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# Foreign Direct Investment in Africa: Study on 25 African Countries Period of 2000-2010

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**Abstract**

As a potential source of capital, FDI offers an avenue for growth. Few previous studies have examined the determinants of Africa separately from the rest of the world. In this paper, I investigate some of the economic, political and geographic variables that may explain the pattern of FDI growth in Africa. Using panel data from 25 African nations during 2000 to 2010 to show what are the determinants of FDI in Africa. This paper examines the performance, promotion, and prospects for foreign direct investment (FDI) in Africa. Factors such as political and macroeconomic instability, low growth, weak infrastructure, poor governance and promotion strategies. The paper argues that countries in the region should pay more attention to the improvement of relations with existing investors and offer them incentives to assist in marketing domestic investment opportunities to potential foreign investors.

**JEL classification numbers:** R42, R53
**Keywords:** Foreign Direct Investment, Africa, developing countries, order least square

## 1 Introduction

The Foreign Direct Investment (FDI) is growing dramatically in the last twenty years; it has become the main instrument by which developing countries integrate into the global economy. More and more countries analyze their international economic relations in terms of FDI and not just in terms of international trade. FDI inflows in the world have been increasing continuously since the 1980s until 2001, during which FDI inflows have registered a peak of 1.12 trillion USD to drop to 589 billion USD in 2002 (UNCTAD, united nations conference on trade and development 2003 ). According to UNCTAD (2003) this was due to the low economic growth worldwide, the depreciation of stock

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values, the decrease in corporate profits, the end of privatization programs in some countries and lower border mergers and acquisitions in number and value.
During the 2000-2005 periods, developed countries were the main recipients of FDI. However, their share of FDI inflows in the world fell from 80% in 2000 to 59% in 2005. This significant decline has benefited developing countries where FDI inflows have increased from 274.2 billion USD in 2000 (or 20% of inward FDI in the world) to 374.1 billion USD in 2005 (or 41% of admissions to FDI in the world). FDI inflows into developing countries have benefited first Asian country (52% on average over the period 2000-2005) and Latin American second (32% on average over the period 2000-2005). The share of Africa in FDI inflows in the developing world has not surpassed the 10% over the period 2000-2005 (the main recipient of South Africa, Egypt and Nigeria).
Among developing countries, the list of major winners remaining relatively unchanged over the period 2000-2005, China confirms its position as leading destination for FDI in the developing world, followed by Hong Kong, Singapore, Brazil and Mexico. Since the debt crisis in the early 1980s, the search for sources of non-creating debt has become a priority of public authorities in many developing countries. FDI has emerged as the ideal source of external finance for developing countries. World Bank (2003) finds a marked increase in flow non-debt creating financing; they went from 21% in 1980 to 66% in 1997 to reach 95% by 2002. Moreover, the structure of net flows to non-debt creating developing countries has radically changed. FDI rose 51% in 1970 to 74% in 2000, FPI increased from 0.01% in 1970 to 12%. Finally, donations and bequests fell 49% in 1970 to 14% in 2000.

## 1.1 Definition of the Foreign Direct Investment

The Foreign Direct Investment is a relatively new research topic in economic literature. Indeed, the classical theories of international economics of Adam Smith (1776) and David Ricardo (1817) and the neoclassical Hecksher-Ohlin (1919 and 1933) the FDI gap analysis of their fields. This exclusion is due to assumptions that led to the classical and neoclassical models, it is among others:

- The assumption of the immobility of factors of production.
- The hypothesis of perfect market and pure competition.
- The assumption of similarity of the technological level.
- The assumption of constant returns to scale.

According to the IMF International Monetary Fund and the OECD Organization for Economic Cooperation and Development (2000) "International Direct Investment reflects the objective of a resident entity in one economy obtaining a lasting interest in an entity resident in an economy other than the investor. The lasting interest implies the one hand, the existence of a long-term relationship between the investor and the enterprise and on the other hand, exercises a significant influence on the management of 'enterprise"[2] . As World Bank (1999) defines Foreign Direct Investment as: "The acquisition of an interest in sustainable management of the company. Foreign direct investment involves the intent to hold an asset for a few years and the desire to influence the management of this asset ".[3]

[2]IMF and OECD (2000), p.2.
[3]World Bank (1999), p. 6.

