Abstract

Recent research has stressed the role of technology as one of the crucial drive engines of growth. Not every country, however, has the same possibilities to access advanced technology. Many of the developing countries in present time lack the necessary social infrastructure in order to innovate and must often recur to benefit from technology invented elsewhere. One of the channels whereby technology may diffuse from developed to developing countries is Foreign Direct Investment (FDI).

The aim of this paper is to investigate the relationship between economic growth and the inflow of foreign direct investment in the SSA region. Secondary data from organizations and institutes are used to examine if other factors may affect total GDP, in addition to FDI. The estimations used in the regression are foreign direct investment, property rights, level of corruption, logistic performance index, education level, initial GDP and life expectancy. By using panel data for 41 sub Saharan countries during the time period of 2005 until 2013, the paper reveals that FDI has a positive effect on economic growth in the host countries. This result is accurate with previous empirical studies and theories.

Key words
Economic growth, endogenous and exogenous growth model, crowding in and crowding out effect, multinational enterprise
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1. INTRODUCTION

Does Foreign Direct investment generate economic growth? For decades, this question has been a controversial topic and the opinions are divided. One of the underlying explanations is that the earlier research shows different outcomes. Additionally the wider benefits of FDI depends to a large extend on the host country’s fundamental economic and institutional environment. The answer is not only important for the life of millions in the developing countries but also crucial for policy makers.

OECD states that foreign direct investment will contribute to financial stability and an overall societal well-being, but with the condition that the host country has a functioning policy framework that allows FDI to contribute to financial stability and increase an overall societal well-being (OECD; 2008). Policymakers in developing countries place high importance in attracting foreign direct investment inflows to bring new technology and know-how to their economy that will help increase the productivity and competitiveness of domestic industries. Many governments even go beyond national treatment of multinationals by offering foreign companies subsidies and tax holidays, more favorable conditions than those granted to domestic firms. As economic rationale this special treatment, policymakers often cite positive externalities generated by FDI through productivity spillovers. Despite its importance to policy choices there is little conclusive evidence of whether domestic firms benefit from foreign presence in their country. Research based on firm-level panel data which examines whether productivity of domestic firms is correlated with the extend of foreign presence in their sector tends to produce mixed results and often fails to find a significant effect in developing countries. However, the picture is more optimistic for vertical spillovers, namely those occurring through contact between multinationals and their local suppliers of intermediate inputs (Moran et al., 2005).
1.2 Background to the Study

The definition of foreign direct investment is “a trans boundary investment by a resident entity in one economy with the aim of obtaining a lasting interest in a business resident in another economy” (Markusen et al., 1995).

Foreign direct investment has increased dramatically over the last two decades, however the majority of FDI has been limited to industrialized countries, hence the investments have mainly been flowing between similar economies. In recent times however, the inflows to developing countries have become more significant. Data presented by the World Bank states that the flow to developing countries has more than 12-fold since the 1980’s (World bank, 1999).

In particular the investments has increased in Sub Saharan Africa, which is primarily due to that the region contains a lot of natural resources namely, oil, copper and gold. In such way, the possibility to make profits exists for investors. Yet determining how FDI affect economic development has been proven to be remarkably difficult reciprocated. Investigating how FDI can contribute to, or detract, from growth and welfare from developing countries is challenging. The difference of the SSA region is that the social and economic conditions differ from the developed countries. As follows they play a crucial role when it comes to the how the impact of FDI turns out in reality (Asiedu.E, 2005).

The incentives for developing countries to strive to attract FDI derive from the belief that foreign investment produces externalities in form of technology transfers and spillovers. To investigate the impact of FDI on economic growth has like so important implications. For instance if FDI has a positive impact on economic growth it weakens the arguments for restricting foreign direct investment. If it on the other hand show that is exert a positive impact on economic growth it would suggest a reconsideration of the rapid expansion of tax incentives, infrastructure, subsidies, import duty exemptions and others measures that countries have adapted to attract FDI. This paper has the purpose of contributing to the debate.
In the manners of the Sub Saharan countries being rich in natural resources it would be expected that the state of them also would develop quicker than it in reality has. Unfortunately many of these countries still belong to a part of the poorest in the world. This makes it relevant to investigate what the effect of FDI is on economic growth.

1.3 Study Objective

FDI seems to differ between developed and developing countries. Therefore the subject needs to be analyzed and the purpose with this thesis is to show the effect on developing countries and more specific countries of Sub Saharan Africa due to wide spread poverty in most of these countries. My aim is to be able to contribute with an insight on how FDI impacts economic growth. This subject in particular is very interesting to investigate due to there still not being a clearly correlation between FDI and economic growth. For this reason it is accurate to contribute to research that either attesting to the fact that there is a positive correlation or exclude this fact.

1.4 Problem Statement

Empirical framing of question:

- Does Foreign Direct Investment generate economic growth in Sub-Saharan Africa?

1.5 Methodology

To answer the research question I will conduct an econometric cross sectional analysis with data based on the Sub Saharan Countries. Combined with the economic theory of FDI I will try to get a better understanding of the thesis. All data that I will use is collected scientific organizations such as the World Bank and Transparency international. Hence there is a high reliability in the data. However since there are some missing values some countries was forced to be excluded, an also due to the limitation in availability of complete data the data spans from 2005-2014 which is a relatively short period of time.
2. Historical background

In the early 1960’s FDI was to a certain extend viewed as an unfavorable investment to developing countries by reason of that it was thought to bring inappropriate technology. This view has interchanged drastically since then. In present time it is seen as favorable investment for developing countries that in preference welcome it. Many governments in the developing countries have invested more in bettering the institutional and economic policies with the ambition to attract foreign investors (Te Velde, 2006).

