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Impact of Foreign Direct Investments flows on Sub Saharan African economies

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To my parents,
for giving me the freedom to make my own choices
and the support to face them.

Abstract

This work conducts an empirical investigation on the relationship between inflows of foreign direct investment (FDI) and economic growth in the economies of the sub-Saharan African region. The analysis uses a fixed-effect model on a panel of 45 countries in the period 1990-2017. Our results do not allow us to conclude about the existence of a statistically significant relationship between FDI flows and economic growth of the countries in the region.

Keywords: Foreign direct investment, Economic growth, Sub Saharan Africa, Panel data

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Chapter 1: Introduction

At the beginning of the millennium world leaders gathered at the United Nation with the goal of fighting poverty. One of the eight millennium development goals (MDGs) developed at this aim, was to halve the amount of people living on less than $1.25 a day, during 1990–2015 (United Nations, 2015).

Extreme poverty declined more than 50 per cent in the period, dropping from 1.9 billion in 1990 to 836 million in 2015. Even if globally, the goal was achieved, figures are not reassuring for the Sub Saharan African countries. New poverty estimates by the World Bank suggest that the number of people living in extreme poverty is on the rise in this region, comprising more than half of the extreme poor in 2015. Forecasts indicate that by 2030, nearly 9 in 10 extremely poor people will live in Sub-Saharan Africa (SSA). In Annex 1 are reported forecast details.

To finance the African developing agenda, the United Nations Millennium Declaration (2000) indicated that an expansion in Foreign Direct Investment (FDI) would help in the fight against poverty and contributes to economic development in SSA. FDI are considered essential for the region because are a possible source of external capital needed for investment.

To make the role of FDI more critical is the fact that countries in SSA are isolated from international capital markets and official assistance is currently limited (Asiedu 2002).

From a theoretical standpoint, FDI are considered to be conductive to economic growth through their potential contribution to technology, employment and through improving managerial skills and host countries competitiveness.

However, the empirical results of studies on the relationship between direct investment flows and economic growth are controversial. The literature is even more at odds on this issue when the region hosting the investments is Africa.

This dissertation has as a final scope to address the following research question:

What has been the impact of FDI inflows on economic growth in Sub Saharan Africa?

The remainder of the dissertation is organised as follows. Chapter 1 contains further basic information on sub-Saharan Africa. Chapter 2 provides a literature review on the expected effects of FDI and their impact on economic growth. Chapter 3 describes the econometric model used to perform empirical analysis and concluding remarks.

1.1 The Sub Saharan African region

1.1.1 Geography and macroeconomic performances

The African continent is made up of 54 states. The different economic, social and political history of the African continent has widened the profound differences between two major regions: North Africa and Sub-Saharan Africa (SSA). The six northern states - Algeria, Djibouti, Egypt, Libya, Morocco, Tunisia and Tunisia - are included in the geopolitical region known as MENA "Middle East and North Africa" because of the greater similarity of languages, religion and culture with the countries of the Middle East rather than with those of their southern desert neighbours. We refer to "Sub-Saharan Africa" (SSA) as the remaining 48 states located in the southern Sahara desert.

The definition of SSA not only refers to physical geography, but also has a cultural element. The states of this region are not united politically, but rather vulnerable to political risks and civil wars. These risks are exacerbated by the combination of traditional and innovative institutions, which have settled in these countries after independence, in order to align the region with the needs of Western models and to allow investments (Fessehaie and Rustomjee, 2018).

Due to their small size, domestic markets of the region are fragmented, causing diseconomies of scale that slow down economic development.

The region accounts for more than 1 billion people (1.06 billion in 2017), or 14% of the world's population. The impressive population growth is quite a recent phenomenon: in 1960 the total population in SSA was about 22% of the current one.

In the period from 2008 to 2017, the average annual population growth rate of the SSA was about 2.8%, while in the rest of the world the rate is at 1.2%. Expectations are that by 2050, Africa's population will exceed 2 billion people, with a share of 25% of the world's total (World Bank, 2018). *Figure 1* compares the world annual urban population growth rate and the one of the Sub Saharan Africa.
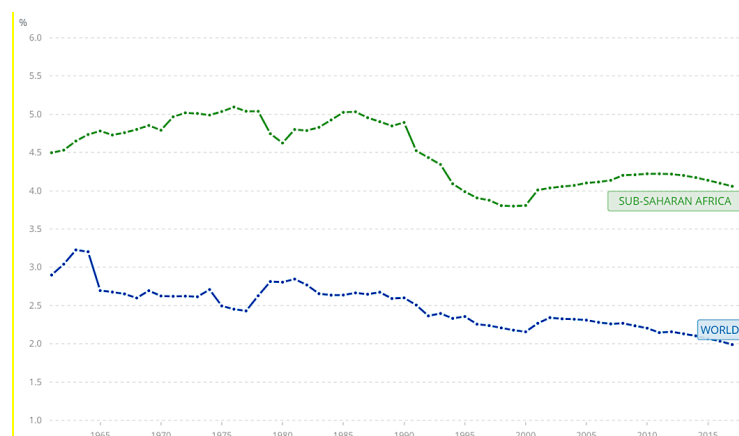
Figure 1- Urban population annual growth rate in the world and in SSA,(Source: World Bank 2018)

Gross Domestic Product of the Sub Saharan African region reached 1.67 trillion USD dollar in 2017 (World Bank data). The value, when weighted for the purchasing power doubles, but is still alarming.

Given population growth trends, it is important to monitor GDP per capita as an indicator of economic growth. The latest data made available by World Bank (2017) report that on average the GDP per capita in current US dollars for the region of Sub-Saharan Africa amounts to $1,574. The smallest figures of GDP per capita was reported in 2018 for Burundi accounting for 307 USD dollar and 733 USD dollar weighted for purchase price parity. *Annex 1* presents more detailed information about income level and GDP per capita figures for the different African countries, both in current dollars and accounting for purchasing power parity. *Figure 3* compares the GDP per capita trend in different African region showing that SSA lies behind all the other curves.
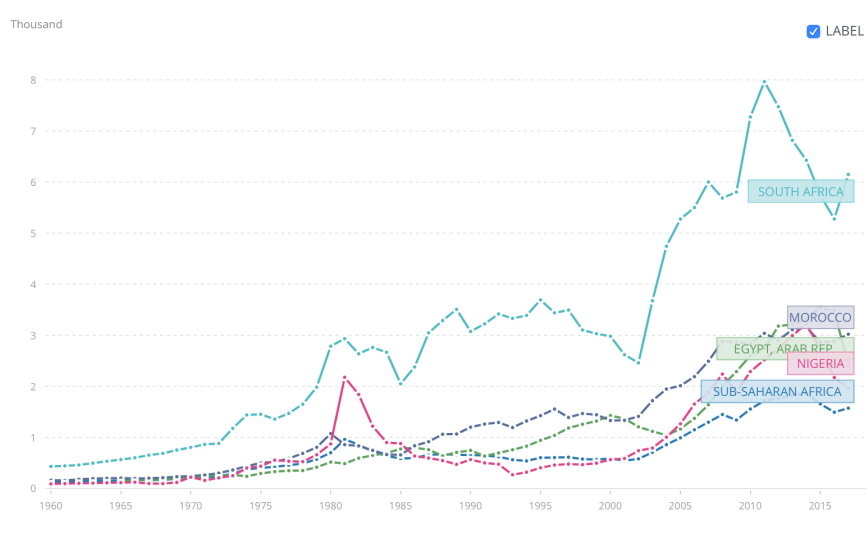
Figure 2- Africa GDP per capita trend comparison

Relying on the World Bank mapping (June 2018) of the income level of different counties[1], African economies can be divided as following: North Africa consists of two out of six countries belonging to the upper middle income level (namely Algeria and Libya), and the rest to the lower middle one; Sub-Saharan Africa countries, with the exception of Seychelles, do not belong to the high or upper middle income level. Out of the remaining 47 countries, 20 belong to the middle category, and 27 to the low income one.

When looking at economic prospect for the region, according to the Africa Economic Outlook 2019, "estimates for economic growth in Africa reach 3.5 per cent in 2018…In the medium term, growth is expected to accelerate to 4% in 2019 and 4.1% in 2020. And although lower than in China and India, Africa should be higher than in other emerging and developing countries. But it is not enough to affect unemployment and poverty." *Figure 4* shows the economic growth trend for developing countries.

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[1] Income groups are created relying on 2016 gross national income (GNI) per capita, calculated using the World Bank Atlas method. The groups are: low income, $995 or less; lower middle income, $996–3,895; upper middle income, $3,896–12,055; and high income, $12,056 or more.
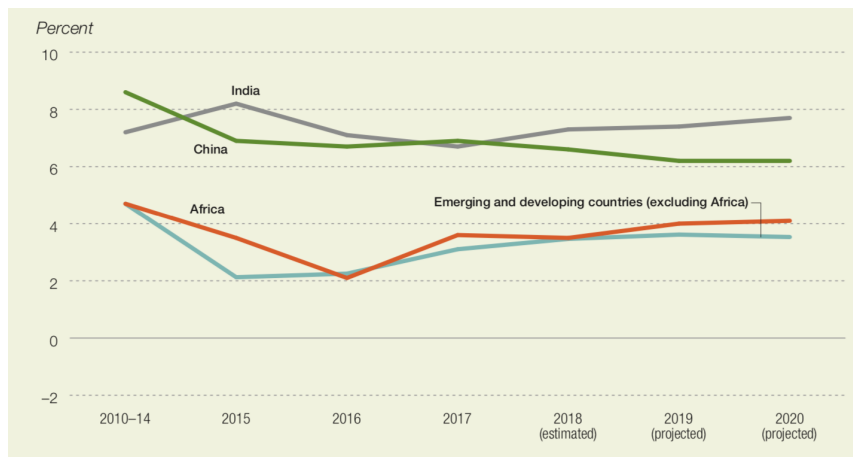
Figure 3 – Real GDP growth 2010-2020 (Source: African Economic Outlook 2019)

The statement is justified by the fact that Africa's working age population is expected to grow from 705 million in 2018 to almost 1.0 billion by 2030. With the current growth rate of the labour force, Africa needs to create around 12 million new jobs each year to prevent unemployment from rising. (African Economic Outlook 2019)

Africa's growth trend is overshadowed by negative risks that can have an impact both indoors and out. Indoors, the risks are linked to increasing debt difficulties in some countries, security and migration concerns, and uncertainties related to elections and political changes. Outside the country, risks include uncertainty about the upsurge in global trade tensions, the normalisation of interest rates in advanced economies and uncertainty about world commodity prices.

The explained macroeconomic scenario has made the African continent, and in particular the sub-Saharan area, the first target for international organizations, such as the International Monetary Fund (IMF), the World Bank, the Food and Agriculture Organization of the United Nations (FAO), and the United Nations Development Programme (UNDP). All these organizations, like many other ones at the national level, contribute with different types of economic aid, ranging from debt cancellation, to the granting of credits, to donations and forms of indirect investment. However, these contributions, although considered crucial for the economic development of the

continent, are losing importance compared to other forms of investment such as FDI in terms of economic value.

1.1.2 Industrialization

Industry growth is a key factor for macroeconomic stabilisation and improved employment performance. However, there has been a deindustrialisation of African economies, which means that industrial growth has not been in line with economic growth over the last two decades.

Relying on African Development Bank Group Data (2018) on average, African industry generates only $700 of GDP per capita which is less than a third of the same amount in Latin America ($2,500) and only a fifth of that in East Asia ($3,400).

The key factor hampering industrialisation, particularly manufacturing growth, is the limited business dynamism mainly caused by corruption, an unfavourable regulatory environment and inadequate infrastructure.

The lack of industrialization is reflected by the close dependency of the African economy on activities that add little value such as agriculture and unprocessed products. Indeed, African exports consist mainly of unprocessed natural resources and low-tech manufactured goods.