Previous definitions, we consider that Foreign Direct Investment means the acquisition by an investor, a lasting interest in the management of an entity (assets, company) resident in an economy other than his own. The notion of "lasting interest" implies a hand, the desire to exercise significant influence over the management of this entity and secondly, the intention to hold the entity (assets, company) Medium / long term. This notion is fundamental because it differentiates conceptually, Foreign Direct Investment (FDI) Foreign Investment in Portfolio (IEP). The IDE includes all the resources (inputs to the capital, grants, loans, provision of cash, trade credits or reinvested earnings) as a foreign direct investor leaves available to companies with which it is in direct investment relationship.

The Foreign Direct Investment means, in the narrow sense, the resources transferred between two countries, which contribute directly to the gross capital formation in the recipient country. In a broader sense, the concept of Foreign Direct Investment means any transaction whereby a foreign investor takes control on a lasting national asset. Definition of this test, it is clear that the Foreign Direct Investment is:

- A capital injection from outside.
- A commitment to the medium / long term owner of capital in the recipient country.
- A takeover of national assets.

When studying the phenomenon of Foreign Direct Investment, economists often encounter two kinds of difficulties: conceptual difficulties concerning the definition of different types of foreign investment (i.e. FDI and FPI) and technical difficulties concerning the different methods of measurement and evaluation of foreign investment.

## 1.2 The Empirical Analysis on the Determinants of the FDI in African Countries

### 1.2.1 Theoretical foundations of modeling

Dupuch (2004) argues that there is no unified theoretical framework to establish clearly what the determinants of FDI are! Calvet (1981) argues that Stephen Hymer (1960) was the first economist to propose a theory of FDI. Recall that this notion was a blind spot of the theories of classical and neoclassical international economics.[4] Hymer (1960) builds his theory on the concept of imperfect markets (such as economies of scale, product differentiation, network distribution, privileged access to information, etc ....). According to Hymer (1960), FDI is highly dependent on the comparative advantages of the multinational enterprise and the degree of market imperfection to these benefits. More market imperfections, the greater the MNE will tend to make FDI or control operations of local businesses. He considers that FDI is the optimal response of the MNE to imperfect markets.

The eclectic theory of Dunning (1979) states that the firm prefers to invest abroad (rather than exporting or transferring a license) if three families benefits are met, namely: the benefits of ownership (competitive products a technological advantage, patents,

[4]Smith (1776) and Ricardo (1817) FDI gap analysis of their fields because of the assumptions that frame their models (perfect market and pure competition, immobility of factors of production, similar levels of technology, constant returns to scale, etc ....). Hecksher and Ohlin (1919 and 1933) argued that trade in goods serve as a substitute for factor mobility.

know-how and specific knowledge, financial incentives), the location advantages (price and quality of inputs, transport costs, cultural distance) and internalization advantages (lower transaction costs, reduce uncertainty, control the supply and quality). Dunning (1979) argues that the choice of enterprises for FDI is stimulated when they simultaneously meet the three families of advantages.

On the other hand, Brainard (1993 and 1997) proposes an approach based on assumptions of imperfect competition, product differentiation and economies of scale. The author puts forward a multinational arbitration between the advantages of proximity and concentration advantages. Horizontal type of FDI appears when the advantages of locating in proximity to consumers outweigh the benefits of concentrating activities on a given site, this is particularly true if: the request of the host market is strong, economies of scale can be achieved between the different production sites, implementation costs are relatively low and trade costs are high. About the benefits of concentration, they are bound to find price competitiveness due to economies of scale resulting from the concentration of production in one factory in the country of origin.

Barrell and Pain (1996) propose a theoretical model that attempts to explain the FDI received by U.S. multinationals during the two decades 1970 and 1980. The model considers FDI as part of the process of maximizing the net wealth of the multinational. It follows the model that the main determinants of U.S. outward FDI are market size (measured by GNP of 7 major economies of the OECD) and the cost of labor and capital in the country of origin. Thus, up 1% on the unit cost of labor in the United States, causes long-term increase of 0.49% of U.S. FDI outflows. Moreover, fluctuations in the short term the U.S. dollar affects the timing of FDI, the dollar appears to temporarily postpone U.S. investment abroad, this is due by Barrell and Pain (1996) with investors' expectations about the U.S. exchange gains expected if the foreign currency payments are delayed. On the other hand, the increase of 1% of net profits of multinationals leads, two quarters later, an increase of 0.12% of U.S. FDI outflows, this suggests that the availability of funds also affects the timing of FDI.