The FDI flow to the African continent began in the latter part of the nineteenth century, during the period when numerous of the African economies were controlled by colonial powers. Accordingly, the type of investment contrived during this time was restrained by outside powers. After the Second World War most of the African colonies were able to achieve independence. The consequence was that many of the countries suffered from political instability and were isolated by the former colonies.

Acemoglu (2001) states that the legacy of the colonialist powers has in deed influenced how the institutions have ended up in present day along with the subsequent growth and economic development of these countries. Consequently, the type of culture and institutions has determined what type of investments the countries attract still as of today.

Today the Sub Saharan countries are to a large extend supported by conditional loans and aid packages from organizations such as the IMF and the World Bank, with the aim to secure economic stability (Griffin, 1996). As this has helped the countries structures there has been an increased inflow of FDI in recent decades (UNCTAD, 1998). This is a result both the more secure political environment but also because of the natural resources.
3. DEFINITION

The most important concept used throughout the thesis is defined in this section with the aim to supply a better understanding to the ingoing theory and empirical analysis.

Foreign Direct Investment

FDI stands for foreign direct investment and it is defined as cross border investment by a resident entity in one economy with the objective of obtaining a lasting interest in an enterprise resident in another economy. Foreign direct investment differs substantially from direct investments in such as portfolio flows, wherein overseas institutions invest in equities listen on a nation’s stock exchange. The main four FDI types that encourage firms to invest in other countries are; market-seeking FDI, resource- or asset-seeking FDI, efficiency seeking FDI and also knowledge seeking FDI (Markusen et al. 1995). Entities making direct investments typically have a significant degree of influence and control over the company onto which the investment is made. Open economies with skilled workforces and good growth prospect tend to attract large amounts of foreign direct investment than closed, highly regulated economies.

“Crowding out” and “crowding in effect”

“Crowding out effect” is the notion that the direct investment will reduce the domestic investment from the market. This in turn implicates that a part of the positive effect from FDI will be reduced. The notion of “Crowding in effect” is that FDI will lead to a larger amount of investment. In other words of the latter, it is a one-dollar increase in the net inflow of FDI associated with an increase in total investment in the host economy of more than one dollar. (Bosworth and Collins 1999)

Multinational enterprise (MNE)

A multinational enterprise (MNE) is organizations that own or control production in more than one country other than the home country. The rapid evolution in the structure of multinational enterprises is also reflected in their operations in the developing world, where foreign direct investment has grown rapidly. In the case of developing countries, multinational enterprises have diversified beyond primary production and industries into manufacturing, domestic market development and service. (OECD 2008)
Research and development (R&D)

Explains the activity by business with the intention to discover a development of new products or services that lead to improvements of existing products or services. It also means that firms can experience future growth and gain market power through improving and expanding their operations. It is often related to high-tech firms that develop new technology and many MNE´s invest large sums on improving products through R&D (Investopia, 2015).
4. PREVIOUS STUDIES

The theory provides conflicting predictions concerning the growth effects of FDI. The economic rationale for offering special incentives to attract FDI frequently derives from the belief that foreign investment produces externalities in form of technology transfers and spillovers. Romer (1993) for example argues that important “idea gaps” between rich and poor countries exist. He notes that foreign investment can ease transfer of technological and business know-how to poorer countries.

In contrast, Aitken and Harrison’s (1999) study of foreign direct investment in Venezuela between 1930 and 1980 find no evidence from a technology spillover from foreign firms to domestically owned ones. Similarly, Germidis (1977), Haddad and Aitken (1993), and Mansfield and Romero (1980) find that FDI does not accelerates the overall economic growth. This result is particularly usual with firm-level studies that do not confer much support for the view that FDI in generating economic growth especially in particular environments (De Gregorio, 1992).

Borensztein, De Gregorio, and Lee (1998) argue that FDI spillovers have a positive effect on economic growth when the country has a highly educated workforce that allows it to exploit FDI spillovers. The result of their study showed that all countries with secondary school attainment would benefit positively from FDI. The countries with low level of human capital seemed to yield a negative coefficient of the FDI, meaning that the FDI had a negative contribution to growth in these countries, thus crowding out the market (Borensztein, De gregorio and Lee, 1998). Another important component for growth is depending strongly on how the host countries manage the investment along with that the technological capabilities in the country are functioning properly.

While Blomstrom, Lipsey and Zejan (1994) find no evidence that education is critical, they argue that FDI has a positive growth effect when the country is sufficiently rich. In turn, Alfaro, Chandra, Kalemli-Ozcan and Sayek (2000) find that FDI promotes economic growth in economies with sufficiently developed financial markets, while Balasubramanyam, Salisu and Dapsoford (1996) stress that trade openness is crucial for obtaining the growth-effects of FDI.