In *Table 1* and *Table 2* are shown respectively the top five exported and imported HS6 digit level products[2] and *Table 3* the share of exports and imports by stage of processing in Sub Saharan Africa in 2017.[3]

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[2] The World Customs Organization's Harmonized System (HS) uses code numbers to define products. A code with a low number of digits defines broad categories of products; additional digits indicate sub-divisions into more detailed definitions. Six-digit codes are the most detailed definitions that are used as standard. Countries can add more digits for their own coding to subdivide the definitions further according to their own needs. Products defined at the most detailed level are "tariff lines"

[3] Data gathered from https://wits.worldbank.org/countrysnapshot/en/SSF

Table 1 - Top 5 exported product 2017 (Source: Adjustment from World Bank data)

Exported products	Values in $M
Petroleum oils and oils obtained from bituminou	47
Gold in semi-manufactured forms, non monetar	11
Diamonds non industrial, unworked or simly sawn	7
Bituminous coal, not agglomerated	5
Natuaral gas, liquefied	5

Table 2- Top 5 imported product 2017 (Source: Adjustment from World Bank data)

Imported products	Values in $M
Petroleum oils, etc (excl crude); preparation	26
Petroleum oils and oils obtained from bituminou	7
medicaments of mixed or unmixed products	4
Transmission apparatus, for radioteleph incorpo	3
Automobiles with reciprocating piston engine di	2

Table 3- Export and Imports of products by stage of processing in 2017 (Source: Adjustment from World Bank data)

Exports and imports of products by stages of processing	Values in $M
Raw material exports	93
Raw material imports	25
Intermediate goods exports	60
Intermediate goods imports	50
Consume goods exports	38
Consumer goods imports	84
Capital goods exports	17
Capital goods imports	59

We can easily observe from the tables that African economies strongly rely on commodities that together with intermediate goods accounts for about 70% of Africa's export.

In *Table 4* we tracked the progress of SSA across the industries: in 2010 and 2017, over four sector categories, namely "agriculture", "industry", "manufacturing", and "services".[4] data are gathered by World Development Index (World Bank, 2018)

Table1. 4 - Value added as % of GDP

	Agriculture		Industry		Manufacturing		Services	
	2010	2017	2010	2017	2010	2017	2010	2017
World	4	4	27	25	16	16	63.3	65.1
Sub Saharan	17	16	26	23	10	10	51.7	53.2

The data show a general reduction in value added as a percentage of GDP for agriculture and industry in the SSA from 2010 to 2017. The manufacturing sector is stable at 10% of GDP, a value not yet sufficient to draw conclusions about the rate of industrialisation of the region; the service sector, which was already the main determinant in 2010, shows instead an increase, which is similar to the one of the rest of the world.

Industrialisation plays a vital role for development as it can improve the balance of payment through the creation of products for export and the creation of internal competition for imports. Moreover, by increasing activities along the value chain from raw materials to finished products, industrialisation contributes to the introduction of new technologies, to the creation of skills and jobs and to widespread improvements in the economy.

1.2 FDI in Africa

As shown in the previous section, the African continent, in particular the sub-Saharan area, has not sufficiently exploited the opportunities to start a solid process of

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[4] agriculture corresponds to the ISIC groups 1-5, and includes forestry, hunting, fishing, crops cultivation, and livestock production; industry includes ISIC groups 10-45, in particular mining, manufacturing, construction, electricity, water, and gas. Manufactury is a subset of industry (ISIC 15-37), as it includes only manufacturing activities, which are to be monitored alone as they are a good proxy for the industrialization process. Eventually, services include ISIC groups 50-99, which include wholesale, retail, transport, education, healthcare, and real estate services

industrialization: It has been argued that FDI represents one of the most important resources to allow the development of the manufacturing sector and secondary industry (Chen et al., 2015) and consequently in driving the growth of the region.

1.2.1 FDI Volume and trend

Global FDI volume has taken off since mid 1980s, World annual FDI flows grew from a little over US$ 50 billion in 1983 to a peak of US $1,400 billion in 2000 and continuing growth till 2007. As we can appreciate from figure 5, In 2018 the total value of FDI in 2017 was $ 1.4 trillion and the fraction devolved to Developing economies accounted for 47 per cent of the total. Africa still accounts for about 6% of this share, less than 3% of the global share of FDI inflows (UNCTAD, 2018).

Multinational enterprises (MNEs) from developed economies (such as the United States, United Kingdom and France) hold the largest FDI stock in Africa. At the same time, developing-economy investors from China and South Africa, followed by Singapore, India and Hong Kong (China), are among the top 10 investors in Africa (*Figure 6*).
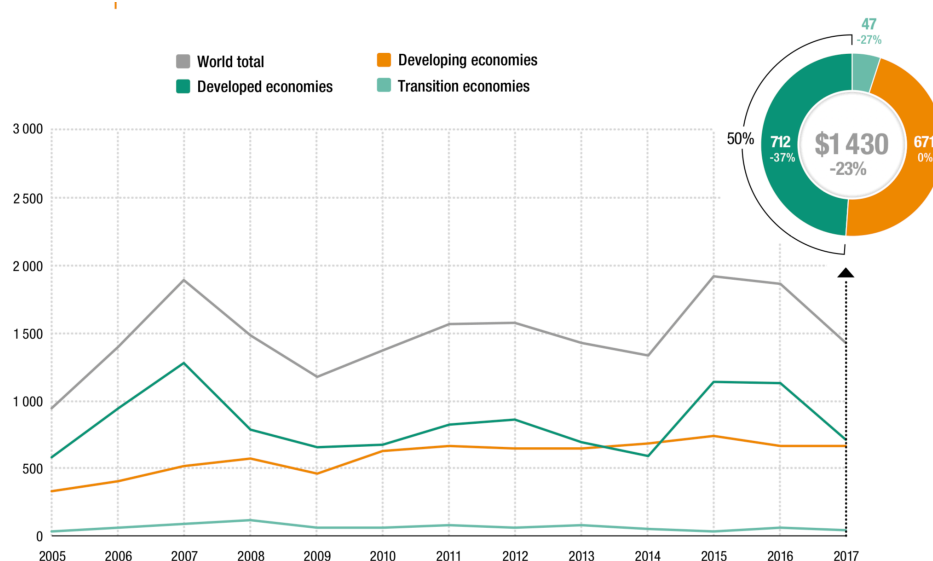
Figure 4- FDI inflows, global and by group of economies, 2005–2017 (Billions of dollars and per cent)Source: Unctad 2018

(Billions of dollars)

Figure 6 - Top 10 investors by FDI stocks Source World Investment Report 2018

World Investment Report 2018 states that FDI flows to Africa slumped to $41.8 billion in 2017, a 21% decline from 2016. Weak oil prices and harmful ongoing macroeconomic effects from the commodity bust saw flows contract in major host African economies.

According to World Bank Data (2018) figures for Sub Saharan Africa reached 24.6 billion in 2017 and *Figure 8* shows the trends of FDI for the region.
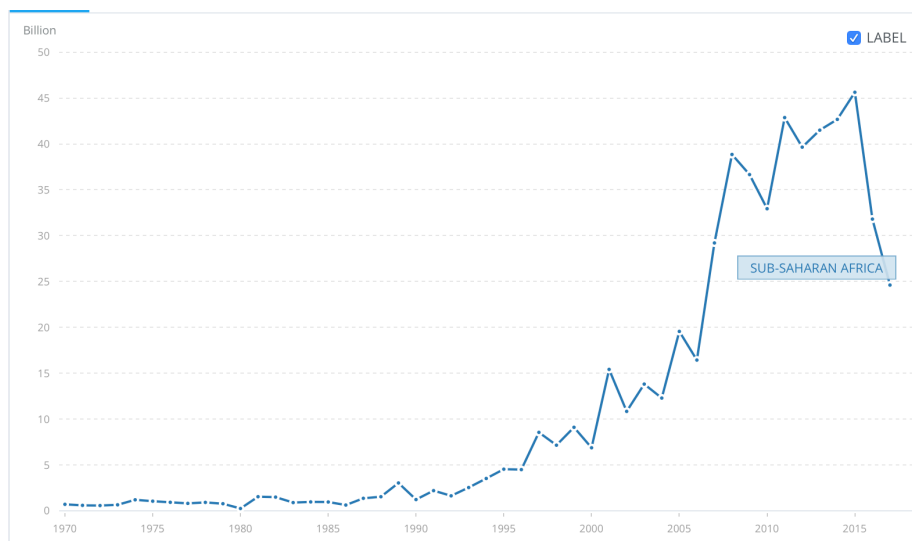
Figure 7 - Foreign Direct Investment Inflows SSA (Source: World Bank)

1.2.2. FDI by destination countries and sector

As a matter of fact, FDI trends result all but homogeneous over Africa regions, countries and sectors: in 1990, the share of FDI inflows was distributed in West and North Africa (respectively 54% and 41%), leaving less than 5% to the other regions; in 2017, West and North Africa still lead in terms of FDI inflows shares (respectively 27% and 32%), but East, Central, and Southern Africa have registered a significant increase, acquiring respectively 18%, 14%, and 9%; the slight decline in the Sub-Saharan area registered in 2016 is due to low and unstable commodity prices, which have diminished the countries' attractiveness (UNCTAD, 2017; UNCTAD, 2018). *Figure 8* reports the split of the investment among the different African region from 2010 onwards.
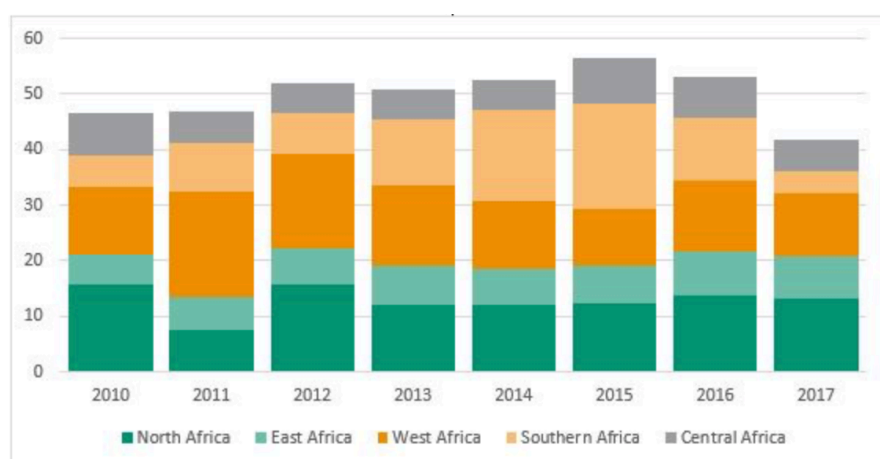
Figure 8 - FDI inflows in billion by region Source: World Investment Report 2018

Within the regions, heterogeneity in FDI flows is high as well, with oil-producing countries accounting for most of the flows per regions, and a quick rise of a few non-oil-producers: in 2017, Egypt and Morocco account alone for 86% of North Africa FDI inflows, mainly due to new investment reforms and gas discoveries, such as Shell's discovery of gas reserves in the western desert of Egypt. Nigeria and Ghana account for 60% of West Africa; Democratic Republic of Congo and Gabon for 50% of Central Africa; Ethiopia and United Republic of Tanzania for 63% of East Africa; Mozambique, South Africa, and Zambia for 94% of Southern Africa (UNCTAD, 2018).

In Table 1 and 2 of *Annex 1* we provide information about the latest M&A and announced greenfield FDI projects by industry and provide a comparison between 2016 and 2017 values.

The Africa's emerging consumer market has led to a shift of investment from extractive to consumer-facing sectors. Short-term considerations weighed on FDI in conventional consumer-facing sectors, and demand has accelerated industrial growth. Consequently, 2017 saw an increase in investment moving towards manufacturing and power generation. These are considered as next-generation sectors given their importance to stimulating Africa's structural transformation.