### 1.2.2 Empirical basis for modeling

Root and Ahmed (1979) draw from their literature review, a list of potential determinants of FDI in the sectors of industry. They are divided into three groups of determinants: economic, social and politiques.49 Discriminated analysis by Root and Ahmed (1979) gives as determinants of FDI following variables: the infrastructure endowment of the host economy, GDP per capita, the degree of economic integration, the degree of urbanization and political stability. The variable weight of the trade and transport and communication in the economy, supports the hypothesis that the infrastructure of the host country are crucial for FDI beyond extractive sectors.

Also, FDI seem oriented towards the exploitation of local markets (market seeking). FDI is attracted to economies where governments are financially involved in the industrialization programs and infrastructure. Frequent changes of government are constitutional even if they seem to deter foreign investors. Investment such as trade appears to be concentrated in developing countries, which offer the best opportunities for growth and innovation.

The study by Cheng and Kwan (2000) investigates the determinants of FDI inflows in 29 Chinese provinces from 1985 to 1995. The theoretical model proposed by Cheng and Kwan (2000) defines FDI as a package of capital, technology, marketing and management.

The authors recognize five major families of potential determinants of FDI: market access to local and peripheral markets, the fundamentals of the local labor market (cost and productivity of labor, unionization, etc. ....) policies towards FDI (tax policy in particular), the availability and quality of infrastructure and finally, economies of agglomeration....
The regressions run by Cheng and Kwan (2000) gave the following results: the past stock of FDI is the most significant explanatory variable, reflecting the authors agglomeration effects, it seems that the regions having attracted the greatest FDI in the past continue to be the preferred destinations for FDI in the present, also the 1% increase in labor costs tends to reduce regional FDI inflows of 0.5%. Also, infrastructure and regional per capita income have a positive impact on inward FDI. For cons, the quality of local manpower (approximated by variables of education) has no significant impact on inward FDI, the authors' recall that the first wave of FDI to China are directed towards sectors rather weakly intensified education. Finally, the nearby provinces of China over Hong Kong and Taiwan contribute significantly to regional attractiveness vis-à-vis FDI.....

## 1.3 Empirical Analysis

### 1.3.1 Econometric model specification, data and methodology

The purpose of this section is to estimate, from panel data, the main macroeconomic determinants of inward FDI in African host countries. The interest we have for the methods of econometrics of panel data is that they allow studying the phenomenon of FDI in their diversity and in its dynamics. Indeed, the panel data include both dimensions of the phenomenon of FDI include: the individual dimension and temporal dimension. This dual dimension gives the methods of econometrics panel data, a definite advantage over other methods of data over time or in cross section. Recall that the use of the first based on an assumption of homogeneity of individuals and the use of second person a dynamic approach to individual behavior. The use of panels, we can begin to account simultaneously the dynamic behavior and their possible heterogeneity. Then, to make estimates and cut in series, thus improving the model specification.

### 1.3.2 The dependent variable

We retain the variable to explain: "The ratio of net flows of FDI relative to GDP real host. According to Asiedu (2002), it is usual to explain the variable in the economic literature. This reflects the considerable influx of FDI in the host economy and thus reflects the importance of FDI for host countries. We refer to the definition of the World Bank (2007a), for which the term "Foreign Direct Investment" means the net inflow of foreign investment, whose objective is to acquire a lasting interest in an entity resident in a economy other than the investor. In the World Development Indicators World Bank (2007a), the flow of FDI is calculated by the sum of capital contributions and in nature, reinvested earnings and other capital flows to long-term and short term (set to According to balance of payments) provided by foreign investors. The flow of FDI is "net" when subtracted capital transferred abroad by foreign investors. Thus, a net inflow of FDI negative simply means that foreign investors have brought out more capital they have brought. As for GDP, it means the sum of the added gross value created annually by resident producers in the economy (domestic or foreign), it is calculated from production costs which are subtracted from indirect taxes and adding subsidies.

