

Does FDI affect GDP per-capita growth in sub-Saharan Africa?

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Acknowledgements

After years of studying it has come to this. Where our knowledge of economics would finally be tested, putting everything together in one thesis. There has been some struggle along the way, both demanding and challenging but in the end we felt that our time spent and hard work was worth the effort. We are satisfied with our choice of subject, it is an important issue that both of us already had an interest for. Our mentor Stig Blomskogs recommendations and important inputs helped to keep us on course at more than one time. Also a huge thanks to our examiner Patrik Tingvall for being engaged in making this thesis better. We would also like to thank our previous teachers at Södertörns Högskola that awakened our interest for economics and helped us gain the knowledge necessary for our conclusion. Last we would like to thank our fellow students that have contributed with both a good spirit and a helpful attitude whenever it was needed.

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Abstract.

Economic growth is a goal for countries around the world in order to improve living standards, and the effect of foreign direct investments (FDI) has long been studied. There are today many theories and empirical studies regarding FDI. Many questions being studied but finding a straight answer to these have showed to be anything but easy. The results and conclusions go in different directions and much disagreement on whether or not FDI actually contributes to growth. One of the core triggers to the Chinese high economic growth pattern is attributed to FDI, this thesis investigates the same FDI impact on economic growth but with focus on sub-Saharan Africa. With the help of different theories and empirical studies we have selected our variables believing they will have a significant impact on this question. With the data collected from the World Bank database about the countries and seven different variables, a regression is created. The results show that FDI plays a part when it comes to GDP per-capita growth and also that corruption has a significant negative effect on growth rates. FDI in sub-Saharan Africa is hypothesized to mainly consist of brownfield investments as a potential explanation. The data this study uses is between 2005 and 2013, meaning the results are probably not applicable to be interpreted long-term.

Key Words

Corruption, Economic Growth, GDP per-capita, Growth, FDI, Foreign Direct Investment, Sub-Saharan Africa

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1. Introduction

This section will present the subject, the background behind it, the objectives and the problem statement. After this the methodology, the scope and structure of the thesis is explained.

1.1 Background to the study

Two of the biggest talks in world economy in recent years and decades have been the boom of the Chinese economy and the economic development in sub-Saharan African countries. While China still has work to do, being behind in GDP per-capita, it cannot be swept under the rug that they are on the right path and has been so for many years. The sub-Saharan countries is now starting their work towards trying to become like the BRIC (Brazil, Russia, India and China) countries, the combined average growth in GDP for the sub-Saharan countries was 4.7% in 2013¹. And is predicted to grow at a 5.1% rate the coming two years². In 2012, 14 out of the 18 top growing countries in the world was held by Sub-Saharan countries.³

Sub-Saharan Africa has recently left the starting blocks of its economic growth, and the future for these 46 countries does not look as bleak economically as previously. This being said, economic growth is not a given. These countries face problems in their efforts to continue this trend. The problem of demographic transition, corruption, raw material scarcity, policymaking, trade, distribution of wealth is some of them. As has been stated before by economists, GDP growth is not a perfect measurement of how well of the people of the entire country is, but it certainly gives the possibility of being better off.

It is a fairly common suggestion that FDIs is a way for outsiders to help developing countries out in achieving growth, though growth in the targeted country not being the main incentive for the firms, this is a positive byproduct. Meaning FDI is not a zero-sum game, but Pareto improvement for both parties⁴. FDI is seen as financial inflow in the countries invested in, and since WWII these direct investments has consistently been an important source of capital

¹ World bank, global economic prospects

² World bank, predicted growth

³ Annex, Global economic prospects- sub Saharan Africa, June 2013

⁴ Zhao. S (2013) Applied economics – vol. 45 p.2127-2139

for developing countries⁵.

1.2 Study objective

This thesis is investigating relationship between growth rate in GDP per-capita and FDI in the sub-Saharan region. To analyze this more, to a regression there will be added control variables that also is said to affect growth. The central data that is attained is about the sub-Saharan countries, the FDI:s and their GDP growth, over the years of 2005-2013.

1.3 Problem statement

Does FDI affect the growth rate in sub-Saharan countries?

1.4 Methodology

Data attained from the World Bank on corruption, FDI, infrastructure, gross domestic savings, education, population, GDP per-capita and growth will be used to running regression models of. This data will originally be a panel data set, later on to be averaged out into a cross section dataset. A regression is created and ran, after this there will be an analysis of the results regarding the effect of FDI on growth, not as singular countries in the sub-Saharan Africa, but rather as a whole and averaged out over the 2005-2013 periods. The growth in GDP per-capita will be categorized as the dependent variable, FDI and the rest of the variables as independent. The independent variables are chosen with logic attained from the theoretical background of previous studies. These manipulating variables will be corruption, education, population, GDP per-capita previous year and infrastructure.

1.5 Scope of the study

The data concerned will be collected about 38 African countries that the World Bank has categorized as sub-Saharan in their datasets. The two main variables concerned in this thesis will be growth in GDP per-capita and FDI, this over the time period 2005-2013. The regression will be made with observations on the yearly basis for each country to later on be averaged out to per country. This to observe sub-Saharan Africa as the studied object instead of having multiple analysis's of each country in the region. This will amount to 342 observations each with seven different variables.

⁵ Krugman. R, Obstfeld. M (2009) International Economics – Theory & Policy, Eight edition, Pearsons international edition

This thesis assumes that FDI positively corresponds to growth in the sub-Saharan countries, this being backed by observations, studies and theories that now seem to be the dominant paradigm by economists. This thesis does not in deep discuss the possibility of growth being the independent variable, and that FDI is done in a country that has started to grow. No difference is made of what sort of FDI (horizontal or vertical, Greenfield or brownfield) has been done in the countries and will be interpreted as a general category of Foreign Direct Investment.

FDI will be measured as the net amount of dollars invested into a country and GDP also is measured in terms of dollars. Growth is measured as percentage change in GDP per-capita since previous period. Two variables, infrastructure and corruption is scale-value variables, corruption is measured on a 1-6 scale and infrastructure 1-5.

2. Theoretical background

This section is where the theoretical foundation that will be used in this thesis is presented and is the ground to what later on create a regression model and the basis on the analysis.

2.1 The theory of Multinational enterprise

Businesses that make a foreign direct investment are often called multinational enterprises (MNE). Why do firms choose to locate production in different countries, and why do foreign country allow for FDI? These are the questions that both parties have to take into consideration. Sometimes FDI can provide better advantages for the MNE but not for the foreign country, and sometimes the other way around. We will look closer at these advantages from both perspectives. For MNEs, the answer is in three parts, the first part is *ownership*, the second is *location* and the third is *internalization*.

For a foreign multinational enterprise to find it profitable to enter a domestic market some conditions need to be satisfied. This means that the profit needs to be higher than the costs such as communications, transportation, stationing personnel abroad, barriers due to language and customs. It's critical to identify the advantages for the multinational enterprise under which direct investments will occur. Dunning (1977, 1981) suggested three conditions that need to be present for a firm to find incentives for direct investment, Dunning explains this as OLI (ownership, location and internalization).

Ownership advantage – Superior management skills and technology is one advantage that a firm can take with them when venturing into another country and hence getting advantages compared to already established firms in the country.

Location advantage – Lower costs of input, expanded market accessibility and cluster-effects can give a firm advantage in terms of production.

Internalization specific advantages – If market solutions is too costly or non-rewarding, to internalize production stages can be an advantage due to external events will not affect the firm in the same way.

Ownership can be a very effective tool when the domestic market has a very restrictive access. Through acquiring or starting a business inside the domestic market could be a way to gain access. Location suggests that the place where the production is located is due to economic incentives. A well thought out placement of a production facility can minimize

costs by having cluster-like situations, where the firm would be placed near the production of inputs needed for its own production reducing transportation costs and keeping production coordinated. Another argument for the importance of location is trade barriers. A firm can, when reaching out to a new geographical segment reduce trade barriers such as customs duty by placing production in particular spots. A big advantage also is the ability for the firm to change production according what this geographical segment demands e.g the cars demanded in the U.S is different from the cars demanded in the EU. Another advantage is access resources, FDI is an effective way to acquire natural resources like minerals and fossil fuels like oil. That's the reason why often Oil Company's make tremendous FDIs to develop oil fields.