EY Attractiveness report of 2018 show the industries that grew the most in 2017 on the basis of number of projects. Real Estate, Hospitality and Construction (RHC) grew by 130% making it the largest sector in 2017 and accounting for 15% of the total number of projects. Power and Utilities sector reached an all-time high investment record accounting for 59 project and reporting a 40% increase on the previous year, FDI into chemicals was solid, with 44 projects during 2017, the highest level of investment into the sector over the last decade. The automotive sector attracted 42% higher investment in 2017 with 47 projects.

Chapter 2: Foreign Direct Investment

Several studies have analysed the impact of foreign direct investment (FDI) inflows on the economic growth rates of different groups of countries over time, leading to non-convergent results. The ambiguous or contradictory results are mainly attributable to the complexity of the phenomenon and the complex interrelation of the economic, social, political and environmental worlds. Moreover, the analysis of the impact can be carried out at different levels such as company, industrial or national level and both by the perspective of the investor or the host country. In the following chapter we will focus on the impact on the host country at a national level.

The chapter will start with a review of the underlying theory of FDI and its definition, a summary of the different motivations that drive investments, and then focus on the

impact that these investments have on the society differentiating by the stage of development of the host country and underlying the main mediating factors.

After this introduction, the chapter concludes with an in-depth analysis of the relationship between FDI and economic growth, providing an overview of the studies carried out on the subject and specifically on the impact of FDI on the African economy.

2.1 FDI definition

According to IMF/OECD definitions (International Monetary Fund 1993, OECD, 1996) "Foreign Direct Investment (FDI), is an investment in a foreign company where the foreign investor owns at least 10 percent of the ordinary shares, undertaken with the objective of establishing a 'lasting interest' in the country, a long-term relationship and significant influence on the management of the firm. FDI flows include equity capital, reinvested earnings and other direct investment capital[5]." In other words, they comprise the financing of new investments, retained earnings of subsidiaries, inter-firm loans and cross border mergers and acquisitions. FDI are different from portfolio investments, which can be divested easily and do not have significant influence on the management of the firm. Thus, to create, acquire or expand a foreign subsidiary, Multinational Enterprises (MNE[6]) undertake FDI.

For this reason, the phenomenon of FDI is greatly connected to the growth and diffusion of multinational enterprises which in turn has been argued to be a crucial

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[5] Reinvested earnings consist of the direct investor's share (in proportion to direct equity participation) of earnings not distributed to the investor; other reinvested capital are debt transactions between the direct investor and the direct investment firm and between direct investment firms that share the same direct investor.

[6] We define MNEs firms that own a significant equity share (typically 50 percent or more) of another company (henceforth subsidiary) operating in a foreign country.

determinant for the global economic growth and development of the last fifty years concerning both the financial, economic, and social spheres.

Main reason of investing abroad is to disperse the firm activities among several countries. A first distinction that must be drawn concerns the way in which the investment is commenced and we can distinguish two ways. 'Greenfield investments' occur when firms invest in new physical plant and productive asset. Alternatively, firms can grow through 'Brownfield investment' which is merger and acquisition (M&A) activity, buying existing assets in a foreign country, or merging with a foreign firm. There are many important differences between these cases but they both share the common structure that a firm's production activities become more spatially dispersed.

The rationale of investing abroad can lie on different motivations that are briefly explained by the OLI framework developed by John Dunning (1977, 1981). According to the framework, firms decide to invest abroad if: they gain market power by owning the products or production processes (O); they can exploit a location advantage in locating their plant in a foreign country rather than at home (L); they can exploit an advantage by internalizing activities carried in a fully owned subsidiary rather than carrying them out through arm's length agreements in the market (I).

2.1.1 Types of Foreign Direct Investment

A more detailed distinction on investment motives is provided by Dunning (1993). The author distinguishes among four main type of foreign direct investments: resource seeking, market seeking, efficiency seeking and strategic assets seeking investments.

Resource seeking investment are driven by the willingness of a firm to get access to resources that are not available in the country of origin, or that are available at a much higher cost. The term resource doesn't only refer to natural resources and raw materials - though they are certainly a major component - but also to products, workforce, and technology.

Market seeking refers to the chance to gain access to the market of the host country, or to one or more of the neighbouring ones. A company may be interested in this type of investment due to a plurality of reasons: issues experienced in previous commercial relationships with the target country, or changes in the political environment to more protectionist measures. Moreover, the proximity to certain markets entails many different advantages, in terms of adapting the product to the consumer needs more effectively, and of being faster than competition in serving them.

Efficiency seeking concerns the optimisation of production processes across the value chain and represents another motive for FDI. Having access to a portfolio of geographically dispersed activities enables the source enterprise to make the most of production factors and of the different economic and political systems and policies. This motive partly justifies the great interest towards developing economies, which represent an opportunity to accomplish labour intensive and low-tech activities at a much lower cost.

Eventually, *strategic asset seeking or competence creating* investments are driven by the awareness of enterprises of the dangers of assuming that their status quo will be stationary in the future when assessing their growth potential and competitive advantage (Anthony et al., 2011); companies thus do actively seek for new competences and resources that can guarantee their sustainability. As a matter of fact, investments in research and development abroad are often the cause of positive spillovers and learning effects that can lead to new innovative competences for the source enterprise.

It is important to point out that these categories of FDIs are not mutually exclusive: on the contrary, it is often a combination of two or more of them that provides a solid reason for a foreign company to accomplish this high-risk kind of investment abroad.

These motivations, can be linked to an alternative strand of theoretical literature of FDI that distinguished other two forms of investments: horizontal FDI and vertical FDI.

In the horizontal model of FDI (HFDI), which originates from the work by Markusen (1984), FDI is mainly driven by market-seeking motivations and desire to avoid trade costs. The investment is aimed to use a local affiliate abroad to supply a new market replicating some or all the activities accomplished in the source market with few adaptations aimed at tailoring the product to the local market. The resulting multinational firm will produce the same lines of goods in each targeted market, and it's common for domestic industries with local markets that are fragmented (Caves and Caves, 1996).

The vertical model of FDI (VFDI) developed by Helpman (1984) suggests that FDI can be explained by MNEs desire to take advantage of factor-cost differences. In this case, the priority is to exploit differences in factor prices across countries by disintegrating production activities in different locations leveraging local resources to optimise the production process, and supply different markets from a chosen one. Therefore, the resulting multinational enterprise will utilise some of their plants to produce outputs that serve as input for others, these "linkages" can also follow the opposite direction.

The different FDI structures have different advantages: HFDI, for example, results in significant savings on commercial costs, due to distributed production, but also involves significant replication costs for the creation of new plants and prevent the company from exploiting economies of scale. On the other hand, VFDIs generate economies of scale between fragmented activities and lead to savings on factor prices, but fragmentation of production generates costs in terms of coordination of activities and trade (Barba Navaretti et al., 2006).

Caves (2007) complements the taxonomy with the case in which the relationship between the plants of the international company cannot be clearly traced back to a horizontal or vertical one. The explanation for this type of MNE lies in the diversification of business risk. The mere fact of expanding into a multinational territory allows the company to diversify in terms of product space and geographical space. On the one hand, individual foreign investments can be considered risky

because they are linked to the support of government structures and the cost of incomplete knowledge of the investor compared to native ones. On the other hand, companies that make investments in different countries benefit from diversification not only as a company but also offer benefits to their international shareholders.

2.2 External effects of FDI

After having understood the rationale and the main different ways to conduct foreign direct investments we shift attention to the effects that the investments generate on the host countries.

The external effects of MNEs have been widely studied in literature and the topic is probably the one on which empirical works about MNEs have devoted more attention. Nevertheless, determining the exact magnitude of effects is always complicated by the difficulty of developing the scenario of what would have happened if the FDI project would have not taken place. Moreover, is not possible to consider the external effects in absolute terms, since these effects do not take place in a vacuum, but only if national firms effectively interact with MNEs and if they are able to actively take part in the learning process. We will then provide a literature review on different possible FDI effects on the host country and underline the main mediating factors that make the effects possible to manifest in developing countries.

2.2.1 FDI effects on the host countries

According to Barba Navaretti and Venables (2006), the effects of FDI on host (receiving) and home (sending) countries can be organized in three major groups: product market effects, factor market effects, and 'spillover effects'. In the analysis we focus on the effect on the host country only.

Product market effect refers to the likely variation in the quantities of product that the company buys and sells within the host country and the country of origin when starting an FDI project. We can find this kind of effect mainly in case of horizontal foreign investment. HFDI indeed is aimed at converting imports into local production to better

serve the host market. In this case, the impact on customers and local businesses varies according to different variables. If the production of these products was previously undertaken by local companies, the most plausible result is to crowd the local supply. In this case, customers do not benefit and some local companies are forced to cut sales (or leave the sector) because of the presence of the multinational company. If the multinational enters by merger or acquisition of an existing supplier, the result is also anti-competitive and detrimental to customers. On the other hand, the presence of the multinational could increase competition in the market, and perhaps increase selection or quality together, bringing benefit to the consumer. Moreover, if the multinational has higher productivity than local companies, some of these profits are also transferred in the form of price reductions.

Factor market effect can occur on both the capital and labour markets. While multinational companies can raise a portion of their funds on the local capital markets, there is usually an inflow of capital that increases the local supply of capital. The most important impact, however, is on labour markets, where many problems arise. Barba Navaretti and Venables (2003) highlight that one possibility is that there are unemployed (or underemployed) resources in the local economy and that multinational investments will use some of these resources. This is an argument that is important in many developing and transition economies, although less so in economies that tend to have full employment. Another argument is that FDI is of a sufficient size to have effects of general equilibrium in the host economy. Demand for labour is being raised enough to raise wages and improve the economy's trading conditions with the rest of the world, but this is not always the case and the effects on labour are far from consistent results.

It is often argued that the main advantages of FDI are a series of "spillovers". The basic premise for the existence of FDI spillovers is that foreign-invested enterprises are technologically superior and that knowledge is transmitted through their interplay with domestic companies, which, in turn, leads to productivity improvements. Crespo and Fontoura (2007) summarise five main channels of technological diffusion linked to

FDI flows and these include: exportation; backward and forward linkages with local firms, labour turnover; competition; demonstration effects.

According to various studies (Rhee, 1990; Aitken et al., 1997; Kokko et al., 2001), local companies can benefit from the export activities of multinational companies. Local firms could be prevented from entering foreign markets because of the costs associated with exporting, such as the cost of transport infrastructure, setting up the distribution network and knowledge of consumer tastes in foreign markets. Through imitation or, in special cases, collaboration activities with multinational companies, which are likely to face these costs, local companies can exploit the opportunity to enter foreign markets with lower costs.

Another channel concern the positioning of local firms in the supply chain of the foreign company. We refer to forward linkages channel when local companies become input or service providers to multinational companies and to backward linkages in the other way around. In the case of backward linkages, the presence of MNEs may benefit local suppliers though the increase in local demand for inputs. Moreover, by being pressured to achieve certain quality standards, multinationals can also benefit local suppliers in several ways: by supporting them in improving the quality of goods or innovating, for example through job trainings; by supporting them in creating manufacturing infrastructure and acquiring raw materials; and by providing them with organizational and management support (Lall, 1980).The presence of multinational companies could also increase competition between local companies that want to become their suppliers, with a consequent increase in the quality and reliability of inputs (Crespo and Fontoura 2007; Javorcik 2008). In addition, Matouschek (1999) considers that the advantages for domestic suppliers of the MNE presence can be broadened to other domestic companies producing end-user consumer goods. In the case of forward linkage, the most obvious channel for spillovers is the supply, by MNEs of higher quality and/or lower costs inputs to domestic producers of end-consumer consumer goods (Markusen and Venables, 1999). However, it may be the case that the higher quality comes together with higher costs, and under this circumstance, if the local firm is not able to exploit benefit of the quality increase, will

only face the detrimental effect of cost increase (Javorcik, 2004b). There can be cases of subcontracting of links, where foreign companies subcontract part of their production to local companies operating in the same industry. In such cases, since multinationals generally require higher quality inputs, this may have an impact on the technology used by local suppliers as well as a spread of expertise to local companies.