### 1.3.3 The explanatory variables (independent variables)

The eclectic theory of FDI Dunning (1979) highlights the advantages of location as the main determinants of FDI. The choice of location is mainly in relation to the comparative advantages of host countries. The motivations of foreign investors are generally related to the search for efficiency gains: skilled labor, low labor costs, market size, economic openness, political stability, infrastructure, etc.... Furthermore, UNCTAD (2002) argues that the choices of international investors are mainly based on the fundamentals of the economy. Factors at the sector or firm does become important only after the factors in the host countries have become positive. When the host country qualifies for basic data (infrastructure, human capital, economic growth ...), it is hoped to be part of the "short list" of foreign investors. (Wilhelms, 1998)
In light of the theoretical and empirical evidence presented above, we use the following explanatory variables:

**Human capital in the host country**
Theories of endogenous growth (Harrod 1961, Frankel 1962, Romer 1986, Lucas 1988, etc ....) Stress the importance of human capital accumulation in the process of economic development. Reich (1993) argues that the wealth of nations lies in their human capital. Human competence is a strategic resource that is ultimately a comparative advantage for the country, thereby enhancing its attractiveness forwards the FDI. The author argues that instead of trying to attract foreign capital through a battery of legal and tax, it would be more profitable to develop local human capital (education, health and training). FDI would flow even if the country does not provide a legal and fiscal framework attractive; this is particularly true when FDI is motivated by seeking a highly skilled workforce. Moreover, Reich (1993) explains that a quality higher education in economics and management, as human capital to manipulate the workings of the global economy and international finance, creating a favorable environment for the FDI by providing creative executives, can work abroad and process flows instantly economic and financial information.
In the analysis of Cheng and Kwan (2000) none of the variables of education (percentage of population with a primary education level and higher) only affects positive and significant impact on FDI inflows. But this low explanatory power of the human capital accumulation in the study of Cheng and Kwan (2000), can be attributed to the fact that education creates positive externalities in terms of production and productivity, which are difficult to capture with the variables selected by Cheng and Kwan (2000). They argue that it is preferable to consider the human capital variable in terms of growth and not in terms of accumulation.
In our model, we expect that the variable of human capital endowment (measured by average years of education of the population aged 15 and over) have a positive impact on FDI inflows in the country our sample.

**The infrastructure endowment of the host country**
The infrastructure endowment of the host country and the services that accompany them can significantly affect the attractiveness of the country forwards the FDI. Foreign firms may find the environment of the host country worse if they are facing lengthy and costly administrative procedures, or if they suffer water shortages and frequent power-ups and, making them subject to productivity poor governance in the host country, in terms of

infrastructure services. According Bouklia-Hassan and Zatla (2001), poor infrastructure and inadequate infrastructure services may constitute a barrier to entry of FDI. However, good infrastructure, particularly in the areas of transport and communications, are presented as potential determinants of FDI inflows.
Furthermore, Van Huffel (2001) argues that when the host country develops its infrastructure, it improves its attractiveness to the extent that it reduces the cost of transporting goods, and increases labor productivity by reducing costs displacement of labor. Infrastructural policies have a dual interest in facilitating both the location of foreign firms and the upgrading of local enterprises. For the author, the nature of FDI is the existence of an efficient telecommunications system, the subsidiaries of multinationals to be connected to the world and especially to their parent. Also, transport infrastructure must allow smooth movement of flows of inputs and outputs.
We use the number of telephone lines per 1000 citizens to report physical infrastructure endowment of the host country. Communications seems to be an important determinant of FDI; the telephone is the primary means of communication that potential foreign investors looking for when prospecting for a future site of FDI into a developing country[5]. However, this measure reflects only the availability of infrastructure and not their reliability, which can be problematic particularly for developing countries, where the deficit may be in terms of infrastructure services and not in terms of infrastructure (Asiedu, 2002). In our model, we expect that the variable of physical infrastructure endowments have a positive impact on FDI inflows in the countries in our sample.

**The degree of economic openness of the host country**
Economic openness increases the productivity of FDI projects in that it allows companies unrestricted access to all types of inputs. Morisset (2000) and Chakrabarti (2001) argue that economic openness positively affects FDI through trade liberalization and greater competitiveness. Noorbakhsh et al. (2001) argue that the positive relationship between economic openness and FDI inflows implies that if the developing countries want to attract more FDI, they should further liberalize their external trade. Asiedu (2002) refers to two indices to measure the degree of economic openness in the host country: the first measure is the weight of foreign trade in the economy (imports plus exports to GDP) that this is available in the database of World Development Indicators World Bank (2007).

