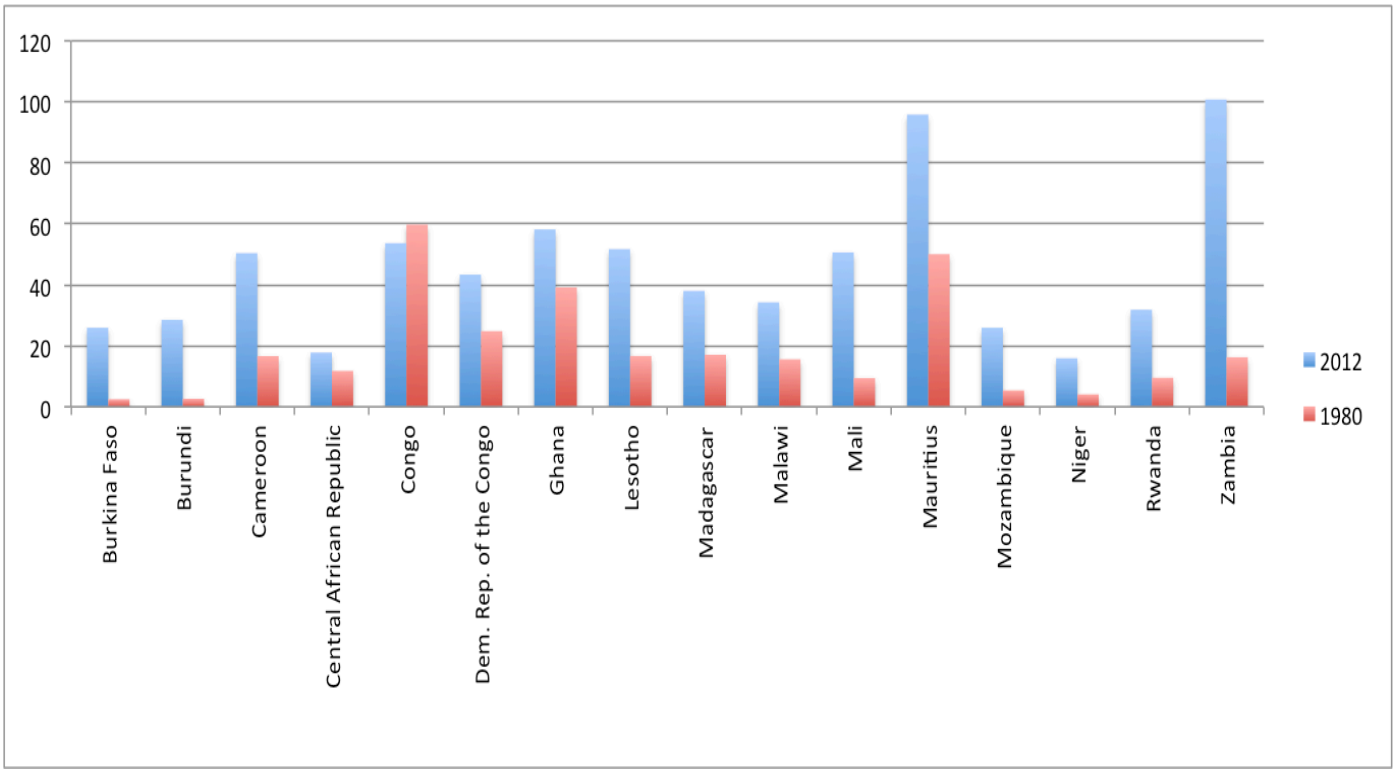
Figure 9



[10] log (1+ FDI per capita)

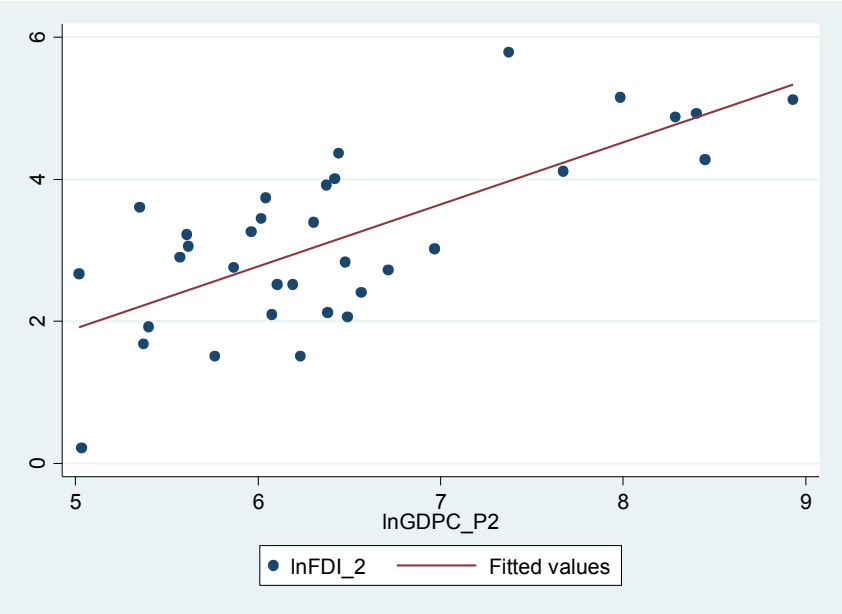
Figure 5 Secondary School Enrollment

(For selected countries that have figures for both years)



The same was done for the other two periods (figure 8 and 9), and the positive relationship holds. However, it is interesting to note in figure 9 that the majority of the observations are clustered around the bottom left corner of the graph and few at the right top end corner, this casts some doubt on the line of best fit, as it could be drawn base on the two extremities rather than a clear linear association.