The paper by Blomstrom, Lipsey and Zejan (1994) show that there are many econometric specifications in which FDI is positively linked with long run growth. FDI may even be a good signal of economic
success as emphasized by Blomstrom, Lipsey, and Zejan (1994)

Similarly, the neoclassical and endogenous growth supports the idea that FDI has the potential of being highly beneficial for developing economies (Ajay, 2006). Most economists hold the opinion that it is positive both on a global level as well as within the given economy. This assumption mainly relies on the standpoint that FDI will contribute to the countries growth by contributing the local employment and increase the efficiency in the domestic market. Besides from these benefits FDI is also seen as beneficial for the economies through spillover effects through technology and knowledge transfers which can drive a long-run economic growth.

From another point of view, Ram and Zhang (2002) conducted a study that implies that foreign direct investment might harm the domestic trade and industry through using technology that are not supposed to be used in the host countries factor proportion. This will intensify the competition and local firms will probably not be able to compete with the MNE’s with more economic power, thus crowding out the local market. This in turn causes distortions in the policies of the host countries so as to benefit the foreign investors and also by the behavior of the foreign investors which is the social and cultural norms that are inappropriate for the host countries trade and industry if the FDI is driven by the motive of gaining economic power on the domestic market.

Asiedu (2005) conducted a study to analyze the relationship between FDI and corruption, political stability, macroeconomic stability in a panel data survey of 22 African countries over the period 1984-2000. The conclusion of the paper showed that investments seems to be dependent on the mentioned factors as well as market size, natural resources and trade openness. It thus indicates that investors attach great importance to functioning of institutions, low inflation, infrastructure, low corruption, natural resources, population, education, well defined property rights, transparency, political stability and legal system that promotes stability in the country.
5. THEORETICAL DISCUSSION

Economic growth is defined as “the increase in capacity of an economy to produce goods and services, compared from one period of time to another”. The concept of economic growth by many economists is viewed as the ultimate target that countries should strive for (Investopedia, 2015).

According to the endogenous growth model, FDI boost the productivity of all firms – not just the receiving foreign capital. Thus, transfers of technology through FDI may have substantial spillover effects for the entire economy. The concept of spillover effects is in consideration of the domestic firms gaining the opportunity to absorb technology transfer brought into the country along with the possibility to generate a higher effectiveness in their own businesses. The technological progress is seen as an important tool in the growth to increase productive capacity and the overall improvement of the life quality of the population. In addition to this aspect there is also the extended job opportunities arising with the foreign investments, thus crowding in the market. Foreign firms are adequate to transfer technology and inspire the domestic market that boost the total output of the country as a whole. In many cases it also contributes to greater tax payment to the government by the foreign companies (M. Dijk et al, 2008).

In contrast, some theories predict that FDI in the presence of preexisting trade, price, and financial and other distortions will hurt resource allocation and slow growth. Thus theory produces ambiguous predictions about the growth effects of FDI, and some models suggest that FDI will promote growth only under certain policy conditions. Firm-level studies of particular countries often find that FDI does not boost economic growth, and these studies frequently do not find positive spillovers running between foreign-owned and domestically owned firms.

5.1 Technology spillovers

Scientific and technological knowledge is the most important determinants of productivity in a country. Their diffusion to industrializing countries, accompanied by investment in physical and human capital is the main explanation for the growth in productivity and income per capita of those countries. Yet, some economies seem stuck far behind the technology frontier, such as the Sub Saharan countries. A better understanding of the nature of technology spillovers should help shed light on why some countries grow faster than others.
Technological knowledge has a nature of non-rivalry and can be used by producers other than the inventors to boost their productivity by the technological knowledge. Hence it generates two types of spillover benefits:

- First, new technological knowledge can be used in any country to produce more efficiently or higher quality goods. This spillover increases the labor productivity of the country that adopts it.
- Second, technological knowledge can be used in any country to produce new ideas or new applications in research and development (R&D). This increases the R&D effectiveness in receiving countries. Inventors usually appropriate at least part of the benefits from the first type of spillovers, either by producing good with the new technology and exporting them to reign world economy technology spillovers market, or by setting up production that uses the new technology in other countries or by licensing out the new technology and receiving royalty payments for it. International patents and copyrights are therefore common channels for diffusing the benefits of technological innovations to consumers in other countries.

5.2 Vertical FDI

Vertical FDI is characterized by multinationals that move “upstream” and “downstream” in the value chain. That is, the firm split its production activity in different stages and in different geographic areas in order to exploit differences in factors costs. This type of FDI is motivated by MNE’s having different input requirements for different part of the production. For example by conducting labor intensive production in countries with low labor costs and locate their headquarters in countries that asses skilled labor that is cheap.

Further, a theoretical model of the vertical FDI developed by Helpman (1984) and Krugman (1985) imply that the location of the different stages of production is based on differences in factor endowments and factors prices across countries. Since the motive for MNE’s is to reduce their total cost by splitting their activity in two different components: high skilled labor intensive headquarter
activities and low skilled labor-intensive production activities, this type of investment is more common in countries in Africa that hold valuable resources but lack the educated labor force.

Similar to horizontal FDI the motivation for vertical FDI is thus a trade-off between costs and benefits. The benefits raised from lower productions costs in a foreign location. The criterion is that the costs of fragmentation such as transportation and the costs of acting in a new country, is lower than cost of savings.

5.3 Horizontal FDI
Horizontal foreign direct investment is also known as the market seeking type of FDI. This kind of investment is characterized by multinationals that produce the same good or services in multiple plants in different countries. The drive force of this kind of investment is above all to avoid transportation cost together with being able to have each plant to serve the local market in the host country. In addition, another benefit is shorter delivery.

