SCHOOL OF ECONOMICS AND MANAGEMENT

Determinants of FDI in Africa

- The role of agglomeration in Africa's performance of attracting FDI

Essay in Economics

By

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Abstract

Acknowledging the macro- and microeconomic importance of foreign direct investment (FDI), this paper aims at examining the determinants, in particular how the agglomeration forces determine the inward FDI in Africa. A comprehension of these determinants is important in order to maintain the positive development and improve the performance of attracting FDI in Africa. Results from my cross-country regression estimations from 2008 to 2016 suggest that: (i) the inward FDI in Africa can be explained by combinations of variables market size, economic stability, openness and agglomeration; (ii) there is a positive correlation between market size and the inward FDI; (iii) agglomeration has positive impact on the inward FDI; (iv) Western and Middle Africa attract less FDI, whist southern African affiliation is positively correlated with the inward FDI.

Key words: Foreign direct investment, Determinants of FDI, Agglomeration forces, African countries

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1 Introduction

1.1 Background

Foreign direct investment´s (FDI) positive effects on the recipient economy both at the macro and microeconomic levels, are agreed upon by most economists. These effects vary, however, according to the sectors concerned, the capacity of the recipient country's market size, economic and political stability but also the size of industrial share (in percentage of GDP). FDI is demanded in both developed and developing economies and can contribute to their development. Some economists argue that FDI is development friendly and more suitable for low-income economies than portfolio flows which include among others, bonds, stocks (equity) and Certificates of deposit. FDI is viewed as a substantial and more sustained investment. FDI increases a country's access to resources by attracting new capital and technical knowledge. It provides the recipient country with knowhow and technology through spillover effects. Earlier studies show that FDI has positive effects on domestic firms in many ways, for example by outsourcing and increased efficiency through the improved business environment and increased competition (See for example Moran 2006).

A main component of globalization process is the rapid increase in FDI. More and more investors from developed countries invest in developing economies, in particular in Africa. But also more investors from developing countries invest in other developing countries (and also in developed countries, for example China). This raises the question of the geographical distribution of FDI and of its determinants. Some economists advance the agglomeration phenomenon (to take advantage of the positive externalities by locating near already established firms) as a possible determinant of FDI (Wheeler and Mody, 1992; Kinoshita and Mody, 2001).

The inward FDI stock to the African continent in percentage of the world, increased from 2.8 percent in year 2008 to 3.1 percent in year 2016. Whilst in Asia it increased from 17.8 percent in year 2008 to 23.4 percent in year 2016 (UNCTAD). Africa lags behind other continents in attracting FDI. Nevertheless, except from very small decline in years 2011 and 2013, the inward FDI in the continent increased gradually during this period. Can this development in Africa be explained by the traditional FDI determinants, in particular by the

agglomeration forces? Can the positive development of FDI in Africa together with the agglomeration phenomenon give a kick-start to the African continent in their performance of attracting FDI? In order to maintain the positive development and improve the performance in attracting FDI in Africa, the answers to these questions are important. It is also important for politics, investors and for future studies on determinants of FDI.

The purpose of this paper is to examine the determinants of FDI in Africa. More particularly the study aim to understand how the agglomeration forces determine the distribution of FDI in Africa. I do this by using the literature on FDI determinants, cluster and agglomeration theories. I will also use data from United Nations database for statistical analyses.

The paper is structured as follows: Chapter two summarizes theories and the economic literature on the determinants of FDI, in particular on the role of agglomeration forces. Chapter three attempts to explain the geographical and sectoral patterns of FDI in Africa. Chapter four presents the model, data sources and variable definitions. Chapter five presents the statistic results. Chapter six summarizes the main results and draws some policy conclusions.

2. Determinants of FDI

2.1 The Dunning framework

Several factors have been put forward to explain FDI. According to the OLI framework, FDI is determined by three advantages. First, the ownership advantages: foreign firms own a specific advantage that domestic companies in the host country are lacking. For example, patents and more developed technology. Second, the localization advantages or country specific advantages like adequate production factors at lower cost and favorable policies for foreign investors make it more profitable for foreign producers to invest in a new factory and produce oversea rather than exporting. Therefore export costs are higher than the costs for establishment for production in the host country. Third, the internalization advantages such as having more control over business activities in one geographic area and protecting the ownership advantages (not cooperating with other firms through contract arrangements such as licensing and joint ventures) which multinational companies can benefit from by establishing new markets and developing existing markets in foreign countries. Thus, a foreign company in competition with domestic companies can substitute its disadvantage of being foreign such as, restrictions, access to resources and cultural barriers with ownership and internalization advantages (Dunning 1974, 1980). Dunning also identified motives driving foreign investors and categorized them in to four groups. These are, resource seeking; market seeking; efficiency seeking and strategic-asset seeking. Resource seeking investors are motivated by the host country's labor force, natural endowments and infrastructure resources. Market seeking investors seek to access and develop the market in the host country. Efficiency seeking investors seek to take advantage of the low labor cost in the host country. Whilst strategic-asset seeking investors seek innovation, advanced technology, research and development (Cleeve 2008).

Identified factors attracting FDI also include macroeconomic stability Mateev (2009), Baniak et al. (2005); openness to trade and agglomeration (Campos and Kinoshita, 2003), (Sekkat and Veganzones-Varoudakis, 2007). As the emphasis in this study is placed on the agglomeration forces, the next section will describe the agglomeration and FDI.

2.2 FDI and Agglomeration

One of foreign direct investor´s goals is to establish a long run interest in a company in the host company. This requires a lasting relationship between the investor and the chosen company/country to invest in. The management of the company also requires a large amount of influence from direct investors, which can be manifested with an ownership of 10 percent or more of the voting power of the host company (UNCTAD, 09/2017).

One of the common characteristics of developing countries is the prevalence of imperfect markets and incomplete information. This includes among others, lack of strong institutional foundations, lack of reliable infrastructure and utilities. The benefits of FDI in the host country include its positive effect on the economic development. Thus, some of the pro-arguments for FDI are: filling in the gap between desired investment and local savings; filling in the trade gap, meaning the gap between essential foreign exchange and net export earnings combined with net public foreign aid; filling the balance gap between government's tax revenue and locally raised taxes. Foreign investors provide developing economies with their management knowledge, abilities in entrepreneurship and technological skills. Foreign investors also provide developing countries with the most advanced techniques in the production process (Todaro 2006).

