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Promoting Growth

An empirical analysis of the effect of ODA and FDI on sub-Saharan Africa's economic growth

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1: PROMOTING GROWTH

Despite an enormous amount of foreign inflow over the past 50 years, sub-Saharan Africa remains to be the poorest region in the world. This foreign inflow mainly consists of official development assistance (hereafter: ODA), which are grants and loans from foreign governments, and foreign direct investment (hereafter: FDI), which also consists of foreign funds but is different in that it does not encapsulate grants and concessional loans, merely investments.

One study argues that ODA "is not only ineffective, it is arguably counterproductive" (Prokopijević, 2007). Economist William Easterly contends in his 2006 book The White Man's Burden that ODA has not worked and there needs to be a different approach to solving the problem of poverty in sub-Saharan Africa. This illustrates the scepticism many countries are facing with regards to ODA, and why so many countries are not taking measures to spend 0.7% of their GNP[1] on ODA.

On the other hand, there are researchers who contest the notion that ODA is detrimental to growth and say that ODA is essential in achieving a poverty-free Africa. Some state that poverty would be higher in absence of aid (McGillivray, 2007). Economist Jeffrey Sachs states in an interview about his book The End of Poverty that 'there are tremendous things that can be done' (Roychoudhuri, 2005) with ODA.

Regardless of one's position in the debate on aid effectiveness, history has shown that the inflow has not been able to alleviate sub-Saharan Africa from its economic pains. World Bank data shows its level of GDP per capita is on average the lowest for any region in the world. This is after more than $600 billion worth of ODA has been given (World Bank Data); $600 billion has not solved the problem. The question then arises: does ODA actually promote growth? And if ODA fails to promote economic growth, are there other instruments that can succeed?

According to Unceta et al. (2010), FDI is more and more seen as the principal method of financing growth. It is very similar to ODA in that both are foreign sources

[1]A policy agreed upon in the UN 1970 General Assembly Resolution. See http://www.unmillenniumproject.org/press/07.htm, retrieved December 10, 2013.

of financial capital, but the two are very different with respect to their goals and effects. While ODA may have the goal of providing better sanitation or health, FDI's intention is to "acquire ownership of assets for the purpose of controlling the production, distribution and other activities of a firm in another country" (Moosa, 2002), and is, following that definition, not primarily aimed at improving living conditions or economic growth. However, according to the OECD (2002), "Developing countries, emerging economies and countries in transition have come increasingly to see FDI as a source of economic development and modernization, income growth and employment." This raises another question: does FDI really promote economic growth or are the positive effects of FDI purely hypothetical?

These questions lead to the main question of this paper: do ODA and FDI affect economic growth? This paper studies the effect of ODA and FDI on sub-Saharan Africa's economic growth and the interaction between human capital and ODA and FDI on economic growth.

1.1: Relevance

This study is of social importance and relevance because it aims to bridge the gap between the proponents and opponents of ODA and FDI. Sub-Saharan Africa's low economic growth is also a problem that requires more investigation. Current ODA spending is under pressure, because the economic crisis is causing countries to reconsider their budget allocations and instead may choose to designate more money to domestic issues instead of ODA. For example, as part of next year's budget cuts, the Netherlands will spend less than the 0.7% of its GNP on ODA. This will be the first time in the history of the Netherlands that the government has decided not to meet this obligation.

This study is of scientific importance and relevance because it adds to the ongoing debate on the effectiveness of ODA and FDI regarding both economic growth and the independent variables of which economic growth consists. Perhaps the most revolutionary aspect of this study is its emphasis on the relationship between human capital and ODA and FDI. This emphasis is largely motivated by the chosen growth model: the Romer model. This paper also takes into consideration several interaction

effects between human capital and ODA and FDI, considers ODA and FDI as endogenous variables and looks at the effects of ODA on FDI and vice versa, which many other studies do not do.

1.2: Sample countries

Due to pragmatic reasons, the decision was made to eliminate several sub-Saharan African countries from the sample. Out of the 48 countries the region consists of, this paper focuses on the economies of the following 15: Benin, Botswana, Burkina Faso, Cote d'Ivoire, Ghana, Guinea, Kenya, Lesotho, Malawi, Mali, Nigeria, Senegal, South Africa, Tanzania and Uganda. The absent countries were not included due to the lack of available data[2] or the fact that they were neither colonized by the British Empire nor France and were not Christian or Muslim.

1.3: Definition of Terms

1.3.1: GDP

Gross domestic product (hereafter: GDP) stands for the sum of value added by all producers within one country. For the purpose of this paper, GDP per capita annual growth (in percentages) will be used. The data is taken from the World Bank and concerns the years 1980-2012. These GDP per capita statistics are based on the constant local currency of each individual country. By measuring each country's annual growth, it becomes suitable for measuring and comparing the different sub-Saharan African economies.

1.3.2: ODA

As mentioned before, ODA stands for official development assistance. Throughout this research paper, the following definition, which was issued by the World Bank, will be maintained: "ODA is made up of payments of loans made on concessional terms and grants of the Development Assistance Committee (hereafter: DAC) by multilateral institution, and by non-DAC countries to promote economic development and welfare in countries and territories in the DAC list of ODA recipients." The main goal of administering ODA to developing countries is to promote the economic

[2]Further information regarding data availability can be found in section 6.

development and welfare of developing countries as its main objective, according to the OECD factsheet "Is it ODA?" (2008). Therefore, monetary funds donated for the purpose of military aid, anti-terrorism and peacekeeping are not considered to be ODA.

In this paper, the ODA statistics are measurements of ODA received as a percentage of the country's GNI. The reason for this is that it is easier to compare ODA amounts countries receive with each other, which is much more difficult to do with absolute amounts of ODA. This paper may occasionally use the term "foreign aid" to denote general aid spending because current literature often refers to foreign aid. Under this umbrella term 'foreign aid', ODA is an active part. Therefore almost all certainties for foreign aid are certainties for ODA as well. The data is taken from the World Bank and concerns the years 1980-2012.

1.3.3: FDI

As mentioned before, FDI stands for foreign direct investment. Throughout this research paper, the following definition, which was issued by the World Bank, will be maintained: FDI "are the net inflows of investment to acquire a lasting management interest in an enterprise operating in an economy other than that of the investor."

In this paper, FDI statistics are measurements of FDI received as a percentage of the country's GDP. The reason for this is that it is easier to compare the amount of FDI one country receives with the amount of FDI that other countries receive. If it were absolute, it would not be as significant. The data is taken from the World Bank and concerns the years 1980-2012.

1.4: State-of-the-art

This section contains a brief overview of the current views on the effects of ODA and FDI on economic growth as can be found in the literature.

1.4.1: EFFECTS OF ODA

The current views on ODA are very polarized. Proponents argue that ODA has brought Africa much-needed infrastructure and services and is necessary for future

development and poverty alleviation (Sachs, 2005) whereas opponents argue that ODA money has fallen prey to corruption, high administration and transport costs and thus is ineffective (Moyo, 2009). Economic literature often argues for the existence of a "micro-macro paradox"; microeconomic studies state aid has a positive influence on economic growth whereas macroeconomic studies suggest the opposite (Durbarry et al., 1998). According to Hansen and Tarp (2000), this paradox is non-existent and the positive effects found in microeconomic studies align with the observations in macroeconomic papers. They state that foreign aid unconditionally promotes economic growth but that its returns are diminishing. This means that finding the right dose of foreign aid is important. Burnside and Dollar (2000), however, argue that foreign aid has a positive impact on growth only in developing countries with good fiscal, monetary and trade policies: “Aid appears not to affect policies systematically either for good or for ill. Any tendency for aid to reward good policies has been overwhelmed by donors’ "pursuit of their own strategic interests.” This paper caused many other publications on the subject, some of which confirmed and supported the paper’s findings (such as Collier and Dollar (2002), McGillivray (2003)) while others find that the analysis presented in the paper is too sensitive and that the effects of ODA are insignificant even when there are sound policies in place (Easterly et al., 2003). Easterly (2003) criticizes the approach in the Burnside and Dollar studies and demonstrates that using different definitions of "aid", "policies" and "growth" (referring to the title of the paper: Aid, Policies and Growth and its contents) changes the outcome. In summary, the effects of foreign aid (and thus ODA) on economic growth are still subject of dispute.

1.4.2: EFFECTS OF FDI

Currently, FDI is believed to be able to play a key role in economic development (Hansen and Rand, 2005) and as a result, many countries have adopted foreign policies that aim to increase the amount of FDI inflow. Carkovic and Levine (2002) state that "an influential rationale" for many countries to work hard to attract FDI is that “FDI and portfolio inflows encourage technology transfers that accelerate overall economic growth in recipient countries.”

However, they also argue that many of the macroeconomic studies that support this belief do not fully control for country-specific effects and several other factors, which

led to their conclusion that “the results [of the study] are inconsistent with the view the FDI exerts a positive impact on growth that is independent of other growth determinants.”

Graham and Krugman (1991), on the other hand, argue that FDI has an advantage over domestic investments because foreign firms must compensate for the advantages (such as better knowledge of and easier access to the market) that domestic firms enjoy, and will thus only take the risk of investing when they are confident that they are able to compensate for these advantages. Borensztein et al. (1998) add to this that "FDI may be the main channel through which advanced technology is transferred to developing countries". They also note that, on the other side, FDI may be the only method for foreign businesses to sell their products on the domestic markets due to protectionist trade policies in the host country that prevent the companies from exporting their goods to this host country. The same study also finds a strong relationship between the level of educational attainment and the effect of FDI on economic growth. It uses educational attainment as a proxy for human capital. This relationship could not be found for domestic investments, which is "possibly a reflection of differences of technological nature between FDI and domestic investment".