In general if a firm has a high trade cost, it can gain profits by establishing a new plant in the host country. However, two crucial components for setting a new plant are firstly positive trade costs and secondly firm-level scale economies (Head, 2002). The cost of establishing a plant in a foreign market depends on the production costs that is established by both technology and factor prices. A criterion is therefore that the benefits outweigh the costs for multinationals to conduct FDI.

Markusen (1984) claims that a firm with two plants has a lower fixed cost than double the ones of single plant firms. In other words, there are motives for firms to establish multi-plant productions. This type of FDI is mostly common in industrialized countries where the firms have the intent to be able to serve the local market.

5.4 Knowledge capital model
The former theoretical literature distinguishes the theories of FDI between the horizontal and vertical FDI. Markusen et al. (1996) has combined these two approaches into one model and develop the “knowledge capital model”. The model is based on factor costs and market access as the driving forces of both vertical and horizontal FDI. It is called the “knowledge capital model” because knowledge is
geographically mobile and serves as a joint input to multiple production plants, independent of the type of FDI. Both types of FDI can arise endogenously within the single model depending on the country characteristics.

Further, the capital knowledge model is defined by three main assumptions:

- **Fragmentation:** the services of knowledge-based assets such as R&D, may be fragmented from production and are easily supplied to production facilities at low cost.
- **Skilled labor intensity:** knowledge-capital is skilled labor intensive relative to final production.
- **Jointness:** the services of knowledge-based assets are (at least partially) joint public into multiple production facilities.

The properties mainly characterize the vertical pattern that locates production in countries with low skilled labor and the headquarters placed in countries with high skilled labor. The third is characterized by the horizontal pattern that produces the same final good in different countries.

**5.5 Endogenous growth and Grossman - Helpman**

According to the endogenous growth model the drive force of economic development is innovation or development of already existing products. The model is grounded on the theory that the accumulation of capital is increased by innovation. I.e. the innovations are of great importance since it stimulates the market in such a way that it generates more competition boosting the development (Mankiw & Taylor, 2008).

Gene M. Grossman and Elhanan Helpman (1994) refined this model to a theory that more in detail describes how innovation generates long-term growth. Their model implies that innovators aim to find more efficient production methods by improving already existing products and services together with inventing new ones. In addition, the condition for this market is thus a state of imperfect competition that allows innovators to gain advantages over their competitors which then also creates incentives for investors to advance in R&D. Thereupon; firms will set prices on products and services so that it covers production and R&D expenditure. Along these lines revenues of future expected capital results in continues innovation and research Grossman – Helpman, 1994).
Grossman-Helpman (1994) also highlights the significance of the institutions in the countries regarding protection of property rights. That indicates that institutions grant the inventor’s exclusive rights and protection on their inventions. Consequently a good protection of property rights will raise incentive to invest in R&D since it creates the possibility to gain market share and make profit until a competing firm find an improved innovation. By this, research and development enables a long term growth in the economy. Additionally the improvement of production and technology it also develop the labor skills in the economy implying that it the human capital also increase over time (Grossman-Helpman, 1994).

According to Graham and Krugman (1991) there is a presumption that FDI further is more productive than domestic investment in developing countries. This presumption is based on the belief that domestic firms have better expertise and access to domestic markets compared to foreign firms, thus if a foreign firm decides to enter the market, it must compensate for the advantages enjoyed by domestic firms. It is most likely that a foreign firm that decides to invest in another country enjoys lower costs and higher productive efficiency than its domestic competitors. In the case of developing countries in particular, it is likely that the higher efficiency of FDI would result from a combination of advanced management skills and more modern technology (Graham and Krugman 1991).

Endogenous growth
In the endogenous growth model the drive force of economic growth is physical capital, productivity through human capital and higher productivity in research and development. These factors are set endogenously (Carlin and Soskice, 2006).

Since the aim of the thesis is to examine the impact of FDI on economic growth in a specific region, the most appropriate growth model is the one based on the endogenous growth; in addition it is also well suited since it considers the probability for countries to absorb technology transfer.

In the initial equation (1.3), the level of GDP per capita is presented, the parameter $G^Y$ stands for economic growth that is driven by human capital $G^h$ thus it is the drive force of growth i.e. the growth in human capital generates economic growth.
Model 1.1

\[ y = k^\alpha \cdot h^{1-\alpha} \]

Model 1.2

\[ gh = \frac{\mu e^{\psi u} A^r h^{1-r}}{h} \]

Model 1.3

\[ gh = gy \]

In the second equation (1.2) the parameter \( \mu \) stands for the country’s ability to absorb the technology brought in. It is thus related to the infrastructure and also the openness of the countries in such way that it shows how well the countries take advantage of the technology transfer. Hence it is applicable on studying developing countries in such way that the ability of absorbing new technology brought in, has an impact of what the outcome of FDI results is. Countries in Sub-Saharan Africa in particular have struggled with both infrastructure and also openness due to the social and political circumstances. (Jones and Vollrath, 2013).

The last model (1.3) shows the equilibrium condition. This is also known as the steady state where economic growth is equal to the growth in human capital. This state is the long run state of the economy where it would be without external shocks. In this state the investment in real capital (k) increase GDP per capita (y) as well as human capital (h).