[5]Wilhelms (1998) described numerous instances in which potential foreign investors were left without a host country to finalize their plans for FDI, because they were frustrated after trying unsuccessfully to communicate by telephone with officials. The author relates his fieldwork in Ghana and Cote d'Ivoire, which potential foreign investors have been trying for days to contact officials and potential local partners to hear the busy signal, and when someone answered the call, investors realized that the caller was unable to take a message because he did not know the official language or was illiterate.

The second measure is the economic freedom index developed by the Heritage Foundation.[6]
In our model, we expect that the degree of economic openness of host countries (total imports and exports as % of GDP) has a positive impact on FDI inflows. Nevertheless, we recall that the impact of economic openness on FDI inflows is particularly dependent on the nature of FDI. Asiedu (2002) notes that when FDI is oriented towards the exploitation of the host market (market seeking), then a protected market is probably more attractive than unprotected market, restrictions on foreign trade can affect positive. But if FDI is export oriented, while an open economy is likely to be more attractive because the restrictions on foreign trade increased transaction costs associated with exporting.

**Market size of host countries**
Singh and Jun (1995) and Morrissey and Rai (1995) argue that the market size, measured GDP, is the first parameter that foreign investors take into consideration when deciding the location of their businesses. Market size can generate significant economies of scale and specialization of production and efficient use of resources. Market size measured by GDP reflects the attractiveness of the economy. Broad market implies greater demand for goods and services, giving the host country a better attraction. Alsan et al. (2004) propose using the population size or GDP per capita to capture the effect of market size. But they note that GDP per head may also reflect the cost of labor. Singh and Jun (1995) propose using the GDP per capita growth rate of GDP to capture the effect of market size. Spess and Neumayer (2005) proposed the log of income per capita, the log of population size and rate of economic growth to capture the current and potential market size.
In our model, we expect the market size of host country (measured by the size of the population) have a positive impact on FDI inflows. This may be true for FDI oriented towards the exploitation of the host market (market seeking).

**Availability of natural resources in host countries**
Onyeiwu (2000) notes that thanks to their natural resources that countries like Saudi Arabia, Qatar and Algeria monopolize a large share of FDI flows to the region of North Africa and Middle East. Morisset (2000) noted that the availability of natural resources attracting FDI with the objective of regularly supplies raw materials for production (resource seeking "). We use the ratio of exports of oil and mining companies reported total exports, to capture the effect of natural resource endowments. In our model, we expect that this variable has a positive impact on FDI inflows.

**The political stability of host countries**
Political stability and democracy provide an environment conducive to investment. In general, democratic regimes respect civil liberties, rules of law and property rights, they provide a climate of confidence to foreign investors. Political risk expresses the threat of destabilization and submission to the arbitrary, in violation of the rule of law in the host

[6]The report “Index of Economic Freedom” is an annual publication prepared by economists at the Heritage Foundation and The Wall Street Journal. The report measures various indicators for 161 countries. The index of economic freedom is actually an average of 10 other indices of freedom, in the following areas: the creation of enterprises, foreign trade, monetary stability, investment ... etc. (Available from 1995 on: www.heritage.org).

country. The company invests abroad assesses political risk as the probability of impact in the short and medium term return on investment. Political risk is usually materializes by coups, civil wars, riots, expropriation of assets, blocking of accounts and funds, terrorism, regional conflicts, nepotism, corruption, organized crime ... etc..

The relationship between FDI inflows and political instability is uncertain; Fernandez-Arias and R. Hausmann (2000) and Asiedu (2002) find no significant relationship between two variables, while Schneider and Frey (1985) found an inverse relationship. Asiedu measure political risk for Sub-Saharan Africa the number of assassination and revolution established by Barro and Lee (1993). Onyeiwu (2000) refers to the political freedom index developed by Freedom House. We refer to the index "Political Stability and Absence of Violence" found in the database "Aggregate Governance Indicators 1996-2006" World Bank (2007b).