Labour turnover is a mechanism that allows knowledge and skills to be transferred from multinationals to local companies through horizontal or vertical transfers. Crespo and Fontoura (2007) stated that skills absorbed by the workforce can be transferred by multinationals to existing local companies or in start- up company created by local workers. The impact of this knowledge transfer is likely to be realised in the medium to long term, as knowledge has to be absorbed primarily by the local workforce. Effect on the local workforce in the short term could be negative as multinationals take away high quality labour from local companies by offering them higher wages and benefits. The labour turnover effects do not occur simply because of the existence of multinationals but it should not be forgotten that they depend on the ability of local companies to attract workforce that have previously worked in multinationals. Other important factors affecting the outcome will be of course related to the quantity and quality of training received by workers in multinational enterprises, the length of time spent in an enterprise and the rigidity of the labour market affecting free movement between enterprises.

The competition effect refers to "pecuniary externalities" (Javorcik 2008). This refers to phenomenon of losses of production or declining market share incurred in the medium to short term by local companies caused by the entrance of multinationals in the market. Local firm will then produce at higher average unit costs due to declining economies of scale (Aitken and Harrison 1999; Crespo and Fontoura 2007). The need to keep up with foreign competitors and the exit of the worst performing players may improve in the long run the average results of the local producers, including productivity, quality and reliability. This, in turn, will benefit the downstream sectors (Javorcik 2008).

Demonstration effect refers to local producers being exposed to multinational firms' production processes, products and marketing strategies. This type of knowledge diffusion represents "real externalities" from foreign entry (Javorcik 2008). We include in this category knowledge spillovers from direct imitation or reverse-engineering that. Demonstration effect reduce the uncertainty about the effectiveness of using advanced technologies, processes, and techniques and this might encourage local producers to incorporate these tools. (Crespo and Fontoura 2007).

All the above mentioned spillovers may or may not materialize depending on characteristic of both the foreign investor and the host country. Technology development, location and entry mode of the foreign investor play a role in determining the intensity of the spillovers. Aspects of the host country's policy environment may also contribute to a domestic firm's capacity to compete and internalize FDI spillovers, including the degree of existing market competition; access to finance; learning and innovation infrastructure; and trade, investment, and industrial policies.

2.2.2 FDI mediating factors and consequence for poorest countries

As the conclusion in the previous chapter could suggest, the effects of the FDI may not reach their highest potential in developing countries. In particular, spillovers are not to be expected to occur in all countries with the same intensity.

The study by Blomstrom (1994) aims to examine the effects of spillovers by discriminating on the basis of the level of development of the host countries. To this end, it uses a sample of 101 countries with different economies. Empirical results show that spillover effects are most appreciated in middle-income developing countries, while for the poorest countries there is no statistically significant correspondence. The findings are also confirmed by the study conducted by Barba - Navaretti and A.J Venables (2003). According to the study, few local companies in poorer countries can compete with foreign multinational companies and few of them have the technical skills to absorb modern technologies.

A frequently identified mediation factor in the literature is the threshold of human capital that host countries must possess to allow FDI to have a stimulating effect on growth. (Balasubramanyam 1998, Borensztein, De Gregorio and Lee 1998). According to the study by Bornstein, De Gregorio and Lee this threshold varies between 0.76 and one year of post-elementary education.

Other factors identified as possible facilitators of the aggregate impact of FDI were the level of development of domestic financial markets (Alfaro, Chanda, Kalemli-Ozcan and Sayek, 2001) or the opening of host markets identified as export-oriented (Balasubramanayan, Salisu and Sapsford, 1996).

FDIs can therefore show their effects to varying degrees depending on the economy of the host country. Likewise, even within the same country, investments in one industry may lead to different results than investments in another. This is reflected in the empirical results of Kokko's study (1994). In cases where investments are made in industries where the similarity between local products and the products of multinationals is reduced or inexistent, the effects of spillovers are likely not to materialise. On the contrary, the latter tend more easily to manifest themselves in a context of direct competition between local producers and multinationals. The interaction between foreign and local companies is thus an imperative to exploit benefits from competition. In a further study conducted by Kokko on the Mexican manufacturing industry (1996) competition effects shown to be greater when the multinational company enter in a market that was previously protected. In other cases, a competition may not materialize since the foreign entrance can reflect of a previously weak local market where local firms can be unable, due to a big process and technological gap, to absorb any spinoff and would rather lose market shares.

Kathuria (1998, 2000 and 2001) suggest that at enterprise level, the effort of local companies to invest in learning and R&D activities matters since it enables to decode the knowledge spilled.

All the above-mentioned studies thus suggest that the indirect gains or spill-over effects of FDI are not an automatic consequence of the presence of multinationals alone.

The relative lag in African countries may affect the role that FDI plays in total factor productivity. The study recently conducted by Malikane and Chitambara (2017) explores the subject by analysing a panel of 45 African countries over the period 1980-2012. The work helps to assess the potential technological diffusion favoured by FDI, which is particularly important for Africa, given its huge technological gap.

The authors used two measures of relative backwardness: the distance from the technological frontier and the income gap. The findings of the study show a generally positive but weak effect of FDI on productivity growth in African countries, suggesting that FDI has a limited effect on productivity in African countries. These results are supported by other studies that have questioned the widespread enthusiasm associated with FDI mentioned above. The inability of many African countries to fully adopt foreign technologies may be due to limited absorption capacity and insufficient development of human capital. Moreover, as there is a huge technology gap, it is unlikely to promote knowledge diffusion and recovery (Falvey et al. 2005) while technology diffusion can be enhanced by institutional support (Manca, 2009). Therefore, African governments must strengthen their institutions to improve the absorption capacity and thus bridge the technological gap.

2.2.3 African scepticism on FDI effects

African continent, as evidenced by the study by T.J. Moss (2004) has developed scepticism about foreign capital. The mistrust of foreign investment is explained in part by historical reasons, which date back to Africa's early experiences with foreign companies during the colonial period, and in part by specific concerns that the benefits of FDI are not imminent but need some kind of government intervention to correct market failures.

The benefits discussed in the previous sections are often questioned on both ideological and empirical grounds. The general critic is that foreign investors crowd out local companies that cannot compete because of their size, financing needs, marketing power or some other unfair advantage (Dunning, 1993; ActionAid, 2003).

Some of the critics claim that some foreign firms merely use the local workforce with no contribution to the economy as a whole, whether through job creation, training of workers or the use of local suppliers (Oxfam, 2003b). The basis of this criticism is the probability that foreign companies can import materials (Chudnovsky and Lopez, 2000) and transfer profits (Oxfam, 2003a).

More broadly, the concern is that the interests of foreign companies may diverge from social development objectives or limit the ability of governments to promote economic development (Chudnovsky and Lopez, 2002).

This general mistrust lead to the creation of the direct and indirect barriers for investors.

2.3 FDI and economic growth

Having understood the factors that could lead FDI to reverse their effect on the host country, in this last section we focus the attention on the impact at a macroeconomic level analysing the relationship between FDI and economic growth. We will first present some theoretical perspectives and then empirical studies. At the end of the section, we will analyse recent studies on the subject carried out specifically for the Sub-Saharan African region.

Two main theoretical perspectives have been used to explain the macroeconomic impact of FDI on the economies of host countries. These are the theories of modernization and dependence.

Modernization theories are based on neoclassical and endogenous growth theories, which suggest that FDI could promote economic growth in developing countries.

The underlying assumption of these theories is that economic growth requires capital investment. Moreover, FDIs become particularly important for developing countries as they can convey technology transfer where the necessary infrastructure for innovation and growth would not be present in terms of educated population, liberalized markets, economic and social stability (Calvo and Sanchez-Robles, 2002).

In addition, as noted by Kumar and Pradhan (2002), FDIs usually flow as a set of resources in addition to technology and capital, including the organisational and managerial skills of multinational enterprises (MNEs). As a result, FDIs perform a dual function, contributing to capital accumulation and increasing total factor productivity (Nath, 2005).

Dependency theorists oppose the prospect of modernisation and argue that foreign investment has a negative impact on both host country economic growth and income distribution. Bornshier and Chase Dunn (1985) advanced the theory that FDI favour a monopolistic structure leading to an underutilisation of the productive forces. The theory is justified by the assumption that foreign control of an economy does not lead to organic growth, but causes separate growth (Admin, 1974). In fact, in the developing countries, the phenomenon of the multiplication of the demand, according to which the demand in a country in a sector causes demand also in other countries, is not true, but rather, the growth tends to be stale in a single country. The study by Pigato (2000) explains that the phenomenon is particularly relevant in Africa, since the majority of foreign investments in the region are investments in the sector of natural resources which, by nature, presents important barriers to entry.

Given conflicting theoretical views, several empirical studies have analysed the impact of foreign direct investment (FDI) inflows on the economic growth rates of different groups of countries over time. However, the results of empirical studies are threatened by methodological problems such as the difficulty of isolating the effect of FDI alone. Moreover, if aggregated FDI flows are used, they cannot be classified according to their growth potential. FDI in primary resources, as we have highlighted above, is

likely to have a smaller impact on growth than equivalent investment in high-tech production.

The methodological approaches used for the analyses of the impact of foreign direct investments on economic growth can be divided into two main categories.

The first category includes approaches used to analyse panel data, the second category tends to use transversal data and to prefer methods of analysis such as OLS and apparently unrelated regressions.

The study of De Mello (1999) highlighted that FDI brings positive impact on economic growth in case of the existence of complementarity between FDI and Domestic Investment. In some cases, FDI flows tend to crowd out domestic investment and the outcomes are not beneficial to the economy of the host country.

The study by Carkovic and Levine (2002) finds no evidence that FDI affects growth. The results are derived from an analysis that used dynamic panel estimation, also accounting for reverse causality problems, for a panel of both industrialized and developing countries in the time period 1960-1995 and denies the existence of any correlation. The analysis takes into account control factors such as: the level of human capital and per capita income of the national economy, the degree of sophistication of national financial markets and the degree of commercial openness.

A wave of different studies claims that the effect on economic growth cannot be caused by FDI alone but it manifests when other factors are taken into account. Azman-Saini, Baharumshah and Law (2010) identified these factors in economic freedom. According to studies by Borensztein, De Gregorio and Lee (1998) the main discriminating factor is the absorption capacity of host countries. Others argue that the growth impact of capital flows especially FDI depend on host country conditions such as initial GDP (Blomstrom et al., 1992), trade openness (Balasubramanyam et al., 1996), macroeconomic stability (World Bank, 2001), infrastructure (World Bank, 2001) and financial development (Hermes and Lensink, 2003; Omran and Bolbol, 2003; Alfaro et al., 2004; Durham, 2004).

2.3.1 Recent studies on FDI and economic growth in Africa

Although the literature has paid attention to developing countries, probably because of the relatively small amount when compared with the one of other developing countries, not many studies have been carried out on Africa. With this section we want to summarise the findings of the recent studies carried on the relationship between FDI inflows and economic growth in Africa, understand the methods used to perform the analysis and highlight their limitations to better frame the model to use later in the empirical study.

Scholars from Agbloyor, Abor, Adjasi and Yawson (2014) studied the relationship between private capital flows and economic growth in Africa in the period 1990-2007. The authors found a negative impact of different types of investments, both portfolio and direct, and of private debt flows on economic growth in the region. To perform the analysis, data were collected for 14 African countries[7] and the authors framed the model as following:

$$y_{it} = \beta_1 Capflows_{it} + \beta_2 Finance_{it} + \sum_{j=1}^{N} \beta_J X_{it} + \varepsilon it$$

The independent variable Y_{it} considered to assess the economic growth was real GDP in constant 2000 USD for country i at time t.