The nature of privatization process can open the economy for foreign direct investors. Trade and investment liberalization and privatization are some of the reforms that most African countries have and are still implementing (Odenthal 2001). Thus, opportunities for the formation of agglomeration phenomena in developing countries, particularly in Africa. Agglomeration can be defined as high concentration of economic activity within one area. The phenomenon of agglomeration in economic activity has been studied by scholars like Porter, Marshall and Krugman. Agglomeration occurs within clusters, different geographic levels, in areas intra cities, countries and continents.

The argumentation for development of the agglomeration phenomena was undertaken very early by Marshall through the localization studies on industrial districts.

He stated that "great are the advantages which people following the same skilled trade get from near neighborhood to one another. The mysteries of the trade become no mystery: but

are as it were, in air…" (Marshall, 1920 p 225). He introduced four positive externalities needed to form a cluster. These are: mass production, access of specialized input services, near proximity of the labor pooling in order to enable face to face communication and access to modern infrastructure (Marshall 1921, see Fujita and Thisse 2002:8). The gain of positive externalities of specialized industrial locations introduced by Marshall was countered by Jacobs (1969). Jacobs's externalities stressed the importance of urban variety in order to attain agglomeration economies through improved possibilities to communicate, enriched knowhow and innovations.

Studying the phenomena of agglomeration as a possible determinant of FDI, it is convenient to include cluster theory. A cluster can be defined as a system of interconnected firms and institutions whose total value is greater than the sum of its parts (Porter 1998). According to him, clusters influence the competition in three ways. The productivity of the component firms and industries increases; their productivity growth increases and that improves their innovation capacity; the cluster also stimulates new firm formation that extends the cluster. As foreign investor´s expertise and influence is required in the host company in order to succeed, it ameliorate the agglomeration phenomenon which attracts more investors. The new economic Geography models by Krugman (1991) proposed that in spatial clustering, interaction between three factors led to increased agglomeration economies in modern time. These factors are: regional market potential, transport costs (geographic transaction costs) and economies of scale generating increasing returns. He meant that large market potential is generated through firms' collocation and the large market potential attracts more firms.

In order to explain economic agglomerations and understand how it may determine the inward FDI, increasing returns are required. More important, the trade-off between increasing returns to production and transportation costs is important for the understanding of the geography of economic activities (Fujita and Thisse, 2002) also discuss Akerlof (1997), Anas et al. (1998) and Marshall (1920) in regard to the importance of externalities in the formation of agglomeration. Increasing returns to scale is one of the three alternative changes in output in response to increase in inputs proportionately. In the case of increasing return to scale, the total output increases more than the proportionately. This change in

output is caused by technical and managerial indivisibilities, higher degree of specialization and dimensional relations.

As described in the theories above, agglomeration has many positive externalities. Regions, countries, and inner cities can all be benefited from its formation. Agglomeration occurs between countries within same geographic area. For example, the rapid economic growth in East Asia in 1990 was Japan dominated and was responsible for 67 percent of the manufacturing GDP of East Asia. According to Fujita and Thisse (2002), the existence of agglomeration in a country can be implied by strong regional differences within the same country. For example, in Île-de-France in Paris and in Seoul and Kyungki Province in Korea, high economic activities are concentrated in small geographic area of the countries. Agglomeration in cities can be specialized in very few industries (Henderson 1997). It can also be diverse and include many unrelated industries, for example New York and Tokyo (Fujita and Tabuchi 1997). At industrial level, the agglomeration can be found in firms with strong technological- and/or informational linkages such as the Silicon Valley, IBM in Armonk or Toyota city in New York. Thus, both at the regional and urban levels, large variation in size and activity arrangements can exist (Fujita and Thisse 2002).

2.3 Previous studies

The larger the size of the market of the recipient country and the more rapid its expected growth, the larger the flows of FDI. Green, Cunningham and Ahroni are some of the economists who have found that market size is an important determinant of FDI inflows. A case study of Brazil in year 2000 showed that, the country stands out among developing countries in its existing and potential location advantages and in attracting FDI investors. It also found that the Japanese transnational corporations' main motivation for investing in Brazil was the large size of the Brazilian domestic market.[1]

The effect of market size of a regional trade agreement on FDI received by member countries was investigated by Jaumotte in 2004 with a test sample of 71 developing countries from year 1980 to 1999 including Mali, Togo, Senegal, Sierra Leone, Niger and Liberia. Her findings suggest that market size (measured by GDP) has a significant effect on FDI stock received by RTA countries. The significance level of market size increased in the 1990s as the number of RTA increased (Jaumotte 2004). According to Eisenman and Kurlantzick (2006) China identifies Africa as a supply source for raw material and energy to cover the demand for their expanding industries and markets.

There are many different risks that investors must take into account in their investment decisions, for example political risk and macroeconomic risk. Political risk, caused by factors such as social and macroeconomic policies in a country affect among others, internal and external business agreements, the whole economy and their relationship with the rest of the world negatively. Schneider and Frey (1985) found an inverse effect of political risk on FDI flows. Jaspersen et al. (2000) on the other hand, found no significant effect of political risks on FDI inflows.

In her research *Foreign Direct Investment in Africa: The Role of Government Policy, Institutions and Political Instability* Asiedu found among other macroeconomic stability to have a positive effect on FDI. She also found that FDI is not driven by natural resource endowment alone, and that governments can play an important role in attracting foreign investments (Asiedu 2006).

[1]UN WIR (2000) FDI Determinants and TNC Strategies: The Case of Brazil

Empirical studies finding agglomeration forces to be positively correlated to FDI have increased the last decades. Examples of these studies are: Crozet et al. (2004) FDI in France, Basile (2004) FDI in Italy, Boudier-Bensebaa (2005) FDI in Hungary, Head et al. (1995). A study on Japanese manufacturing firms in US, Anyanwu (2012) FDI in Africa, Woodward (1992) FDI in US and Campos and Kinoshita (2003) FDI in transition economies from 1990 to 1998.