In conclusion, the relationship between FDI and growth is mostly believed to be positive, but whether this relationship is independent of other growth-promoting variables is still contested.

1.5: Structure of the paper

This paper will adhere to the following structure. The next section of the paper, Theoretical Framework, will encompass all the relevant economic theory needed for the understanding of this study. Thereafter research methods and necessary clarifications can be found, in Methodology. This will lead to the core of the paper: the results and analyses. In this section the results from the regression analyses will be investigated and discussed. Subsequently, a final analysis will be made in this paper’s conclusion wherein the found results will be substantiated. The anomalies will be picked out and scrutinized in an effort to better understand the subject matter.

A policy recommendation based on this final analysis follows. Lastly, a discussion of the paper is included.

2: THEORETICAL FRAMEWORK

2.1: Economic Growth

Economic growth is defined as the increase in GDP per capita (in %) of a country and is often used as a measure of wealth in a country (Goossens, 2009). GDP per capita is used as a measure because it corrects a country's annual production for the size of its population, giving a decent indication of the wealth of that country. This definition of wealth, however, is imperfect seeing as it is only focuses on "economic market activity", as European Commission president Barroso puts it (Goossens, 2009). It does not include such factors as happiness or the quality of the environment of a country. Nonetheless, it seems to be the most appropriate measure there is to compare and contrast the economic development between the sub-Saharan African countries.

2.2: Growth model - Romer

As was mentioned in section 2.1, economic growth is defined as the increase in GDP per capita. The total GDP of a country is, in turn, the sum of all the production within a country. In addition, the traditional production is a function of the available physical capital (K) and labour (L) in a country. This all leads to the following equation:

$$Y = f(\mathrm{K}, \mathrm{L})$$

This function is the starting point for any study of economic growth and is known as the classical growth model. In this model, everything aside from K and L is exogenous.

This classical model, however, does not take into account the factor human capital. Oxford Dictionaries defines human capital as "the skills, knowledge, and experience possessed by an individual or population, viewed in terms of their value or cost to an organization or country." The role of human capital has shown to be more imperative for the economic growth in developing countries than thought in the past (Hanushek, 2013).

Despite the relatively recent emphasis on the link between human capital and economic development, Adam Smith had already written about human capital in his most prominent work, The Wealth of Nations:

> But this proportion must in every nation be regulated by two different circumstances: first, by the skill, dexterity, and judgement with which its labour is generally applied; and secondly by the proportion between the number of those who are employed in useful labour, and that of those who are not so employed. Whatever be the soil, climate, or extent of territory of any particular nation, depend upon those two circumstances.

As is evident from the above written excerpt, Smith acknowledged the influence that skill, dexterity and judgement have on labour. Nowadays, these three characteristics can be attributed to human capital: the qualities that define the workforce.

Apart from the human capital aspect of Smith's extract, the last line focuses on another aspect that is forgotten in the classical model. Circumstances such as soil and climate are ignored. This brings us to geographical, demographical and social factors that play a role in determining economic growth (Tradico, 2008). Sachs and Bloom (1998) have shown that other factors are significant in the economic growth rate that countries enjoy, aside from the classical model's physical capital and labour. These other factors will be called total factor productivity (hereafter: TFP) for the rest of this paper.

The lack of human capital and TFP in the classical model led to the use of the Romer model to conduct the analysis. The founder of the Romer model, Paul Romer, focuses on the important questions that are ignored by the classical model, especially whether human capital should be treated as exogenous or endogenous. According to the Romer model, matters such as education and health, should be made endogenous as it is a result of government policy (Parker coursebook). Romer's simplification makes human capital responsive to economic incentives, instead of physical capital (Romer, 1989). Thus Romer's model for economic growth is:

$$y(t) = \frac{\mathrm{Y(t)}}{\mathrm{A(t)H(t)}}$$

In this growth equation y is the change in production (GDP, in this case), also known as economic growth, Y stands for GDP, A stands for TFP and H stands for human capital.

3: METHODOLOGY

To find the manner in which both ODA and FDI affect economic growth, a cross-country regression analysis is used for the 15 different sub-Saharan African countries: Benin, Botswana, Burkina Faso, Cote d'Ivoire, Ghana, Guinea, Kenya, Lesotho, Malawi, Mali, Nigeria, Senegal, South Africa, Tanzania and Uganda. In line with the Romer model, the decision was made to find variables for the two main inputs of economic growth: human capital and TFP. This results in the following model wherein Y stands for GDP, A stands for TFP and H stands for human capital:

$$Y = AH$$

As the assumption is made that A and H determine GDP, proxies for A and H were found for the regression analysis to measure human capital the standard is education. However this paper finds education to be too narrow to measure both the intellectual capacities of the labour force, as well as the physical aspect of the labour force. Three other variables were used: health, workforce and employment and enabling environment. These variables will be explained in section 3.2

To measure TFP this paper focused on the main characteristics of the sub-Saharan African countries that, according to current literature, have a large influence on a country's economic situation. The chosen proxies for TFP are: geographical position, political instability, ethno-linguistic fractionalization, former colony and religion. These variables will also be explained in section 3.2

3.1: Regression analysis

For the purpose of this paper, a cross-country regression analysis will be performed using the 15 different sub-Saharan African economies. Through Microsoft Excel 2013, it is possible to run a regression analysis up to 16 variables.

A regression analysis describes the variances between the x-values and the y-value. The assumption is then made that all economic growth starts at the same intercept, and change according to the data of each economy. Put simply, it will try and describe Y as a function of the X-variables:

$$Y = b_0 + b_1X_1 + b_2X_2 \ldots + b_nX_n$$

In this equation b_0 denotes the intercept, b stands for the coefficient of the corresponding X, and X denotes the x-value. The coefficients of each of the variable show their part in determining the economic growth an economy enjoys.

3.1.1: INTERPRETING OUTPUT

To understand the results, it is essential to understand the regression output as presented in Excel and in the tables. For this purpose, the following terms will be explained in this section: R^2, adjusted R^2, significance F and p-value. All these terms will be used in section 4, Results.

3.1.1.1: R^2

R^2, also known as the coefficient of determination, describes the variation in the y-value as a result of the variances of the x-values. R^2 is always between 0 and 1, with 0 meaning that 0% of the variation of y can be attributed to the x-values and a value of 1 meaning that 100% of the variation of y can be attributed to the changes of the x-values.

3.1.1.2: Adjusted R^2

The adjusted R^2 is of importance in multiple regression analyses, as it takes into account that R^2, by definition, grows when more variables are added. The increment in adjusted R^2, however, also takes into account the number of x-values in the model compared to the number of data. Therefore, adding an x-term will not increase the adjusted R^2, unless its influence on the y-value is significant. If the added x-term is insignificant, the value for adjusted R^2 will drop.

Adjusted R^2 differs from R^2, as it is mostly a tool for comparing the suitability of alternative sets of variables.

3.1.1.3: Significance F

The significance F shows whether the model is statistically significant or not, or in layman's terms: is this model accurate? The normal distribution plays an important role in the calculations performed in a regression. This case can be seen in the

significance F. Under the regression's normal distribution, the null hypothesis is that the coefficients of all the variables are equal to 0. The alternative hypothesis, in this instance, is that the coefficient is lower or higher than 0, and thus, whether the independent variables actually have an influence on the dependent variable. The null hypothesis is rejected if the significance F is below 0.05 (Rice, 1989).

3.1.1.4: P-value

The p-value is another example of the role that the normal distribution is strongly present in this paper's method of analysis. Using the normal distribution, it is possible to test a null hypothesis against an alternative hypothesis through the means of data. Once again, the null hypothesis is that the coefficients of the x-value to which the p-value belongs is 0, while the alternative hypothesis is that it is greater or lesser than 0. This value is expressed in terms of a chance, or probability, hence 'p'-value. In order to accept the alternative hypothesis, the p-value has to be lower than the significance level indicated. Just like with the significance F, the significance level at which a value is believed to be accurate is 5%, as is mentioned in section 3.1.1.3.

3.1.2: Two-way interaction

Through the cross-country regression analysis, this paper learns only the superficial effects of the variables. An economy is dynamic; the determinants of economic growth interact with one another. The following example will illustrate this point. When a person takes medicine A, it relieves their ache. If another person takes medicine B, it also combats the symptoms of the disease. On their own, both medicines work fine. However, what happens if one person takes both medicine A and B? As is common knowledge, mixing medicines is not a good idea because the newly created effect is unknown, or harmful. In development economics, this is the same case. Does a particular combination of human capital and ODA or FDI influence economic growth? Is this influence positive or negative? Regardless of it being positive or negative, the results will add to the understanding of the subject matter.

Measuring the effects of the combined variables, better known as interaction term, is different from interpreting the results from the main regression. In a regression

wherein an interaction term is present, it is necessary to include the two original variables it consists of. The reason for this is, mathematically put:

$$Y = b_0 + b_1(A) + b_2(B) + b_{12}(AB)$$

In the equation written above b_0 is the intercept, b_0 is the coefficient of variable A, b_2 is the coefficient of variable B and b_{12} is the coefficient of the interaction term, AB. As is noticeable, this equation is considerably different from the equation without the interaction effect (see section 3.1). Coefficient b_{12} can be found by running a regression analysis in Excel, wherein both the independent variables it consists of are included.