Capflows$_{it}$ consisted of FDI, EFPI, private non-guaranteed debt flows and total capital flows for country i at time t. All the variables were normalized dividing them by GDP. The authors used a FDI delay as a direct result of signs that FDI flows are strengthening. *Finance$_{it}$* represented indicators for financial market development for country i at time t. The financial markets variables used were the stock market capitalization ratio, stock market turnover, bank credit to GDP ratio, private credit to GDP ratio and the M2 to GDP ratio. Eventually, X_{it} consisted of a vector of control

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[7] The countries used in the empirical analysis are Botswana, Cote D'Ivoire, Egypt, Kenya, Malawi, Mauritius, Morocco, Namibia,South Africa, Swaziland, Tanzania, Tunisia, Uganda and Zambia.

variables for country i in time t assumed to be exogenous to the process of economic growth. The determinants included were retrieved from the growth literature and included population, savings, financial openness and institutional quality.

The results were derived from the General Momentary Method (IV-GMM), to account for arbitrary heteroskedasticity and endogeneity. It has been demonstrated that the negative impact identified by the capital flow towards economic growth could be mitigated by the presence of strong financial markets that would turn the negative impact into positive flows. Therefore, the study has concluded that the flow of private capital supports economic growth in the existence of strong national financial markets.

Akinlo (2004), in its analysis of the impact of direct investment on Nigeria's economic growth in the period 1970-2001, showed a limited and not statistically significant effect of delayed FDI and FDI on economic growth. The data seem to justify the argument that extractive FDI, which has been the most appreciated in the region, may be less effective in promoting economic growth than investment in the manufacturing sector. The equation used by Akinlo is given above:

$$\Delta y = d_0 + d_1 \Delta l + d_2 \Delta k_p + d_3 \Delta k_f + d_4 \Delta h + d_5 \Delta x + d_6 \Delta c_g$$
$$+ d_7 \Delta B_g + d_8 \Delta \text{Fn} + d_9 D + d_{10} T + \varepsilon$$

Citing the author to explain the variables: "lower case letters denote natural logarithms, and Δ is the difference operator; y is the natural log of real GDP; l is the labour, kp and kf are stock of private and foreign capital respectively; cg is real government consumption, x is real export, h is human capital proxied by the share of university, polytechnics and colleges of education students in the population, D is the adjustment dummy, 1 for adjustment period 1986–2001 and 0 otherwise, Fn stands financial depth measured as ratio of money supply broadly defined to GDP, Bg is budget balance over GDP. T is the time trend to capture secular trend in output during the period of study."

The analysis was based on cointegration method using ECM.[8]

The results of a number of EC models have shown that foreign capital has a positive impact on growth in Nigeria only after a substantial delay and is not significant. There has been a positive and statistically significant effect on growth from exports. Financial development as measured by the M2/GDP ratio has a significant negative effect on growth, which may be due to the high capital outflow it generates. Furthermore, the findings indicated a positive and statistically significant effect on the export and growth of human capital, which suggested the need for action on labour force strengthening and education policy to increase the stock of human capital in the country.

The study by Adams (2009), focused on the relationship between domestic investment (DI), foreign investment (FDI) and economic growth. The study was extended to the Sub-Saharan Africa region for the period 1990-2003. The author used a panel data set for 42[9] SSA countries for the period 1990–2003. The authors estimated a pooled time-series cross-section regression of the form:

$$Y = \beta_0 + \beta_1 \mathbf{X}_{it} + \beta_2 Z_{it} + \mu_i + \varepsilon_{it}$$

Where "Y is the Real GDP per capita growth rate for country i in year t; β_0 is the constant term, β_i are the coefficients to be estimated. $\mathbf{X}_{it}$ is a vector of variables

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[8] The ECM (Error correction model) is a theoretical approach used to estimate short- and long-term effects of one time series on an another. The expression error-correction relates to the idea that the deviation of the last time period from a long-run equilibrium, the error, impacts its short-run pattern. So the ECM directly estimate the velocity at which a dependent variable reverts to equilibrium after a variation in other variables.

[9] Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros Congo Rep. Cote d'Ivoire, Equatorial Guinea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea Bissau, Kenya, Lesotho, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Sierra Leone, Nigeria, Rwanda, Sao Tome and Principe

including; the stock of human capital (SEC), the degree of openness of the economy (OPEN), gross domestic investment (GDI), and foreign direct investment (FDI). Z is a set of additional variables that are included as determinants of growth in cross-country growth studies, including government consumption, inflation rate, geographical location, and political risk (a proxy measure for institutional infrastructure). μ_i represents the country-specific effect which is assumed to be time invariant, and ε_{it} is the classical disturbance error component."

The authors analyses the data with both OLS estimates and fixed effect models. The fixed effects model enables to control for unobserved country heterogeneity and the associated omitted variable bias, which seriously afflicts cross-country regressions. Moreover, lagged dependent variable was considered to capture short run autoregressive behaviour of the dependent variable. The positive correlation between DI and economic growth was confirmed by empirical results of both methods, OLS and fixed effects, while FDI were positive and significant only in the OLS estimate. Moreover, the study revealed that in the short term FDI have a negative effect on DIs suggesting the presence of a crowding effect. However, the effect for the panel countries studied was positive in the long term. Of the macroeconomic variables, inflation was never significant in any of the model specifications, while the government consumption variable was negative and significantly correlated with economic growth in both the OLS and fixed effects estimations. The institutional variable was positive and significantly correlated with economic growth in all model specifications.

The study of the complementarity between national and foreign capital was also presented in the J.W. study. Fedderke and A.T. Romm (2005). The authors focused on South Africa and estimate both the growth impact of FDI, and the determinants of FDI by means of a VECM structure. Scholars employed annual time series data for South Africa from 1960 to 2002 and reported a positive technological spin-off from foreign to domestic capital. The study in question also shown that in the short term foreign investment limits domestic investment.

Finally, the presence of a positive long-term relationship between investment and economic growth was also highlighted in the Dike study (2018). The study in question focused in particular on foreign agricultural investment and on the sub-Saharan African region, analysing the data in panel format according to dynamic models and error correction. The correlation suggested that the positive effect was an indication that agriculture is a strength for the region and thus contributes to increasing the production of food and raw materials for businesses.

Although it is a less investigated area of research than the one that studies the effects of FDI on economic growth, it is interesting to mention the evidence of how FDI has affected poverty, which is especially important for African countries that have continued to record high rates of poverty. The reasons for this poor research on the link between FDI and poverty according to some scholars lie in the implicit assumption that the ratio of FDI to poverty can be deduced from the ratio of FDI to growth, and therefore if FDI is good for growth, then it is good for poverty (Sumner 2005, p. 275).

The study by Babajide Fowowe - Mohammed I. Shuaibu (2014) uses data from 30 African countries in the period 1981- 2011. Using the GMMM system, the study concluded that FDI contributed significantly to poverty reduction in African countries. The results showed higher FDI coefficients in countries with a higher incidence of poverty, thus confirming the conclusions of Gohou and Soumare (2012) that FDI has a greater incidence on poverty reduction in the poorest and least developed African countries. The results of the analysis were robust for the inclusion of explanatory variables like institutional quality, human capital development, macroeconomic stability, infrastructure and financial development. Findings have shown that increased foreign direct investment in Africa has had a positive impact on poverty reduction.

Chapter 3: Model specification, data and methodology

The aim of the study is to test the hypothesis of significant effects of FDI on economic growth in the Sub-Saharan Africa region.

In the chapter, therefore, first is presented the modelling framework and the data used and then he methodology employed.

3.1 Modelling framework and data

3.1.1 The model

The model is in the form:

$$(1) \quad Y_{it} = \beta_0 + \beta_1 X_{1it-1} + \beta_2 X_{2it-1} + \ldots + \beta_k X_{kit-1} + \varepsilon_{it-1}$$

$$i = 1,\ldots,n; \quad t = 1,\ldots,T$$

Where the dependent variable is a measure of the economic growth of the region and $X_{1\ldots}X_k$ are the explanatory variable chosen consistently with literature and explained below.

In the model i are the different 48 states of the Sub Saharan Africa region and t is the time horizon used for the study than spans over 27 years between 1990 and 2017. The choice of the time period was linked to the availability of the data.

The model was analysed through the hypothesis of a time discrepancy between regressors and the dependent variable: in other words, the independent variables have an effect on economic growth with a delay of one year.

3.1.2 Data description

The dependent and independent variables used in the analysis are explained below.

The dependent variable employed in the study to assess the economic growth of the region is GDP growth and it is the most common measure employed in literature.

The data were gathered by the World Bank Indicators that defines the GDP growth indicator as "annual percentage growth rate of GDP at market prices based on constant local currency. Aggregates are based on constant 2010 U.S. dollars. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources.[10]"

After choosing the dependent variable, we moved to regressors.

The first variable is the Foreign Direct investment. To assess the impact on the host country economy only FDI inflows are taken into account and according to literature we chose to report them as a percentage of GDP. The data are gathered from World Development Indicator that calculates FDI net inflows as the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments. [11]

Variable 1: FDI inflow as percentage of GDP "*fdi*"

Capital accumulation is considered as an important factor of economic growth. This assertion is observed both in theoretical and empirical literature. In fact since the analysis of Solow (1957), physical capital accumulation contributes to increase the level of production. To take this into account we included Gross fixed capital formation as a regressor. The data for this variable are extracted from WDI[12] and the value includes land improvements (fences, ditches, drains, and so on); plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including schools, offices, hospitals, private residential dwellings, and

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[10] https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG

[11] https://data.worldbank.org/indicator/BX.KLT.DINV.WD.GD.ZS?view=chart

[12] https://data.worldbank.org/indicator/NE.GDI.FTOT.ZS

commercial and industrial buildings. Consistently with FDI, we report the variable as percentage of GDP.

Variable 2: Gross fixed capital investment as percentage of GDP "grossfixcap"

Consistently with literature, we decided to include a variable to control for openness of the target country: the indicator chosen to control for this aspect, offered by WDI database, is "merchandise trade, % of GDP"[13]. The indicator corresponds to the sum of merchandise exports and imports, divided by the value of GDP in current US dollars. We name the variable "TrdOpn"

Variable 3. Openness of target country: "*TrdOpn*"

The model controls for labour force participation since it is considered to be an enhancing factor to the economic growth (Duval, Eris & Furceri 2010). The indicator, labour participation rate, extracted from the WDI database is "the proportion of the population ages 15 and older that is economically active: all people who supply labour for the production of goods and services during a specified period." Controlling for this variable is important for developing countries that faced the problem of low level of labour force participation.

Variable 5. Labour participation rate "*lab*"

Another crucial component to determine the state of a country concerns human capital: once again, we pick from the World Bank database (WDI) the "primary school enrolment"[14]. The rate is called gross enrolment ratio and is the ratio of total enrolment, regardless of age, to the population of the age group that officially corresponds to the level of education shown. Primary education provides children with basic reading, writing, and mathematics skills along with an elementary understanding of such subjects as history, geography, natural science, social science, art, and music. The

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[13] https://data.worldbank.org/indicator/TG.VAL.TOTL.GD.ZS

[14] https://data.worldbank.org/indicator/SE.PRM.ENRR

variable is important to draw inferences on the educational attainment of the target country: in other words, high values of the index suggest that the country offers a wide range of opportunities to acquire literacy skills, which strongly affect the quality of future labour force. Although we are aware that primary education is not the best index to monitor human capital, the choice has been forced by the availability of data. We include the variable as a regressor named "schoolenr"

Variable 5. Educational attainment: "*schoolenr*"

We then included a variable to control for population growth. The variable, picked from WDI database[15], is Population growth (annual %) described as following "Annual population growth rate for year t is the exponential rate of growth of midyear population from year t-1 to t, expressed as a percentage . Population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship."