Figure 10

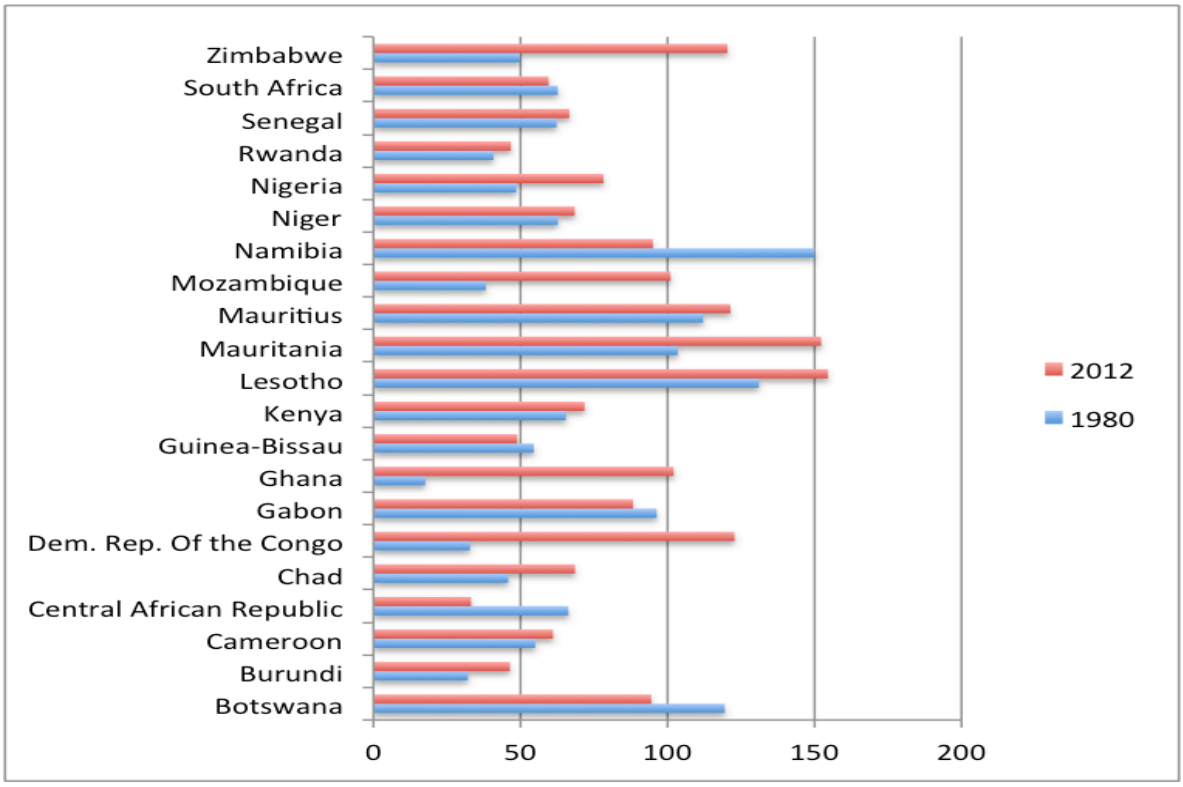


Trade as a percentage of GDP: Democratic republic of Congo, Ghana, Mozambique and Zimbabwe show increases in their Trade to GDP ratios over the period, however most countries have remained at the same trade/GDP ratios (see figure 10). From table 4 we see that the mean trade/GDP ratio is 71% for the whole period. The mean for the other two periods vary only slightly for the whole period, implying that the trade/GDP ratio is consistent over the whole period.

Table 4

Variable	*Obs*	*Mean*	*Std. Dev.*	*Min*	*Max*
Trade WP (% GDP)	34	71.869	31.753	33.957	163.130
Trade P1 (% GDP)	34	68.095	33.629	31.689	153.523
Trade P2 (% GDP)	34	75.912	32.672	35.972	172.992
Telephone lines per 100 people WP	34	1.712	3.072	0.063	15.954
Telephone lines per 100 people P1	34	0.968	1.658	0.050	7.829
Telephone lines per 100 people P2	34	2.456	4.737	0.034	26.294

Figure 10 Trade as a percentage of GDP



Telephone lines per 100: As previously mentioned in the discussion on the limitations of this variable, telecommunications networks and infrastructure, has had sluggish development in the SSA region for the past 3 decades. Aside from Botswana, Mauritius and South Africa, the rest of the countries in the region lag behind in ICT infrastructure. As seen in table 4, the mean for the whole period is 1.7 telephone lines per 100 people, with a minimum of 0.063 telephone lines per 100 in the Democratic Republic of the Congo and 15.9 telephone lines per 100 in Mauritius. The mean for the period 1997 – 2012 is higher than that of 1980 – 2012 which shows that there was been some process however small.

Financial Sector Development indicators: M2 (stock of money as a percentage of GDP), Bank credit to bank deposit ratio, Domestic Credit to Private sector: The financial sector indicators description in table 6 that the bank to credit ratio for the whole period has a mean of 90%which is slightly below what is considered healthy[11] between 95% and 105%. The minimum for the period is 37% (Sierra Leone), which is well below the healthy range. Domestic credit to private sector is low for the majority of the countries, with a mean of 19% and has remained consistent since there is hardly any variation in the mean between 1980 -1995 and 1997 – 2012.

[11] Dick Bove, bank analyst at Punk Ziegel & Co

Table 5

Variable	*Obs.*	*Mean*	*Std. Dev.*	*Min*	*Max*
M2 % GDP 1980 - 2012	34	26.918	12.796	12.796	74.731
M2 % GDP 1980 - 1995	34	25.023	10.354	14.532	57.551
M2 % GDP 1997 - 2012	34	29.057	16.213	10.796	91.961
Bank credit to deposit ratio WP	34	90.333	32.891	37.290	155.981
Bank credit to deposit ratio P1	34	105.777	48.366	39.111	204.713
Bank credit to deposit ratio P1	34	75.749	24.853	34.078	124.447
Domestic credit to private sector WP	34	19.249	19.087	2.652	110.309
Domestic credit to private sector P1	34	18.834	14.087	1.803	80.897
Domestic Credit to Private sector	34	19.488	24.869	3.523	138.684

Good Governance and Institutional development indicators: Governance effectiveness (GE), Corruption Control (CC), Rule of Law (RnL) and Regulatory quality (RQ). The indicators range from -2.5 (weak) to 2.5 (strong). GE measures the quality of public services, the quality of the civil service and the degree of its independence from political pressure. Also included are the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. CC measures the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests. RnL measures the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence and finally RQ measures the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.[12] As previously mentioned in the limitations of the data, these indicators are only available for the later part of the period. As such the indicators are for 1996 and are only used in the regression corresponding to that period (1997 – 2012). In table 6 we see the range for the 34 countries, where the weakest indicator is RnL (mean – 0758). The minimums and maximums in table 6 show that countries have weak good governance indicators – very close to the weakest possible levels of -2.5 and no where near the top end of 2.5.