3.1.3: STANDARDIZING VARIABLES

All variables, and their accompanying data, that this paper has used are recorded in Appendix A. For the purpose of this paper, the decision was made to standardize all the x-values, or independent variables. The y-value, or dependent variable, will remain unstandardized to maintain its original and more meaningful metric. This approach to standardization is called x-standardization: only the x variables are standardized.

Standardizing means that one centres all the data of the variables; the mean of the data becomes 0. This can easily be done by subtracting the mean from all the variables. Afterwards, the centred variables are divided by their standard deviation. As a result the standardized variables will have a mean of 0 and a standard deviation of 1 (see Appendix B). This is useful, as the unstandardized data are on very different scales (see Appendix A) and thus the regression coefficients cannot be directly compared to each other.

In this paper, there are several regression analyses. Most of these have GDP as the y-value. For this reason, GDP is not standardized in those regressions. However in section 4.3.1, the y-value of that regression is ODA. In this instance, ODA is not standardized, while GDP is (as it is now considered to be an x-value). The same is true for section 4.3.2, wherein FDI is the y-value.

3.2: Variables Explained

The independent variables used in this paper both deviate and conform to the current wave of research on ODA and FDI effectiveness. For example, this paper does not solely measure human capital with the proxy of education. It also takes into account health, workforce and employment and enabling environment. On the other hand, traditional variables such as geographical position and religion are used in the regression analysis. The effects of these variables have shown to be influential and should thus be included in the analysis.

3.2.1: RELIGION

Religion is still very much present in Africa. While the Western world has secularized in the past years (Bruce, 1999; 2002), Africa still enjoys a very high degree of religiosity and is particularly split between Islam and Christianity (Duin, 2010). According to Barro & McCleary (2003), "empirical research on the determinants of economic growth has typically neglected the influence of religion." This study tries to compensate for that lack by incorporating religion into the model. The same study also finds that the belief in heaven and hell tends to increase economic growth, a belief which is mostly found in Islam. This positive relationship between Islam and economic growth compared to Christianity is supported by Noland (2005), a study that also notes the positive effect of Islam as TFP. This is the reason why this paper uses dummy variables denoting Islam and Christianity. The data was collected from the CIA World Factbook (2010 edition).

3.2.2: LANDLOCKED

Whether a country is landlocked or not matters; 90% of the world's trade volume is transported by ship (OECD data) and Africa's economy is characterized by a low level of intra-continental trade[3], and thus many countries need to rely on trade by sea. Adam Smith already theorized that economic growth would occur in areas adjacent to major waterways:

> As by means of water-carriage a more extensive market is opened to every sort of industry than what land-carriage alone can afford it, so it is upon the

[3] As stated by the African Union: Action plan for boosting intra-African trade

> sea-coast, and along the banks of navigable rivers, that industry of every kind naturally begins to sub-divide and improve itself, and it is frequently not till a long time after that those improvements extend themselves to the inland part of the country.

Historically, Smith's observations seem to be correct. Periods of high economic activity have mainly taken place in areas with access to large rivers, seas or oceans. Gallup and Sachs (1999) shows that the GDP per square meters, which is used as an indicator for economic activity, is the highest in areas connected with oceans or major rivers.

This means that landlocked countries are put at a disadvantage because they need to rely more on infrastructure (mainly (rail)roads) for transport, have no direct access to seaports and have to pay more customs fees. On average, 15% of export earnings in landlocked countries are spent on transport. Some African countries even pay upwards to 50% of their export earnings on transport (Hagen, 2003).

Landlocked data was taken from a map of the world.

3.2.3: PAST COLONIZER

Starting in 1881 and lasting up until the dawn of the First World War in the 20th century, European imperial powers colonized African soil. Most countries in Africa were occupied by the French and British Empires, the remaining countries being occupied by other European powers such as Belgium (Congo) and Portugal (Angola) (Pakenham, 1991). We will solely focus on former British and French colonies, for practical reasons, such as to maintain the manageability of our analyses.

The past colonizer of a country has a great influence on the general development of a country. In general, it is found that former British colonies perform better, in terms of economic growth and wealth, than former French colonies (Grier, 1999). This is attributed to several factors. Firstly, the legal system; the British Commonwealth and its (former) colonies are known to use the principles of common law (laws that have

been adopted and evolved through judges' decisions[4]), while the countries colonized by the French adopted the civil law system (CIA: The World Factbook, 2010):

> 1) Common law systems provide greater rights to investors and property owners (in comparison to civil law systems) while
>
> 2) British culture creates a strong commitment to the enforcement of those rules that do exist, and
>
> 3) The independent judiciary and emphasis on separation of powers in common law systems provide a greater number of checks on political expropriation. As North (2005) argues in the context of American economic development, "The heritage of British institutions created a favourable milieu for the development of the institutions of impersonal exchange which were the foundation of the long-term economic growth…" Treisman (2000) finds that common law countries have lower levels of corruption in comparison to civil law countries. (Lee & Schultz, 2011)

Secondly, the educational systems implemented by the British and French colonizers also differ, which Grier (1999) views as an important contributor to development. An example of one of these different policies:

> The largest difference between colonial education policies is that the British made a conscious effort to avoid alienating the native culture, by teaching in the vernacular languages and training teachers from the indigenous tribes.

This approach to education during colonial times highlights differences between the way the French treated their colonies and their inhabitants compared to the British. The British allowed for a more openly structured and free colony (even though British treatment of the US during colonization would suggest otherwise) while the French consciously tried to assimilate the cultures present in their colonies and make them part of France:

> The French approached the constitutional relationship between colonies and metropolis with an assumption derived from the republican principles of 1789. The republic was one and indivisible: colonies were an intrinsic part of it, and

[4] As defined by the Encyclopaedia Brittanica

> should ideally be assimilated to it in every particular way (...) This meant not only a single tariff system, but application of the metropolitan pattern of local government and laws, representation of colonists in the French assembly, and full cultural assimilation. (Fieldhouse, 1966)

From this follows that the relationship between economic growth and having been colonized by the British Empire is relatively positive compared to the relationship between economic growth and having been colonized by the French.

The data used to determine whether a country used to be a French or British colony was retrieved from the CIA World Fact Book.

3.2.4: ETHNO-LINGUISTIC FRACTIONALIZATION

Ethno-linguistic fractionalization is the division of ethnic and linguistic groups. A high degree of ethno-linguistic fractionalization means that there are many different of these groups in the relevant country. In the past few decades, researchers have increasingly looked at ethno-linguistic fractionalization as a determinant of economic growth (Bossert et al., 2005). Alesina and La Ferrara (2005) state that a high degree of ethno-linguistic fractionalization can hamper growth due to an increase in discrimination and conflicts of interests. High ethnic diversity is also closely associated with low schooling, underdeveloped financial systems, distorted foreign exchange markets and insufficient infrastructure, according to Easterly and Levine (1999). They also state that the large differences between Africa's and East Asia's growth (the former being a disaster, the latter a success) can partially be attributed to Africa's higher ethno-linguistic fractionalization. On average, it explains between one-fourth and two-fifth of the difference between the two regions and might fully explain some extreme cases (like Tanzania, which is highly ethnically fractionalized, and Japan, which is the opposite).

This paper uses a variant of the standard ethno-linguistic fractionalization measurement that only takes groups that are politically relevant into account, an indicator called Politically Relevant Ethnic Groups (hereafter: PREG). Using this indicator was proposed by Posner (2004) as a more accurate method of accounting for the effects of ethno-linguistic diversity on economic growth because these groups

are the only ones that have an influence on politics and thus on economic policies. This paper also uses the data of Posner's study.

3.2.5: POLITICAL INSTABILITY

This paper uses the political instability index from the Economist Intelligence Unit as a measure for social unrest in a country. Current literature finds that political instability exerts a very strong negative effect on economic growth, and to a lesser extent, also has an adverse impact on the aggregation of human capital (Aisen and Vega, 2012). Alesina et al. (1996) used a sample of 113 countries with data from the years 1950 to 1982 and find that countries with high political instability have significantly lower GDP growth than other countries. This outcome is supported by Jong-a-Pin (2009).

It is also theorized that a high degree of social unrest has a negative correlation with FDI (Alesina and Perotti, 1995). This would be because it may cause an uncertain investment climate in which foreign companies cannot accurately assess the return on their investments and are thus discouraged from investing money. The same study also concludes that increased income equality and decreased FDI are connected through an increase in political instability. They suggest that taking measures to decrease the difference between income classes decreases the political instability and in turn, helps to stimulate FDI and growth. Socio-political unrest is also linked to an increase in inflation (Aisen and Veig, 2006).

3.2.6: EDUCATION

Over the years, the positive link between education and a country's economic growth has become common knowledge. The case is made that the level of education within a country is an appropriate measure of the capabilities of its workforce (Tamny, 2013). This phenomenon is known as human capital. The fast growth of some countries at the top of the achievement distribution, such as Singapore and Korea, can be readily explained by their students' high educational achievements (Peterson and Hanushek, 2013). Following the same principle, a lacklustre education system accompanies weak economic growth.

The link between education and economic growth has shown to be positively related to the starting level of average years of school attainment (Barro and Lee, 2001).

The data used for the regression is retrieved from the Human Capital Report by the World Economic Forum (hereafter WEF). The WEF variable of education is divided into three groups: the country's access to education, the quality of education and the educational attainment of those already active in the labour force.