Internalization is mainly about development of production, knowledge is better transferred within a firm than between firms. If one part manages to develop something new, this can easier be implemented in other lines of production as the structure often is that the output of one facility is the input in another. Improved level of technology is easily shared to other subsidiaries and is called *technology transfer*. The other concept in internalization is *vertical integration* which suggests that the more of the production process is based within the same firm the better. This due to price fluctuations that might occur with changes in supply-demand equilibriums and no real coordination between different parts of the process is made. Whilst the first level of production might want to lower prices, the last part might want to raise prices. There are also disadvantages for MNEs when establishing FDI. These could be unstable economic conditions or unstable political and legal systems. When much of the FDI take place in developing countries, there is often the case that the market conditions and economic system are unpredictable. The other factor from this problem is underdeveloped political and legal systems which can causes problems with property contracts. The chance of a high corruption is a big problem and can lower the MNEs incentives to invest.

2.2 Foreign direct investment (FDI)

When a firm that is residing in another country acquires or expands into a different country's market in some way, it is called *foreign direct investment*. The firm makes a direct investment into the receiving country; this emerges as financial inflow for the receiving

country and financial outflow for the investing country/firm.⁶ The two main forms of these are M&A (Mergers and acquisitions) also known as *brownfield investments*, and *Greenfield investments*. Brownfield focuses on interacting with firms already located within the target country by merging or acquiring them. A strategy of a brownfield investment being used could be that a multinational enterprise buys a commercial site that was once used for producing steel or oil refinery. The enterprise then cleans it up and is used for a less polluting purpose, example office space. A brownfield investment could be seen as less expensive than a greenfield investment. Though when implementing a brownfield investment, the enterprise have to take into consideration the costs of existing employees, outdated equipment and cultural differences. Greenfield investment is when the firm expands into the new region, by placing its production facilities there (often due to labor costs etc.). There could be more opportunity cost for the host country when enterprises implementing the greenfield investment strategy, this because they build new facilities from scratch. And this is usually done where no previous facilities existed before. When building facilities from scratch this also creates new long-term jobs in the foreign country when the demand for hiring new employees needs to be meet. Countries often prefer the greenfield strategy to the brownfield so they often offer enterprises tax breaks, subsidies and other incentives to choose the greenfield investment.

The purpose FDI's have is two main reasons; *vertical* and *horizontal*. Vertical is generating the FDI in a country with the intention of selling to the local market, this method is typically used for poorer countries where there are lower wages. An example of this is the clothing industry, which creates their products in very poor countries and then being shipped back home to a high-wage country. This type of FDI is usually called "efficiency seeking" since the methods main motive is to create a more effective production and of course cheaper. A Horizontal FDI is to have a place for production in order to export, they produce the same product but apply a different method. Here they service local markets through affiliate production, this kind of FDI is sometime called "market seeking FDI. The main inflow of FDI to developed countries today, is horizontal. This kind of investment tends to increase the countries labor intensity and the home country will gain more domestic production.⁷

⁶ Krugman. R, Obstfeld. M (2009) International Economics – Theory & Policy, Eight edition, Pearsons international edition

⁷ Adams. S (2009) "Can foreign direct investment (FDI) help to promote growth in Africa?" African journal of business management. May Vol.3(5) p.178-183

A possibly negative effect of FDI is the concept of *crowding out*. This means that if there isn't a gap between savings and investments, external investments might cause internal investments to not be done due to oversaturation and no projects with positive projections. The idea of FDI in general is that it can fill the savings-investment gap that might exist, but this is not certain. Crowding out can also be seen as a purely internal problem within a country. An expansionary fiscal policy with the intent to boost the economy also has an effect on investments. As we can see, there are both positive and negative consequences from different kinds of FDI's. The government is a part that has much to say about this, they can either welcome foreign investments or put up restrictions. Both have their reasons for doing so as we will see.

The governments of Hong Kong and Singapore long ago realized the importance of global trade and FDI's. They opened up their economy when they understood that FDI would help create jobs, expand local technical knowledge and increase their economic standards. What we can see today, most of the citizens have a much higher living standard. At that time, Hong Kong was one of the easiest places to implement a brownfield or greenfield investment strategy. The government had clear guidelines available for the enterprises, the business could be set up with a new office just a few days later.

At the same time, many other countries in Asia, their government had a different view on FDI's. They made the decision to restrict or control the FDI in their countries by requiring massive amount of paperwork to be filed before getting approved to invest. This restriction did of course create many disincentives for the multinational enterprises. By the 1990s most of the Asian countries had opened up for global trade and have since then showed an increased GDP per-capita, we can see the same relationship in the sub-Saharan countries today.⁸ There are many different theories about the growth path from FDI, it will be difficult to just apply one of them for this research. Now we know that FDI can contribute to economic development in different ways with different conditions. And we know that it can have both benefits and costs. The advantages for the foreign countries are basically the external capital, which can lead to economic development (in theory), additionally tax revenue from MNEs will give a positive effect. There are many factors that need to be right for the country to expect growth from FDI. But the knowledge spillover effect is certainly

⁸ Challenges and opportunities in international business – Foreign direct investment

one that helps. For example, an MNE make a greenfield investment. They will build a new factory in a small developing country, this means that the MNE would have to hire some local labor and equipment. When the foreign money gets in the economic cycle, more jobs will be created. Once the new factory is up and running, it will pay taxes for profit and labor, create tax revenue from now possible added economic activity. The country's government can then use this new capital to promote better welfare, infrastructure and school systems that could create more growth in both physical and human capital. Since the MNE usually don't own all of the foreign company when developing the new industry. This means that the domestic partner that owns the rest of the industry will establish a new market abroad from the cooperation with the MNE. The developing country will also get a more indirect advantage from FDI, known as knowledge spillovers.⁹

This occurs when setting up a business abroad. We refer to it as when one inventor learns from the outcomes of others research. Then being able to implement this newfound knowledge into its own research productivity, this without having to compensate the other inventors. This is something that occurs from FDI in the foreign country. Though it's only a one-way street. Only the host country will receive the benefits of knowledge spillovers, these benefits together with the direct capital suggest that FDI can promote growth in a developing economy.¹⁰ There is empirical evidence that suggest that these positive externalities may not always generate growth and might even create a negative effect from FDI. There are recent studies that indicate that it's the country's possibility to take advantage of foreign direct investments externalities. What this means is that if a developing country has low level of financial markets or educational level, such conditions may limit the absorptive conditions of theses externalities. Borensztein, Gregorio and Lee¹¹ and Xu & Wang¹² shows result that FDI brings technology that can be translated into higher growth, but only when the foreign country has a minimum threshold stock of human capital. Hermes and Lesink¹³ have provided evidence which says that only countries with a well-developed financial market can gain significantly from FDI, in terms of their growth rates. There is other empirical evidence

⁹ Grimsley.S. What is foreign direct investment? – Definition, Advantages & Disadvantages

¹⁰ Branstetter. L (2000) Is foreign direct investment a channel of knowledge spillovers? – Evidence from Japan's FDI in the United States

¹¹ Borensztein. E et.al (1998) "How does foreign direct investment affect economic growth?" Journal of international economics, 45, p.115-135

¹² Xu. B & Wang (2000) "Trade, FDI, and international technology diffusion"

¹³ Hermes. N & Lesink. R (2003)"Foreign direct investment, financial development and economic growth" Journal of development studies 40, 142-163

at the micro level that finds no effect of foreign presence on economic growth. The findings even suggest that there are negative productivity spillovers from MNE on the developing country firms.¹⁴

2.3 Corruption

There are a lot of different ways to define corruption. This thesis will use one that is created by the World Bank since it is mainly the economic part of corruption that this thesis is interested in.