[12] These definitions are from the World Wide Indicators data base, for full explanation of the measure and all the components in each indicator visit http://info.worldbank.org/governance/wgi/index.aspx#home

Table 6

Variable (1996)	*Obs.*	*Mean*	*Std. Dev.*	*Min*	*Max*
Government Effectiveness	34	-0.649109	0.6838647	-1.726857	0.8765076
Corruption Control	34	-0.535081	0.6792265	-2.057458	0.7609187
Rule of Law	34	-0.758266	0.6889333	-2.022398	0.8560672
Regulatory Quality	34	-0.640685	0.6115374	-1.834302	0.7575555

3.3 Methodology

A Cross-sectional dataset was computed from time series data for the periods 1980 – 2012,1980 – 1995 and 1997 – 2012. Subsequently, 3 regression analyses for the 2 periods (the whole period and the first period) and 4 regression analyses for the final period 1997 – 2012, are done using an augmented version of the Barro & Sala-i-Martin economic growth model specification. Which serves as a baseline on which other variables of interest will be tested for inference with GDP growth and each other. In conformity with the literature the log form was taken for all explanatory variables except population, telephone lines per 100 people and the variables on good governance used for the period 1997 - 2012. The dependent variable is average growth over the periods (obtained by calculating the slope for each country over the periods), and explanatory variables are computed by taking the averages for each country over the periods. A robust standard errors[13] OLS regression of equation (1) is conducted, equation (1) states that GDP growth is a function of a BV_{1t}, $FDIperCapita_{2t}$ and ABC_{3t}

$$\boldsymbol{GDPCtrend_t = \beta_1 + \beta_2 BV_{1t} + FDIperCapita_{2t} + ABC_{3t} + \mu_t} \quad (1)$$

where $\boldsymbol{BV_{1t}}$ consists of baseline variables: Initial LN GDP per capita, LN Gross Capital formation, LN CPI, population annual growth and LN Secondary School enrollment. $\boldsymbol{ABC_{3t}}$ is a set of variables known as absorptive capacities. $\boldsymbol{ABC_{3t}}$ consists of 1.) Accessibility to new technology: LN trade as a percentage of growth and telephone lines per 100 and 2.) Ability to assimilate new technologies and processes: a) through Financial sector development: LN M2 quasi money, LN Bank credit to bank deposit ratio, LN Domestic credit to private sector and b) through Good governance and institutions indicators: Government Effectiveness, Corruption Control, Rule of Law and Regulatory Quality. The third aspect of absorptive capacity – ability to learn - uses Secondary

[13] Robust Standard errors regression is used to control for heteroskedasticity – this was an extra control measure even through formal tests on standard OLS versions of the regressions yielded no rejection of the null hypothesis of homoscedasticity (Asteriou and Hall, 2011)

School Enrollment as the indicator for human capital, which is already one of the baseline variables. The missing good governance indicators for the regressions 1980 – 2012 and 1980 – 1995 will look to CPI as a proxy, which is also already included in the baseline variables. After each regression a test for multicollinearity was done by obtaining the variance inflator factors, which gives a better outlook on multicollinearity problems[14] as opposed to simply viewing pair-wise correlation tables. It may be the case that the correlation tables show a low correlation than in fact exists.

As discussed in the purpose of the study's expectation, in conformity with the theory on FDI, is to find a positive relationship between FDI and GDP growth over the period. The additional variable expectations are as follows: Initial GDP per capita should be negatively correlated to GDP growth, Gross Capital Formation (GCF) should be positively associated with GDP growth as it is the accumulation of capita in the country and should promote economic growth. CPI is expected to be negatively associated with growth i.e. high CPI is negatively associated with growth. Population is used as a control for the per capita specification used in this model, the sign on population should be negative. Secondary School Enrollment (SSE) should be positively associated with GDP, as the increase in human capita should promote economic growth. Trade, telephone lines, financial development and good governance should all be positively associated with growth in accordance with the theory discussed in section 2.

3.4 Results

Results for the regression analysis for the three periods are presented in three separate tables that show the predicted coefficients and their corresponding t-values in brackets. Table 7 shows the regressions run for the period 1980 to 2012. From column (1) we see that Initial GDP per capita is negatively associated with GDP growth over the period and the coefficient is statistically significant at 1% level. CPI and Population are also statistically significant and have the correct sign (that is to say they are negatively related to GDP growth over the period). FDI per capita is positively associated with GDP growth and is statistically significant at 5%. Concerning is that the human capital indicator, secondary school enrollment, contains the correct sign but is statistically insignificant. Gross capital formation is also statistically insignificant. In column (2) the indicators

[14] Serious multicollinearity problems would increase the standard error of the coefficients therefore affecting the estimation precision of the model. It can also increase the t-statistic which in many cases meaning a rejection of a true null hypothesis that the estimator is not equal to zero (Asteriou and Hall, 2011)

for access to technology, trade/GDP and telephone lines per 100, are statistically insignificant, Secondary School education and gross capital formation remain statistically insignificant as in the first regression, however it is important to note that FDI becomes more statistically significant in column (2) as opposed to column (1) (a change from 5% significance level to 1%). This suggests one of two things a) there is a large correlation problem between the explanatory variables or b) the trade/GDP ratio and the telephone lines per 100 increase the association of FDI to GDP growth. Checking for multicollinearity between the variables in column (2) shows that there is no cause for concern[15] in terms of multicollinearity (*full VIF table 3 in appendix*). A final regression, column (3) contains the financial development indicators: bank credit to bank deposit ratio and domestic credit. Both variables contain the correct sign but are statistically insignificant. The other variables in the regression remain the same in terms of statistical significance as in column (2) except noted is the CPI becomes less significant (from 1% to 5%).