The Human Capital Report uses several proxies to measure their variables. A country's access to education is measured by looking at the primary, secondary and tertiary enrolment rate as well as the gender gap in each of these groups. The quality of education is measured by assessing the internet access in schools, along with the quality of the education system, the primary and management schools and the math and science curriculum. Lastly, the WEF looks at the primary, secondary and tertiary education attainment of the population over the age of 25. By looking at this last factor, it takes into account the country's history.

3.2.7: HEALTH

The causal relationship between stable economic growth and good health may be more obvious, but it is also known that an increase in health can cause increased growth (Arora 2001). Arora also states that better health allows a population to be more productive. Moreover, health improvements over the past century have "reduced constraints on human ability and increased the pace of long-term growth by 30 to 40 percent." This was caused by investments in factors such as health infrastructure but also by increased knowledge of germs. The gap between healthcare services may even explain the economic disparity between developed and lesser developed countries.

The data used by this paper concerning health consists of many different factors, fully outlined in the WEF Human Capital Report. Such factors include the number of people dying from non-communicable (such as cancer) and communicable (such as HIV/AIDS) diseases before the age of 60 which the WEF regards as the time period in which an individual contributes the most to economic growth. Malaria is known to be especially detrimental to economic growth, being one of the most widespread and deadly diseases in sub-Saharan Africa, and is often attributed as being one of the primary causes of poverty in these countries (Gallup and Sachs, 2000).

The health variable also contains indicators concerning services and infrastructure such as accessibility to health care, hospitals, and drinking water resources. These are all significant to health since they determine how long humans live. This leads to the final factor taken into the equation, which is life expectancy (WEF Human Capital Report, 2013). Life expectancy at birth is, according to the WHO, "the average number of years a person can expect to live, if in the future they experience the current age-specific mortality rates in the population[5]." Life expectancy is often used as a determinant of economic growth because it reflects the number of years in which a person exerts productivity and can contribute to economic growth; increased life expectancy and growth are generally found to be positively correlated. Low life expectancy is also correlated with low education levels and low health care quality (Castelló-Climent and Domenech; 2008), which limit productivity and thus negatively affect economic growth (Colglough, 1980). A study by Bloom, Canning and Sevilla (2004) also found that "health has a positive and statistically significant effect on economic growth." The study suggests that an improvement in a population's life expectancy with one year could cause a 4% increase in the country's output. This suggests that health expenditure may be justified purely on the basis of increased labour productivity and not only on the basis of the direct effect improved health has on welfare.

3.2.8: WORKFORCE AND EMPLOYMENT

According to the WEF Human Capital Report,

> There are no standard, internationally comparable datasets that directly measure skills, talent and experience despite agreement among governments, academia and business leaders that these should be measured. Therefore, the Index relies on a number of proxy variables to seek to provide an aggregate measure for quantitative and qualitative aspects of the labour force.

The workforce and employment variable contains indicators concerning the level of labour participation in a country and the quality of this participation. Indicators with respect to participation include standard labour participation rates but also the rate at which women are able to take part in production. The variable also takes into account

[5] WHO definition, retrieved December 16, 2013, from http://www.who.int/topics/life_expectancy/en/

statistics regarding unemployment, especially youth (youth being persons between the age of 15 and 24[6]) unemployment (using the ILO definition, which is standard, according to O'Higgins (1997)). Individual unemployment at a young age tends to persist throughout the life of the unemployed (Gregg, 2001). Unemployed youth also tend to earn less at a later age (Mroz and Savage, 2004). The sources of (youth) unemployment are often rooted in low educational attainment or an unfavourable labour market (Gregg, 2001). It follows that unemployment has a clear negative impact on growth, through purely economic effects but also social consequences which can disrupt the fabric of society (ILO, 2011).

The workforce and employment variable also contains indicators concerning the talent and training of the population. These proxies include the average level of experience found in an economy by looking at the median working age of the population, the ability of a country's businesses to attract and keep talented individuals and whether this talent leads to growth.

3.2.9: ENABLING ENVIRONMENT

The enabling environment variable contains indicators which show whether human capital is effectively employed, and investments in human capital aren't offset by inefficacies that arise during the conversion of human capital to economic growth. These indicators concern infrastructure, legal framework, collaboration and social mobility.

The infrastructure factor looks at the availability of transport, "which facilitates access to workplaces and is critical to connecting industry and communities together." Access to ICT services is also included. Easterly and Rebelo (1993) find that "investment in transport and communication is consistently correlated with growth", which further supports the findings of Munnell (1992) and Canning and Fay (1993). However, both Esfahani and Ramírez (2003) and the aforementioned study by Munnell state that, in order for investments in infrastructure to be effective, institutional and systemic reforms need to take place.

[6] According to the standard UN Definition, retrieved December 10, 2013 from http://www.unesco.org/new/en/social-and-human-sciences/themes/youth/youth-definition/

The indicators grouped under legal framework comprise factors such as corruption. Mauro (1995) finds that increased corruption lowers investments and thus growth. Many African countries suffer from problems of governance associated with bureaucratic problems, leading to poverty (Evans & Rauch, 1999). The ease of doing business is thus found to be very important for growth to take place. Corruption and ethno-linguistic fractionalization are often linked (Easterly and Levine, 1997); Mauro (1995) even used indicators measuring ethno-linguistic fractionalization and both that study and Easterly and Levine (1997) prove that corruption and ethno-linguistic fractionalization are positively correlated. This is a major reason for this study to incorporate both factors.

According to the WEF report on human capital, collaboration helps technical innovation and the development of human capital. The former statement is supported by Teece (1986), which states that collaboration between firms and research facilities contributes to innovation and growth.

The WEF report also states that decreased social mobility hinders economic growth because it is said to limit an individual's motivation for developing their human capital.

4: RESULTS

The aim of this empirical investigation is to find the relationship between FDI and GDP, and ODA and GDP. This paper's secondary aim is to investigate through which human capital channel FDI and ODA seem to benefit GDP the most.

The following section, section 4.1, presents the correlation matrix of the dataset used in this paper. This provides a clear overview of the relationship between the variables in the African countries. In section 4.2, the main effects will be analysed. This analysis will indicate the validity of the regression variables and the initial relationship between the independent variables and economic growth. Hereafter, in section 4.3, a look will be taken at the so-called interaction effects. Lastly, in section 4.4, the effect of the independent variables on the amount of ODA and FDI the country will be analysed.

4.1: Correlation matrix

TABLE 1: CORRELATION MATRIX

	EDU	*HEA*	*W&E*	*EV*	*LND*	*POL*	*PREG*	*F COL*	*REL*	*ODA*	*FDI*	*GDP*
EDU	1											
HEA	0,563	1										
W&E	0,416	0,245	1									
EV	0,755	0,521	0,299	1								
LND	-0,195	-0,061	-0,099	-0,045	1							
POL	-0,505	-0,154	-0,072	-0,310	-0,346	1						
PREG	0,224	-0,382	0,301	0,064	-0,504	0,131	1					
F COL	0,709	0,059	0,387	0,676	0,111	-0,437	0,372	1				
REL	-0,752	-0,394	-0,208	-0,531	-0,218	0,484	-0,035	-0,600	1			
ODA	-0,303	-0,343	0,185	-0,469	0,471	-0,203	-0,107	-0,175	0,104	1		
FDI	0,082	-0,013	-0,187	-0,053	0,275	-0,134	-0,205	0,402	-0,196	-0,065	1	
GDP	0,307	-0,007	-0,075	0,312	0,516	-0,720	-0,389	0,456	-0,334	0,022	0,425	1

Table 1: Correlation matrix

The correlation matrix shows the correlation between the independent variables, which is useful to look at because it shows whether the regression suffers from multicollinearity and to explain outcomes of the main regression endogenously.

The correlation matrix also shows the regression does not suffer from multicollinearity, the issue that one variable is so highly correlated with another

variable that it can almost linearly predict that other variable. This can be seen because there are no variables which have a correlation relatively higher than the critical value of 0.8 (Stevens, 2002). This shows the variables used in the regression analyses are sufficiently independent of each other.

A close look at the correlation matrix reveals some interesting details. There is a negative relationship between Islam and most variables, with the exception of political instability and ODA grants, in comparison to Christianity. A cause for this disparity is that Islamic countries have shown to have more conflicts than non-Islamic countries (Esposito, 1997). ODA also has a negative correlation with political instability.

Regarding ODA and FDI, the correlation matrix shows that ODA is positively correlated with workforce and employment, being landlocked, being Islamic and very slightly with economic growth. FDI is shown to be positively correlated with education, being landlocked, having Britain as former colonizer, and most importantly, quite significantly, with economic growth. These are the individual correlations.

Later sections will refer back to the correlation matrix to explain other findings.

4.2: Main effects

In Table 2.1, the primary analysis shows that the model is functioning well: R^2 is 0.991, meaning that this model explains about 99.1% of the change of economic growth as a result of the variance of the variables, and significance F is 0.009, showing that the model is statistically significant. The high value of R^2 was to be expected, because this paper tried to explain all economic growth in accordance with Romer's human capital model. His model has thus been shown to be appropriate for this paper.