“We can define corruption as “the abuse of public office for private gain”, it covers a broad range of human actions which all has an effect on the country’s economy and political system. One of the most common ways of corruption is through fraud and bribery, which can be used by private parties to “buy” local governments or licenses. This can help firms to speed up a project in the country. In many developing countries there is a high volume of corruption, which can give a decrease in growth rate due to loss of taxes, environmental pollutions and makes the financial system vulnerable to crises and macroeconomic instability.”¹⁵

To polarize this probable negative effect of corruption in an economy, there is an idea that a inefficient governance can be neglected with corruption. This idea is called greasing up effect or greasing the wheels. This effect is seemingly transitory either way, and is not the way to achieve long term growth. Corruptions effect on short term, hinders the growth long-term. It is named to reduce domestic investments, discourage FDI, making government spending distorted away from infrastructure, education and health. All of which is said to have positive effects on growth.

2.4 Summary - theory

When firms go through with FDIs, horizontal, vertical, greenfield or brownfield, the firms will be able to bring a higher level of technology and knowledge to gain advantages in the

¹⁴ Caves, Richard E (1974) “Multinational Firms, Competition, and Productivity in Host-Country Markets,” *Economica*, 41: 176-193.

¹⁵ The world bank (1997) “Helping countries combat corruption – the role of the world bank” p.8

market in terms of production. This also raises the productivity in the economy and depending on the belief of knowledge being a public good, this technology will spread and further improve the economy. There is seemingly with this selection of theories that there could be both positive and negative effects generated by FDIs, short-term or long-term. The interaction between FDI and knowledge spillovers what it does at its core. One of the problems is that there are many theories and empirical evidence to support different conclusions. Many questions but not many of them can we be certain of. Another problem for the theories is the matter of corruption and the fact that property rights in a government with corruption is not strong, the corruption hence gives less incentives for innovation and development which to gives a uncertain conclusion for the theories to fall back on.

3. Previous studies

Presents a number of studies performed in this very subject, this to provide some general knowledge and expectations on what the results will be

3.1 Gui Dilby (2014) ¹⁶

Panel Data from 50 African countries between 1980 and 2009 is analyzed and concludes that FDI inflows have a significant effect on economic growth. Also found is that different level of human resources did not impact the effect FDI had on growth. A difference is found when dividing up the time periods, between 1980 and 1994 the impact was negative. 1995 to 2009 the impact was found to be positive.

3.2 Zhao (2013) ¹⁷

This article discusses a variety of factors that helped China to become an economic superpower in just three decades. The main discussion concerns foreign direct investments (FDI), but also touches upon the subjects of economic policy with three big events; liberalization, marketization and privatization. One thing the authors point out is that China, due to former policies had a great amount of human capital, allowing this rapid growth. Along with its economic growth, China successfully also has enabled infrastructure to keep up with growth, in 1988 china had 100km of roads, in 1995 2.100km, and in 2008 60.000km.

3.3 Mauro (1995) ¹⁸

The article concludes that a malfunctioning and/or corrupt government is an obstacle for growth, or reduces growth. This malfunction reduces investment, entrepreneurship and innovation incentives. The major factor contributing to this is the low level of security of rights in a country characterized by these traits. Physical capital, property rights, patents, profits are the main categories that suffer when there's a lack of safety in terms of rights. The study finds a strong negative relationship between level of corruption and economic growth.

¹⁶ Gui Dilby S. L (2014) "Impact of foreign direct investments on economic growth in Africa: Evidence from three decades of panel data analyses" *research in economics* vol. 68 p.248-256

¹⁷ Zhao. S (2013) "Privatization, FDI inflow and economic growth in Chinas provinces 78-08" *Applied economics* – vol. 45 p.2127-2139

¹⁸ Mauro. P (1995) "Corruption and growth" *The quarterly journal of economics*, august 1995

3.4 Habib, Zurawicki (2002) ¹⁹

The authors of this article try to see if there is a connection between corruption and FDI. The conclusion is that foreign investors, generally tries to avoid investing in corrupt countries. The reasoning behind it is that morally, it is wrong, because environments like these are unfamiliar to investors and this creates a possible problem with inefficiencies in the upcoming business operations.

3.5 Chakraborty (2008) ²⁰

The author of this article researches how FDI has affected growth in different sectors in India. It concludes that there is a difference between of the effect of FDI depending on which sector that is receiving it. There are three main sectors discussed, the manufacturing sector, primary sector and the service sector. The manufacturing sector is the sector that is the most positively affected by FDI. Primary sector fails to find any causal relationship to growth, the effects on service sector seems to be over a very short time, transitory. An interesting finding is that the FDI spent in the service sector, appears to have promoted growth in the manufacturing due to spill-over effects

3.6 Kinda (2013) ²¹

Improved economic climate will help aggregate FDIs in the region. The study was done on 30 sub-Saharan countries. Vertical and horizontal FDIs are showing different behaviors. Firms tend to invest vertically in countries that are operating with a high level of trade regulation. This in affect means they want to secure a market position in a very protected market. Horizontal FDI is more affected by human capital constraints and investment opportunity constraints. Infrastructure and institutional constraints are less of a factor for horizontal FDIs than for vertical FDIs

¹⁹ Habib, M, Zurawicki, L (2002) "Corruption & FDI" Journal of International business studies, Vol.33, no2. p.291-307

²⁰ Chakraborty, C (2008) "Economic Reforms, FDI, and Economic Growth in India: A sector level analysis" World development, Vol. 36, No. 7. p. 1192-1212

²¹ Kinda, T (2013) "Beyond natural resources: Horizontal and vertical FDI diversification in sub-Saharan Africa" Applied Economics, vol.45 p. 3587-3598

3.7 Pradhan (2009) ²²

Via statistics, this paper explores FDI and growth in the ASEAN countries concluding that there is a long run equilibrium between foreign direct investment and economic growth. It is confirmed by a granger causality test at individual level and panel level there is bidirectional causality between FDI and economic growth, with Malaysia as the singular exception on the individual level. This bidirectional causality implies that we do not know in what way the causality goes. “To get more economic growth, we need to bring more foreign direct investment. And to get more foreign direct investment, there is need of sustainable economic growth in the economy. The lack of foreign direct investment may constraint to economic growth and vice versa.”²³

3.8 Yalta (2013) ²⁴

Contrary to the other study of China growth, this article concludes that there is no significant relationship between FDI and growth between 1982 and 2008 contrary to the consensus of the field. The author states that there is a need for analysis's that are not on the aggregate level, but rather on the disaggregate level to be able to conclude the real effect of FDI. This by looking at different sectors, provinces and industries.

3.9 Meon & Sekkat (2005) ²⁵

71 countries over the time period 1970 -1998 where looked at to investigate the effect of corruption. A negative relationship is found with growth and investments, both as a group and separately. The impact of corruption is different depending on how well the country is run, governance. The worse the governance is, the more corruption has a negative effect on growth. This makes the idea that corruption can grease up the economy, and is able to compensate for bad governance not likely to have a big effect on growth in the long run.