Woodward (1992) studied the correlation between agglomeration and FDI. Using Japanese manufacturing start-up companies in US, he found that agglomeration do have a positive and significant effect on FDI. His findings indicate that, the positive effect of agglomeration forces on FDI can remain even in a cluster with comparable firms. Using panel data from 1996 to 2008 for 53 African countries, Anyanwu (2012) analyzed why FDI goes where it goes in Africa. Some of the variables included were market size, openness to trade, macroeconomic stability and agglomeration. He found among others market size, openness to trade and agglomeration to impact the FDI inflows positively. African sub-regions East and Southern attracted more FDI.

3. Patterns of FDI in Africa

3.1 Development

A list of countries in the appendix clarifies where in Africa included countries are situated. Initially, African countries were skeptical to FDI. Moss, Ramachandran and Shah, for example, think that historical, ideological and political reasons in Africa contribute to this skepticism (Moss, Ramachandran and Shah 2004). But the FDI image has changed over time and many investment barriers, legal restrictions etc. that were against FDI have been removed. The figure below presents the geographic dispersion of FDI in Africa.

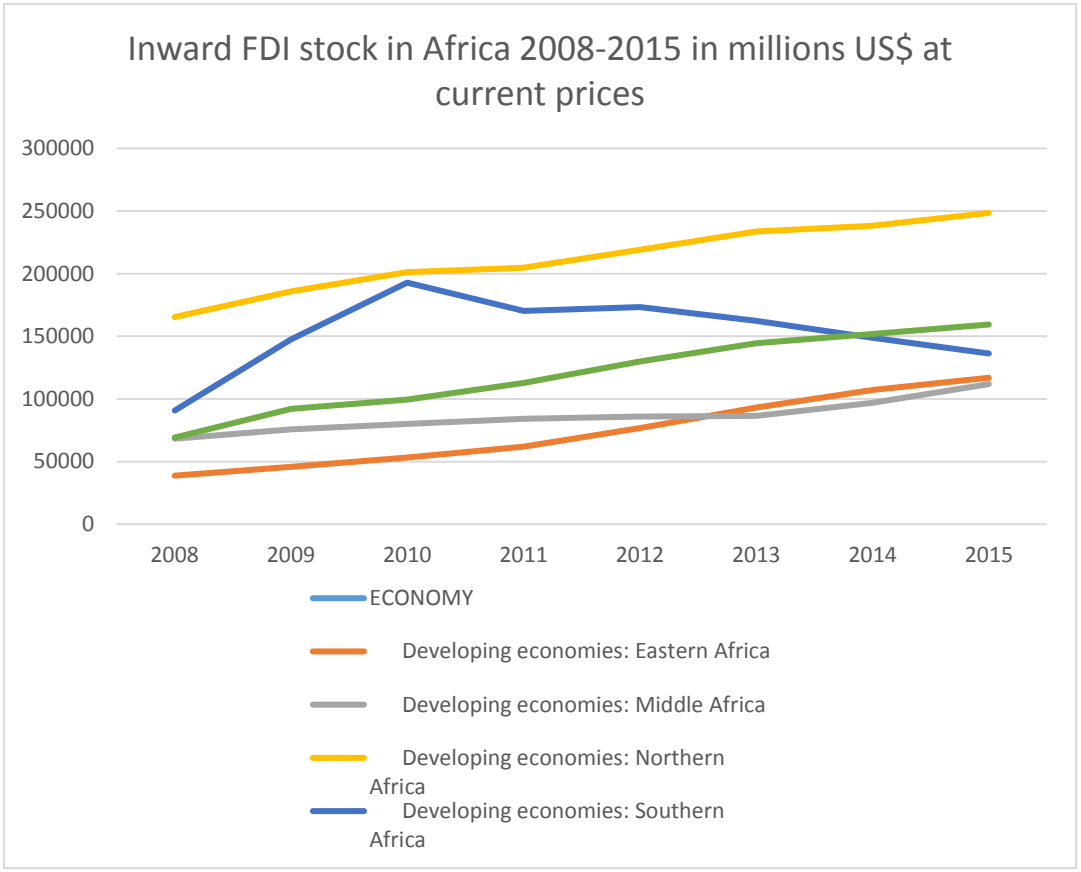

Figure 1: Inward FDI in Africa 2008-2015, source: UNCTAD statistics, 2018-01-15

Studying the values of inward FDI, one should keep in mind that FDI is defined differently in different countries. Because, the reported values of inward FDI can be affected by its definition in the country, see example of FDI definitions in the appendix 1 table.

As we can see Northern and Southern Africa were leading in attracting FDI. But Southern Africa's inward FDI decreased gradually between 2008 and 2015. Western Africa's inward FDI on the other hand increased successively during this period. The regions with lowest inward FDI were Eastern and Middle Africa.

3.2 Types of FDI

As this study examines the determinants of FDI and how agglomeration determines the inward FDI in Africa, it is important to distinguish between different types of FDI and their effect on the inward FDI.

Foreign direct investment is divided in two categories, horizontal FDI and vertical FDI. Ownership of a company by a firm from one industrial country in another industrial country is addressed to as horizontal FDI. There are many benefits of having a company in another industrial country. Examples of these benefits are: dodging the cost of export tariffs by producing and selling in the local market; improved access to the economy of the host country due to the better access to marketing information and facilities for local company. Horizontal FDI give firms a possibility to extend their businesses internationally. Although the host country loses in the tariff income, they gain from the increased inward FDI and its positive effect on the economy.

Vertical FDI on the other hand is ownership of a company situated in a developing country by a firm from industrial economy. Benefits of vertical FDI include, the low wages in developing countries, escaping the tariffs and compete with local firms for sales in the host market. (Feenstra and Taylor 2012). The benefits of vertical FDI in the host country include increased inward FDI and its positive externalities such as advanced technology and knowhow. Thus, the country becomes more open, more integrated in the global market, more promotion and attract more FDI. This development presents possibilities for the formation of agglomeration in the host country (see agglomeration theories in chapter 2).

3.3 Distribution between Sectors

The resource abounded countries in Africa have attracted more FDI in the last ten years. FDI inflows in Africa were concentrated in the primary sector which includes agriculture, fisheries and forestry sectors. According to the African Trade Policy Centre, the primary sector answered for more than half of the FDI inflows during 1996 to 2000 and the concentration was mainly in oil and gas industries. FDI inflows in service industries from the tertiary sector also increased from 1999 (UNCTAD: FDI in LDCs). The mining, transportation, finance, natural resources, insurance and diving industries are also attracting more FDI inflows. More information on the distribution of FDI between sectors would have been useful in this study. The lack of information and statistics hinders further studies on the sectorial distribution of FDI and its effect on these sectors in West Africa.