TABLE 2: MAIN EFFECTS

	2.1	2.2
INTERCEPT	1.807* (0.551)	0.769 (0.404)
EDU	1.930* (0.348)	1.855* (0.486)
HEA	-1.785** (0.231)	-1.508** (0.272)
W&E	0.537* (0.145)	0.376 (0.176)

EV	0.653 (0.295)	-
LND	1.911* (0.391)	1.726* (0.536)
POL	-0.605* (0.130)	-0.523* (0.175)
PREG	-0.655* (0.189)	-0.910* (0.211)
F COL	-3.066 (0.968)	-1.292 (0.760)
REL	1.060* (0.316)	1.160 (0.439)
ODA	-0.693* (0.137)	-0.746* (0.190)
FDI	0.733* (0.220)	0.319 (0.161)
R^2	0.991	0.976
Adjusted R^2	0.958	0.916
SIGN. F	0.009	0.008

Table 2: Main effects ***= significant at 5% level** ****= significant at 1% level**

Furthermore, it is evident that all variables are statistically significant, with the exception of former colony, denoted as F COL in Table 2, and enabling environment, denoted as EV. As former colony has already proven to be quintessential to the economic growth of sub-Saharan African countries, see section 3.2.3, the decision was made to incorporate the variable into the regression regardless of the relatively high p-value. Enabling environment, however, has not yet shown its worth in the current literature. Therefore the decision was made to run a regression without this variable to determine its value. The results of this second regression can be found in Table 2.2. As is evident from the table, the R^2 has dropped significantly (from 0.991 to 0.976). This means that less of the variables are explained now that enabling environment is excluded from the dataset. However, to compare models, the emphasis should be placed on the adjusted R^2, as explained in section 3.1.1.2. The adjusted R^2 has dropped from 0.958 to 0.916 due to the removal of the variable. It can thus be concluded that enabling environment has an influence on the model, despite its statistical insignificance.

Now that it has been established that the model is functioning properly, the initial results can be considered valid. Table 2.1 shows that education, workforce and employment, enabling environment, being landlocked, being Islamic and receiving FDI are beneficial to the economic growth, as their coefficients are all positive. This means that for each increase of their standard deviation, the economic growth is raised by the corresponding coefficient. Oppositely, health, political instability, ethno-

linguistic fractionalization, being colonized by the British Empire and receiving ODA are all adverse to the economic development of the sub-Saharan African countries.

Out of these variables, most results have fallen in line with current literature with the exception of health, having been colonized by the British and being landlocked. The latter variable can be explained through the correlation matrix (Table 1). Referring back to section 3.2.2, landlocked countries are more dependent on infrastructure and transport than countries which have access to the sea. However, in our sample, landlocked countries seem to have a higher enabling environment (which includes the quality of the infrastructure). Therefore it is clear that the landlocked countries in our sample have overcome their adversity to such an extent, that their increased infrastructure has become more advantageous than access to the sea.

Due to our relatively small sample size, many characteristics typically attributed to several of the variables are not brought unto the foreground as prominently as in other papers. This paper believes that this is the cause of the inconsistency between the relationship between the former colony variable and economic growth. This point will be elaborated upon in section 6. Nevertheless, the matter of this paper does not concern these other characteristics; this paper solely researches the impact of ODA and FDI on economic growth, and what role human capital plays in this phenomenon.

Lastly, the negative relationship between health and economic growth is further explored in the following section, as the interaction between human capital and foreign inflow comes into play there.

4.3: Interaction effects

In section 4.2, the main effects of the regression were discussed. However, these results are not sufficient to explain the influence of ODA and FDI, as explained in section 3. To further look at the relationships between ODA, FDI and the independent variables and the economic growth of the sub-Saharan African countries, a look is taken at the effect of the available stock of human capital and the inflow of FDI or ODA, as was mentioned in section 1.2. In the following subsections, this paper will investigate the relationships between the interaction terms and the economic growth that the sub-Saharan African countries enjoy.

In a model wherein an interaction effect is present, the aim is to solely look at the statistics of the involved independent variables (variable A, variable B and their interaction term variable AB). As a variable has been added into the regression analysis, the change in the adjusted R^2 should be observed in order to see if the added term is beneficial to describing the relationship between the independent and dependent variables.

4.3.1: EDUCATION & FDI

In this section the interaction term for education and FDI, denoted as EDU*FDI in Table 3.1, is investigated. As mentioned before, because an interaction term is present, this analysis only looks at the statistics of the involved independent variables; in this case education, FDI and their interaction term. The model should prove to be statistically relevant in order to write a valid analysis. When comparing Table 2.1 and Table 3.1, it is clear that an independent variable has been added to the regression: the interaction term.

By comparing the two tables, it is evident that the adjusted R^2 has dropped from 0.958 to 0.944. However, the model remains to be statistically relevant, as shown by its significance level of 0.047. Nevertheless, the interaction term's addition has proven to be insignificant to describing the change in economic growth as a result of the variances of its determinants. Therefore, this paper holds that the interaction effect between education and FDI is not of substantial value to the economic development of sub-Saharan Africa.

Despite the insignificant interaction term, education on its own does show to be statistically significant. Based on this fact, another conclusion can be drawn; education is capable of promoting economic growth without the aid of FDI. According to Table 3.1, education would increase economic growth with 1.929% for each increase of standard deviation if there was no FDI present in the economy.

TABLE 3: INTERACTION EFFECTS

	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8
INTERCEPT	1.780 (0.636)	1.573 (0.786)	1.621 (0.924)	1.788 (0.704)	2.251 (0.629)	1.843 (0.645)	2.044 (0.628)	1.838 (0.700)
EDU	1.929* (0.400)	1.922* (0.401)	2.015 (0.510)	1.946 (0.460)	2.433* (0.525)	2.113 (0.565)	2.035* (0.379)	1.943* (0.431)
EDU*FDI	0.184 (0.358)	-	-	-	-	-	-	-
EDU*ODA	-	-	-	-	0.446	-	-	-

					(0.367)			
HEA	-1.751* (0.274)	1.766* (0.269)	-1.759* (0.292)	-1.782* (0.284)	-2.090* (0.330)	-1.813* (0.275)	-1.914* (0.279)	-1.798* (0.294)
HEA*FDI	-	-0.237 (0.469)	-	-	-	-	-	-
HEA*ODA	-	-	-	-	-	0.093 (0.200)	-	-
W&E	0.498 (0.184)	0.504 (0.180)	0.544 (0.175)	0.500 (0.441)	0.399 (0.176)	0.516 (0.175)	0.624 (0.179)	0.582 (0.338)
W&E*FDI	-	-	0.122 (0.424)	-	-	-	-	-
W&E*ODA	-	-	-	-	-	-	0.121 (0.135)	-
EV	0.620 (0.346)	0.516 (0.435)	0.491 (0.666)	0.667 (0.389)	1.105 (0.462)	0.693 (0.354)	0.746 (0.323)	0.634 (0.381)
EV*FDI	-	-	-	0.079 (0.852)	-	-	-	-
EV*ODA	-	-	-	-	-	-	-	-0.054 (0.349)
LND	1.774 (0.523)	1.935 (0.453)	1.924 (0.471)	1.867 (0.676)	2.426* (0.558)	2.100 (0.611)	2.026* (0.424)	1.935 (0.501)
POL	-0.532 (0.208)	-0.595 (0.152)	-0.522 (0.330)	-0.550 (0.623)	-0.435 (0.185)	-0.586 (0.157)	-0.585 (0.137)	-0.617 (0.177)
PREG	-0.624 (0.226)	-0.836 (0.420)	-0.738 (0.367)	-0.661 (0.242)	-0.818 (0.221)	-0.631 (0.226)	-0.658 (0.196)	-0.635 (0.266)
F COL	-2.863 (1.183)	-2.662 (1.374)	-2.750 (1.600)	-2.979 (1.514)	-4.034 (1.201)	-3.308 (1.240)	-3.576 (1.152)	-3.186 (1.412)
REL	0.941 (0.431)	1.014 (0.375)	1.089 (0.392)	1.036 (0.466)	1.200 (0.315)	1.198 (0.473)	1.061 (0.327)	1.072 (0.393)
ODA	-0.664 (0.168)	-0.701* (0.159)	-0.710 (0.175)	-0.661 (0.383)	-0.650* (0.132)	-0.679 (0.163)	-0.745* (0.153)	-0.706 (0.187)
FDI	0.724 (0.254)	0.669 (0.283)	0.685 (0.312)	0.730 (0.270)	0.700 (0.206)	0.745 (0.257)	0.825 (0.250)	0.773 (0.376)
R^2	0.992	0.992	0.991	0.991	0.995	0.992	0.994	0.991
Adjusted R^2	0.944	0.944	0.939	0.937	0.963	0.943	0.955	0.937
SIGN. F	0.047	0.047	0.051	0.053	0.031	0.048	0.038	0.053

Table 3: Interaction effects ***= significant at 5% level**

4.3.2: HEALTH & FDI

The interaction term for health and FDI, denoted as HEA*FDI in Table 3.2, will be examined. Similar to the previous subsection, the adjusted R^2 will be examined for the same reasons. Table 3.2 has an adjusted R^2 of 0.944; this is a decrease of 0.014 compared to the main regression found in Table 2.1. Therefore it can be said that, despite the interaction term's addition, this model is less accurate. Nevertheless the model remains to be statistically significant, as its significance F is lower than 0.05.

By observing the independent variables involved with the interaction term (health and FDI), it is evident that only health is statistically significant. Therefore it can be concluded that the interaction term is not of any substantial value to clarifying the change in economic growth. This interaction term is not significant.