²² Pradhan. R (2009) "The FDI- Led- Growth Hypothesis in ASEAN- 5 Countries: Evidence from Cointegrated Panel Analysis" International Journal of Business and Management, Vol.4, No.12 p.153-164

²³ P.159 - Conclusions

²⁴ Yalta. Y.A. (2013) "Revisiting the FDI-led growth Hypothesis: The case of China" Economic Modeling, 31, p. 335-343

²⁵ Méon. P & Sekkat. K (2005)"Does corruption grease or sand the wheels of growth?" Public choice 122, spring, p.69-97

3.10 Summary – Previous Studies

It seems to be the general consensus that FDI is a part in a growing economy, the cause-effect relationship is not determined but without a question, there seem to be economic growth where there is FDI and vice versa. It is not only the FDI in itself that accomplished this though, there are more factors that is important in achieving economic growth. In the case of China this is attributed to human capital, policies and infrastructure. Human capital was the initially biggest endowment China possessed, and infrastructure arises from policies and economic growth. This can be interpreted as FDI took care of the human capital in the country, and the rest fed on itself. In the case of India it was found that there are certain sectors that develop at a greater rate than others, it is found that manufacturing is the sector that improves the best, while primary sector fails to show causality and the service sector has transitory effects. Corruption in a country has a negative effect on both the growth of the economy, the amount of FDI received and investments made. The corruption affects the security of property rights which takes away incentives to invest, both internally within the country, and for foreign investors. The internal part affects growth, the external part affects FDI. Corruptions effect on growth is not from its effect on investments. Corruption affects both variables separately.

The most promising starting point for economic growth hence it seems to be a country to possess highly skilled workers (human capital), a potential for business to be starting within the manufacturing sector in a non-corrupt country with a government that is good at implementing policies that enhances possibilities for growth, an open economy and actions that relates to accessibility, in the example of China, infrastructure was a big part.

4. Empirical analysis

The section presents the created regression model. The variables will be explained and the results will be presented, followed by an analysis of the results.

4.1 Regression model

The regression model is linear and is based on the cross-sectional dataset that has been attained. The model used is based on the previous study by Gui-Dilby²⁶ on FDI and growth in Africa is the framework for this model with some modifications. Government consumption is replaced with corruption. The rest of the variables used will represent the same core idea, but with different measurements.

Using Ordinary Least squares (OLS) we run the following specifications:

$$y_{\text{growth}_t} = \alpha + \beta_1 \text{FDI/GDP}_t + \beta_2 \text{COR}_t + \beta_3 \text{EDU}_t - \ln \beta_4 \text{GDPCAP}_{t0} - \beta_5 \text{POP}_t + \beta_6 \text{GDS}_t + \epsilon$$

$$y_{\text{growth}_t} = \alpha + \ln \beta_1 \text{FDI}_t + \beta_2 \text{COR}_t + \beta_3 \text{EDU}_t - \ln \beta_4 \text{GDPCAP}_{t0} - \beta_5 \text{POP}_t + \beta_6 \text{GDS}_t + \epsilon$$

y_{growth}	% Change in GDP per capita from previous year
β_n	Correlation coefficient
α	Intercept
FDI_t	Amount of foreign direct investment received
FDI/GDP	The ratio of FDI to GDP
COR_t	Level of corruption in a country
EDU_t	Number of people with secondary education
GDPCAP_{t0}	GDP per-capita previous year
POP_t	Population in the country
GDS_t	Gross Domestic Savings as % of GDP
ϵ	Stochastic error term

²⁶ Gui Dilby S.L.(2014) “Impact of foreign direct investments on economic growth in Africa: Evidence from three decades of panel data analyses” research in economics vol. 68 p.248-256

4.2 Data and specification for chosen variables

The data is based of nine year averages for every country between 2005 and 2013.

Table 1 – Specification table

Variable	Units	Description	Source	Expected Sign
Y_{growth}	%	Growth in GDP per capita	World Bank	
logFDI	Dollars	Millions	World Bank	+
FDI/GDP	Dollars	Ratio	World Bank	+
Corruption	1-6 scale	CPIA	World Bank	+
Human Capital	Thousands of people	Education	World Bank	+
logGDPCAP_{t-1}	Dollars	GDP per capita	World Bank	-
Population	Millions	People	World Bank	-
Gross Domestic savings	%	Of aggregate GDP	World Bank	+

4.2.1 y_{growth}

Dependent variable Economic growth will be measured as the percentage change in GDP per-capita between the precious year and the current. GDP per capita has been chosen because of its ability to show the potential economic wellbeing in a country rather than the scale of the economy.

$$y_{growth} = \frac{y_t - y_{t-1}}{y_{t-1}}$$

4.2.2 Foreign Direct Investment

FDI is expected to have a positive sign in the regression. This based on previous studies that have been gone through earlier in this thesis. The data is attained from the World Bank database and is measured as the net inflow of foreign direct investment to a country. The value is chain weighted to the 2005 dollar and does not differentiate between the different types of FDI such as horizontal, vertical, brownfield or greenfield. The variable will be logged in the regression for a clearer interpretation due to its relative size.

4.2.3 FDI/GDP

How big is FDI compared to the overall economy, this is measured by dividing the net inflow of FDI by aggregate GDP, both adjusted to the 2005 dollar. It is assumed that the bigger the part of the GDP that is represented by FDI, the greater the growth will be in the country. This is to measure the intensity of FDI in the economy.

4.2.4 Corruption

The measurement used is a part of the world banks evaluation on the prospects for growth in sub Saharan countries along with 16 other areas. Corruption is expected to have a negative effect on the rate of economic growth, the expected sign will hence be positive, since the measurement refers to absence of corruption. The measurement is in this thesis called CPIA; transparency, accountability, and corruption in the public sector rating. The scale is 1 through 6, with 1 being a low level of transparency and 6 being a high level. In the document World Bank describes the measurement as “The extent to which the executive, legislators, and other high-level officials can be held accountable for their use of funds, administrative decisions, and results obtained.”²⁷ There is no information on whether the values are ordinal or interval. Corruption in being not specific for sub-saharan Africa but prevalent is the big deviation from Gui-Dilbys regression concerning all of Africa.

4.2.5 Education

Education will be measured as thousands of people in the country with a secondary education. This is a good way to assess human capital in a country. That being said there is no way to

²⁷ World Bank Group. CPIA Africa report, assessing African policies and institutions. P.76

tell of the quality of education with this measurement. This is intended to be interpreted as having a positive effect on the economic growth. The higher the education, the more positive impact it will have on growth in the economy with the main concept used is productivity of labour.

4.2.5 GDP per-capita previous year

A high level of GDP per-capita from previous year is assumed to be positive for growth but negatively effect on the rate of growth. As this regression is built up based on cross section data it is assumed that countries with a higher level of GDP per capita will display lower rates of growth- The GDP per-capita used will be $GDPCAP_{t0}$. It is assumed that this will have a negative effect on the economic growth with the reasoning that any incremental increase in GDP or GDP per capita will be lower for a high GDP per-capita level country than for a low level GDP per-capita country. The values of GDP is based on the value of the dollar as the measurement was done. Meaning GDP was not adjusted for inflation between periods

4.2.6 Population

Population in being a part of GDP per capita is thought to affect the GDP per-capita growth. With the same economic level of GDP with a bigger population there will be a lower GDP per-capita level. Population is measured in terms of millions of people.

4.2.7 Gross Domestic Savings

GDS or gross domestic savings, will be measured as part of aggregate GDP in percentage terms. The variable is representing the measurement of the level of domestic investment in the economy. Motivated by the idea of savings equals investments and is expected to have a positive impact on economic growth

4.3 Regression results

Table 2 – Regression FDI/GDP ²⁸

Dependent Variable:	GDP per capita growth (y_{growth})2005-2013			
Models:	1	2	3	4
Independent variables	Estimated coefficient	Estimated coefficient	Estimated coefficient	Estimated coefficient
Constant	1.8689*** (0.4713)	-3.3839** (1.4828)	-4.906 (3.16)	-4.0184 (3.3488)
FDI/GDP	4.5403 (2.9349)	5.1076** (2.5049)	5.5159** (2.5184)	8.538*** (2.934)
Corruption		1.6253*** (0.5018)	1.5253*** (0.5221)	1.3768** (0.5379)
Education		0.0011*** (0.0004)	0.0008* (0.0004)	0.0009* (0.0004)
lnGDPCAP_{t0}			0.2567 (0.4886)	0.1464 (0.5575)
Population			0.0136 (0.0133)	0.0013 (0.0013)
GDS				0.0073 (0.0225)
r²	0.062	0.377	0.404	0.458
Adjusted r²	0.036	0.322	0.313	0.353
P-value(F)	0.131	0.001	0.003	0.003
<i>*Check appendix table 6-9 for full information about the models</i>				

N=38

The regressions created shows that FDI/GDP have an significant positive effect on the per capita economic growth in sub-Saharan African countries. Models two through four shows a

²⁸ Standard errors in parenthesis

***p<0.01

**p<0.05

*p<0.1

All FDI/GDP regressions to be found in appendix

positive significant relationship on the standard 1 and 5 percent levels for FDI and growth. In the final model FDI showed significance at the 1 percent level with a 8.138 value and a standard error of 2.934

Also showing a significant relation was the variable corruption (transparency), which since introduced showed a significant positive relationship with economic growth at the 1, 1 and 5 percent level with 5 being the significance level in the final model. With a value of 1.3768 on the coefficient and 0.5379 as standard error.