The factor that leads to economic growth is though growth in human capital by technology frontier of the world (A). The ability to absorb technology (\( \mu \)), years of schooling (u) and productivity in the education sector (\( \psi \)) decide the change in human capital (Jones and Vollrath 2013).

Thereby it shows that more years of schooling (u) increase the ability to take advantage of the technology. Thus for technology to even take place in the first place, the FDI is necessary for these countries. To generate long-term growth positive externalities must arise through new ideas and
innovations. Positive externalities lead to non-diminishing returns to capital and thus contribute to long-term growth (Johnson, 2005: 6).

5.6 Effects of FDI

As been shown by previous studies foreign direct investment can have a range of impacts on the host country, the investment bring more than just a capital import and the below listed various effects that it can contribute to:

**Creates jobs:** In addition to the increased capital brought into the host country, FDI may also be a generator of increased job opportunities for the host countries. Withal this is built upon the type of investment made alongside with the industrial category that it is brought to the country. Generally, an investment transferred to a country that is rich on natural resources has the aim of employing a capital-intensive industry, such as the oil industry, that generate relatively few jobs in addition with the investment. Respectively, investment conducted in labor-intensive countries generates more jobs. Considering that most countries in Sub-Sahara region have relatively high unemployment FDI is thus a generator of job opportunities that in turn increases the countries’ growth (Perkins, Radelet & Lindauer, 2006).

**Transfer of technology "know-how" and ideas:** As been mentioned earlier, another important aspect of FDI is the transfer of technology also known as “know how”. By introducing new technology and “know-how” to the local market it also conjointly gives the opportunity to educate the staff and managers of the host country. The spillover effect of this kind can also by absorbed by local suppliers and competitors, hence spillover effects generates increased competition and higher productivity. The degree aforementioned depends on the host country’s ability to take advantage of the multiplier effect of technology and ideas that occur. The ability to absorb the above effects depends on the level of education. Accordingly, a higher educated population increases the potential for a country to take advantage of these effects and contribute in this way to increased growth (Perkins, Radelet & Lindauer, 2006).

**Access to the world market:** The host country gets access to the world market by the MNC’s as they already are engaged in trading internationally and are well established in the global arena (Perkins,
Radelet & Lindauer 2006). From the perspective of the host country FDI is to certain extend constructed as substitutes for imports (horizontal) by so that production takes place on the market when export increases (vertical) the increased production may give a boost in such way that the demand increases for domestic products (Dunning, 2001). That indicates that exports contribute positively on the country´s capital stock, which generates growth (UNDP, 2009).

**Positive and negative externalities:** The presence of the MNC´s stimulates the competition in the host country and the local competitors will face a tougher competitive pressure i.e. they must constantly evolve and find better and more productive ways to produce. It is imperative that other firms within the same industry invest more in research and development (R&D) to keep up the pace with the increased compaction. Thereupon it motivates and encourages companies to continuously streamline their production and their products and by invest more in R&D, which then benefit economic growth. Withal, the same process can be disadvantageous of economic growth. In the case of the increased competition by major MNE´s, their presence on the market can take advantage of the environmental circumstances such as corruption, giving them benefits that outcompete the local firms i.e. crowding out the domestic production. Depending on the national laws and regulations it is not certain how the MNE´s are taking advantage of the gains since sometimes the laws and regulations turns into their profits. The result is that the capital flowing out of the country and then local businesses are driven out the possibilities aside for domestic investment (Perkins, Radelet & Lindauer, 2006).
6. EMPIRICAL ANALYSIS

The section with previous studies shows that FDI will have an effect of economic growth, from earlier research it has been stated that it depends on the conditions of the host countries that shows different results. This makes it interesting to control the GDP growth against FDI and also a range of institutional factors such as level of corruption, property rights and logistic performance index. I will also check human capital factors that include level of education together with life expectancy. The reason is to establish the conditions that motivate investors and optimize the impact of FDI on economic growth.

6.1 Variables

Dependent variable

**GDP growth rate:** Gross domestic product growth rate as the annual percentage growth rate of GDP per capita growth. This value is based on market price based on constant local currency. Aggregates are based on constant 2005 U.S dollars. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. The value of gross domestic product divided by the population used as a gauge to measure the economic growth and used in this study as the dependent variable.

This variable is suitable when the aim is to determine independent variables effect on economic growth. Average of data is collected during the observed period in the current real-US $ rate (World Bank, 2015).

Independent variables

**Foreign direct investment:** FDI is defined as the net inflow of foreign direct investments to establish control over business (with at least 10% of decision-making-power) located in another economy/market than where the investor normally operates. The sum of FDI to GDP ratio is used to see how much of the states GDP made up of FDI. Real data of current US $ exchange rate and Average of data is used during the observation period and in real current US $ rate (World Bank, 2015).
**Logistics performance index**: LPI shows the country’s logistics capabilities and conditions such as tariffs efficiency and quality of trade and transport related to infrastructure. The index runs from 1 -10 with 10 being a country with the best conditions and execution in logistic support. A high LPI thus is expected to have a positive effect on economic growth and the ability to attract FDI as this simplifies trade opportunities with other countries. The data is taken from the “Logistics Performance Index” surveys conducted by The World Bank in partnership with academic and international institutions and private companies and individuals engaged in international logistics. Average of ranking during the observed period is used (World Bank, 2015).