On the other hand, health does show to be statistically significant. With a coefficient of -1.759, the case is once again made that health is adverse to the economic growth of the African countries. Based on Table 3.2, the conclusion can be drawn that one standard deviation increase in health will detract 1.759% of economic growth, if the economy did not receive any FDI.

4.3.3: WORKFORCE AND EMPLOYMENT & FDI

The interaction term between workforce and employment and FDI, denoted as W&E*FDI in Table 3.3, shows not to be statistically relevant, as the significance F is above the 5% level, nor aid in clarifying the change in economic growth. The addition of the interaction term is therefore not of any statistical value. Neither of the original variables the interaction term comprises of (workforce and employment and FDI) are statistically significant. Therefore, no rationalisation can be found to interpret this model's results. The only conclusion drawn from this model is that workforce and employment and FDI do not have any relationship that helps describe the determination of economic growth in sub-Saharan Africa.

4.3.4: ENABLING ENVIRONMENT & FDI

In this section the interaction term for enabling environment and FDI, represented by EV*FDI in Table 3.4, will be examined for as far as it is possible. The inclusion of this term has, much like the previous regressions, produced a decrease in the adjusted R^2 compared to Table 2.1. Adding the relatively high significant F, this model is deemed statistically insignificant from the start. Taking into account that all three variables (EV, FDI and EV*FDI) are statistically insignificant, there is no reason why this model would be worth examining. As a result, the only conclusion that can be drawn from Table 3.4 is that EV*FDI is of no assistance to explaining Africa's economic growth.

4.3.5: EDUCATION & ODA

In this section the interaction term for education and ODA, denoted as EDU*ODA in Table 3.5, will be investigated. This model is the only robust model out of all of the interaction models. This bold statement is based on the fact that it is the only model where the adjusted R^2 actually increased compared to the main regression (from 0.958 to 0.963) and the fact that the model is statistically significant, as its

significance F is 0.031. This means that through the introduction of the interaction term, ODA*FDI, more of the change in economic growth can be attributed to the x-variables. Therefore, despite the statistical insignificance of the interaction term, it is of substantial value.

As is evident from Table 3.5, the only statistically significant variable out of the two variables that form the interaction term is education. By interpreting the table's results, it can be concluded that education can support economic growth independently from ODA. Education will promote economic growth with 2.433% for each standard deviation increase.

For the purpose of this section, the interaction term will be discussed as it makes theoretical sense. More knowledge on determining economic growth is unlocked as a result of its addition. Assuming that EDU*ODA is of value, Table 3.5 suggests that for each standard deviation increase in education or ODA, the economic growth will increase by 0.446 (the interaction term's coefficient) times that amount. Therefore, the combination of education and ODA has shown to be beneficial to economic growth.

4.3.6: HEALTH & ODA

In Table 3.6, the interaction term for the variables health and ODA is introduced, HEA*ODA.

Similar to almost all the models in Table 3, this model's adjusted R^2 is lower than the adjusted R^2 presented in the main regression. Therefore it can be said that this model describes less of the determination of economic growth. However the model remains statistically significant after the model's addition, therefore the interpretation of the statistically significant can still be of some importance.

It is apparent from Table 3.6 that health is the only significant variable. With a coefficient of -1.813, the variable reconfirms its negative relationship with GDP per capita annual growth. On the other hand, ODA is statistically insignificant. The interaction term is also statistically insignificant, but looking at its coefficient in Table 3.6, a strange occurrence can be found. The interaction between ODA and health seems to be beneficial to the economic growth. Despite it being, statistically seen, trivial, the coefficient is remarkable. Both ODA and FDI have shown to be negative to

the economic development of the African countries in the main regression. Yet the presence of both variables within one economy has shown to stimulate economic growth, albeit slightly (its coefficient is quite low in comparison with the other variables in Table 3.6). Further research on this phenomenon is required to understand this matter fully.

4.3.7: WORKFORCE AND EMPLOYMENT & ODA

In this section the significance of the interaction term between workforce and employment and ODA, denoted as W&E*ODA in Table 3.7, is examined. The adjusted R^2 has decreased, compared to the main regression's adjusted R^2. Therefore the deduction can be made that the interaction term W&E*ODA does not help in defining the relationship between economic growth and the independent variables.

The model, however, does indicate that ODA is statistically significant. With a coefficient of -0.745, this means that if the value for workforce and employment in an economy was 0, that ODA would decrease GDP with 0.745% per standard deviation increase. This once again shows that ODA is negatively related to economic growth.

4.3.8: ENABLING ENVIRONMENT & ODA

In this section the significance of the interaction term between enabling environment and ODA, noted as EV*ODA in Table 2.8, will be investigated. The adjusted R^2 has decreased in comparison with the main regression's adjusted R^2 (see Table 2.1). Along with the relatively high significance F, this model is deemed statistically insignificant.

The two variables that form the interaction term, enabling environment, noted as EV in Table 2.8, and ODA, are both statistically insignificant, as is their interaction term. Due to the insignificance of enabling environment in the main regression, no justification can be found to believe that this interaction term is of any value.

4.4: Endogenous determination of foreign inflow

A regression analysis that looked at the influence of the variables on ODA and FDI was also performed. The following sections look at the relationships between the

independent variables, including GDP per capita annual growth, and the dependent variables ODA/FDI, with the goal to describe which factors play an important role in the acquiring of ODA and FDI and thus how these exert an influence on growth through their influence on ODA and FDI specifically. By making the amount of foreign inflow endogenous, this paper not only takes into account the main and interaction effects, but also the indirect effects a variable exerts on economic growth through its effect on other variables.

4.4.1: ODA

TABLE 4: DETERMINING ODA

	4.1	4.2
INTERCEPT	4.598 (4.017)	13.987 (4.303)
EDU	9.880 (4.527)	14.443* (3.301)
HEA	-8.101* (2.863)	-13.294* (2.634)
W&E	2.180 (1.181)	4.179* (1.048)
EV	-1.759 (1.785)	4.526 (2.591)
LND	10.257 (4.020)	14.680* (3.005)
POL	-2.791 (1.714)	-4.475* (1.242)
PREG	-5.684 (2.708)	-4.765 (1.728)
F COL	-3.253 (5.007)	-23.011 (7.990)
REL	6.401 (4.198)	7.895 (2.684)
GDP	-7.276 (2.716)	-10.099 (1.997)
FDI	-	5.333 (1.984)
R^2	0.889	0.967
Adjusted R^2	0.610	0.848
SIGN. F	0.137	0.056

Table 4: Determining ODA ***= significant at 5% level**

Firstly, a regression was performed using all the variables except for FDI. As explained in section 3.1.3, ODA's data was unstandardized in this regression as it is the y-value, while GDP is now standardized as it's an x-value.

The results, presented in Table 4.1, of this regression are largely statistically insignificant when using the standard p-values. The exception to this was health, which is shown to have a negative effect on ODA. This resulted is not unexpected,

considering that health is a significant destination of ODA (United Nations Development Programme [UNDP], chapter 5, 2011), and countries with better health would therefore require less ODA to solve their health problems. Therefore a country receives less ODA if it has less health issues, represented by a high value for HEA.

Secondly, the FDI variable was added to the set. By adding FDI in Table 4.2, it is clear that FDI has an influence on the determination of ODA and that its addition affects the other independent variables. The value for significance F dropped considerably. Although this value is still above 0.05, the difference as a result of the addition of FDI is undeniable. The adjusted R^2 has risen from 0.610 to 0.848. This means that the model explains more variances between the variables as a result of FDI's inclusion.

In Table 4.2, the following variables are considered to be significant: education, health, workforce and employment, being landlocked and political instability. These five variables have shown to be of statistical significance to describing the relationship between acquiring ODA and the independent variables.

The variables education, workforce and employment and landlocked are all significant and have a positive relationship with ODA. This means that when these three variables increase, the amount ODA increases as well.

Education has a positive relationship with ODA. According to Glaeser et al (2006), education is strongly correlated with democracy. Democracy in return is a major determinant of ODA inflow. It has been estimated that democracies receive 50 percent more ODA than their non-democratic counterparts (Alesina and Dollar, 2000).

A high value for workforce and employment and being landlocked are also positively linked to ODA. Due to the lack of available literature on these two variables in connection with ODA, little can be said regarding the cause of this positive relationship. This could be subject for further research.

The variables health and political instability are both significant and are negatively related to ODA. This means that if health indicators rise, the economy will receive less ODA. This is a logical result as, if there is less illness, less ODA is needed to combat the diseases. The regression's output regarding political instability also

signifies that if a country is less politically stable, it receives less ODA. This also adheres to common sense, as corruption is a large part of political instability. ODA is therefore given less to countries that are prone to abuse it.

The remaining variables are not significant and will therefore not be discussed, with the exception of former colony. Although this variable is statistically insignificant, the coefficient is remarkably low (-23.011). This would suggest that countries that were formerly colonized by the British Empire receive far less aid than countries that were colonized by France. However, this result should be taken with a grain of salt, as neither the model nor the variable is statistically significant. Nevertheless, the low coefficient is too remarkable to ignore and could be subject for further research.