The last one to show a significant relationship with was human capital or education. The relationship is positive with a 0.0009 value and a standard error of 0.0004. The rest of the independent variables have not shown any significant values across the model, these variables shows results that contradicts the expected signs of the coefficient values. Population and previous years GDP per-capita in showing a positive relationship when it is hypothesized to be negative.

The R^2 and adjusted R^2 values shows that the model improves its ability to explain the changes in GDP per-capita growth. Model four ends up with a 0.458 value on r^2 and a much lower adjusted r^2 at 0.353 when adjusting for the amount of observation. The best P-value(F) is in model 2 with a 0.001 value, model 4 got 0.003 meaning it loses some reliability between the models.

Table 3 – Regression lnFDI²⁹

Dependent Variable:	GDP per capita growth (y_{growth})2005-2013			
Models:	1	2	3	4
Independent variables	Estimated coefficient	Estimated coefficient	Estimated coefficient	Estimated coefficient
Constant	-8.6327** (3.8919)	-9.3693** (3.7586)	-6.6131 (4.2362)	-8.4632* (4.5042)
lnFDI	0.5664*** (0.2009)	0.3645* (0.1981)	0.4763** (0.2243)	0.5406** (0.2271)
Corruption		1.4911*** (0.4814)	1.6837*** (0.4873)	1.4586*** (0.5156)
Education		0.0007* (0.0004)	0.0005 (0.0004)	0.0006 (0.0005)
lnGDPCAP_{t0}			-0.8248 (0.5341)	-0.5991 (0.5825)
Population			0.0017 (0.0134)	0.0023 (0.0134)
GDS				-0.0259 (0.0211)
r²	0.185	0.394	0.436	0.463
Adjusted r²	0.162	0.339	0.348	0.356
P-value(F)	0.008	0.001	0.001	0.002
<i>*Check Appendix table 10-13 for full information about the models</i>				

N=38

The logged FDI variable shows significant positive relationship with GDP per-capita growth across the models, varying between a 10, 5 and 1 percent significance level. In the final model it's significant at the 5 percent level and holds a value of 0.5406 with a standard error of 0.2271. The minimum value of the models is 0.3645 and the maximum value is 0.5664.

²⁹ Standard errors in parenthesis

***p<0.01

**p<0.05

*p<0.1

Across the models since introduced, absence of corruption is significantly positively related with GDP per-capita growth at the 1 percent significance level. The value in the last model is 1.4586 with a 0.5156 standard error.

The rest of the variables show no significant relationship with growth. Deviating from the expected signs is population showing a positive sign and GDS showing a negative sign. Otherwise across the variables, the estimated coefficients show signs that were to be expected.

The r^2 value show the best fit between the final model and the data with a 0.463 value. Adjusting for number of observation points the adjusted r^2 has a 0.356 value.

4.4 Comparing models

In both regressions the model two shows the highest P-value(F) 0.001 and in both models, all of the variables (the constant, measurement of FDI, corruption and education) shows a significant relationship with growth. In the two final models (table 9 and 13 in appendix) shows a significant positive relationship of the FDI measurements, FDI/GDP at the 1 percent significance level with 8.538 coefficient estimate and lnFDI at the 5 percent level with a 0.5406 coefficient meaning FDI/GDP is slightly more reliable due to the significance level.

The corruption variable also shows a significant relationship with growth in the two final models. The model with FDI/GDP as measurement of FDIs impact holds corruption significant at the 5 percent level with a 1.3768 value and lnFDI at 1 percent level with 1.4586 value.

Education holds significance in only one of the final models, namely FDI/GDP. This at the 10 percent level. The values of the independent variables that are used in both final models shows similar values in corruption, education and population. GDS and $\ln\text{GDPCAP}_{t0}$ switches signs between the models with lnFDI-model having them as negative and FDI/GDP-model holding them as positive.

5. Analysis

In this section the results are discussed with emphasis on interpretations of it

5.1 Analyzing the regression

The regression at its core is a decent depiction of what affects growth. The chosen ways of measuring the variables is probably not the best ones as there is many different alternative ways of measuring economic growth, FDI, corruption, education and domestic investments. Scale values might not be the best to use in order to get a good estimation of the impact that the variable has. Neither infrastructure nor corruption is stated if ordinal or interval values and the fact of these values being averaged out to values with decimals might slightly alter the results. FDI had alternatives on how to be measured, either as net or net inflows or net outflows, and perhaps another one should be a better fit to measure. Corruption also has an alternative, CPI which is more often used to measure corruption in a country and is created by transparency international whose main focus is corruption and with a wider scale (0-100) instead of the CPIA 1-6. The results are therefore not very reliable, but the hope is that they can give inkling on how growth rates are a function of these variables. With this being said, based on the results, the following is what this thesis finds.

5.2 Analyzing FDI

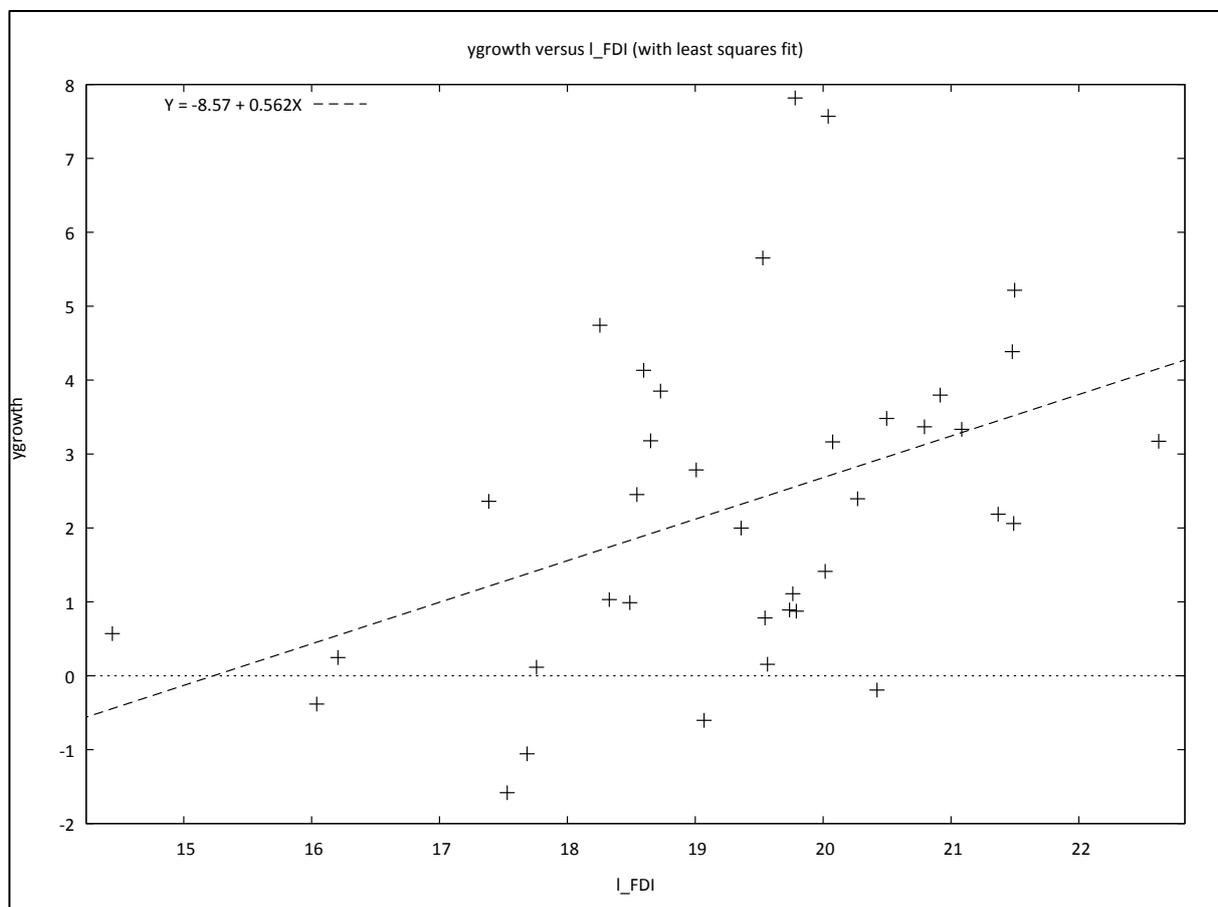
Results from the model support the idea of foreign direct investments being positively related to economic growth. The logged variable FDI indicates that a one percent increase in FDI will result in a 0.5406 percent higher GDP per-capita growth holding all other variables constant. Since no distinguishment between different types of FDI is made during this thesis, it is impossible to definitely say anything about it. The added up overall effect of FDI still is positive, this would imply that the positive effects is greater than the negative ones. The crowding out effect hence is not an immediate threat to growth when MNE is investing in the host country, at least not short term.