Variable 6. Population growth rate: "*Popgr*"

In addition, after some preliminary analyses we decided to include as a regressor also a delayed variable of GDP to include the influence that the growth trend of the variable has on its future growth. As the literature suggests, a dynamic panel model enables the introduction of dynamic effects feedback from either current or past shocks into the actual model. In the meantime, the lagged dependent variable also contributes to the control of the effect of any potentially relevant but omitted variables and to the control of serial correlation.

Variable 7. Lagged GDP: "GDP_l"

Equation (1) thus become Equation (2)

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[15] https://data.worldbank.org/indicator/SP.POP.GROW

(2) $GDP_{it} = \beta_0 + \beta_1 FDI_{1it-1} + \beta_2 GROSSFIXCAP_{it-1} + \beta_3 TRDOPN_{it-1} + \beta_5 SCHOLLENR_{it-1} + \beta_6 POPGR_{it-1} + \beta_8 GDP\_L_{it-1} + \varepsilon_{it-1}$

The error term ε_{it} accounts for the fixed effects, which are assumed to be white noise and consist of unobserved country specific effects (v_i) and the observation specific error (e_{it}).

The number of variables chosen to start the analysis is consistent with the literature summary. In the next section we analyse the methodology to build the econometric model and eventually we present the main results of the analysis drawing comparisons with literature.

3.2 Methodology

As mentioned above, the model used is a panel data model, which implies that our data has both a temporal and a cross-sectional dimension. To model the data panel, an estimate of the fixed effects was used to correct the omitted variable distortions that may result from pure cross section regressions. The fixed effects model accounts for non-observable country-specific effects that are expected to be fixed parameters to be estimated. However, because of the type of our model and the variables that are included, there is a possibility that the panel suffer from reverse causality between economic growth and explanatory variables. In other words, FDI in Africa, could have caused economic growth but could also have been caused by a greater dynamism of the country itself (with a causality, that would reverse from GDP growth to FDI). What the model therefore proposes to test is the identification of the factors that are associated with economic growth, but not what are the factors that cause economic growth.

The data where analysed through different iterations, explained in the following section.

As reported in the literature, the availability of data is one of the main constraints for African studies. After a first attempt at data collection, the data was reorganized by

eliminating those observations for which the lack of data was considered to be limiting in terms of errors introduced into the model.

From the original sample of 48 states, states for which there were no values for the dependent variable for all or most of the years considered for the study were eliminated.

The result of the process was the elimination of observations for Swatziland, Somalia and southern Sudan by reducing the observation sample to 45 states in *Table 5*.

However, despite the reorganization, the resulting data sample was not perfectly balanced but the choice fell into the trade-off between quantity and quality of the inputs that must be taken into account in the analysis of the results. *Table 6* summarises the variables of the model.

Table 5 - List of Countries

List of countries

Angola	Comoros	Ghana	Mauritania	Seychelles
Benin	Congo, Rep.	Guinea	Mauritius	Sierra Leone
Botswana	Congo, Dem. Rep.	Guinea-Bissau	Mozambique	South Africa
Burkina Faso	Cote d'Ivoire	Kenya	Namibia	Sudan
Burundi	Equatorial Guinea	Lesotho	Niger	Togo
Cabo Verde	Eritrea	Liberia	Nigeria	Uganda
Cameroon	Ethiopia	Madagascar	Rwanda	Tanzania
Central African Rep.	Gabon	Malawi	Sao Tome and Principe	Zambia
Chad	Gambia	Mali	Senegal	Zimbabwe

Table 6 - Variable summary

Variables and symbols

Gdp growth rate (%)	GDP growth
FDI inflow % GDP	FDI
Labour participation rate (%)	Lab
Gross fixed capital formation % GDP	Gross Fix Cap
Sum of merchandise exports and imports % GDP	TrdOpn
Primary school enrollment rate	Schoolenr
GDP growth lagged	GDP_l
Population growth rate	Popgr

3.3 Empirical results

The observations were collected for 45 states in 27 time period accounting ideally for a total of 1215 observations. However, the database, due to the unavailability of some

data, is not fully balanced. The minimum number of data is relative to the educational attainment variable, that acts as an observation constraint.

The descriptive summary in *Table 7* depicts for every variable the variance both within and between. Variance within shows how much the variable varies for the same country over time while variance between is a measure of the variance of the variable across countries.

The correlation matrix in *Table 8* shows that some significant correlation exist in the data set. FDI, in particular shows significant correlation with all the variables of the model and the highest values are reported for gross fixed capital formation and trade openness.

Table 7 – Descriptive summary statistics

Variable		Mean	Std. Dev.	Min	Max	Observations	
panelid	overall	23	12.99252	1	45	N =	1215
	between		13.13393	1	45	n =	45
	within		0	23	23	T =	27
time	overall	2003	7.792088	1990	2016	N =	1215
	between		0	2003	2003	n =	45
	within		7.792088	1990	2016	T =	27
gdpgro~l	overall	4.359536	7.549378	-50.25	149.97	N =	1185
	between		2.826942	.8788889	19.86741	n =	45
	within		6.999958	-51.83565	134.4621	T-bar = 26.3333	
fdi	overall	4.399802	9.832643	-8.59	161.82	N =	1159
	between		5.514603	.4140741	28.62118	n =	45
	within		8.446193	-23.92137	142.285	T-bar = 25.7556	
labour	overall	69.70163	11.64827	42.22	91.54	N =	1188
	between		11.60228	42.80111	88.30815	n =	44
	within		2.00448	61.0057	78.92608	T =	27
grossf~p	overall	20.5736	8.989265	-2.42	60.02	N =	1059
	between		6.862403	11.03704	39.62625	n =	44
	within		6.738691	.7447973	57.34656	T-bar = 24.0682	
trdopn	overall	53.55158	28.85926	4.91	225.3	N =	1186
	between		25.35298	20.38296	128.6315	n =	45
	within		13.90117	-5.748811	155.4212	T-bar = 26.3556	
school~r	overall	90.06552	25.85187	21.53095	158.2732	N =	1004
	between		20.87767	45.19934	140.7591	n =	44
	within		15.58597	37.83025	142.3258	T-bar = 22.8182	
pop_gr~h	overall	2.508933	1.095843	-6.766223	8.117929	N =	1215
	between		.7197133	.6810179	4.054695	n =	45
	within		.8330538	-6.006192	8.877959	T =	27
gdp_l	overall	4.301454	7.585754	-50.25	149.97	N =	1183
	between		2.84124	.64	19.98444	n =	45
	within		7.032508	-51.5804	134.287	T-bar = 26.2889	

Table 8- Correlation matrix

	fdi	labour	grossf~p	trdopn	school~r	pop_gr~h	gdp_1
fdi	1.0000						
labour	-0.0763* 0.0102	1.0000					
grossfixcap	0.3078* 0.0000	-0.1364* 0.0000	1.0000				
trdopn	0.4101* 0.0000	-0.1108* 0.0002	0.4531* 0.0000	1.0000			
schoolenr	0.1481* 0.0000	-0.1531* 0.0000	0.1479* 0.0000	0.3233* 0.0000	1.0000		
pop_growth	0.0766* 0.0091	-0.0166 0.5681	0.0394 0.2007	-0.1663* 0.0000	-0.1731* 0.0000	1.0000	
gdp_1	0.2588* 0.0000	-0.0291 0.3225	0.1866* 0.0000	0.2543* 0.0000	0.0884* 0.0055	0.1779* 0.0000	1.0000

3.3.1 Fixed effect model at country level

First, a model with fixed effects at a country level was implemented, in order to mitigate the endogeneity resulting from the heterogeneity between countries.
The result of the fixed effects model adopted lies on the analysis of 823 observations spread across 42 groups, so 42 countries were taken into account in the analysis.

The fixed effect analysis suggests that the population growth has, a positive and significant effect on the independent variable and this variable seems to capture the major part of the other effects.

Nevertheless, the analysis also shows a low but positive and significant effect also of lagged GDP variable, FDI and gross fixed capital formation on the dependent variable.

The negative coefficient that we can observe in some of the regressors as for example the labour one, is counterintuitive but is not significant and we cannot infer nothing on the impact of the other regressors as well.

Table 9 - Results of the fixed effect model

```
50 . * Fixed effects or within estimator
51 . xtreg $ylist $xlist, fe
```

```
Fixed-effects (within) regression              Number of obs      =        834
Group variable: panelid                        Number of groups   =         42

R-sq:  within  = 0.0753                         Obs per group: min =          4
       between = 0.0140                                        avg =       19.9
       overall = 0.0416                                        max =         27

                                                F(7,785)           =       9.14
corr(u_i, Xb)  = -0.5297                         Prob > F           =     0.0000
```

gdpgrowtha~1	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
fdi	.084594	.0361534	2.34	0.020	.0136253	.1555627
labour	-.1308459	.0918174	-1.43	0.155	-.3110825	.0493907
grossfixcap	.0474707	.0279626	1.70	0.090	-.0074196	.1023609
trdopn	.0077894	.0161983	0.48	0.631	-.0240078	.0395865
schoolenr	.0093247	.0125018	0.75	0.456	-.0152162	.0338656
pop_growth	.976303	.2549673	3.83	0.000	.4758046	1.476801
gdp_l	.0993007	.0368857	2.69	0.007	.0268945	.1717069
_cons	7.802196	7.189843	1.09	0.278	-6.311397	21.91579
sigma_u	2.5485924					
sigma_e	4.5683467					
rho	.23735778	(fraction of variance due to u_i)				

```
F test that all u_i=0:     F(41, 785) =      1.90          Prob > F = 0.0007
```

The choice to adopt the fixed effect model was dictated by the data set itself. We are aware about the existence of a correlation between the error term and the dependent variable without isolating the fixed effect.

Hence, the model with fixed effects is necessary to determine the size of the error term. We are also aware that Nickell bias can occur in case of dynamic panel data model and in this case it could be generated by the lagged GDP variable. It can extend to other variables of interest and depends inversely on the size of the observed period and directly from the magnitude of the coefficient of the lagged dependent variable(GDP_L in our case). Having a long period available and a small coefficient for the lagged dependent variable, we can reasonably assume that the bias is quite small and thus negligible and hence we are confident about the goodness of the estimate.

3.3.2 Fixed effect model for time and country

The presented fixed effects model was then complemented with the addition of some control variables.

The first step was to add fixed effects not only by country but also by time. Control for time effects is relevant whenever unexpected variation or special events in a given year (i.e worldwide macroeconomic variables) may affect the outcome variable.

The result of the analysis can be appreciated in *Table 10.* The increase of R square is mainly due to the increase of the explanatory variable in the model. Nevertheless, to see if time fixed effects were needed when running the FE model we tested for time fixed effect (*Table 11*). The test was performed to see if the dummies for all years were equal to 0 (null hypothesis Ho). The results of the test led us to reject the null hypothesis and to state that time fixed effects are needed in this case.

The result of the analysis lead to weaker statistically significance of FDI on economic growth, while gross fixed capital formation and population growth are statistically significant and population growth that register the highest coefficient.