Table 7 Robust OLS regressions, Whole Period 1980 - 2012

	(1)	(2)	(3)a
Obs	34	34	34
LN GDP per capita	-0,0118623***	-0,0150963**	-0,0129039***
	(-3,41)	(-4,54)	(-3,38)
LN GCF	0,0085438	0,0131935	0,009602
	(0,95)	(1,5)	(1,02)
LN CPI	-0,0080947***	-0,0085428***	-0,0066534**
	(-3,18)	(-3,38)	(-2,75)
POP	-0,014946***	-0,0116175	-0,0153259
	(-3,69)	(-2,56)	(-4)
LN SSE	0.0031225	0,0052675	0,0013929
	(0,55)	(0,9)	(0,22)
LN FDI	0,0081122**	0,0117856***	0,0085488***
	(2,72)	(3,17)	(2,94)
LN Trade		-0,0136874	
		(-1,55)	
Tele		0,00092	
		(1,33)	
LN Bank credit to bank deposit			0,0042671
			(0,57)
LN Domestic credit to private sector			0,0028913
			(0,73)
R^2	0.61	0.65	0.63

**** statistical significance at 1% level, ** at 5% and * at 10%*
a. M2 was removed from regressions (3) due to its high multicollinearity (VIF = 10) with the other variables (see VIF table 2 in Appendix)

[15] A rule of thumb is that a VIF of around 5 is important to be aware of however 8 and above would deem the coefficients inefficient (Asteriou and Hall, 2011)

One way to interpret this is that CPI is correlated to some extent with the financial development indicators. FDI per capita remains statistically significant at 1%, an increase from regression (1). The Human capital indicator, secondary school enrollment remains statistically insignificant throughout all regressions.

Following the initial regression analysis for the whole period from 1980 to 2012 subsequent regression analyses were conducted for two sub periods: 1980 – 1995 and 1997 – 2012. The justification for the periods was made from the trends viewed in FDI per capita data for the SSA region, where we saw an increase in FDI from the early 90's *(figure 1 and 5).* The early 90's also constituted a turning point in SSA, where most countries began the shift towards liberalization and outward oriented policies. In table 8 we have the regression analysis for the first period (1980 to 1995). We see in column (1) that initial GDP per capita is negatively associated with GDP growth over the period and the coefficient is statistically significant at 10% level. CPI is as well negatively associated with GDP growth at a 10% significance level.

Table 8 Robust OLS Regression, 1st Period 1980 - 1995

	(1)	(2)**a**	(3)b
Obs	30	30	30
LN GDP per capita	-0,0127259*	-0,0295807***	-0,0161708**
	(-1,93)	(-4,04)	(-2,38)
LN GCF	0,0167573	0,016397	0,0161073
	(1,36)	(1,17)	(1,01)
LN CPI	-0,0084866*	-0,0084302**	-0,0060243
	(-1,9)	(-2,1)	(-1,62)
POP	-0,0049408	0,004601	-0,0066652
	(-0,58)	(0.57)	(-0,83)
LN SSE	0.0053771	-0,0000231	0,0048996
	(0,69)	(0,00)	(0,53)
LN FDI	0,0123191**	0,0233356**	0,0151648**
	(2,09)	(2,68)	(2,53)
LN Trade		-0,0102115	
		(-0,56)	
Tele		0,0103951***	
		(2,99)	
BCBD			0,0049352
			(0,34)
DCPS			0,0064711
			(0,81)
R^2	0.37	0.54	0.40

**** statistical significance at 1% level, ** at 5% and * at 10%*

a. FDI in this equation is bordering on being highly multicollinearity (see VIF table 4 in Appendix)

b**.** *M2 was removed from regressions (3) due to its high multicollinearity (VIF = 10) with the other variables*

Gross capital formation, population growth and secondary school enrollment are all statistically insignificant however contain the correct signs. FDI is positively associated with GDP growth at 5% significance level. Column (2) shows the regression analysis containing trade/GDP and telephone lines per 100. We see that CPI and initial GDP per capita become more statistically significant, shifting from 10% to 1% and from 10% to 5% respectively. FDI renames statistically significant at 5% and telephone lines per 100 is significant at a 1% level. However there is cause for concern in this regression as we see a change in the signs associated with population and secondary school enrollment. Checking for multicollinearity it is found that FDI per capita and initial GDP per capita in this regression are highly correlated with the other explanatory variables (VIF of 6.58 and 5.91 respectively). As such caution is taken in interpreting this regression. Column (3) shows the regression including financial development indicators (Bank credit to bank deposit ratio and domestic credit to private sector). Both are statistically insignificant and so are all other variable except for FDI per capita and initial GDP per capita (all the signs attached to the coefficients are correct). Table 9 shows that regression analyses for the period 1997 to 2012. We see for that table that FDI is only statistically significant in one of the regression, in column (2) containing trade/GDP ratio and telephone lines per 100, at a significance level of 1%. CPI is statistically significant in regression (1) and regression (3), both at the 10% level. The final regression, which contains good governance indicators, has no explanatory power. Although the R^2 is 0.39, higher than the R^2 in column (1) it is suspected this inflation of the R^2 could be caused by correlation between the explanatory variables *(full regression tables as well as select VIF tables are found in the appendix).*

Table 9 Robust OLS Regression, 2nd Period 1997 - 2012

	(1)	(2)	(3)a	(4)
Obs.	34	34	34	34
LN GDP per capita	-0,0028	-0,00575	-0,01290	-0,00459
	(-0,47)	(-0,99)	(-0,73)	(-0,58)
LN GCF	0,0129	0,01548	0,009602	0,01237
	(0,8)	(0,84)	(0,86)	(0,59)
LN CPI	-0,00540*	-0,00465	-0,0066534*	-0,00583
	(-2,04)	(-1,79)	(-1,35)	(-1,6)
POP	0,0018741	0,00082	-0,0153259	0,00209
	(0,32)	(0,12)	(0,64)	(0,3)
LN SSE	-0,00664	0,00526	0,0013929	-0,00484
	(-0,83)	(-0,87)	(-0,47)	(-0,48)
LN FDI	0,006719	0,00971**	0,00854	0,00761
	(1,5)	(2,15)	(1,56)	(1,41)
LN Trade		-0,01339		
		(-1,53)		
Tele		0,00086		
		(1,45)		
BCBD			0,0042671	
			(0,34)	
DCPS			0,0028913	
			(1,04)	
Gov Effectiveness				
0,0067555				
				(0,79)
Corruption Control				-0,0004035
				(-0,05)
Rule of Law				-0,0099201
				(-0,82)
Regulatory Quality				0,0045209
				(0,34)
R^2	0.36	0.41	0.41	0.39