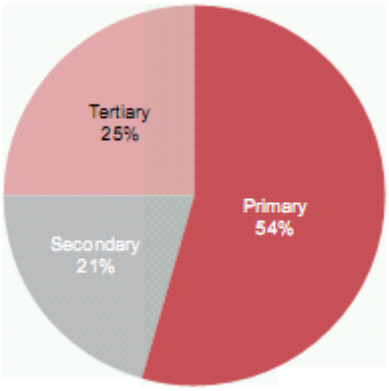

Figure 2: FDI inflows in Africa by sector (1996-2000)

Source: African trade Policy Centre. Work in Progress No..21

3.4 Countries of origin of FDI

Countries of origin of the inward FDI in Africa vary. Foreign direct investors from developed economies have been dominating in Africa, for example Germany, United Kingdom, France, Japan and USA.

But FDI from developing economies in particular from Asia has increased recently. China is now one of the most important investors in the African continent. The Chinese government promotes investment and trade with Africa by encouraging and supporting Chinese companies' investment business in Africa. For example, preferential loans, guidance and service are offered for China- Africa investment and trade. Infrastructure development and construction of special economic zones have received more of the Chinese FDI. These special economic zones are expected to increase employment opportunities. They are also expected to improve infrastructure and technology transfer.[2]

India is another large contributor in Africa's FDI development. This trend augments the African countries' access to the global market and the development opportunities. According to *Asia-Pacific trade and investment review* by Marc Proksch, the increased Asian FDI is motivated by trade. Oil and other natural resources has been the primary target. But Indian FDI in other industries such as textiles, manufacturing and agro-industries has also increased in recent years.

According to the World Investment Report from 2010, investors from developing economies are less concerned about the development of the locational factors in Africa than investors from developed economies. Examples of these factors are infrastructure development, investment services and access to power supply. The increased confidence led to more resistant FDI and helped African countries to sustain the global financial crisis. This trend is more sustainable than the investment from developed economies. "*Behind this increase are some important factors such as high commodity prices, the growing internalization of emerging TNCs and fast-growing emerging economies in need of natural resources*." (World Investment Report 2010 p.34 – 37)

[2]China's African Policy: http://www.fmprc.gov.cn/zflt/eng/zt/zgdfzzcwj/t230479.htm 01-12-2012

In recent years, intraregional FDI in Africa has increased. South Africa, Morocco, Tunisia and Mauritius are some of the African countries that have increased their outward FDI to other African economies. For example, South Africa's outward FDI stocks increased from 5% (share of Africa's total FDI outward) in year 2000 to 22% in year 2008. Most of these investments went to telephone communication, infrastructure, mining and energy. According to World Investment Report 2010, this development was facilitated by the deepening of regional integration.

The dominating industries attracting investors from developing countries are crude petroleum and natural gas, infrastructure, banks and telephone communication. The majority of these investors are state-owned companies seeking for market, resources and efficiency. Examples of these companies are, the Indian Oil and Natural Gas Corporation (ONGC) and China National Offshore Oil Corporation (CNOOC, UN WIR 2010)

4. The model and data: Determinants of FDI in Africa

4.1 The model

This chapter will present the model and the dataset used in my study. As described in chapter two, market size, economic stability, agglomeration forces and trade openness are potential determinants of FDI. To test the effect of these factors on the inward FDI in African countries, a multiple regression is run using MS-Excel. Countries included in the test are listed in the table appendix 2.

Model 1: The following model will be estimated:

$FDI_{it} = \beta_0 + \beta_1 (\text{Market size})_{it} + \beta_2(\text{Economic stability})_{it} + \beta_3(\text{Openness})_{it} + \beta_4(\text{Agglomeration})_{it} + \text{Regional dummies} + \varepsilon_{it}$

Where i and t represents time, and the variables are defined as:

- FDI represents the value of accumulated foreign direct investment (US Dollars at current prices in millions)
- Market size is measured by GDP per Capita, GDP, Total Population
- Economic stability is measured by Inflation rates
- Openness is measured by trade openness indicator
- Agglomeration measured by Urban Population, industry, services and agriculture
- Regions is a dummy variable representing African regions (Eastern, Middle, Northern, Southern and Western Africa)
- β is standardized coefficient
- ε_{ij} denotes other factors affecting FDI, assumed to be well behaved.

Independent Variables	Measurements	Expected Effect
Market size	GDP per Capita, GDP, Total Population	+
Economic stability	Inflation rates	-
Openness to Trade	Trade openness indicator	+
Agglomeration	Urban Population, industry, services and agriculture	+
Regional dummies	Eastern, Middle, Northern, Southern and Western Africa	-

Table 1: Potential determinants of the inward FDI

The table above summarizes the potential determinants of FDI in this study and used measurements for these variables and their expected effect on the inward FDI. A description and sources of variables are presented in the table appendix 3. Earlier studies have suggested large market size as important determinant of FDI See for example: Jaumotte (2004), Green and Cunningham (1975). As summarized in the table above market size is proxied by GDP Per Capita, GDP and Total Population size. GDP Per Capita is total gross domestic product for the level of economic activity (US Dollars in Millions). GDP is gross domestic product (Annual average growth rate). Whilst Population is total population in thousands.

Higher and more fluctuating inflation rates leads to higher risks for investors. It also makes it riskier to have long-term planning and projects. Economists suggest macroeconomic stability as determinant of FDI (Mateev 2009), (Baniak et al. 2005). Therefore Economic stability is represented by inflation rates from the annual consumer price indicator. Studies like Anyanwu, 1998; Campos and Kinoshita, 2003; Anyanwu and Erhijakpor 2004 have confirmed the positive effect of openness to trade on the inward FDI. Openness ratio Export and Import/GDP (Annual, US Dollars at current prices in millions) is hence proxied as openness to trade variable. Countries with larger industries are suggested to attract more FDI stocks. This can be explained by the advantage of the positive externalities by locating nearby already established companies. The measurements for agglomeration varies between urban

populations which is urban population in percentage of total population; Industry is percentage of the GDP consisting of mining and quarrying; manufacturing; gas and water supply; electricity and construction. Agriculture is percentage of the GDP consisting of agriculture, hunting, forestry and fishing.