Table 10- Time and country fixed effects

```
47 . * Fixed effects or within estimator time dummies
48 . xtreg gdpgrowthannual fdi labour  trdopn grossfixcap schoolenr pop_growth gdp_
```

Fixed-effects (within) regression   Number of obs   =   834
Group variable: **panelid**   Number of groups   =   42

R-sq: within = 0.1553   Obs per group: min =   4
       between = 0.0068   avg =   19.9
       overall = 0.0863   max =   27

                                           F(33,759)   =   4.23
corr(u_i, Xb) = -0.5378   Prob > F   =   0.0000

gdpgrowtha~l	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
fdi	.0668573	.0361675	1.85	0.065	-.0041429	.1378576
labour	-.1464161	.0911469	-1.61	0.109	-.3253461	.0325138
trdopn	-.0123494	.0167338	-0.74	0.461	-.0451995	.0205008
grossfixcap	.0722527	.028155	2.57	0.010	.0169819	.1275235
schoolenr	-.0165321	.0146165	-1.13	0.258	-.0452257	.0121615
pop_growth	1.072282	.2518797	4.26	0.000	.5778187	1.566746
gdp_1	.0628444	.037415	1.68	0.093	-.0106049	.1362937
time						
1991	-2.64625	1.149437	-2.30	0.022	-4.902703	-.3897973
1992	-1.682725	1.143744	-1.47	0.142	-3.928003	.5625538
1993	-.6979438	1.173283	-0.59	0.552	-3.001209	1.605321
1994	1.647125	1.157376	1.42	0.155	-.6249132	3.919162
1995	2.860095	1.164687	2.46	0.014	.5737037	5.146486
1996	2.004045	1.194969	1.68	0.094	-.3417912	4.349881
1997	.0726776	1.247657	0.06	0.954	-2.376592	2.521947
1998	.4909607	1.18145	0.42	0.678	-1.828338	2.810259
1999	-.7239555	1.150972	-0.63	0.530	-2.983423	1.535512
2000	1.429791	1.147944	1.25	0.213	-.8237315	3.683314
2001	.9254142	1.157277	0.80	0.424	-1.346431	3.197259
2002	1.221131	1.169896	1.04	0.297	-1.075485	3.517747
2003	2.703928	1.192768	2.27	0.024	.3624116	5.045444
2004	2.021522	1.208481	1.67	0.095	-.3508398	4.393885
2005	2.784205	1.196382	2.33	0.020	.4355941	5.132816
2006	2.090325	1.199443	1.74	0.082	-.2642947	4.444945
2007	1.726885	1.182157	1.46	0.144	-.5937994	4.04757
2008	.4362714	1.174515	0.37	0.710	-1.869412	2.741955
2009	2.870771	1.169395	2.45	0.014	.5751387	5.166404
2010	2.125543	1.219901	1.74	0.082	-.2692383	4.520324
2011	3.043539	1.21138	2.51	0.012	.6654851	5.421592
2012	1.051657	1.212608	0.87	0.386	-1.328807	3.432121
2013	1.747669	1.262485	1.38	0.167	-.7307079	4.226046
2014	.3682916	1.239304	0.30	0.766	-2.064579	2.801162
2015	-.2505411	1.26733	-0.20	0.843	-2.738429	2.237347
2016	.9015107	1.264537	0.71	0.476	-1.580895	3.383917
_cons	10.60006	7.142521	1.48	0.138	-3.421384	24.6215
sigma_u	2.7724065					
sigma_e	4.4404383					
rho	.28048145	(fraction of variance due to u_i)				
```

F test that all u_i=0:     F(41, 759) =      2.27               Prob > F = 0.0000
```

46

Table 11 - Test for time fixed effects

```
. *Test for time fixed effect*
. testparm i.time

 ( 1)  1991.time = 0
 ( 2)  1992.time = 0
 ( 3)  1993.time = 0
 ( 4)  1994.time = 0
 ( 5)  1995.time = 0
 ( 6)  1996.time = 0
 ( 7)  1997.time = 0
 ( 8)  1998.time = 0
 ( 9)  1999.time = 0
 (10)  2000.time = 0
 (11)  2001.time = 0
 (12)  2002.time = 0
 (13)  2003.time = 0
 (14)  2004.time = 0
 (15)  2005.time = 0
 (16)  2006.time = 0
 (17)  2007.time = 0
 (18)  2008.time = 0
 (19)  2009.time = 0
 (20)  2010.time = 0
 (21)  2011.time = 0
 (22)  2012.time = 0
 (23)  2013.time = 0
 (24)  2014.time = 0
 (25)  2015.time = 0
 (26)  2016.time = 0

       F( 26,  735) =    2.47
           Prob > F =   0.0001
```

3.3.3 Fixed effect model for time and country accounting for heteroskedasticity

The model was then adjusted in order to account for heteroskedasticity (or heteroscedasticity) which happens when the standard errors of a variable, monitored over a specific amount of time, are non-constant. With heteroskedasticity, the tell-tale sign upon visual inspection of the residual errors is that they will tend to fan out over time.

In order to test if our data sample is affected by heteroskedasticiy we performed the Wald test which operates calculating a modified Wald statistic for group wise heteroskedasticity in the residuals of a fixed effect regression model, following Greene (2000, p. 598). The test statistic, degrees of freedom and p-value are depicted in *Table 12*.

Table 12- Modified Wald test for heteroskedasticity

```
. xttest3

Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

chi2 (41)  =    8439.61
Prob>chi2 =      0.0000
```

The null hypothesis is homoskedasticity (or constant variance). Given the result of the test, we rejected the null and conclude heteroskedasticity.

Therefore, in order to account for the given heteroskedasticity we run again the model with corrected standard errors and the results are illustrated in *Table 13*. Under this revised model, the correlation between FDI and the annual GDP growth loose significance while Gross Fixed Capital formation and population growth continue to have a significant impact on GDP growth.

Table 13- Result for time and country fixed effect accounting for heteroskedasticity

```
57 . xtreg $ylist $xlist i.time, fe robust
```

```
Fixed-effects (within) regression          Number of obs      =        834
Group variable: panelid                    Number of groups   =         42

R-sq:  within  = 0.1553                     Obs per group: min =          4
       between = 0.0068                                    avg =       19.9
       overall = 0.0863                                    max =         27

                                            F(33,41)          =      47.87
corr(u_i, Xb)  = -0.5378                     Prob > F          =     0.0000
```

(Std. Err. adjusted for **42** clusters in panelid)

gdpgrowtha~l	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf. Interval]	
fdi	.0668573	.0604386	1.11	0.275	-.0552009	.1889156
labour	-.1464161	.098291	-1.49	0.144	-.3449188	.0520865
grossfixcap	.0722527	.0338751	2.13	0.039	.0038406	.1406648
trdopn	-.0123494	.0171185	-0.72	0.475	-.0469209	.0222221
schoolenr	-.0165321	.0132898	-1.24	0.221	-.0433714	.0103073
pop_growth	1.072282	.4124662	2.60	0.013	.2392899	1.905275
gdp_l	.0628444	.0653617	0.96	0.342	-.0691561	.1948449
time						
1991	-2.64625	1.396321	-1.90	0.065	-5.466178	.1736779
1992	-1.682725	1.207382	-1.39	0.171	-4.121081	.755632
1993	-.6979438	1.178489	-0.59	0.557	-3.07795	1.682062
1994	1.647125	1.018266	1.62	0.113	-.4093056	3.703555
1995	2.860095	1.214636	2.35	0.023	.4070866	5.313103
1996	2.004045	.9988806	2.01	0.051	-.0132352	4.021325
1997	.0726776	1.552428	0.05	0.963	-3.062515	3.20787
1998	.4909607	.9363178	0.52	0.603	-1.399971	2.381893
1999	-.7239555	1.127522	-0.64	0.524	-3.001032	1.553121
2000	1.429791	.9584973	1.49	0.143	-.5059335	3.365516
2001	.9254142	1.29326	0.72	0.478	-1.686377	3.537206
2002	1.221131	1.066555	1.14	0.259	-.9328217	3.375083
2003	2.703928	1.131486	2.39	0.022	.4188448	4.989011
2004	2.021522	.9219803	2.19	0.034	.1595454	3.883499
2005	2.784205	1.045842	2.66	0.011	.6720835	4.896327
2006	2.090325	.9511115	2.20	0.034	.1695166	4.011134
2007	1.726885	1.153509	1.50	0.142	-.6026737	4.056445
2008	.4362714	1.111945	0.39	0.697	-1.809347	2.68189
2009	2.870771	1.073387	2.67	0.011	.703023	5.038519
2010	2.125543	1.104841	1.92	0.061	-.1057287	4.356814
2011	3.043539	1.186781	2.56	0.014	.6467861	5.440291
2012	1.051657	1.486174	0.71	0.483	-1.949732	4.053045
2013	1.747669	.9522963	1.84	0.074	-.1755324	3.67087
2014	.3682916	1.066231	0.35	0.732	-1.785005	2.521588
2015	-.2505411	1.227483	-0.20	0.839	-2.729494	2.228411
2016	.9015107	1.124053	0.80	0.427	-1.368561	3.171582
_cons	10.60006	7.307018	1.45	0.154	-4.156762	25.35688

sigma_u	2.7724065			
sigma_e	4.4404383			
rho	.28048145	(fraction of variance due to u_i)		

3.3.4 Robustness tests

In order to test the robustness of our results, we have removed from our database the South Africa, since it acts as an attractor of the FDI in comparison to the other countries in the panel and its inclusion could affect the results. *Table 14* analyse the panel of data without the South Africa.

As we can appreciate from the results of the analysis, the previously stated empirical results remain stable even when removing South Africa from the panel of data.

Table 14 - Robustness test removing South Africa

```
. * Fixed effects or within estimator time dummies
. xtreg gdpgrowthannual fdi labour trdopn grossfixcap pop_growth schoolenr gdp_l i.time, fe robust

Fixed-effects (within) regression          Number of obs      =        808
Group variable: panelid                    Number of groups   =         41

R-sq:  within  = 0.1549                     Obs per group: min =          4
       between = 0.0064                                     avg =       19.7
       overall = 0.0847                                     max =         27

                                            F(33,40)           =      46.27
corr(u_i, Xb)  = -0.5541                    Prob > F           =     0.0000

                        (Std. Err. adjusted for 41 clusters in panelid)
```

gdpgrowtha~l	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf. Interval]	
fdi	.0656281	.0612286	1.07	0.290	-.0581195	.1893757
labour	-.1499477	.0994766	-1.51	0.140	-.3509973	.0511019
trdopn	-.0119494	.0175503	-0.68	0.500	-.0474199	.023521
grossfixcap	.0734303	.0340542	2.16	0.037	.0046042	.1422564
pop_growth	1.095484	.4196662	2.61	0.013	.2473071	1.943661
schoolenr	-.0174695	.0135436	-1.29	0.205	-.0448421	.009903
gdp_l	.0599382	.0652322	0.92	0.364	-.071901	.1917775
time						
1991	-2.691939	1.444211	-1.86	0.070	-5.610799	.2269201
1992	-1.796745	1.215153	-1.48	0.147	-4.25266	.6591706
1993	-.882086	1.205723	-0.73	0.469	-3.318942	1.55477
1994	1.548736	1.049184	1.48	0.148	-.5717449	3.669216
1995	2.768422	1.252268	2.21	0.033	.2374935	5.29935
1996	1.943265	1.031933	1.88	0.067	-.1423487	4.028879
1997	.0143852	1.622812	0.01	0.993	-3.265439	3.29421
1998	.3524838	.9613192	0.37	0.716	-1.590415	2.295382
1999	-.9642097	1.140788	-0.85	0.403	-3.269828	1.341408
2000	1.311916	.988918	1.33	0.192	-.6867616	3.310594
2001	.7681269	1.319085	0.58	0.564	-1.897844	3.434097
2002	1.082717	1.09226	0.99	0.328	-1.124824	3.290257
2003	2.571286	1.160347	2.22	0.032	.2261371	4.916435
2004	1.85723	.9375489	1.98	0.055	-.037627	3.752087
2005	2.637561	1.070894	2.46	0.018	.4732039	4.801918
2006	1.922494	.97001	1.98	0.054	-.037969	3.882958
2007	1.635003	1.185237	1.38	0.175	-.7604503	4.030457
2008	.436096	1.148586	0.38	0.706	-1.885283	2.757475
2009	2.809055	1.111198	2.53	0.016	.5632401	5.054869
2010	2.055624	1.149926	1.79	0.081	-.2684631	4.379711
2011	3.029007	1.234604	2.45	0.019	.5337797	5.524233
2012	.9701962	1.533175	0.63	0.530	-2.128466	4.068858
2013	1.714565	.9965765	1.72	0.093	-.2995916	3.728721
2014	.2966229	1.111826	0.27	0.791	-1.950461	2.543707
2015	-.3332714	1.290499	-0.26	0.798	-2.941466	2.274924
2016	.8290123	1.181795	0.70	0.487	-1.559484	3.217509
_cons	10.9995	7.431124	1.48	0.147	-4.019365	26.01836

```
sigma_u |  2.8357722
sigma_e |  4.5037642
    rho |   .28389986   (fraction of variance due to u_i)
```

3.4 Concluding remarks and managerial implications

As things stand, over the last two decades the African continent has managed to attract a growing amount of foreign capital through FDI. The portfolio of both investors and investments has expanded and diversified. However, on an empirical level, not much progresses has been made on how foreign subsidiaries can best be integrated to maximise spillover effects and increase host countries' productivity. Moreover, there is no unanimous evidence that such investments have contributed to accelerating economic growth in the beneficiary countries.