**** Statistical significance at 1% level, ** at 5% and * at 10%*

a. M2 was removed from regressions (3) due to its high multicollinearity (VIF = 10) with the other variables

4 Analysis

In section 3.4 we see from the regression analysis that FDI per capita is positively associated with GDP per capita growth over the period 1980 to 2012,which is consistent with results found by Borensztein at al. (1998). However it was not possible to see weather this effect was due to human capita1 as they conclude in their study. Human capital for the 34 countries remained consistently insignificant throughout all the regressions despite having a positive sign. This could be due to the problems discussed earlier in the use of secondary school enrollment. However, Kamara (2013) uses a more complete Barro & Lee data set, which measures secondary school attainment, yet the study also finds no statistical relationship between human capital and growth.

The lack of relationship between the human capital indicator and growth makes it difficult to draw inference on its contribution through FDI by using interaction terms. One is therefore obliged to conclude in accordance with Kamara (2013) that human capital (as proxied by secondary school enrollment) may play a small role in the FDI-absorptive capacity – growth nexus in SSA due perhaps to brain drain and the insufficient use of local experts by foreign firms. By the same token it is difficult to conduct further test between FDI and the absorptive capacity indicators for finance and good governance, as they too were statistically insignificant over all periods. In this regard the results on financial investment indicators are in stark contrast to Hermes and Linsins (2003) & Alfaro et al. (2006) who find there to be a positive association between GDP per capita growth and financial development and further find an interaction term for FDI and Financial indicators to be positively correlated to growth. As such they concluded that FDI effects growth when there is substantial financial development in a country. This inference cannot be made here. The lack of inference between the finance and good governance indicators with growth may be to a misspecification of the relationship between them and growth for these particular countries (i.e. imposing a linear relationship where the relationship is other than linear). It may also be the case that the values for the two groups of indicators are too similar across the 34 countries. Therefore the cross-section analysis is unable to force a relationship between the variables.

An interesting outcome of the regression analysis was regressions (2) in all three periods. The addition of the trade/GDP ratio and the telephone lines per 100 people (indicators for access to new technological know-how and processes) increased the statistical significance of the positive

association between FDI per capita and GDP growth. In the absence of multicollinearity problems this result suggests interplay between FDI and the absorptive capacity indicators for access to new technological know-how and process in contribution to GDP growth. This would be in line with Balasubramanyam et al. (1996) who site trade as a factor that affects a country's ability to attract and reap the benefits of growth from FDI.

Essentially the results from the regression analysis show a direct linkage between FDI and growth with a possible nexus between the indicators for access to technological know-how and process. In addition, the sub-periods analysis suggests that this positive association is mainly from the first half of the whole period, 1980 – 1995. More specifically we see in the regression analysis that FDI is positively associated with growth for all three regressions in 1980 – 1995 yet the same does not hold for the period 1997 – 2012 (except for regression (2)). Interestingly, the period 1980 to 1995 was not the period where SSA experienced the most increased in FDI relative to the latter period. The period 1980 to 1995 was instead marred with protectionist trade policies, closed economies and slow GDP growth.

5. Conclusion

The purpose of this study was to conduct an investigation on the nexus between FDI, absorptive capacity and GDP growth for the period 1980 to 2012, with sub-periods 1980 – 1995 and 1997 – 2012 for 34 countries in Sub-Saharan Africa. From the onset the theory is clear, that FDI promotes economic growth and it does so via the accumulation of capital and technological transfers. Initial empirical work on the subject showed the relationship between FDI and growth to be ambiguous at best. Subsequent research on this ambiguity resulted in the growing consensus that FDI may in fact not affect GDP directly, but instead work in conjunction with other factors in the economy to promote growth. Factors such as infrastructure, trade openness, human capital, financial development and good governance are widely accepted as promoters of a positive impact of FDI on growth. The findings from this study are that FDI does have a positive and direct association with growth for the periods chosen. Indicators for absorptive capacity used in this study for the most part are statistically insignificant. However this must be taken in to consideration when interpreting the results since this is a cross-sectional study uses averages over the periods. By doing so we lose some of the variation within the period, which could yield different results, further reinforcing the discussion in the literature on the ambiguity in the relationship between FDI and GDP growth since the outcomes from research are heavily

dependent of model specifications. Furthermore, a result that show FDI per capita to be positively associated with GDP growth should not necessarily be interpreted as an indication of economic development, which encompasses many other factors such as improved education, life expectancy, health care systems and infrastructure.

Appendix

Table 1 Regression 1: 1980 - 2012

Linear regression — Number of obs = 34; F(6, 27) = 5.85; Prob > F = 0.0005; R-squared = 0.6150; Root MSE = .01132

GRWTH_WP	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
LNgdp_cap	-.0118623	.0034778	-3.41	0.002	-.018998	-.0047265
lnGCF_WP	.0085438	.0089722	0.95	0.349	-.0098655	.0269532
lnCPI_wp	-.0080947	.0025468	-3.18	0.004	-.0133203	-.002869
POP	-.014946	.004047	-3.69	0.001	-.0232497	-.0066424
lnSSE	.0031225	.0056521	0.55	0.585	-.0084747	.0147196
lnFDI	.0081122	.0029822	2.72	0.011	.0019932	.0142311
_cons	.0812299	.03215	2.53	0.018	.0152636	.1471962

Table 2 Regression 2: 1980 - 2012

Linear regression — Number of obs = 34; F(8, 25) = 8.92; Prob > F = 0.0000; R-squared = 0.6585; Root MSE = .01108