Services represent all other economic activities that are not included in industry and agriculture. (Crozet et al. 2004); (Basile 2004); (Anyanwu 2012); (Woodward 1992).Urban population, industry values, agriculture and service values are proxied as agglomeration forces. Including agriculture and service values to measure the agglomeration forces may be far-fetched. But, as mentioned before in chapter three, more than half of the FDI inflows in Africa from 1996 to 2000 was concentrated mainly in oil and gas industries primary sector. Also Indian FDI in Africa increased in textile and agro-sectors in recent years.

4.2 Data and Estimation Methodology

The data set in this study comprises annual data from 2008 to 2016 for 33 African countries. A summary of the statistics results are presented in the table below. Five different regression estimation are made using variables inflation, openness and the regional dummies in all the estimations.

Some of the earlier studies have used GDP and/or GDP per capita and/or total population as proxy of market size. The effect of agglomeration forces on FDI has also been measured with industry and urban population separately. In this study, these measurements for market size and agglomeration are separately tested in the estimations below. Thus, changes in the effect of the market size and agglomeration will be captured and compered with each other. This can also show the measurement of variables that are most suitable for African countries due to the diversity in their resource endowment, economic stability and development progress. Another reason for testing the measurements separately is due to multicollinearity issues. As mentioned earlier in chapter three, FDI is defined differently in different countries. Because, the reported values of inward FDI can be affected by its definition in the country, see example of FDI definitions in the table appendix 1. Although Africa's five regions are included as dummy variables, the discussion will not include Northern and Eastern Africa. Because, the estimation do not show correct results for these region due to multicollinear issues (see appendix 9).

5. Results and discussion

5.1 Horizontal vs Vertical FDI

An increase of vertical FDI promotes the host country on the global market (potential future investors). Thus, possibilities for agglomeration formation. Although an increase of horizontal FDI also promotes the host country, the effect vary due to many factors. The differences in what a developing country has to offer versus what an industrial country has to offer the investor (see the OLI framework in chapter 2). The choice of measurements for included variables is important because it can affect the results differently depending on the type of FDI being studied. Since this study is about FDI in Africa and the majority of investors in the continent are from industrial countries, the type of FDI the study is related to, is the vertical FDI. The determinants of FDI in African countries (developing countries) may differ from the determinants of industrial countries because of the differences in their structural diversities. Also the significance of a variable may be more relevant for a study on vertical FDI than a study on horizontal FDI. For example, GDP can be used as market size measurement of an industrial country but GDP do not include intermediate goods and services. The majority of the population in Africa live and work in rural areas with agriculture. Thus GDP per capita and total population may be better measurements for market size in African countries because we can see how level of living and population size affect the inward FDI.

5.2 The five estimations

The first estimation in the table below shows results when the model is estimated including all the measurements except urban population. As we can observe, Adjusted R-Square at 0.61 illustrates that about 61% of the variation in the inward FDI in Africa can be explained by the independent variables. The significance F value shows that the test is significant. We can observe that there is a significant and positive correlation between the dependent variable inward FDI and the market size - GDP Per Capita and Total Population. This indicates that African countries with large markets (in term of GDP per Capita and Total population) attract more FDI. This result is consistent with the FDI theories identifying market size as one of the factors attracting foreign investors (Dunning). It is also consistent with the findings of previous studies such as Y.Ahroni (1966) and Green and Cunningham (1975) the expected (table 1). The third proxy for market size GDP on the other hand, shows negative and insignificant effect on the inward FDI. Which may be explained by the multicollinearity issues (appendix 9). GDP Per Capita and total population as market size measurement seems to fit vertical FDI better than GDP. The results also show that economic stability – inflation - has positive but statistically insignificant effect on the inward FDI in African countries. This result goes against former findings that suggest that countries with higher economic stability attract more FDI (Mateev 2009, Baniak et al. 2005, Asiedu 2006). It also goes against the expected result (see table 2). Agglomeration forces - Industry, agriculture and services - show positive and insignificant results. This is inconsistent with theories and models suggesting that, advantages of the agglomeration phenomena attract FDI (Porter 1998, Krugman 1991). It is also inconsistent with previous findings on the variable´s relationship with the inward FDI (Crozet et al. 2004, Anyanwu 2012) and the expected. The openness on the other hand is negative and insignificant. The variable also shows a result that goes against the expected and against previous findings (Campos and Kinoshita 2003, Sekkat and Veganzones-Varoudakis 2007, Anyanwu and Erhijakpor 2004) openness to trade leads to more inward FDI.

Table 2: Summary of the regression estimations

Variable	(i)	(ii)	(iii)	(iv)	(v)
Intercept	-559493,183	-27223,582*	-503839,444	21782,930***	20660,701**
	(1209448,429)	(16186,437)	(1277977,521)	(7512,019)	(8751,903)
GDP	-143,568		-30,205		
	(113,954)		(118,315)		
GDP Per Capita	4,216***	4,508***		4,148***	2,395**
	(0,781)	(1,174)		(0,761)	(1,020)
Inflation	256,095	576,449*	114,298	216,279	666,938**
	(221,754)	(293,396)	(232,835)	(219,866)	(298,464)
Openness	-64,807	-346,808***	-51,372	-75,570	-440,913***
	(64,929)	(89,497)	(68,564)	(64,426)	(85,929)
Tot.Population	0,595***		0,610***	0,600***	
	(0,041)		(0,044)	(0,041)	
Agriculture	5747,169	572,913***	5174,404		
	(12086,135)	(205,639)	(12770,777)		
Services	5859,174	897,801***	5384,243		
	(12097,003)	(248,470)	(12782,622)		
Industry	5185,368		5041,626	-584,878***	
	(12093,869)		(12779,642)	(149,122)	
Urban		100,450			297,719**
Population		(142,878)			(126,304)
Western Africa	15207,274***	-23961,778***	-23673,341***	-16203,267***	-15549,897**
	(5171,025)	(6876,474)	(5205,720)	(5128,348)	(6482,659)
Southern Africa	3970,444	-9253,686	3681,077	5483,278	5800,517
	(5220,26)	(8107,444)	(5514,275)	(4915,798)	(6775,274)
Middle Africa	-4210,365	-16411,104	-14364,576***	-5342,999	-16219,297**
	(5339,979)	(7118,071)	(5278,913)	(5305,902)	(7267,991)
Adjusted R^2	0,613	0,306	0,571	0,614	0,275
Number of observations	264	263	263	263	263
F-statistic	36,397	12,751	33,171	47,995	13,699
Significance F	2,95E50	3,934E-19	5,013E-45	9,58E-53	6,884E-18