4.4.2: FDI

TABLE 5: DETERMINING FDI

	5.1	5.2
INTERCEPT	-0.814 (1.054)	0.320 (0.783)
EDU	-1.425 (1.188)	-3.605* (1.100)
HEA	1.622 (0.752)	3.409* (0.814)
W&E	-0.624 (0.310)	-1.105* (0.264)
EV	-1.963* (0.469)	-1.575* (0.327)
LND	-1.381 (1.055)	-3.644* (1.070)
POL	0.526 (0.450)	1.142 (0.363)
PREG	-0.287 (0.711)	0.967 (0.645)
F COL	6.170** (1.314)	6.888** (0.864)
REL	-0.466 (1.102)	-1.879 (0.867)
ODA	-	1.243 (0.462)
GDP	0.881 (0.713)	2.487* (0.745)
R^2	0.912	0.974
Adjusted R^2	0.693	0.880
SIGN. F	0.091	0.040

Table 5: Determining FDI ***= significant at 5% level** ****= significant at 1% level**

Similar to the analysis in the previous subsection, a regression was first performed without the inclusion of ODA. The results of this analysis can be found in Table 5.1. The adjusted R^2 is 0.693, which means that about 69% of the variances between the

x-values and y-value is explained. The model is not statistically significant, as is indicated by the significant F level of 0.091. Nevertheless, in this insignificant model, there are two variables that seem to be significant: enabling environment and former colony. The coefficient of enabling environment is -1.963 and would indicate that a typically ‘attractive’ business environment actually repels FDI. This contradicts the reasoning and evidence from other papers presented in section 1.5. The reasoning and evidence from the other papers presented in section 1.5, however, were not specifically targeted at the sub-Saharan region. According to Asiedu (2002), sub-Saharan Africa does not adhere to the same conditions set for the rest of the world to attract FDI; Africa just receives less FDI because it is Africa. Despite the increasing suitability of the business environment, the increase in FDI does not match the increase in enabling environment. Former colony’s coefficient of 6.170 suggests that countries that were formerly colonized by the British attract more FDI. This could be because many have English as an official language, which is the main language of large and economically important countries such as the USA and England. Also, all human capital variables in these countries are higher.

In Table 3.2, the output of the model including ODA is shown. The model has become statistically significant, as its significant F level is 0.040. Also the R^2 has risen to 0.9743, meaning that more variances between the independent variables and FDI are described, as a result of FDI’s addition. As the model is now significant, and the significant variables of Table 3.1 remain to be statistically significant, it can be concluded that enabling environment and former colony are essential to determining FDI.

Numerous variables have become significant in Table 5.2 compared to Table 5.1. Some of these have a positive relationship with FDI (health and GDP), while some are negative (education, workforce and employment and landlocked). The positive coefficients found in health and GDP per capita annual growth means that for every unit increase of these two variables, the amount of FDI received will increase by their corresponding coefficients. The relationship of the two variables was to be expected, as a healthy population attracts foreign investors (Alsan et al., 2004). The same principle applies to GDP; investors prefer countries that are economically better off. As is evident from the correlation matrix (see Table 1), countries with high GDP

usually have more political stability. This ensures the investors that their investments are (relatively) safe.

The variables which have shown to have a negative relationship in describing the economic growth are education, workforce and employment, landlocked and the already mentioned enabling environment. The negative relationship between education and FDI is remarkable, as this paper's earlier results (see section 4.2.1) have shown that the interaction between FDI and education benefits economic growth. However, promoting a country's economic growth is not the primary goal of FDI, as mentioned in section 1. Keeping this goal in mind, it seems rational that investors would avoid countries with high education as they usually have higher wages (Sahn and Alderman, 1988). The same principle applies to the variable for landlocked; companies prefer countries that have access to the sea, as mentioned in section 3.2.2. Workforce and employment also shows a negative impact on describing the amount of FDI a country receives. The variable for workforce and employment has not yet been used (often enough) in the current literature to compare this paper's results with those. Nevertheless, a reason for this negative relationship can be found. Countries with high labour participation and a talented and trained labour force are more expensive to invest in, as their wages are higher. The costs of producing in these countries would be higher than producing in a country where the circumstances are worse. FDI has proven to be attracted to countries with low wage costs (Cheng and Kwan, 2000).

5: CONCLUSION & POLICY RECOMMENDATIONS

5.1: Conclusion

This paper set out to explore how ODA and FDI affect sub-Saharan Africa's economic growth, by using a different economic framework than that of mainstream literature. The paper has also sought to know to what extent the amount of foreign inflow a country receives and the country's available stock of human capital are of influence to determining the economic growth.

To answer the research question, a cross-country regression analysis was performed using historical data. The main empirical findings are summarized in section 4: Results. In the main regression the direct effects of FDI and ODA are found: ODA has shown to have a negative relationship; FDI has shown to have a positive relationship with economic growth, as indicated by current literature (see section 1.4.2).

Secondly, the interaction effects between the human capital factors and ODA and FDI were investigated. Out of this section, it can be concluded that the effects of ODA and FDI reach further than only the amount received in an economy. Human capital plays a vital role; through the regression analyses, this paper has found that both FDI and ODA in combination with the variables for human capital have a negligible effect on economic growth, with the exception of the interaction between education and ODA and health and ODA. This paper concludes that the interaction term EDU*ODA is of importance in describing the relationship between economic growth in connection with the independent variables. This is notable, as ODA has repeatedly shown that it has a negative relationship with economic growth. However the presence of both variables in one economy, leads to an economic increase.

The interaction between health and ODA on GDP is also noteworthy. Despite both variables being adverse to the economic development in the main regression, the mere presence of both variables is beneficial to the economy. The positive role that ODA plays in both of these interaction effects shows that ODA can be used as a catalyst.

On the other hand, FDI has shown to require some stock of human capital in order to be statistically significant. This is based on the fact that FDI has not been statistically

significant in any of the interaction terms (see Table 3), indicating that when the values for the human capital variables are 0, FDI is not statistically significant. Therefore the conclusion can be drawn that FDI requires some stock of human capital (education, health, workforce and employment and enabling environment) to exist in the economy, in order to stimulate economic growth. As this has been the case in this paper's sample countries, the main regression has found FDI to be of statistical significance.

Furthermore this paper has researched the indirect effects of this paper's chosen variables. This paper finds that these indirect effects are by determining the inflow of ODA and FDI endogenously; ODA and FDI become dependent on the x-variables. Through these analyses the major determinants of FDI and ODA were found.

In order to attract FDI, the countries in the sample should raise their values for health and GDP. As mentioned in section 4.4.2, a healthy workforce is desirable for investors. Solid economic growth is also paired with less political instability; this means that their investments are more like to be safe. Having been colonized by the British is also a strong pull for foreign investors. This could be explained by the fact that the official language of most former British colonies remains to be the English language. This is the same language as that of the large and economically important countries such as the USA and UK.

Being landlocked, having high workforce and employment, being highly educated and having a high value for enabling environment are all seen as detrimental to increasing the inflow of FDI. As specified in section 4.4.2, being landlocked is not favourable to foreign investors as there is no access to the sea. Having a high workforce and employment value and having a highly educated population are both disadvantageous to drawing FDI, as both increase the cost of labour within an economy. A high value for enabling environment has also shown to not be effective in enticing potential foreign investors.

In order to attract ODA, education, workforce and employment and being landlocked are the foremost positive determinants. A high value for education is strongly correlated with a country being democratic. And, as explained in section 4.4.1, democratic countries seem to receive far more ODA than non-democratic countries.

Health and political instability have shown to have a negative relationship with ODA. These two relationships are both reasonable as health is an important destination of ODA (see section 4.4.1). Once a disease is eradicated, or at least moderated, the value amount of ODA will decrease while the value for health increases. The negative relationship between political instability and ODA is due to the fact that ODA donors prefer not to donate to politically unstable countries where they are inclined to abuse the given monetary funds.

All in all, it is clear to see that the effects of ODA and FDI reach further than the initial main regression. The interaction effects and indirect effect also play an important role. ODA has shown to have a negative direct effect, but indirectly contributes a significant amount to the economic development of a country. This is most notable in HEA*ODA and EDU*ODA. FDI has shown to have a positive direct effect on economic growth, but it fails to stimulate economic growth on its own. It requires a basis of human capital within the economy in order to deliver the necessary boosts in economic growth.

5.2 Policy implications

This section will take the conclusions presented in the previous section and detail which policy implications follow, assuming African countries want to promote economic growth.

Building upon the conclusions, the need for investing in attracting FDI inflow is evident. There are several policies that can be implemented in order to boost this inflow. Firstly, trade regimes need to be liberalized. This is not only a responsibility of African countries themselves, but also of the international community (in particular such organizations as the WTO and the EU) because international cooperation is required for import barriers and trade tariff changes to positively affect the business environment of sub-Saharan Africa. Asiedu (2002) also states that "the full benefits of trade liberalization will be realized only if investors perceive reform as credible and not subject to reversal", which implies less political instability. According to Morisset (1999), other measures that can be taken are the privatization of government bodies, improving legislature of mining and investment and more "image building". The first two would allow private companies, domestic and from abroad, to gain access to markets that were previously dominated by governments, while the third would lead

to more appreciation of Africa's current investment potential. This paper also suggests that African countries need to have basic investments in human capital stocks in order for FDI to become effective at all. Thus, in order to free sub-Saharan Africa from grants such as ODA and replace it by FDI, investments need to be made in the area of human capital.