GRWTH_WP	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
LNgdp_cap	-.0150963	.0033247	-4.54	0.000	-.0219438	-.0082489
lnGCF_WP	.0131935	.0087885	1.50	0.146	-.0049068	.0312938
lnCPI_wp	-.0085428	.0025275	-3.38	0.002	-.0137484	-.0033373
POP	-.0116175	.0045458	-2.56	0.017	-.0209798	-.0022552
lnSSE	.0052675	.0058336	0.90	0.375	-.006747	.0172819
lnFDI	.0117856	.0037142	3.17	0.004	.0041362	.0194351
lntrd_WP	-.0136874	.0088298	-1.55	0.134	-.0318728	.004498
TELE	.00092	.0006911	1.33	0.195	-.0005033	.0023433
_cons	.1201566	.038669	3.11	0.005	.0405164	.1997968

Table 3 Variance Infator Factor Regression 2: 1980 - 2012

Variable	VIF	1/VIF
lnFDI	5.36	0.186578
LNgdp_cap	4.36	0.229345
lntrd_WP	3.75	0.266542
lnSSE	3.62	0.276307
TELE	2.67	0.374001
POP	1.89	0.527984
lnGCF_WP	1.67	0.599412
lnCPI_wp	1.62	0.616740
Mean VIF	3.12	

Table 4 Variance Inflator Factor Financial Development Indicators: 1980 - 2012

Variable	VIF	1/VIF
lnM2_wp	10.67	0.093763
lnDCPS_wp	9.19	0.108798
LNgdp_cap	4.67	0.214280
lnSSE	3.98	0.251052
lnFDI	3.56	0.280513
lnBDBC_wp	2.39	0.417593
lnCPI_wp	2.00	0.501177
POP	1.90	0.527205
lnGCF_WP	1.59	0.627060

Table 5 Regresson 3: 1980 - 2012

Linear regression

Number of obs	34
F(8, 25)	5.44
Prob > F	0.0005
R-squared	0.6364
Root MSE	.01143

GRWTH_WP	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
LNgdp_cap	-.0126571	.003747	-3.38	0.002	-.0203743	-.00494
lnGCF_WP	.0093803	.0091577	1.02	0.316	-.0094804	.028241
lnCPI_wp	-.0066534	.002419	-2.75	0.011	-.0116354	-.0016714
POP	-.0153259	.003829	-4.00	0.000	-.0232119	-.0074399
lnSSE	.0013929	.0063783	0.22	0.829	-.0117435	.0145293
lnFDI	.0085488	.0029058	2.94	0.007	.0025643	.0145334
lnBDBC_wp	.0042671	.0074849	0.57	0.574	-.0111484	.0196826
lnDCPS_wp	.0028913	.0039577	0.73	0.472	-.0052598	.0110424
_cons	.0593769	.0418328	1.42	0.168	-.0267794	.1455332

Table 6 Variance Inflator Factor, Regression 3: 1980-2012

Variable	VIF	1/VIF
LNgdp_cap	3.75	0.266738
lnFDI	3.38	0.295522
lnSSE	3.24	0.308774
lnBDBC_wp	2.05	0.487305
lnCPI_wp	1.96	0.509920
lnDCPS_wp	1.92	0.519506
POP	1.54	0.649131
lnGCF_WP	1.50	0.665920
Mean VIF	2.42	

Table 7 Regression 1: 1980 - 1995

Linear regression

Number of obs	30
F(6, 23)	2.35
Prob > F	0.0647
R-squared	0.3776
Root MSE	.02133

GRWTH_P1	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
LNgdp_cap	-.0127259	.006591	-1.93	0.066	-.0263605	.0009087
lnGCF_P1	.0167573	.0122765	1.36	0.185	-.0086387	.0421533
lnCPI_p1	-.0084866	.0044688	-1.90	0.070	-.017731	.0007577
POP_P1	-.0049408	.0084828	-0.58	0.566	-.0224888	.0126071
lnSSE1	.0053771	.0077433	0.69	0.494	-.0106412	.0213954
lnFDI_1	.0123191	.0058823	2.09	0.047	.0001507	.0244876
_cons	.0304737	.0609897	0.50	0.622	-.0956931	.1566404

Table 8 Variance Inflator Factor, Regression 1: 1980 - 1995

Variable	VIF	1/VIF
LNgdp_cap	3.07	0.325473
lnFDI_1	2.62	0.381021
lnSSE1	2.47	0.404201
lnGCF_P1	1.54	0.648208
lnCPI_p1	1.36	0.734501
POP_P1	1.03	0.970156
Mean VIF	2.02	

Table 9 Regression 2: 1980 - 1995

```
Linear regression                               Number of obs =      30
                                                F(  8,    21) =    3.84
                                                Prob > F      =  0.0063
                                                R-squared     =  0.5420
                                                Root MSE      =  .01915
```

GRWTH_P1	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
LNgdp_cap	-.0295807	.0073234	-4.04	0.001	-.0448105	-.0143508
lnGCF_P1	.016397	.0139913	1.17	0.254	-.0126995	.0454936
lnCPI_p1	-.0084302	.0040077	-2.10	0.048	-.0167646	-.0000958
POP_P1	.004601	.0081131	0.57	0.577	-.0122712	.0214732
lnSSE1	-.0000231	.0084678	-0.00	0.998	-.0176328	.0175867
lnFDI_1	.0233356	.0087011	2.68	0.014	.0052407	.0414304
lntrd_P1	-.0102115	.0183105	-0.56	0.583	-.0482903	.0278672
Tele_p1	.0103951	.0034722	2.99	0.007	.0031743	.0176158
_cons	.1458419	.0768687	1.90	0.072	-.0140153	.3056991

Table 10 Variance Inflator Factor, Regression 2: 1980 - 1995

Variable	VIF	1/VIF
lnFDI_1	6.58	0.152007
LNgdp_cap	5.91	0.169268
lntrd_P1	4.88	0.204736
Tele_p1	3.18	0.313984
lnSSE1	2.77	0.360557
lnGCF_P1	2.27	0.440428
POP_P1	1.67	0.597310
lnCPI_p1	1.59	0.627674
Mean VIF	3.61	

Table 11 Regression 3: 1980 – 1995

```
Linear regression                               Number of obs =      30
                                                F(  8,    21) =    2.01
                                                Prob > F      =  0.0962
                                                R-squared     =  0.4082
                                                Root MSE      =  .02177
```