**Secondary education**: is used to measure the level of secondary education enrollment. The variable is expressed as a percentage of total population of the secondary education age, with no regards to current age. This variable reflects a part of the *human capital*, which has been shown to play an important part for economic growth and this is expected to have a positive impact. A higher education level creates possibilities to adapt technology transfers (Barro, 1991). An average of total years of the measured enrollment is used for the observed time (World Bank, 2015).

**Initial GDP**: Initial GDP per capita level is based on 2005 figures. This is used to test for the conditional convergence; that a higher initial GDP leads to a lower GDP per capita growth. Therefore it is necessary to include this in the regression. The sign is thus assumed to be negative in the regression and demonstrate a “catching up” effect where poor countries are growing rapidly to catch with the rich (World bank, 2015).

**Corruption**: Corruption is measured on a value from 1 to 10, 10 being free from corruption. According to Transparency international corruption is defined as the abuse of power to favor own interests. Corruption is thus expected to have a negative impact on trade and investment and thereby have a negative effect on economic growth. The higher the score a country is assigned to the higher degree of corruption prevails and the coefficient is expected to be negative. (Transparency International, 2015; International Chamber of Commerce, 2012)

**Property rights**: gives an indication on how well property rights are protected through legal and political environment (LP), Physical property rights (PPR) or Intellectual Property Rights (IPR)
implications. By including case studies in the index, the data and statistical reasoning is given real-world applicability. Developing countries seem to struggle as weak protectionist policies over intellectual and physical property rights tend to be more prevalent. De socioeconomic structures are most in need of sustained economic growth. The index is scored from 1 to 10, 10 being an indicator of high protection (De Soto, The international property rights index, 2014).

**Life expectancy:** The life expectancy is the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life (World bank, 2015). In the theory of economic growth this is a variable that always has positive effect on economic growth since it is shown that the longer people live the more incentive to get a higher level of education and thereby being able to absorb more technology, which is a source contribution to growth in most modern growth models.

**6.2 Regression analysis**

The aim with the regression model is to see the changes in dependent variable as a function of a change in a set of independent variables. The regression is constructed by a cross sectional analysis between variables based on an average of the collected secondary data over the observed period 2005-2014. I have constructed the regression in four different stages and divided the variables in different groups.

The first model will include the dependent variable and FDI to interpret the correlation between FDI and GDP.

The second model will include the variable that is related to the trade opportunities and therefore include the *logistic performance index*. The third model will include the variables that are related to institutional circumstances and includes *property rights and level of corruption*.

The last model will include variables that are related to human capital that include *level of education* and *life expectancy*. I also chose to include the variable *initial GDP* in this group, and this variable will be logarithmic.
Due to that some countries do not have data on several variables, they had to be excluded. The countries that I have excluded are: Cabe Verde, Sierra Leone, Eritrea, South Sudan and Somalia. This reduces the number of observations from 47 that was set in the beginning of this essay, to 42 countries. In the regression equation the GDP growth rate will be the dependent variable, followed by the independent:

**Regression equation:**

\[
\text{GDP growth rate} = \beta_0 + \beta_1 \text{FDI} + \beta_2 \text{LPI} + \beta_3 \text{EDU} + \beta_4 \text{IN GDP} + \beta_5 \text{CPI} + \beta_6 \text{IPRI} + \beta_7 \text{LIFEEXP} + \mu
\]

*Overview if regression variable and expected outcome*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Source</th>
<th>Expected outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>Total annual GDP growth 2005-2014, measured in percent</td>
<td>World Bank</td>
<td>Dependent variable</td>
</tr>
<tr>
<td>FDI</td>
<td>Foreign Direct Investment inflow, measured in percent</td>
<td>World Bank</td>
<td>+</td>
</tr>
<tr>
<td>LPI</td>
<td>Logistic performance index</td>
<td>World Bank</td>
<td>+</td>
</tr>
<tr>
<td>EDU</td>
<td>Education</td>
<td>World Bank</td>
<td>+</td>
</tr>
<tr>
<td>IN GDP</td>
<td>Initial GDP</td>
<td>World Bank</td>
<td>-</td>
</tr>
<tr>
<td>CPI</td>
<td>Corruption</td>
<td>Transparency International</td>
<td>-</td>
</tr>
<tr>
<td>IPRI</td>
<td>Property rights</td>
<td>Property right Alliance</td>
<td>+</td>
</tr>
<tr>
<td>LIFEEXP</td>
<td>Life expectancy</td>
<td>World Bank</td>
<td>+</td>
</tr>
</tbody>
</table>
Multicollinearity

Multicollinearity refers to a situation where two or more independent variables are correlated with each other. The higher the correlation between a particular variable and the other independent variables, the greater the standard error will be. It can be said that multicollinearity makes the estimates of the regression coefficients become less reliable (Edling and Hedström, 2003). To avoid this I will check this in to correlation matrix where the value of 0.8 often is used as a criterion of there is a correlation or not (Edling and Hedström, 2003).