This index considers the possibility that the government destabilized by unconstitutional means such as violence and terrorism. The index takes values of "-2.5" (complete instability) to "2.5" (perfect stability). It reflects the outcome of opinion polls with experts, research institutes, think tanks, NGOs and international bodies (data available from 1995). In our model, we expect that the index of political stability has a positive impact on the influx of IDE.[7]

**The business climate in the host country**

The business climate in the broad sense means the legal, economic, fiscal and financial environment in which businesses operate. We refer to the Index of Economic Freedom Heritage Foundation. The report "Index of Economic Freedom is an annual publication prepared by economists at the Heritage Foundation (2007) and The Wall Street Journal (available from 1995). The term 'economic freedom' means according to the Heritage Foundation (2007) the opportunity for individuals and businesses work, produce, consume, invest and own, and in complete freedom, that is to say, without constraint Without prohibition or restriction. The index takes value from 0 (totally restrictive environment) to 100 (perfectly free environment) [8] The Index of Economic Freedom Heritage Foundation (2007) is actually an average of 10 other indices of freedom. In our model, we expect that this variable has a positive impact on inflows of FDI in host countries.

### 1.3.4 Macroeconomic fundamentals in host countries

**Macroeconomic fundamentals include:**

- Economic growth: the growth rate of real GDP measures the attractiveness of the host market, we expect that this variable has a positive impact on FDI inflows....
- Inflation: is approximated by the rate of annual change in the index of consumer prices, it reflects the economic stability. We expect that this variable has a negative impact on FDI inflows.

[7]The methodology is detailed in D. Kaufmann, A. Kraay and M. Mastruzzi (2007).

[8]The methodology is detailed in the Heritage Foundation (2007), Index of Economic Freedom 2007.

- The weight of foreign debt in the host economy: the ratio is calculated by the amount of external debt as a percentage of GDP of the host country. We expect that this variable has a negative impact.
- Productivity of labor: ILO - International Labor Office (2007) - holds the real GDP per person employed to measure the productivity of labor in the world (real GDP per employed population). According to the ILO (2007) Labor force refers to all persons aged 15 and older reporting employment or seeking one. The employed population means the subset of people who are employed (including trainees and apprentices paid). We expect that this variable has a positive impact on FDI inflows.
- GDP per head:like to Asiedu (2002) we use the GDP per capita to measure the return on capital in the host country. Asiedu (2002) noted that the economies where capital is scarce tend to have a GDP per head rather low. Thus, the author concludes that we can measure the return on capital in developing countries by the real GDP per capita. This reflects somewhat the rate of the return on investment. This implies, other things being equal, that investment in economies with higher real GDP per capita is expected to pay low capital. Accordingly, it is expected that real GDP per capita in the host country has a negative impact on FDI inflows.[9]

# 2 Model

## 2.1 Econometric Model Specification

We have data on N = 25 African countries on T = 11 periods (2000 to 2010), n = 1, ..., N denotes the country index, t = 1, ..., T denotes the index periods, $Y_{nt}$ is the dependent variable, $X_{knt}$ the explanatory variables, $b_{0nt}$ is a constant $b_{knt}$ are the coefficients of explanatory variables and $w_{nt}$ are random disturbances. The general form of our model is:

$$Y_{nt} = b_{0nt} + \sum_{k=1}^{K} b_{knt} X_{knt} + w_{nt}$$

The complete formulation of our model for the period 1995-2005 is as follows:

[9]Asiedu (2002) noted that return on capital of U.S. FDI in developing countries was 17% for the period 1990-1993, against 10% for U.S. FDI in developed countries during the same period. Asiedu (2002) admits that the move towards FDI host countries that offer the best return on capital. But the author admits that measuring return on investment is problematic, particularly for developing countries that do not have sufficiently developed financial market. This usually results in a lack of efficiency of financial markets in developing countries. The econometric relationship between real GDP per capita and FDI inflows is far from unanimous in the economic literature. Schneider and Frey (1985) conclude that real GDP per capita rate implies better prospects for investment in the host country (GDP per capita is the indicator most used for international comparisons of living standards) but the authors caution that their findings are valid for FDI directed towards the exploitation of local markets (market seeking "). Moreover, Loree and Guisinger (1996), they find no significant relationship between two variables.