Notes: Standard errors in parentheses. *, **, *** denote statistical significance at the 10, 5 and 1% significance levels, respectively, Source: Author´s Estimations

In the second estimation, urban population represents the agglomeration forces and GDP per capita represents the market size. As we can observe from the table, Adjusted R-Square at 0.306 illustrates that about 31% of the variation in the inward FDI in Africa can be explained by the independent variables. The significance F value shows that the test is significant. The variable market size hold its positive and significance effect on the inward FDI. The results for economic stability also remain unchanged, meaning positive and insignificant effect on the inward FDI in African countries. Urban population is positive but not significant. Agriculture and services on the other hand show positive and significant results. The lack of significance for urban population may be explained by multicollinearity issues. This indicates that, agglomeration forces may have positive effect on the inward FDI. The openness to trade remains negative but significant which goes against the expected and against the results of previous findings.

And in the third estimation, GDP and total population represent market size whilst industry represents the agglomeration forces. As we can observe from the table, Adjusted R-Square at 0.571 illustrates that about 57% of the variation in the inward FDI in Africa can be explained by the independent variables. The significance F value shows that the test is significant. Total population shows positive and significant effect whilst GDP shows negative and insignificant sign. The lack of positive and significance for GDP may be explained by multicollinearity issues. Thus, market size hold its positive and significance effect on the inward FDI. The results for economic stability also remain unchanged, meaning positive and insignificant effect on the inward FDI in African countries. Agglomeration - Industry, agriculture and services - is positive but not significant. The results for agglomeration forces in this estimation are not in accordance with the expected results and previous findings. The openness to trade remains negative but significant.

The fourth estimation has GDP per capita and industry as proxies for market size and agglomeration forces. As we can observe from the table, Adjusted R-Square at 0.614 illustrates that about 61% of the variation in the inward FDI in Africa can be explained by the independent variables. The significance F value shows that the test is significant. Market size - Total population and GDP per capita - holds its positive and significance effect on the inward FDI. The economic stability – inflation - shows positive and insignificant effect on the

inward FDI in African countries even in this estimation. Agglomeration - Industry - is negative and significant. Whilst openness to trade shows negative and insignificant result.

In the last estimation, the market size and agglomeration are presented by GDP per capita and urban population. As we can observe from the table, Adjusted R-Square at 0.275 illustrates that about 28% of the variation in the inward FDI in Africa can be explained by the independent variables. The significance F value shows that the test is significant. Market size - GDP per capita - holds its positive and significance effect on the inward FDI. The effect of economic stability is positive and significant in this estimation. Agglomeration - Urban population - shows positive and significant effect on the inward FDI. The openness to trade remains negative but significant.

5.3 Model Variation

The results from the five estimations above vary. Although we can see, in particular in the fifth estimation that the inward FDI in Africa may be explained by combinations of the independent variables. We cannot tell the unique effect of each independent variable have on the inward FDI in Africa. Because, in some estimations, the F-values are significant but P-values are not (appendix 5). For example, the lack of significance for urban population in the second estimation. Also because, results for economic instability and openness in these estimations differ from results of previous studies and the expected.

Economic instability´s effect on inward FDI seems to be positive whilst openness seems to be negative. Although the table appendix 9 shows no correlation between these variables, a new estimation is made without including economic stability and openness (see model 2 below). Service and agriculture is also removed from the equation. Thus, the market size is presented by GDP per capita and total population. Agglomeration is presented by urban population.

Model 2:

$FDI_{it} = \beta_0 + \beta_1 (\text{Market size})_{it} + \beta_2(\text{Agglomeration})_{it} + \text{Regional dummies} + \varepsilon_{it}$

Where i and t represents time, and the variables are defined as:

- FDI represents the value of accumulated foreign direct investment (US Dollars at current prices in millions)
- Market size is measured by GDP per Capita and Total Population
- Agglomeration measured by Urban Population
- Regions is a binary variable representing African regions (Eastern, Middle, Northern, Southern and Western Africa)
- β is a vector of coefficients

ε_{ij} denotes other factors affecting FDI, assumed to be well behaved.

Table 3: Summary of regression estimation model 2

Variable	
Intercept	-10776,8*
	(6315,453)
GDP Per Capita	1,233113*
	(0,742)
Tot.Population	0,643896***
	(0,039)
Urban Population	303,2435***
	(90,731)
Western Africa	-9039,59*
	(4739,843)
Southern Africa	15545,15***
	(4925,223)
Middle Africa	-1590,02
	(5425,935)
Northern Africa	0,000
	(0,000)
Eastern Africa	0,000
	(0,000)
Adjusted R^2	0,605
Number of observations	264
F-statistic	59,520
Significance F	4,76E-54

Notes: Standard errors in parentheses. *, **, *** denote statistical significance at the 10, 5 and 1% significance levels, respectively.

The estimation result in the table 4 illustrates that, about 60% of the variation in the inward FDI in Africa can be explained by the independent variables. The significance F value shows that, the test is significant. Market size - GDP per capita and total population - holds its positive and significance effect on the inward FDI. Agglomeration - Urban population is positive and significant. This result coincides with agglomeration theories such as Porter 1998, Krugman 1991and the findings of previous studies (Crozet et al. 2004, Anyanwu 2012). We can observe that, Western Africa is negative and significant. Middle Africa is also negative but insignificant, indicating that, the inward FDI in this region is not correlated with the affiliation. Southern Africa on the other hand is positive and significant.