Heteroscedasticity

Heteroscedasticity is when the error term in the regression model is unequally distributed, in other words it does not have a constant variance. This means that the estimates of the regression will no longer be the most effective. When heteroscedasticity occurs a greater emphasis is put on the variables with large error terms than those with less variance when the regression coefficients are estimated. This is because of the regression line is adjusted to minimize the total sum of the squared error terms. Since the countries used in this regression are of different sizes this could thus occur since the error term might be different for different countries. To control this I will check the residual plot against the estimated values.
## Result 6.3

**Dependent variable: GDP per capita growth rate**

<table>
<thead>
<tr>
<th></th>
<th>4.02008 ***</th>
<th>7.84153 ***</th>
<th>2.16431*</th>
<th>6.78236**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FDI</td>
<td>0.130942 ***</td>
<td>0.130518 ***</td>
<td>0.138347***</td>
<td>0.146197 ***</td>
</tr>
<tr>
<td>LPI</td>
<td>-1.58545</td>
<td>-1.58545</td>
<td>-1.58545</td>
<td></td>
</tr>
<tr>
<td>Property rights</td>
<td>0.215215</td>
<td>0.215215</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corruption</td>
<td>0.0284138</td>
<td>0.0284138</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Life Exp</td>
<td>-0.0501393</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td>0.00307854</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial GDP</td>
<td></td>
<td>-0.0147565</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R squared</td>
<td>0.177537</td>
<td>0.216834</td>
<td>0.228631</td>
<td>0.221764</td>
</tr>
<tr>
<td>Adjusted Rsquared</td>
<td>0.156975</td>
<td>0.176672</td>
<td>0.167733</td>
<td>0.137630</td>
</tr>
<tr>
<td>P-value</td>
<td>0.005454</td>
<td>0.008514</td>
<td>0.018652</td>
<td>0.049358</td>
</tr>
</tbody>
</table>

**Observed countries: 42**

*** Level of significance 1%

** Level of significance 5%

* Level of significance 10%

The effect of FDI on GDP shows a positive correlation, which is also in accordance with the scatterplot in Appendix 1 showing a distinct correlation. Considering that it also shows a level of significance this is then in accordance with the theoretical background alongside with the endogenous growth model that imply that one of the main drive forces of economic development is innovation. As MNE’s enter the market they invest in innovation i.e. it stimulates the market in such way that it generates more competition boosting the development (Mankiw & Taylor, 2008). By the outcome of the FDI variable it is assumed that the countries in the Sub Saharan Africa are strengthened by capital inflows.

The *logistic performance index* was expected to have a positive correlation since theory declare that the trading environment is of big importance for the contribution of economic growth. Still, the
variable does not show a level of significance and thus it rejects the theory. The scatterplot present a spread result as well, indicating that there is no correlation. However, much of the previous studies have shown that the infrastructural circumstances are of importance when it comes to attracting FDI and especially the vertical FDI, which is a determining factor for investors to be able to export at low costs. It can thus be assumed that the infrastructural circumstances still have an indirect effect on economic growth.

*Property rights and level of corruption* hold no level of significance. This outcome is not in accordance with the theory that declares both of these variables as important in what the outcome of FDI will be in terms of economic development. Grossman- Helpman (1994) highlights the importance of high level of protection of property rights as an important factor. However, it can be assumed that there still will be an indirect effect on economic growth. *Level of corruption* was expected to have a negative correlation with economic growth. According to Perkins et al. (2006) if MNE`s take advantage of the gains then they are able to crowd out domestic firms.

*Life expectancy* and *Education* show no level of significance, which neither is in accordance with the theory about human capital, which has been shown to play an important part for economic growth and this is expected to have a positive impact. A higher education level creates possibilities to adapt technology transfers (Barro, 1991). *Initial GDP* shows a negative relation to FDI, which is in accordance with the conditional convergence theory, but does not either have a level of significance.

Overall the regression seems robust since the coefficient FDI does not change remarkably between the different models. However, the other variables show no level of significance, which is surprising since previous studies shows that pre mentioned variables are of importance for countries being able to absorb technology. One reason to why the lack a level of significance can however be due to the lack of observations, i.e. that it should be more included.

The $R^2$ is quite low in all four models, which indicates that there can be variables excluded from the regression that have a more impact on the economic growth.
6.5 Discussion

The aim with this paper was to investigate if FDI has a contribution to economic growth in Sub Saharan Africa. In earlier research it has turned out that the result show that FDI does in fact have an impact on economic development but that it still depends on the condition of the country.

The outcome thus seems to be divergent depending on the countries endowments. FDI can contribute to technology transfer that can be absorbed and increase efficiency. But still there are countries struggling with taking advantage of the spillover effects that occur. In such cases there is a risk that the MNE’s increases the competition making it tougher for the local firms to compete, leading to crowding out the firms.

In the regression FDI is shown to have a positive impact on economic growth and it is accordingly in consensus with earlier with the endogenous growth model and that a capital inflow will lead to economic growth. The theory of Krugman and Helpman (1994) states that the FDI capital flow will create and incentive for investors to invest in R&D that in turn lead to economic growth. The R&D will lead to increased labor skills as well and this it implies that human capital will increase over time.

In the regression the human capital did not show a level of significance, which was expected to have positive correlation to GDP. However, it can still be assumed that the variables have a indirect effect on economic growth since previous studies show that a country with higher human capital are able to take part in investment and should have a bigger output on growth. In contrary a country with a low level of human capital is assumed to face a challenge in the sense of being able to absorb the transferred technology brought by the MNE’s. Further, with horizontal FDI rises the opportunity for developing countries to increase human capital through technology and knowledge transfer, thus it is important for countries to be able to attract this kind of investment as well. Since many of the Sub Saharan countries are rich on natural resources and not as much in human capital the main type of FDI brought in to this area consists of vertical FDI that results in that many MNE’s keep their head quarters in the industrialized countries that can offer high level of human capital for a low cost.