GRWTH_P1	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
LNgdp_cap	-.0161708	.0068075	-2.38	0.027	-.0303278	-.0020138
lnGCF_P1	.0161073	.0158855	1.01	0.322	-.0169285	.0491431
lnCPI_p1	-.0060243	.0037137	-1.62	0.120	-.0137473	.0016987
POP_P1	-.0066652	.008003	-0.83	0.414	-.0233082	.0099779
lnSSE1	.0048996	.0091965	0.53	0.600	-.0142256	.0240249
lnFDI_1	.0151648	.0059841	2.53	0.019	.0027203	.0276094
lnBDCD_p1	.0049352	.0146568	0.34	0.740	-.0255454	.0354158
lnDCPS_p1	.0064711	.0079773	0.81	0.426	-.0101187	.0230609
_cons	.0098119	.0954093	0.10	0.919	-.1886025	.2082263

Table 12 Regression 1: 1997 – 2012

Linear regression

Number of obs	= 34
F(6, 27)	= 2.72
Prob > F	= 0.0340
R-squared	= 0.3628
Root MSE	= .01828

GRWTH_P2	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
lnGDPC_P2	-.002847	.0060179	-0.47	0.640	-.0151946	.0095006
lnGCF_P2	.012999	.0161717	0.80	0.429	-.0201825	.0461806
lnCPI_p2	-.0054097	.0026513	-2.04	0.051	-.0108496	.0000303
POP_P2	.0018741	.005928	0.32	0.754	-.010289	.0140373
lnSSE2	-.0066443	.0079681	-0.83	0.412	-.0229936	.0097049
lnFDI_2	.0067199	.0044701	1.50	0.144	-.0024519	.0158918
_cons	.0041614	.0625176	0.07	0.947	-.1241141	.1324369

Table 13: Regression 2: 1997 - 2012

Linear regression

Number of obs	= 34
F(8, 25)	= 3.87
Prob > F	= 0.0044
R-squared	= 0.4110
Root MSE	= .01827

GRWTH_P2	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
lnGDPC_P2	-.0057576	.0058063	-0.99	0.331	-.0177158	.0062007
lnGCF_P2	.0154869	.0183547	0.84	0.407	-.0223153	.0532892
lnCPI_p2	-.0046503	.0025925	-1.79	0.085	-.0099896	.000689
POP_P2	.0008219	.0066364	0.12	0.902	-.0128459	.0144898
lnSSE2	-.0073769	.0085009	-0.87	0.394	-.0248848	.010131
lnFDI_2	.0097109	.0045103	2.15	0.041	.0004218	.0190001
lntrd_P2	-.0133976	.0087284	-1.53	0.137	-.0313741	.0045789
Tele_p2	.0008659	.0005983	1.45	0.160	-.0003663	.0020982
_cons	.0647864	.0592663	1.09	0.285	-.0572749	.1868476

Table 14 Variance Inflator Factor: Regression 2, 1997 - 2012

Variable	VIF	1/VIF
lnFDI_2	3.87	0.258162
lnGDPC_P2	3.38	0.295976
lntrd_P2	3.33	0.299887
POP_P2	2.72	0.368094
lnSSE2	2.10	0.477078
Tele_p2	1.99	0.502604
lnGCF_P2	1.57	0.635479
lnCPI_p2	1.30	0.771550
Mean VIF	2.53	

Table 15 Pair-wise Correlation table Regression 2, 1997 - 2012: Trade, Telephone lines and FDI

	Tele_p2	lnFDI_2	lntrd_P2
Tele_p2	1.0000		
lnFDI_2	0.4295	1.0000	
lntrd_P2	0.3329	0.7259	1.0000

Table 16 Regression 3: 1997 - 2012

Linear regression

Number of obs = 34
F(8, 25) = 4.01
Prob > F = 0.0035
R-squared = 0.4112
Root MSE = .01826

GRWTH_P2	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
lnGDPC_P2	-.0049296	.0067745	-0.73	0.474	-.018882	.0090228
lnGCF_P2	.0144638	.0168002	0.86	0.397	-.0201369	.0490645
lnCPI_p2	-.0043798	.0032479	-1.35	0.190	-.0110689	.0023093
POP_P2	.0042798	.0066465	0.64	0.525	-.0094089	.0179685
lnSSE2	-.0045706	.009764	-0.47	0.644	-.0246799	.0155388
lnFDI_2	.0075911	.0048733	1.56	0.132	-.0024457	.0176279
lnDCPS_p2	.0017434	.0051788	0.34	0.739	-.0089226	.0124093
lnBDBC_p2	.0124423	.0119968	1.04	0.310	-.0122655	.0371501
_cons	-.0622367	.0767154	-0.81	0.425	-.2202351	.0957617

Table 17 Regression 4: 1997 - 2012

Linear regression

Number of obs = 34
F(9, 24) = 2.10
Prob > F = 0.0707
R-squared = 0.3915
Root MSE = .01895

GRWTH_P2	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
lnGDPC_P2	-.0038713	.0074792	-0.52	0.609	-.0193075	.011565
lnGCF_P2	.0134195	.0192933	0.70	0.493	-.0263999	.0532389
lnCPI_p2	-.0063067	.0035362	-1.78	0.087	-.013605	.0009917
POP_P2	.0017253	.0066226	0.26	0.797	-.0119432	.0153937
lnSSE2	-.004133	.0096792	-0.43	0.673	-.02411	.015844
lnFDI_2	.0069923	.0043848	1.59	0.124	-.0020576	.0160421
gov_effectiveness	.0083414	.0090571	0.92	0.366	-.0103516	.0270344
cc	.00011	.0077518	0.01	0.989	-.015889	.016109
rnl	-.0093321	.0115257	-0.81	0.426	-.03312	.0144557
_cons	.000389	.079431	0.00	0.996	-.1635485	.1643266

Table 18 Variance Inflator Factor, Regression 4: 1997 - 2012

Variable	VIF	1/VIF
gov_effect~s	5.05	0.198087
reg_q	4.89	0.204300
rnl	4.80	0.208488
cc	3.54	0.282392
lnGDPC_P2	3.48	0.287218
lnFDI_2	3.00	0.333501
lnSSE2	2.55	0.391669
POP_P2	2.33	0.429193
lnGCF_P2	1.89	0.529589
lnCPI_p2	1.73	0.576835
Mean VIF	3.33	