6. Conclusions

I examined the determinants of foreign direct investment in Africa aiming to understand how the agglomeration forces determine the inward FDI in the continent. To clarify the potential factors attracting FDI in Africa, a multiple regression is run in MS- excel. Attempting to predict the size of inward FDI (US Dollars at current prices in millions) as a function of market size (GDP, GDP per capita and total population); economic stability (inflation rates); openness and agglomeration (urban population, industry, agriculture and services). I find that, the inward FDI in Africa can be explained by combinations of the variables above. Using a new estimation model - the inward FDI in Africa as a function of market size (GDP per capita and total population) and agglomeration (urban population). I find that: there is a positive correlation between market size (GDP per capita and total population) and the inward FDI in Africa; agglomeration forces (urban population) have positive effect on the inward FDI in Africa. This result is in accordance with previous findings of Anyanwu (2012). Thus GDP Per Capita and Total population seem to be more preferable market size measurement for developing countries.

African regions are also included in the model as dummy variables to study the effect of regional affiliation. I find that, Western Africa is negative and significant. Middle Africa is also negative but insignificant, which coincide with previous findings that African countries attract less FDI, given their market size (GDP per capita and total population) and agglomeration (urban population). Southern Africa on the other hand is positive and significant, indicating that, the region has developed in the performance of attracting FDI, given the same variables.

The empirical findings suggest that, the positive development of Africa's performance in attracting FDI from 2008 to 2016 can be explained by traditional FDI determinants, in particular by agglomeration forces. Thus, the increased FDI in Africa, the trade and investment reforms combined with the agglomeration phenomenon; and the positive externalities of FDI introduce an atmosphere that can be convenient for the continent in their performance of attracting FDI and for their economic development. Studies in the future within this subject area should aim at analyzing microeconomic data. This would among others enlighten us on the effect of agglomeration in different sectors.

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Appendix

Appendix 1: Example of definitions of FDI in African countries

Senegal	A capital investment of at least 5 million FCFA or in UN-dollars, which create employment for at least three Senegalese and which must keep regular accounts according to the Senegalese format.
Mauritania	*"the contributions of foreign currency or new capital equipment in any enterprise, on the condition that it offers shares or stocks; the reinvestment of profits, which could have been transferred abroad; and the repurchase of existing enterprises or participation in existing enterprises effected by a return of foreign currency."*
Mali	"part of investment, in the spirit of the law, the funding of assets and of the initial working capital within the framework of a development project."
Guinea	"*1) as the contribution to any business duly established in Guinea of foreign currency or new capital goods acquired abroad, in return for the granting of company stock or shares, such stock or shares entitling the contributor to an interest in the profits and proceeds of liquidating the business, provided the value of any contribution other than a foreign currency contribution has been determined by independent certified public accountants; 2) the reinvestment of earnings from the business that could have been transferred abroad; and 3) the purchase of existing businesses or the acquisition of holdings in such businesses through a contribution of foreign currency.*"
Guinea-Bissau	*"any contribution calculable in financial terms brought into the country from an external source by individuals or corporate bodies not domiciled or headquartered with the national territory, either for the purposes of their own commercial activities or for the purpose of participating in the capital of companies that are already established or that is intended to establish in the Republic of Guinea-Bissau (Decree-Law No. 2/85)."*

Sources: FDI in Least Developed Countries at a Glance, 2002, Senegal p. 92-93, UNCTAD WID Country Profile: Senegal 13-11-2006, p.1; UNCTAD WID Country Profile: Mauritania 13-11-2006, p.1, Mali 09-03-2004, p.1, Guinea 13-11-2006, p.1, Guinea Bissau 13-11-2006, p.1

Appendix 2: List of the countries

African Regions	Countries
Western Africa	Benin
	Burkina Faso
	Cape Verde
	Côte d'Ivoire
	Gambia
	Ghana
	Guinea
	Guinea Bissau
	Liberia
	Mali
	Mauritania
	Niger
	Nigeria
	Senegal
	Sierra Leone
	Togo
Northern Africa	Algeria
	Egypt
	Libya
	Morocco
Central Africa	Angola
	Cameroon
	Central African Republic
	Chad
Southern Africa	Botswana
	Lesotho
	Namibia
	South Africa
	Swaziland
Eastern Africa	Burundi
	Djibouti
	Eritrea
	Comoros

Appendix 3: Definition of Variables and Data Source

Variable	Definition	Source
FDI (Stock)	The value of accumulated foreign direct investment (US Dollars at current prices in millions)	United Nations Conference on Trade and Development, Data Center 2017
GDP Per Capita	Total Gross Domestic Product (US Dollars in Millions)	United Nations Conference on Trade and Development, Data Center 2017
GDP	Gross Domestic Product (Annual average growth rate)	United Nations Conference on Trade and Development, Data Center 2017
Inflation	Consumer price indicator (Annual)	United Nations Conference on Trade and Development, Data Center 2017
Population	Total Population (in thousands)	United Nations Conference on Trade and Development, Data Center 2017
Urban Population	Urban Population (% of total population)	United Nations Conference on Trade and Development, Data Center 2017
Openness	Trade openness indicator, Export and Import/GDP (Annual, US Dollars at current prices in millions)	United Nations Conference on Trade and Development, Data Center 2017
Agglomeration		
Regional Dummies	Eastern, Middle, Northern, Southern and Western Africa	United Nations Conference on Trade and Development, Data Center 2017

Variable	*Coefficients*	*Standard Error*	*t Stat*	*P-value*
Intercept	-559493,183	1209448,429	-0,463	0,644
GDP	-143,568	113,954	-1,260	0,209
GDP Per Capita	4,216	0,781	5,401	0,000
Inflation	256,095	221,754	1,155	0,249
Openness	-64,807	64,929	-0,998	0,319
Tot.Population	0,595	0,041	14,340	0,000
Agriculture	5747,169	12086,135	0,476	0,635
Services	5859,174	12097,003	0,484	0,629
Industry	5185,368	12093,869	0,429	0,668
Western Africa	-15207,274	5171,025	-2,941	0,004
Southern Africa	3970,444	5220,268	0,761	0,448
Middle Africa	-4210,365	5339,979	-0,788	0,431
Northern Africa	0,000	0,000	65535,000	0.000
Eastern Africa	-19057,621	6575,887	-2,898	0.000
Adjusted R^2				0,613
Number of Observation				264
F-statistic				36,397
Significance F				2,95E50