Grossman- Helpman (1994) also highlights the significance of the institutions in the countries regarding protection of property rights. It is of importance the institutions give the inventors exclusive rights and protection on their inventions. The institutional factors such as level of corruption and property rights was expected to show a level of significance. This is since the condition has been proven before to be
of importance when it comes to increasing the incentive for investors to invest in these countries. Since many of the countries in the Sub Sahara Africa are rich on natural resources it seems to be strengthening for them by capital inflows. Other from economic growth it can increase the incentive for these countries to improve the institutional characteristics that can attract investors.
References


Electronic resources


Appendix 1

FDI versus GDP (with least squares fit)

$Y = -0.148 + 1.36X$
Appendix 2

Appendix 3
Appendix 4

Appendix 5
Model 1: OLS, using observations 1-42
Dependent variable: GDP
Independent variable: FDI

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-ratio</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>const</td>
<td>4.02008</td>
<td>0.424132</td>
<td>9.4784</td>
</tr>
<tr>
<td>FDI</td>
<td>0.130942</td>
<td>0.044562</td>
<td>2.9384</td>
</tr>
</tbody>
</table>

Mean dependent var | 4.864223 | S.D. dependent var | 2.202391 |
Sum squared resid  | 163.5646 | S.E. of regression | 2.022156 |
R-squared          | 0.177537 | Adjusted R-squared | 0.156975 |
F(1, 40)           | 8.634385 | P-value(F)         | 0.005454 |
Log-likelihood     | -88.14573| Akaike criterion   | 180.2915 |
Schwarz criterion   | 183.7668 | Hannan-Quinn       | 181.5653 |

Model 2: OLS, using observations 1-42
Dependent variable: GDP
Independent variable: LPI

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-ratio</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>const</td>
<td>7.84153</td>
<td>2.76371</td>
<td>2.8373</td>
</tr>
<tr>
<td>FDI</td>
<td>0.130518</td>
<td>0.0440394</td>
<td>2.9637</td>
</tr>
<tr>
<td>LPI</td>
<td>-1.58545</td>
<td>1.13335</td>
<td>-1.3989</td>
</tr>
</tbody>
</table>

Mean dependent var | 4.864223 | S.D. dependent var | 2.202391 |
Sum squared resid  | 155.7494 | S.E. of regression | 1.998393 |
R-squared          | 0.216834 | Adjusted R-squared | 0.176672 |
F(2, 39)           | 5.398949 | P-value(F)         | 0.008514 |
Log-likelihood     | -87.11757| Akaike criterion   | 180.2351 |
Schwarz criterion   | 185.4482 | Hannan-Quinn       | 182.1459 |

Model 3: OLS, using observations 1-42
Dependent variable: GDP Property rights corruption
Independent variable: Property rights and corruption
<table>
<thead>
<tr>
<th></th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-ratio</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>const</td>
<td>2.16431</td>
<td>1.24811</td>
<td>1.7341</td>
<td>0.09101*</td>
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<tr>
<td>FDI</td>
<td>0.138347</td>
<td>0.0454784</td>
<td>3.0420</td>
<td>0.00425***</td>
</tr>
<tr>
<td>Propertyrights</td>
<td>0.215215</td>
<td>0.283368</td>
<td>0.7595</td>
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</tr>
<tr>
<td>Corruption</td>
<td>0.0284138</td>
<td>0.033631</td>
<td>0.8449</td>
<td>0.40347</td>
</tr>
</tbody>
</table>

Mean dependent var 4.864223  S.D. dependent var 2.202391
Sum squared resid 153.4035 S.E. of regression 2.009212
R-squared 0.228631 Adjusted R-squared 0.167733
F(3, 38) 3.754348 P-value(F) 0.018652
Log-likelihood -86.79886 Akaike criterion 181.5977
Schwarz criterion 188.5484 Hannan-Quinn 184.1454

Model 4: OLS, using observations 1-42
Dependent variable: GDP

<table>
<thead>
<tr>
<th></th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-ratio</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>const</td>
<td>6.78236</td>
<td>2.95785</td>
<td>2.2930</td>
<td>0.02763**</td>
</tr>
<tr>
<td>FDI</td>
<td>0.146197</td>
<td>0.0470053</td>
<td>3.1102</td>
<td>0.00359***</td>
</tr>
<tr>
<td>Lifeexpectancy</td>
<td>-0.0501393</td>
<td>0.0543998 -0.9217</td>
<td>0.36267</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>0.00307854</td>
<td>0.0184141</td>
<td>0.1672</td>
<td>0.86814</td>
</tr>
<tr>
<td>l_InitialGDP</td>
<td>-0.0147565</td>
<td>0.0722522 -0.8501</td>
<td>0.40076</td>
<td></td>
</tr>
</tbody>
</table>

Mean dependent var 4.864223  S.D. dependent var 2.202391
Sum squared resid 154.7691 S.E. of regression 2.045226
R-squared 0.221764 Adjusted R-squared 0.137630
F(4, 37) 2.635849 P-value(F) 0.049358
Log-likelihood -86.98498 Akaike criterion 183.9700
Schwarz criterion 192.6583 Hannan-Quinn 187.1546