Countries used in the study:

Benin

Botswana

Burkina Faso

Burundi

Cameroon

Central African Republic

Chad

Comoros

Congo

Cote d'ivoire

Dem. Rep. Of the Congo

Gabon

Gambia

Ghana

Guinea-Bissau

Kenya

Lesotho

Madagascar

Malawi

Mali

Mauritania

Mauritius

Mozambique

Namibia

Niger

Nigeria

Rwanda

Senegal

Sierra Leone

South Africa

Swaziland

Togo

Zambia

Zimbabwe

References

Acemoglu, D., Johnson, S., Robinson, J. A., (2001), "An African Success Story: Botswana"

Abramovitz, M., (1986), "Catching Up, Forging Ahead, and Falling Behind", *The Journal of Economic History*, Vol. 46, No. 2, pp. 385 – 406

Abed, G. T., & Gupta, S., (2002), "Governance, corruption, and economic performance" *International Monetary Fund*

Adams, S., (2009), "Foreign Direct Investment, Domestic Investment, and Economic Growth in SSA", *Journal of Policy Modeling*, 31, pp. 939 – 949

Adeniyi, O. Omisakin, O., (2012), "Foreign Direct Investment, Economic Growth and Financial Sector Development in Small Open Developing Economies", Economic Analysis and Policy, Vol. 42, No.1, pp.105 – 127

Alfaro, L., Chanda, A.,Kalemli-Ozcan, S., Sayek, S., (2004), "FDI and economic growth: the role of local financial markets", *Journal of International Economics*, 64, pp. 84 - 112

Alverez, I., Marin, R., (2008), "FDI and world heterogeneities: The Role of Absorptive capacities", *European Union Project "Inequality: mechanisms, effects and policies –INEQ*

Asterious, D., Hall, S., (2006) "Applied Econometrics", *Palgrave Macmillan,* Second Edition

Barro, R., Sala-i-Martin, X., (1995)," Economic Growth", *McGraw-Hill, Cambridge Press, MA*

Balasubramanyam, V.N., Mohmmed, S., (1996), "FDI and growth in EP and IS countries" *Economic Journal, 106(1), pp. 92 – 105*

Boresztein, E., Gregorio, J.D., Lee, J.W., (1998), ", How does economic growth affect economic growth", *Journal of International Economics, 45, pp. 115 - 135*

Cohen, W.M, Levinthal, D.A., (1990), "Absorptive Capacity: A New Perspective on Learning", *Administrative Science Quarterly,* 30, pp. 128 – 152

Collier, P., Gunning, J. W., (1999), "Explaining African Economic Performance", *Journal of Economic Literature*, Vol. 37, pp.64 -111

Dunning, J. H, (2000), "The eclectic paradigm as an envelope for economic and business theories of MNE activity", *International Business Review*, 9, pp. 163 - 190

Fagerberg, J., Srholec, M., (2007), "National Innovations Systems, Capabilities and Economic Development", *Research Policy*, 37, pp. 1417 – 1435

Grossman, G., Helpman, E., (1991), "Innovation and Growth in the Global Economy", *MIT Press Cambridge, MA*

Hermes, N., Lensink R., (2003), "Foreign Direct Investment, Financial Development and Economic Growth", The Journal of Development Studies, Vol 40, No.1, pp. 142 – 163

Kamara Y., (2013), "Foreign Direct Investment and Growth in Sub-Saharan Africa: What are the channels?", *University of Kansas*

Kokko, A. (1992), "Host Country Characteristics And Technology Transfer By U.S Multinationals" *Stockholm School of Economics Research Institute PhD Dissertation*, Chapter 3 pp. 81 – 120

Kokko, A. (1992), "Competition And Endogenous Spillovers: Test of some recent spillover hypothesis" *Stockholm School of Economics Research Institute PhD Dissertation*, Chapter 6 pp. 184 – 214

Lall, S., Narula, R., (2004), "Foreign Direct Investment and its Role in Economic Development: Do We Need a New Agenda?" *The European Journal of Development Research*, Vol. 16, No. 3, pp. 447 - 464

Mortimore, M., Vergara, S. (2004), "Targeting Winners: Can Foreign Direct Investment Policy Help Developing Countries Industrialize?" *The European Journal of Development Research*, Vol. 16, No. 3, pp. 499 – 530

Mowery, D.C., Oxley, J.E., (1995), "Inward technology transfer and competitiveness: the role of national innovation systems", *Cambridge Journal of Economics*, 19, pp. 67 – 93

Narula, R., (2001), "Multinational Firms, Regional Integration and Globalizing Markets: Implications for Developing Countries", *MERIT – Maastricht Economic Research Institute on Innovation and Technology,* 36

Narula, R., Dunning, J. H., (2000), "Industrial Development, Globalization and Multinational Enterprises: New Realities for Developing Countries", *Oxford Development Studies*, Vol. 28, No. 2, pp. 141 – 167

Nguyen, H., Duysters, G., Patterson, J., Sander, H., (2008), "Foreign Direct Investment Absorptive Capacity Theory", *Working Paper*

Olusanya, S.O., (2013) "Impact of foreign direct investment inflow on economic growth in a pre-regulated and post-regulated Nigera Economy – A Granger Causality Test", *European Scientific Journal,* Vol. 9, No. 25, pp. 335 – 356

Pigato, M., (2000), "Foreign Direct Investment in Africa: Old Tales and New Evidence", *Africa Region Working Paper Series No. 8*

Rodrik, D. (Ed.). (2003). In search of prosperity: Analytic narratives on economic growth, Princeton University Press.

Rogers, M. (2004), "Absorptive capacity and economic growth: how do countries catch-up?" *Cambridge Journal of Economics*, 28, pp. 577 - 596

Websites

World Wide Governance Indicators
http://info.worldbank.org/governance/wgi/index.aspx#home

Human Development Report, (1996), UNDP

http://hdr.undp.org/en/content/human-development-report-1996

World Economic Forum Reports: The Global Information Technology Report 2014

http://www.weforum.org/reports/global-information-technology-report-2014

Delivering Digital Infrastructure Advancing the Internet Economy

http://www.weforum.org/reports/delivering-digital-infrastructure-advancing-internet-economy