$$FDI_{nt} = b_{0nt} + b_{1nt}SCHOOL_{nt} + b_{2nt}INFRA_{nt} + b_{3nt}OPEN_{nt} + b_{4nt}POP_{nt} + b_{5nt}NATUR_{nt} + b_{6nt}POLITRISK_{nt} + b_{7nt}FREEDOM_{nt} + b_{8nt}GROWTH_{nt} + b_{9nt}INF_{nt} + b_{10nt}DEBT_{nt} + b_{11nt}LABOR_{nt} + b_{12nt}GDPPC_{nt} + w_{nt}$$

- **FDI:** Net FDI Inflows as a percentage of GDP of the host country.
- **SCHOOL:** human capital endowments in the host country.
- **INFRA:** Depreciation infrastructure of the host country.
- **OPEN:** Degree of openness in the host country.
- **POP:** Market size of host countries.
- **NATUR:** Availability of natural resources in host countries.
- **POLITRISK:** Index of political stability in host countries.
- **FREEDOM:** Index of Economic Freedom of the host country.
- **GROWTH:** Growth rate of real GDP of the host country.
- **INF:** Inflation rate in the host country.
- **DEBT:** Size of external debt in the economy of host countries.
- **LABOR:** Labor productivity in the host country.
- **GDPPC:** GDP per capita of the host country.

The Tables 1 and 2 show selected measures for our explanatory variables to explain and, as the authors' references and sources of our data. The main data source is the annual World Development Indicators World Bank (2007).

Table 1: Various measures adopted in our econometric model

| **Variables** | **Selected measure** | **Reference authors** |
|---|---|---|
| FDI | Ratio of net flows of FDI as % of real GDP of the host country. | Asiedu (2002)<br>Spess and Neumayer (2005) |
| SCHOOL | Average years of education of the population aged 15 and older. | Ram and Zhang (2002)<br>Barro and Lee (2002) |
| INFRA | Telephone lines per 1000 citizens | Asiedu (2002) |
| OPEN | Sum of imports and exports as% of real GDP of the host country | Asiedu (2002)<br>Spess and Neumayer (2005) |
| POP | Population size | Spess and Neumayer (2005) |
| NATUR | Oil and mining exports as% of total exports of the host country | Onyeiwu (2000)<br>Morisset (2000) |
| POLITRISK | Index of political stability | World Bank (2007b) |
| FREEDOM | Index of Economic Freedom | Asiedu and Esfahani (2006) |
| GROWTH | Growth rate of real GDP | Asiedu (2002) |
| INF | Inflation rate (consumer prices) | Asiedu (2002) |
| DEBT | External debt as% of real GDP of the host country | Onyeiwu (2000) |
| LABOR | Real GDP / Labour Force | ILO (2007) |
| GDPPC | Real GDP per capita of the host country | Asiedu (2002) |

Source: made by ourselves

Table 2: Data sources

| **Variables** | **Database and source** |
|---|---|
| FDI, INFRA, OPEN, GDPPC, POP, NATUR, GROWTH, INF, DEBT. | World Development Indicators World Bank (2007a) |
| SCHOOL | International Measures of Schooling Years Barro and Lee (2002) |
| FREEDOM | Index of Economic Freedom Heritage Foundation (2007) |
| POLITRISK | Aggregate Governance Indicators World Bank (2007b) |
| LABOR | Key Indicators Of The Labor Market International Labor Office (2007) |

Source: made by my self

**Estimation methods**

For our regressions we refer firstly to the OLS model (Ordinary Least Squares). Then we use the estimation methods on panel data, namely: the fixed effects model and random effect model. Note that the econometrics of panel data based on the definition of canonical four models, each corresponding to a particular set of constraints: the fixed effects model, the model error component (random effects model), the coefficient model compounds and the random coefficient model (Sevestre, 2002). Let the general form of our model, namely:

$$Y_{nt} = b_{0nt} + \sum_{k=1}^{K} b_{knt} X_{knt} + w_{nt}$$

**The model of Ordinary Least Squares (OLS):** The OLS[10] is to minimize the sum of squared errors. It is based on assumptions related to stochastic error term (the explanatory variables are observed without error, the expectation of error term is zero, uncorrelated errors ... etc..) and structural assumptions (absence of co linearity between explanatory variables ... etc..). OLS estimators are unbiased, convergent and provide the lowest variance.