The research paper has tried to deepen the two themes mentioned above.

An in-depth literature review was carried out to identify the main mediating factors that allow FDI to have positive repercussions on the economies of host countries, paying particular attention to cases in which the host country is a developing country. The widespread enthusiasm associated with FDI is questioned in literature when analysing African countries.

The empirical study was conducted to complement the existing literature to frame the impact of direct investment on the economies of sub-Saharan Africa. The topic was addressed through the observation of GDP growth in 45 African countries in the period 1990- 2017 through a dynamic panel data analysed with fixed effect model. Control variable in the model were FDI net inflow, gross fixed capital formation, human capital, population growth, labour rate and trade openness. The fixed effects model allows to control for unobserved country heterogeneity and the associated omitted variable bias, which seriously afflicts cross-country regressions. Moreover, lagged dependent variable was considered to capture short run autoregressive behaviour of the dependent variable and the model was controlled for heteroskedasticity.

From the results of this study, it cannot be concluded that FDI inflows to African countries have statistically significant correlation with economic growth in the last 27 years. Population growth was found to be strongly correlated with the dependent

variable, i.e. the GDP growth, and also gross fixed capital formation presented a low but significative correlation all the model specifications.

The results of the study are thus in line with the argument that the impact of FDI on economic growth cannot be generalised but depends on the sector of the investment. Akinlo (2004) showed a limited and not statistically significant effect of extractive FDI on economic growth of Nigeria, while Dike (2018) found a positive correlation between agricultural investments and the economic growth of the Sub Saharan African region.

Human capital in our study has not been found to be a con-incentive for economic growth, however to maximise the benefits of technological spillovers we believe that it is imperative to improve the training of the workforce as it could also be a determinant, in the long term, of the diversification of FDI flows.

We cannot ignore the limitations of the study in order to better interpret the results and to suggest further empirical works. The limitations are linked to the unavailability of complete annual time series for some indicators and to the lack of some statistics that are certainly relevant to consider other contingencies, such as the state of development of the financial markets, the infrastructure development or the internal governance of the host country.

The empirical results, complemented by the evidence from the study of literature, suggest that the African continent needs FDI and therefore it would be appropriate to develop a targeted strategy, through the collaboration of governments and multinationals, to increase the attractiveness for investors and to maximize the absorption capacity of local businesses.

The widespread belief that Africa's GDP will be among those that will experience greater growth in the next 20 years makes the country an interesting target for foreign investors willing to seize this business potential. Through the survey "Rethinking African Business Opportunity"(2018) the consulting firm Mckinsey & Company has highlighted that the main factors that discourage investors from investing in Africa are

the inadequacy of infrastructure and logistics and the general governance weakness. Evidence suggests that policy makers should develop policies to improve these determinants and government actions seem to be following these lines with the recent entry into force of the African Continental Free Trade Area (AfCFTA). The expected benefits are first and foremost the gradual expansion of intra-African trade and, through it, the impetus to the processes of economic development and diversification - as well as the fight against poverty - for the states of the region. The new area should also reduce the vulnerability of African economies to commodity price trends and create larger and more attractive markets for investment from other parts of the world.

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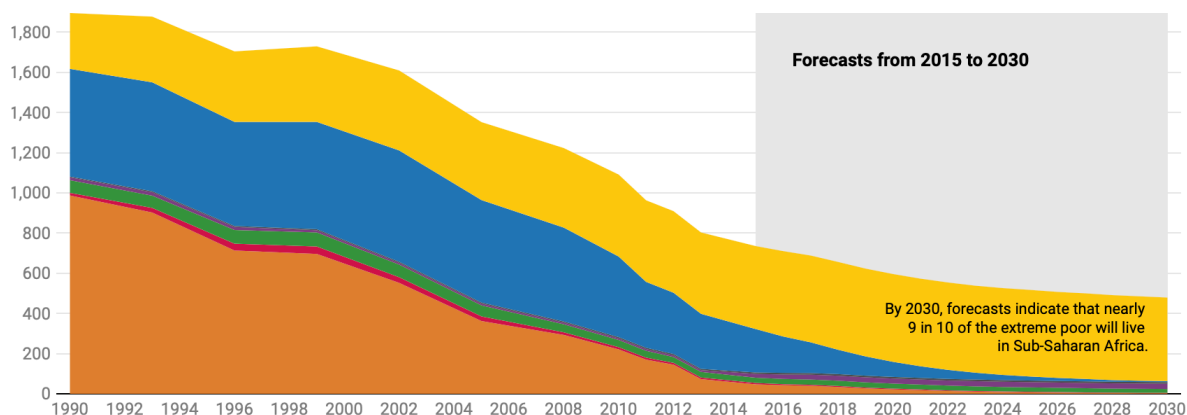The World Bank. (2018). "World Development Report 2018: learning to realize education's promise" World Bank.

Annexes

1. Extreme poverty forecasts (Source: World Bank Poverty and Equity Data Portal)

People in extreme poverty (millions)

2. GDP per capita income Adapted from World Economic Outlook Database (October 2018)

Country	2017	2018	2017	2018
	U.S. dollars		Purchasing power parity	
Algeria	4,034	4,450	15,167	15,611
Angola	4,466	3,924	6,835	6,782
Aruba	24,371	24,881	37,526	38,435
Benin	831	923	2,282	2,411
Botswana	7,584	8,168	17,021	17,888
Burkina Faso	655	734	1,868	1,996
Burundi	312	307	737	733
Cabo Verde	3,301	3,622	7,022	7,400
Cameroon	1,441	1,545	3,688	3,820
Central African Republic	389	454	680	712
Chad	810	890	2,349	2,428
Comoros	788	877	1,595	1,633
Democratic Republic of the Congo	478	478	792	816
Republic of Congo	2,005	2,572	6,761	6,881
CÙte d'Ivoire	1,621	1,791	3,892	4,170
Djibouti	1,989	2,085	3,567	3,788
Egypt	2,495	2,572	12,698	13,374
Equatorial Guinea	14,818	15,294	37,402	34,421
Eritrea	980	1,112	1,585	1,658
Eswatini	3,851	4,093	10,110	10,347
Ethiopia	873	891	2,165	2,344
Gabon	7,373	8,385	18,105	18,648
The Gambia	705	740	2,642	2,763
Ghana	1,663	1,787	4,740	5,026
Guinea	790	865	2,156	2,277
Guinea-Bissau	794	852	1,865	1,951
Kenya	1,695	1,865	3,502	3,694
Lesotho	1,361	1,466	3,294	3,374
Liberia	694	663	1,292	1,327
Libya	4,740	6,639	9,610	10,797
Madagascar	449	475	1,556	1,626
Malawi	326	349	1,170	1,202
Mali	813	892	2,182	2,271
Mauritania	1,271	1,310	4,452	4,564
Mauritius	10,504	11,015	22,279	23,597
Morocco	3,137	3,355	8,568	8,956
Mozambique	426	481	1,256	1,295
Namibia	5,589	5,923	11,229	11,516
Niger	438	489	1,165	1,218
Nigeria	1,995	2,050	5,941	6,030
Rwanda	772	800	2,084	2,231
Sao Tome and Principe	1,847	2,069	3,228	3,359
Senegal	1,331	1,485	3,456	3,676
Seychelles	15,859	16,377	29,115	30,516
Sierra Leone	488	496	1,559	1,618
South Africa	6,180	6,560	13,573	13,775
South Sudan	243	307	1,590	1,527
Sudan	1,123	792	4,349	4,222
Tanzania	1,034	1,090	3,247	3,446
Togo	611	668	1,663	1,738
Tunisia	3,465	3,573	11,936	12,370
Uganda	707	717	2,367	2,490
Zambia	1,491	1,450	3,999	4,120
Zimbabwe	1,185	1,269	2,304	2,381

3. World Bank list of economies, June 2018 (adapted from Wdi.worldbank.org, 2018a)

Contries split by income level

■ High Income ■ Upper Middle Income ■ Lower Middle Income ■ Low Income
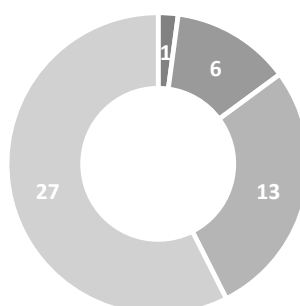
High Income	Upper Middle Income	Lower Middle Income	Low Income
Seycelles	Botswana	Angola	Benin
	Equatorial Guinea	Cabo Verde	Burkina Faso
	Gabon	Cameroon	Burundi
	Mauritius	Congo Rep	Central African Republic
	Namibia	Cote d'Ivoire	Chad
	South Africa	Ghana	Comoros
		Kenya	Congo, Dem. Rep
		Lesotho	Eritrea
		Mauritania	Ethiopia
		Nigeria	Gambia
		Sao Tome and Principe	Guinea
		Swaziland	Guinea Bissau
		Zambia	Liberia
			Madagascar
			Malawi
			Mali
			Mozambique
			Niger
			Rwanda
			Senegal
			Sierra Leone
			Somalia
			South Sudan
			Tanzania
			Togo
			Uganda
			Zimbawe

4. Next cross border M&A[16] by industry 2016-2017 (Millions of dollar) – Adapted from Unctad 2018

Sector/ Industry	Sales	
	2016	2017
Total	**9684**	**3452**
Primary	**52**	**30**
Mining, quarrying and petroleum	45	30
Basic metals and metal products	**-345**	**284**
Food, beverages and tobacco	780	9
Pharmaceuticals, medicinal, chemicals and botanical products	87	2
Basic metals and metal products	-1102	244
Services	**9977**	**3137**
Trade	6	80
Information and communication	-39	-373
Programming and broadcasting	-	-
Financial and insurance activities	512	506
Business activities	103	2699

5. Announced greenfield FDI projects by industry (Millions of dollars) – Adapted from Unctad 2018

Sector/ Industry	Africa as destination	
	2016	2017
Total	**94039**	**85305**
Primary	**3713**	**10574**
Mining, quarrying and petroleum	3713	10574
Basic metals and metal products	**19357**	**21060**
Textile, clothing and leather	1077	3998
Chemicals and chemicals products	5107	5644
Non metallic mineral products	1144	3036
Motor, vehicles and other transport equipment	2754	1506
Services	**70969**	**53671**
Electricity, gas and water	15601	37485
Construction	16372	6488
Transport, storage and communications	12872	3215
Business services	22734	3063

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[16] **Cross-border M&A sales** are calculated on a net basis as follows: Sales of companies in the host economy to foreign TNCs (-) Sales of foreign affiliates in the host economy … The data cover only those deals that involved an acquisition of an equity stake of more than 10 … Data refer to the net sales by the region/economy of the immediate acquired company