The positive effects of FDI is attributed to many different things, one of them being the idea of knowledge spillover when entering a country. Mauro concluded in his study, among other things that corruption and decreasing levels of property rights goes hand in hand. Africa in being a relatively corrupt region of the world hence would see very low levels of these rights. An interesting thought is the interaction between low levels of property rights and protection

of it, and knowledge spillover in FDI. Hypothetically the knowledge spillover effects can, in a way be secured by having low levels of property protection with techniques, ideas etc. easily being able to be copied by other less efficient firms.

Whether the MNEs are performing their FDIs horizontally or vertically the effects according to theory would be the same since these two ideas are based on the intentions of the firms, the hostcountry will still be in the same position. The policies in the host country with regards to taxation and trade for example are what would determine horizontal or vertical.

Figure 1

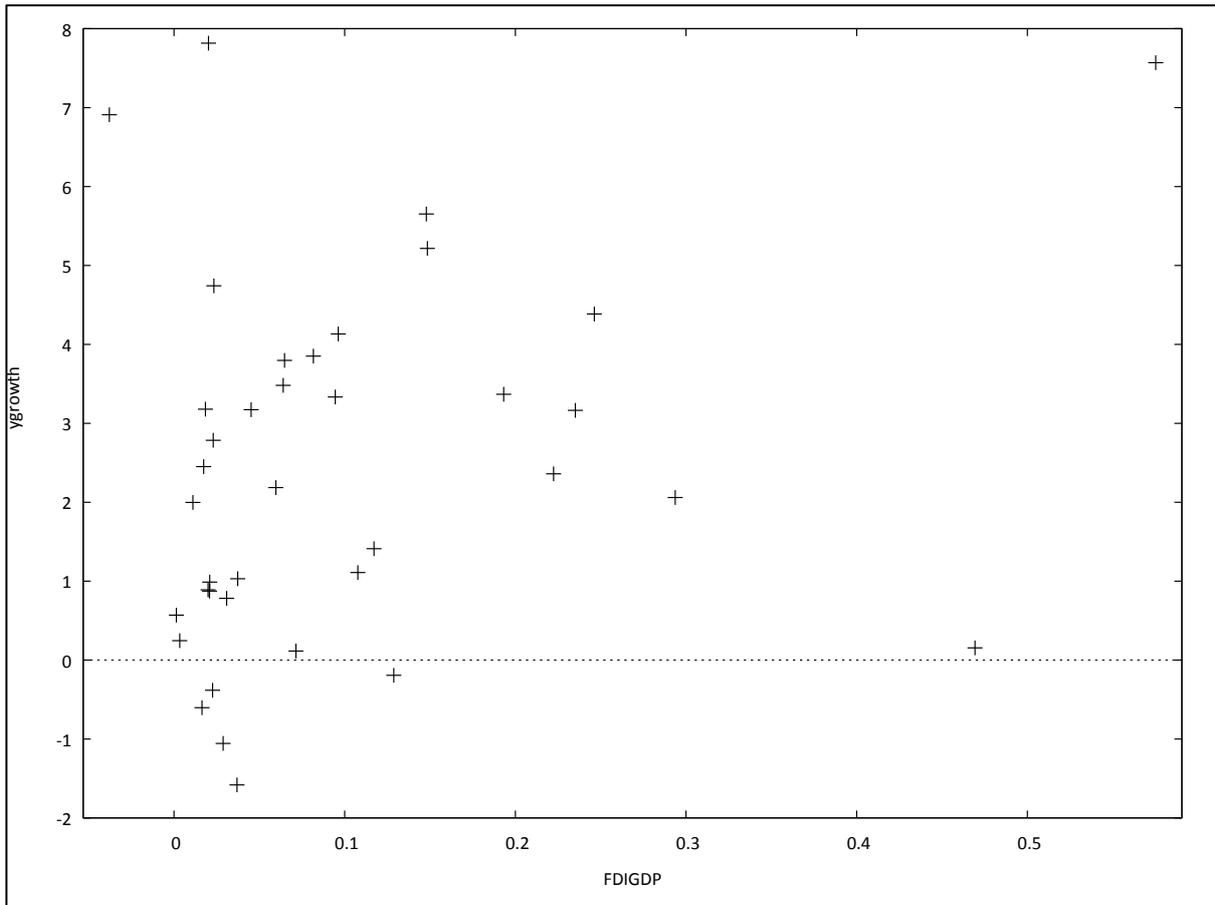


The x-y scatterplot with the dependent variable GDP per-capita growth and independent variable FDI further shows the positive relationship between the two. With a best fitted function of $y_{\text{growth}} = -8.57 + 0.562 \cdot \ln \text{FDI}$. The intercept, though not being too important implies that for a sub-Saharan country with no FDI received, there would be a negative growth of -8.57 percent.

The increased growth with FDI is along the lines of current theory. It is widely discussed in what way FDI generates growth. Changing the productivity of labour and capital, spillover effects, technology levels being raised. Borensztein et.al, Xu & Wang are all agreeing that for the technology brought into the host country via FDI, can only be translated into higher growth if the country possesses a certain level of human capital. If that is the case, then sub-Saharan Africa had sufficient levels of human capital in the 2005-2013 time period.

The study by Gui-Dilby concluded that FDI does have a positive effect on growth for the whole of Africa between 1980 and 2009. When it was divided up into two main periods, 1980-1994 and 1995-2009 the results showed that it was only having a positive effect in the 1995-2009 period. The results of this thesis supports that this observation stands true when only looking at the sub-Saharan part of Africa between 2005 and 2013.

Figure 2



The results of FDI/GDP is that the coefficient estimated 8.538, holding all other variables constant implies that a country in sub-Saharan Africa having FDI=GDP would have an 8.538% greater growth holding all other variables constant than if having FDI=0. This should be taken lightly as having a one-to-one ration between FDI and GDP would imply amongst other things zero consumption and thus not a fully reliable interpretation of the result.