Appendix 4: Summary of the regression estimation 1

Column1	*Coefficients*	*Standard Error*	*t Stat*	*P-value*
Intercept	-27223,582	16186,437	-1,682	0,094
GDP Per Capita	4,508	1,174	3,840	0,000
Inflation	576,449	293,396	1,965	0,051
Openness	-346,808	89,497	-3,875	0,000
Agriculture	572,913	205,639	2,786	0,006
Services	897,801	248,470	3,613	0,000
Urb.Population	100,450	142,878	0,703	0,483
Western Africa	-23961,778	6876,474	-3,485	0,001
Southern Africa	-9253,686	8107,444	-1,141	0,255
Middle Africa	-16411,104	7118,071	-2,306	0,022
Northern Africa	0,000	0,000	65535,000	0,000
Eastern Africa	-45064,649	8796,642	-5,123	0,000
Adjusted R^2				0,306
Number of Observation				263
F-statistic				12,751
Significance F				3,934E-19

Appendix 5: Summary of the regression estimation 2

Column1	*Coefficients*	*Standard Error*	*t Stat*	*P-value*
Intercept	-503839,444	1277977,521	-0,394	0,694
GDP	-30,205	118,315	-0,255	0,799
Tot.Population	0,610	0,044	13,969	0,000
Inflation	114,298	232,835	0,491	0,624
Openness	-51,372	68,564	-0,749	0,454
Agriculture	5174,404	12770,777	0,405	0,686
Services	5384,243	12782,622	0,421	0,674
Industry	5041,626	12779,642	0,395	0,694
Western Africa	-23673,341	5205,720	-4,548	0,000
Southern Africa	3681,077	5514,275	0,668	0,505
Middle Africa	-14364,576	5278,913	-2,721	0,007
Northern Africa	0,000	0,000	65535,000	0,000
Eastern Africa	-25978,478	6813,349	-3,813	0,000
Adjusted R^2				0,571
Number of Observation				263
F-statistic				33,171
Significance F				5,013E-45

Appendix 6: Summary of the regression estimation 3

Column1	*Coefficients*	*Standard Error*	*t Stat*	*P-value*
Intercept	21782,930	7512,019	2,900	0,004
GDP Per Capita	4,148	0,761	5,450	0,000
Inflation	216,279	219,866	0,984	0,326
Openness	-75,570	64,426	-1,173	0,242
Industry	-584,878	149,122	-3,922	0,000
Tot.Population	0,600	0,041	14,631	0,000
Western Africa	-16203,267	5128,348	-3,160	0,002
Southern Africa	5483,278	4915,798	1,115	0,266
Middle Africa	-5342,999	5305,902	-1,007	0,315
Northern Africa	0,000	0,000	65535,000	0,000
Eastern Africa	-18381,075	6365,257	-2,888	0,000
Adjusted R^2				0,614
Number of Observation				263
F-statistic				47,995
Significance F				9,58E-53

Appendix 7: Summary of the regression estimation 4

Column1	*Coefficients*	*Standard Error*	*t Stat*	*P-value*
Intercept	20660,701	8751,903	2,361	0,019
GDP Per Capita	2,395	1,020	2,347	0,020
Inflation	666,938	298,464	2,235	0,026
Openness	-440,913	85,929	-5,131	0,000
Urb.Population	297,719	126,304	2,357	0,019
Western Africa	-15549,897	6482,659	-2,399	0,017
Southern Africa	5800,517	6775,274	0,856	0,393
Middle Africa	-16219,297	7267,991	-2,232	0,027
Northern Africa	0,000	0,000	65535,000	0,000
Eastern Africa	-28492,567	7666,864	-3,716	0,000
Adjusted R^2				0,275
Number of				263
Observation				
F-statistic				13,699
Significance F				6,884E-18

Appendix 8: Summary of the regression estimation 5

	GDP	*Tot.Population*	*GDP Per Capita*	*Inflation*	*Openness*	*Urb.Population*	*Western Africa*	*Southern Africa*	*Middle Africa*	*Northern Africa*	*Eastern Africa*	*Industry*	*Services*	*Agriculture*
GDP	1,000													
Tot.Population	0,021	1,000												
GDP Per Capita	0,065	0,133	1,000											
Inflation	0,094	0,066	-0,073	1,000										
Openness	0,067	-0,236	0,186	0,051	1,000									
Urb.Population	-0,060	0,076	0,500	-0,028	0,226	1,000								
Western Africa	0,073	0,040	-0,446	-0,140	0,029	-0,020	1,000							
Southern Africa	-0,028	-0,091	0,399	0,006	0,314	-0,060	-0,410	1,000						
Middle Africa	-0,012	-0,042	-0,051	0,087	-0,097	-0,132	-0,360	-0,157	1,000					
Northern Africa	-0,059	0,255	0,483	0,046	-0,013	0,406	-0,360	-0,157	-0,138	1,000				
Eastern Africa	-0,011	-0,174	-0,187	0,075	-0,280	-0,179	-0,360	-0,157	-0,138	-0,138	1,000			
Industry	-0,023	0,095	0,691	-0,056	0,190	0,282	-0,425	0,212	0,248	0,507	-0,338	1,000		
Services	-0,073	0,065	0,105	0,033	-0,110	0,210	-0,248	0,363	-0,263	-0,113	0,356	-0,200	1,000	
Agriculture	0,075	-0,127	-0,632	0,018	-0,065	-0,389	0,533	-0,454	0,009	-0,315	-0,011	-0,639	-0,627	1

Appendix 9: Independent variables Correlation

Column1	*Coefficients*	*Standard Error*	*t Stat*	*P-value*
Intercept	-10776,760	6315,453	-1,706	0,089
Urb.Population	303,243	90,732	3,342	0,001
GDP Per Capita	1,233	0,743	1,660	0,098
Tot.Population	0,644	0,039	16,377	0,000
Western Africa	-9039,593	4739,843	-1,907	0,058
Southern Africa	15545,147	4925,223	3,156	0,002
Middle Africa	-1590,021	5425,935	-0,293	0,770
Northern Africa	0,000	0,000	65535,000	#NUM!
Eastern Africa	-3321,232	5762,580	-0,576	#NUM!
Adjusted R^2				0,605
Number of observation				264
F-statistic				59,520
Significance F				4,759E54

Appendix 10: Summary of the regression estimation 6