Regarding ODA, it is clear that the sample countries need not solely focus on attracting ODA, as ODA negatively impacts growth. Instead, the focus needs to be put on ODA's role as a catalyst. Based on the analyses, this paper suggests that, if ODA is to be effective in promoting growth, investment also needs to target education. The conclusion suggests that English-speaking countries have an advantage of French-speaking countries, and in the latter, ODA investments geared towards education could thus be focused on promoting the speaking and writing of English in order to improve the ability of the inhabitants to converse and trade with important foreign partners, such as the USA and the Euro zone, who are, according to Forbes, two of the four biggest economies of the world.

6: DISCUSSION, LIMITATIONS AND SUGGESTIONS

6.1 Development of the paper

Over the course of writing this paper, the methodology has changed. The main question was at first, only whether foreign aid had been effective in what it does and how it could be improved in entire sub-Saharan Africa. However, over the course of researching the subject we realized this particular question had been answered before. We decided we wanted to make the project more original by comparing ODA to its alternative, FDI, and by looking at the differences between the countries' economic growths by dividing them into different groups. The countries in each group would have similar characteristics. These characteristics were, at the time, former colony, being landlocked, main industry and the level of corruption. Later, others, such as financial freedom, were added. These were the precursors to our determinants of economic growth.

However, we then realized these factors combined were nowhere near effective in determining economic growth and the coefficients could not be found in the literature either, so we decided to look for better factors. We decided to keep former colony and being landlocked in because we were able to appropriately justify them, unlike the other variables.

After much deliberation, we realized that we did not have the appropriate tools to analyse the effect of ODA and FDI on economic growth this way, and we started to look for alternatives. We decided to use a regression analysis as this was the main method used in most macroeconomic studies, and because it would allow for exact and significant analysis. We then decided that one regression analysis would not provide enough information on the effect of ODA, FDI and the other determinants and decided to use a correlation matrix and interaction terms of the human capital variables, for which the reasons are outlined in sections 3 and 4. We also decided we wanted to examine the influence the variables had on ODA and FDI, as outlined in section 4.4. In order to make interpretation easier, we also decided to standardize the determinant variables.

6.2 Limitations

The most important of limitations in this paper have to do with the availability of data. Many countries did not have data available for our variables, which caused us to shrink down our sample size to 15 sub-Saharan countries. This sample may not represent of the entirety of sub-Saharan Africa. The most serious issue caused by the lack of data was, however, the inability to perform a time-series regression analysis. Our GDP data is an average from a time period from 1980 until 2012. Human capital data has been taken from a shorter time period and ethno-linguistic fractionalization, religion and political instability have been taken from one year because more data was not available. This limits the accuracy of the results, and thus the paper has to assume that most of these variables are and have remained constant over the years. This may be true for indicators such as life expectancy and religion and is of course true for being landlocked, but not for others; for instance, health indicators are known to change in Africa.

The lack of data also caused us to not be able to research some issues that we wanted to research, such as the connection between donor country and the effectiveness of ODA and FDI as well as the link between the sector in which the money was invested and the effectiveness.

Another limitation concerning the data is the reliability of GDP data in sub-Saharan Africa, as Morten Jerven argues in his book Poor Numbers. This paper uses World Bank data, but GDP data from other sources are known to differ. This is because there are many troubles in sub-Saharan African countries that can influence the accuracy of GDP measurements. This, of course, greatly influences the outcome of the research.

Due to a lack of econometric knowledge, we were not able to use the more sophisticated growth models, and we used a simplified version of the Romer model instead. Our results may have been more accurate had we used a more complex model.

The religion variable is also quite simplistic and could have included more differentiation and more differences in belief. Instead of looking at merely the major religion of a country, the variable could have included the amount of religious fractionalization, the intensity with which the religion was practiced (e.g. indicators

concerning the attention of institutional services), or even contained a wider spread of beliefs and making a distinction between the different branches of Christianity and Islam.

Interpretation of the regression outcomes has also proven to be difficult. This is why we decided to not perform a 3-way interaction analysis, as the interpretation for such an analysis would be too hard for us to do.

6.3 Suggestions for further research

Further research could focus on solving the limitations presented in the discussion. The religion variable could be incorporated less black-and-white as it has been in this paper. When more data becomes available a more accurate time series analysis including more countries could be performed on the basis of a sounder econometric model. GDP data could also be drawn from other sources than the World Bank databank which is used as source in this paper.

Future research could also try to explain findings in this paper that seem to contradict other research, such as the negative effect of health on economic growth. It could be investigated thoroughly whether these anomalies surfaced because of the specific sample of countries or the model and data that were used. Examples include the positive link between W&E, F COL and ODA and the large negative relationship found in our data sample between being colonized by the British and ODA.

Very important to note is that this study is limited in that it only researches the effect of ODA and FDI on economic growth. As stated before, economic growth is not the primary goal of ODA or FD,I and whether the two are effective in accomplishing those targets has not been measured. Further research could also attempt to see whether or not the individual goals of both ODA and FDI have been achieved.

Another topic for further research could be the inconsistency in the relationship between the former colony variable and economic growth. A clear cause for this disparity could not be found using out dataset, and current literature on the matter had not been able to adequately explain this.

In terms of research regarding ODA and FDI, there are many questions this paper has not and has not tried to answer but should be answered in order for ODA and

FDI to become effective. These questions concern the following issues. Which methods could make ODA and FDI more effective? Which countries give effective ODA and FDI? Also, when indicators that measure wealth on a different level than GDP have been developed, the effect of ODA and FDI on those indicators can be measured. All these questions still lack a definitive answer, but are essential to answer if one wants to improve sub-Saharan Africa’s economic condition.

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APPENDICES

Appendix A

Countries	EDU	HEA	W&E	EV	LND	POL	PREG	F COL	REL	ODA	FDI	GDP
Benin	-1,044	-0,689	-0,481	-1,244	0	5,9	0,3	0	0	10,278	1,200	0,879
Botswana	-0,386	-0,27	-0,416	-0,09	1	4,7	0	1	0	3,911	3,041	4,693
Burkina Faso	-1,817	-0,943	-0,374	-1,173	1	6,9	0	0	1	13,531	0,341	2,147
Cote d'Ivoire	-1,302	-0,418	-0,208	-1,107	0	7,8	0,49	0	1	4,962	1,309	-1,680
Ghana	-0,505	-0,533	-0,099	-0,317	0	5,9	0,44	1	0	8,431	2,287	1,741
Guinea	-1,482	-1,026	-0,911	-1,667	0	7,5	0,48	0	1	9,387	2,547	0,424
Kenya	-0,503	-0,603	0,226	-0,347	0	7,5	0,57	1	0	6,851	0,546	0,380
Lesotho	-1,084	-0,588	-0,438	-0,894	1	7	0	1	0	10,147	7,392	2,225
Malawi	-0,897	-0,723	-0,007	-0,89	1	5,7	0,55	1	0	21,273	1,343	0,411
Mali	-1,747	-0,826	-0,614	-0,949	1	7	0,13	0	1	16,750	1,219	0,712
Nigeria	-1,411	-1,034	-0,328	-0,74	0	7	0,66	1	1	1,058	3,058	1,090
Senegal	-1,202	-0,404	-0,006	-0,794	0	7,5	0,14	0	1	10,755	1,174	0,213
South Africa	-0,589	-0,533	-0,588	0,265	0	7	0,49	1	0	0,333	0,838	0,515
Tanzania	-0,87	-0,957	-0,087	-0,805	0	5,9	0,59	1	1	16,082	2,742	2,201
Uganda	-1,036	-0,959	-0,147	-0,767	1	6,5	0,63	1	0	12,295	2,735	2,437

Appendix B

Countries	EDU	HEA	W&E	EV	LND	POL	PREG	F COL	REL	ODA	FDI	GDP
Benin	0,033	0,048	-0,647	-1,017	0	-0,902	-0,273	0	0	0,096	-0,551	-0,249
Burkina Faso	-1,761	-1,015	-0,268	-0,865	1	0,295	-1,537	0	1	0,674	-1,067	2,495
Cote d'Ivoire	-0,566	1,182	0,321	-0,724	0	1,373	0,528	0	1	-0,848	-0,486	0,663
Guinea	-0,984	-1,363	-2,172	-1,920	0	1,014	0,486	0	1	-0,062	0,258	-2,092
Mali	-1,599	-0,526	-1,119	-0,387	1	0,415	-0,989	0	1	1,245	-0,540	0,371
Senegal	-0,334	1,241	1,037	-0,056	0	1,014	-0,947	0	1	0,181	-0,567	-0,577
Botswana	1,561	1,801	-0,417	1,448	1	-2,339	-1,537	1	0	-1,034	0,554	-0,609
Ghana	1,285	0,701	0,708	0,963	0	-0,902	0,318	1	0	-0,232	0,101	0,719
Kenya	1,289	0,408	1,860	0,899	0	1,014	0,866	1	0	-0,512	-0,944	-0,586
Lesotho	-0,060	0,470	-0,495	-0,269	1	0,415	-1,537	1	0	0,073	3,167	-0,370
Malawi	0,375	-0,095	1,034	-0,261	1	-1,142	0,781	1	0	2,049	-0,465	-0,098
Nigeria	-0,819	-1,396	-0,104	0,060	0	0,415	1,245	1	1	-1,541	0,564	-0,729
South Africa	1,090	0,701	-1,026	2,206	0	0,415	0,528	1	0	-1,670	-0,769	-0,512
Tanzania	0,437	-1,074	0,750	-0,079	0	-0,902	0,950	1	1	1,127	0,374	0,702
Uganda	0,052	-1,082	0,537	0,002	1	-0,184	1,119	1	0	0,454	0,371	0,872