A more logic way to interpret this coefficient is when raising the FDI to GDP ratio value by an increment of 0.01 (1%) the results imply that this would raise GDP per-capita growth by 0.08538%. For any given country, this would imply if holding GDP constant along with the other variables, the amount of FDI in terms of dollars has to rise by to increase growth rate by 0.08538% will be $\frac{GDP}{100}$.

In conclusion for both models is that relative amounts of FDI and absolute amounts, have a positive effect on economic per-capita growth in sub-Saharan countries. The two models with FDI/GDP and lnFDI support each other's results as an increase in FDI or lnFDI would also increase the FDI/GDP ratio and yield in a positive effect on economic growth. Whilst FDI/GDP explains the positive effect of FDI intensity relative to GDP, lnFDI or FDI explains the positive effect of the event of receiving FDI. In both cases it would appear that FDI and a higher level of GDP per-capita growth does correlate positively together.

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6.3 Statistical sources

All data collected from the World Bank database

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Appendix

Table 4 – Country mean value table

	FDI	GDP	GDS%	FDI/GDP
Angola	1753819841	46325847663	37,50469925	-0,03786
Benin	107035662,9	5114350302	11,8274203	0,020928
Burkina Faso	125906796,9	6841688577	11,96853299	0,018403
Burundi	1870961,587	1343713719	-4,157729517	0,001392
Cabo Verde	119254513,2	1239177729	7,409266889	0,096237
Cameroon	393450357,9	18897808813	14,4347824	0,02082
Central african Republic	47924044,44	1664419487	2,364972255	0,028793
Chad	179820703,7	7818667129	25,66792135	0,022999
Comoros	9247120,507	409098632,7	-17,69000673	0,022604
Congo, rep	2153041036	7331251485	46,9470793	0,29368
Congo, Dem.rep	1434153468	15179202043	10,34475577	0,094481
Cote d'ivoire	373120952,3	18695543261	21,06079129	0,019958
Eritrea	41025629,74	1110893516	-11,8907159	0,03693
Ethiopia	389852236,3	19292976004	13,00946066	0,020207
Gambia	51596693,35	722071427,3	4,709028604	0,071456
Ghana	2169117142	14608727973	11,61645915	0,148481
Guinea	314024444,4	669127298,3		0,469304
Guinea-bissau	10916613,15	3248165990	3,852025568	0,003361
Kenya	255453709,8	23035061957	7,639232911	0,01109
Lesotho	136027971,2	1665659414	-36,88563563	0,081666
Liberia	504955183,8	877892230,5	-51,96011686	0,57519
Madagascar	739625672,4	5744732080	4,947578942	0,128749
Mali	382760732,7	3553087550	5,177426152	0,107726
Malawi	113105968,3	6502398184	11,70757298	0,017395
Mauritania	522740883,6	2222967328	26,86685106	0,235155
Mozambique	2130198587	8649662888	7,597031847	0,246275
Nigeria	6691546046	1,47985E+11	22,17211851	0,045218
Niger	492948268,5	4207102974	12,17815382	0,11717
Rwanda	84671174,78	3625342936	6,04729243	0,023355
Sao Tome	35508403,51	159654703,1	3,926522048	0,222408
Senegal	307917903,7	9975913379	7,541687512	0,030866
Sierra leone	302741497,6	2047572818	3,629528027	0,147854
Sudan	1906302513	31923372561	21,64903342	0,059715
Tanzania	1211640514	18708891587	16,49875181	0,064763
Togo	91157589,73	2441255300	0,145352601	0,03734
Uganda	797358141,3	12463883615	10,48270276	0,063973
Zimbabwe	191188888,9	11644170436	14,12637613	0,016419
Zambia	1071636667	5547602923	-9,923965088	0,193171

	CPIA	EDU1000	Y_{growth}	GDPCAPt0	POP
Angola	3	412,014833 3	6,909964078	3587,98584	18,960273
Benin	3,5	503,523	0,988349692	652,4265424	9,2457075 5
BurkinaF	3,33333333 3	434,509	3,179095174	521,3910299	15,129383 4
Burundi	2,16666666 7	266,203375	0,569890373	187,3336034	8,9419406 6
Cabo Verde	4,5	58,595625	4,132388704	3044,058968	0,4873471 1
Cameroon	2,5	934,54	0,873703487	1090,752027	20,142280 3
Central African Republic	2,5	94,398	-1,055915174	423,9940984	4,2754458 8
Chad	2	365,030875	2,785017393	816,4477974	11,393540 1
Comoros	2,5	63,6925	-0,382227314	728,207501	0,6667888 8
Congo, rep	2,38888888 9	264,6815	2,059793898	2485,344828	3,9935284 4
Congo, dem. Rep	2	2704,4068	3,333316432	309,5841942	60,605948 8
Cote d'ivoirie	2,33333333 3	914,041	0,890676996	1182,720594	18,709915 1
Eritrea	2,11111111 1	236,299875	-1,581923715	317,8492258	5,5752297 7
Ethiopia	2,66666666 7	3511,35325	7,817268868	291,4457198	84,963974 2
Gambia	2,05555555 6	107,73375	0,114988587	508,5150039	1,6345234 4
Ghana	3,94444444 4	1780,61737 5	5,216465587	1094,862167	23,668201 2
Guinea	2,22222222 2	538,660875	0,154676506	405,8795442	10,618245 7
Guinea bissau	2,38888888 9	60,9106666 7	0,246133563	506,9833056	1,5561112 2
Kenya	3	2796,097	1,997895837	836,8829389	39,929160 8
Lesotho	3,5	109,963125	3,851363098	893,131636	1,9942844 4
Liberia	3	173,3545	7,569640403	261,2986995	3,7992471 1
Madagascar	2,88888888 9	975,202	-0,192951628	377,5808748	20,543028 2
Mali	3,38888888 9	572,588625	1,109754224	595,3681712	13,583105 2
Malawi	2,94444444	643,61425	2,45162788	284,463343	14,599762

	4				1
Mauritania	2,55555555	108,1025	3,164461275	867,9332867	3,5167884
	6				4
Mozambique	3	512,096375	4,384767333	426,1159535	23,386491
					7
Nigeria	3	709	3,172429199	1513,693311	155,89189
					7
Niger	2,94444444	259,999625	1,411676446	324,4410738	15,388350
	4				5
Rwanda	3,38888888	290,850571	4,74251377	433,998205	10,554060
	9	4			5
Sao Tome	3,5	10,675875	2,360325279	1041,476863	0,1734222
					2
Senegal	3,16666666	611,57575	0,782653334	941,9505325	12,636105
	7				
Sierra Leone	2,77777777	376,7665	5,652225629	421,0612995	5,6309343
	8				3
Sudan	1,72222222	1508,891	2,185706781	1157,242517	34,815275
	2				4
Tanzania	3,11111111	1204,61185	3,797141033	465,2295167	43,804904
	1	7			
Togo	2,22222222	436,65175	1,030855664	475,1781685	6,1590045
	2				5
Uganda	2,61111111	1030,91042	3,481102808	410,82854	32,985350
	1	9			3
Zimbabwe	1,33333333	709	-0,603365864	575,9741134	13,128633
	3				
Zambia	2,88888888	667,2715	3,368228818	1245,069088	12,900814
	9				6

Table 5 – Total mean value table

Variable	Average
FDI/GDP	0.096878
FDI	635184864.5
Corruption	2.761261
Education	709.432514
GDPCAP _{t0}	834.3342137
Population	20.0463
GDS	7.366

Table 6 – OLS model 1

Model 1_1: OLS, using observations 1-38
 Dependent variable: ygrowth

	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	
const	1.9689	0.47132	4.1774	0.00018	***
FDIGDP	4.54025	2.93486	1.5470	0.13061	

Mean dependent var	2.420256	S.D. dependent var	2.324372
Sum squared resid	187.4394	S.E. of regression	2.281808
R-squared	0.062335	Adjusted R-squared	0.036288
F(1, 36)	2.393228	P-value(F)	0.130609
Log-likelihood	-84.24118	Akaike criterion	172.4824
Schwarz criterion	175.7575	Hannan-Quinn	173.6476

Table 7 – OLS model 2

Model 1_2: OLS, using observations 1-38
 Dependent variable: ygrowth

	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	
const	-3.38397	1.48278	-2.2822	0.02886	**
FDIGDP	5.10764	2.50488	2.0391	0.04928	**
COR	1.62528	0.501805	3.2389	0.00268	***
EDU1000	0.00113213	0.000401131	2.8224	0.00791	***

Mean dependent var	2.420256	S.D. dependent var	2.324372
Sum squared resid	124.4743	S.E. of regression	1.913377
R-squared	0.377317	Adjusted R-squared	0.322374
F(3, 34)	6.867476	P-value(F)	0.000970
Log-likelihood	-76.46342	Akaike criterion	160.9268
Schwarz criterion	167.4772	Hannan-Quinn	163.2574

Table 8 – OLS model 3

Model 1_3: OLS, using observations 1-40 (n = 39)
 Missing or incomplete observations dropped: 1
 Dependent variable: ygrowth

	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	
const	-4.90602	3.16008	-1.5525	0.13008	
FDIGDP	5.51586	2.51849	2.1901	0.03569	**
COR	1.52527	0.522076	2.9215	0.00624	***
EDU1000	0.000885535	0.000485882	1.8225	0.07745	*
l_yt0	0.256745	0.488575	0.5255	0.60275	
POP	0.0136057	0.0133514	1.0190	0.31559	

Mean dependent var	2.419599	S.D. dependent var	2.293588
Sum squared resid	119.2068	S.E. of regression	1.900613
R-squared	0.403670	Adjusted R-squared	0.313317
F(5, 33)	4.467691	P-value(F)	0.003223
Log-likelihood	-77.12592	Akaike criterion	166.2518
Schwarz criterion	176.2332	Hannan-Quinn	169.8331

Table 9 – OLS model 4

Model 1_4: OLS, using observations 1-40 (n = 38)
 Missing or incomplete observations dropped: 2
 Dependent variable: ygrowth

	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	
const	-4.01842	3.34876	-1.2000	0.23924	
FDIGDP	8.538	2.93404	2.9100	0.00663	***
COR	1.37679	0.537861	2.5597	0.01557	**
EDU1000	0.000890915	0.000475634	1.8731	0.07051	*
l_yt0	0.146391	0.557503	0.2626	0.79461	
POP	0.0132813	0.013089	1.0147	0.31811	
GDS	0.00731555	0.022525	0.3248	0.74753	

Mean dependent var	2.479202	S.D. dependent var	2.293562
Sum squared resid	105.5470	S.E. of regression	1.845194
R-squared	0.457721	Adjusted R-squared	0.352763
F(6, 31)	4.361017	P-value(F)	0.002649
Log-likelihood	-73.32950	Akaike criterion	160.6590
Schwarz criterion	172.1221	Hannan-Quinn	164.7375

Table 10 – OLS model5

Model 2_1: OLS, using observations 2-38 (n = 37)

Dependent variable: ygrowth

	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	
const	-8.63271	3.89186	-2.2181	0.03313	**
l_FDI	0.566418	0.200904	2.8194	0.00787	***
Mean dependent var	2.298912	S.D. dependent var	2.231080		
Sum squared resid	146.0327	S.E. of regression	2.042636		
R-squared	0.185075	Adjusted R-squared	0.161792		
F(1, 35)	7.948756	P-value(F)	0.007868		
Log-likelihood	-77.89961	Akaike criterion	159.7992		
Schwarz criterion	163.0211	Hannan-Quinn	160.9351		

Table 11 – OLS model6

Model 2_2: OLS, using observations 2-38 (n = 37)

Dependent variable: ygrowth

	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	
const	-9.36926	3.75864	-2.4927	0.01787	**
l_FDI	0.364532	0.198092	1.8402	0.07475	*
COR	1.49109	0.481363	3.0976	0.00397	***
EDU1000	0.000724838	0.000414535	1.7486	0.08967	*
Mean dependent var	2.298912	S.D. dependent var	2.231080		
Sum squared resid	108.6443	S.E. of regression	1.814456		
R-squared	0.393718	Adjusted R-squared	0.338602		
F(3, 33)	7.143382	P-value(F)	0.000795		
Log-likelihood	-72.42821	Akaike criterion	152.8564		
Schwarz criterion	159.3001	Hannan-Quinn	155.1281		

Table 12 – OLS model7

Model 2_3: OLS, using observations 1-40 (n = 38)
 Missing or incomplete observations dropped: 2
 Dependent variable: ygrowth

	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	
const	-6.61309	4.23618	-1.5611	0.12834	
l_FDI	0.473597	0.224285	2.1116	0.04262	**
COR	1.68366	0.487313	3.4550	0.00157	***
EDU1000	0.000539858	0.000464772	1.1616	0.25401	
l_yt0	-0.824807	0.534146	-1.5442	0.13238	
POP	0.00174071	0.0133917	0.1300	0.89739	

Mean dependent var	2.301431	S.D. dependent var	2.200778
Sum squared resid	101.0830	S.E. of regression	1.777314
R-squared	0.435942	Adjusted R-squared	0.347808
F(5, 32)	4.946347	P-value(F)	0.001821
Log-likelihood	-72.50842	Akaike criterion	157.0168
Schwarz criterion	166.8424	Hannan-Quinn	160.5127

Table 13 – OLS model8

Model 2_4: OLS, using observations 1-40 (n = 37)
 Missing or incomplete observations dropped: 3
 Dependent variable: ygrowth

	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	
const	-8.46322	4.5042	-1.8790	0.07000	*
l_FDI	0.540583	0.22713	2.3801	0.02387	**
COR	1.4216	0.515967	2.7552	0.00987	***
EDU1000	0.000579613	0.000465907	1.2441	0.22311	
l_yt0	-0.599087	0.582472	-1.0285	0.31192	
POP	0.00237683	0.0134018	0.1774	0.86042	
GDS	-0.0259089	0.0210831	-1.2289	0.22866	

Mean dependent var	2.359452	S.D. dependent var	2.201474
Sum squared resid	93.63477	S.E. of regression	1.766680
R-squared	0.463330	Adjusted R-squared	0.355996
F(6, 30)	4.316709	P-value(F)	0.002974
Log-likelihood	-69.67768	Akaike criterion	153.3554
Schwarz criterion	164.6318	Hannan-Quinn	157.3308

Table 14 – Correlation matrix

	CPIA	EDU	y _{growth}	POP	GDS	FDI/GDP	lnGDPCAP _{t0}	lnFDI
CPIA	1	-0.0868	0.4304	0.1062	-0.1525	0.0824	0.2952	0.1071
EDU		1	0.3018	-0.0204	0.1971	-0.1737	-0.1223	0.4102
y _{growth}			1	-0.1174	-0.0203	0.2497	0.1401	0.4302
POP				1	0.0017	-0.1682	0.0926	0.0245
GDS					1	-0.3421	0.4389	0.3632
FDI/GDP						1	-0.3366	-
lnGDPCAP _{t0}							1	0.3183
lnFDI								1

Table 15 – Variable Summary

Variable	Mean	Median	Min	Maximum	Std. Dev
y _{growth}	2.42	2.27	-1.59	7.82	2.32
lnFDI	19.300	19.545	14.442	22.624	1.695
FDI/GDP	0.099	0.059	-0.037	0.575	0.126
Corruption	2.7646	2.8333	1.3333	4.5000	0.63072
Education	709.43	470.09	10.676	3511.4	798.46
lnGDPCAP _{t0}	6.4686	6.3063	5.2329	8.1853	0.68244
Population	19.863	12.901	0.17342	155.89	28.359
GDS	7.3660	7.6392	-51.960	46.947	17.618