## 2.2 Descriptive statistics

The initial sample contained all the developing countries that appear in the 2006 World Investment Report (UNCTAD, 2006). That is to say, 53 African countries. But missing data reduced our sample to 25 developing countries for the period 2000 to 2010.

[10]See demonstrations and explanations in Maddala (1992), pp.127-179.

Table 3: List of African countries in the sample

| | |
|---|---|
| **The countries** | ALGERIA, BENIN, CAMEROUN, Congo, Democratic Republic of the Congo, EGYPT, GHANA, KENYA, LESOTHO, MALAWI, MALI, MAURITUS, MOROCCO, MOZAMBIQUE, NIGER, RWANDA, SENEGAL, SOUDAN, SOUTHAFRICA, TANZANIA, TOGO, TUNISIA, UGANDA, ZAMBIA, ZIMBABWE |

Table 4: Sample descriptive statistics

| | **DEBT** | **FDI** | **FREEDOM** | **GDPPC** | **GROWTH** | **INF** | **LABOR** |
|---|---|---|---|---|---|---|---|
| **Mean** | 1.015 | 2.881 | 53.205 | 787.254 | 4.241 | 19.843 | 4475.394 |
| **Median** | 0.835 | 1.655 | 54.500 | 359.872 | 4.300 | 6.029 | 3054.500 |
| **Maximum** | 2.961 | 30.491 | 70.100 | 4249.507 | 35.224 | 541.908 | 14080.000 |
| **Minimum** | 0.080 | -1.350 | 25.600 | 84.276 | -8.418 | -100.000 | 988.000 |
| **Std. Dev.** | 0.590 | 4.336 | 8.327 | 919.779 | 3.870 | 64.415 | 3542.467 |
| **Skewness** | 1.098 | 4.043 | -0.612 | 1.990 | 1.650 | 6.551 | 1.025 |
| **Kurtosis** | 3.887 | 22.802 | 3.196 | 6.304 | 18.473 | 49.529 | 2.666 |
| | | | | | | | |
| **Jarque-Bera** | 64.283 | 5204.571 | 16.047 | 304.455 | 2847.342 | 26190.54 | 47.507 |
| **Probability** | 0.0000 | 0.0000 | 0.00032 | 0.0000 | 0.000000 | 0.000000 | 0.000 |
| | | | | | | | |
| **Sum** | 279.279 | 786.604 | 13301.30 | 214920.6 | 1157.969 | 5337.842 | 1181504. |
| **Sum Sq. Dev.** | 95.590 | 5114.509 | 17266.60 | 2.30E+08 | 4073.943 | 1112026. | 3.30E+09 |
| **observations** | 275 | 273 | 250 | 273 | 273 | 269 | 264 |

| | NATUR | OPEN | POLITRISK | POP | SCHOOL | INFRA |
|---|---|---|---|---|---|---|
| **Mean** | 30.39657 | 64.87649 | -0.601037 | 19207133 | 3.584962 | 64.6178 |
| **Median** | 17.23076 | 57.20373 | -0.409800 | 12403930 | 3.510000 | 20.9067 |
| **Maximum** | 98.84443 | 148.9175 | 1.043800 | 67559040 | 6.140000 | 559.462 |
| **Minimum** | 0.026201 | 21.83464 | -3.076200 | 1122000. | 0.760000 | 0.37468 |
| **Std. Dev.** | 30.83136 | 29.88205 | 0.879049 | 15762714 | 1.545452 | 108.641 |
| **Skewness** | 0.873241 | 1.186267 | -0.510822 | 1.168609 | -0.115062 | 2.75310 |
| **Kurtosis** | 2.420510 | 3.604164 | 2.588674 | 3.797789 | 1.994313 | 10.4849 |
| | | | | | | |
| **Jarque-Bera** | 37.10500 | 68.18101 | 13.89832 | 69.37675 | 11.70799 | 978.556 |
| **Probability** | 0.000000 | 0.000000 | 0.000959 | 0.000000 | 0.002868 | 0.00000 |
| | | | | | | |
| **Sum** | 7994.299 | 17711.28 | -165.2852 | 5.24E+09 | 946.4300 | 17576.0 |
| **Sum Sq. Dev.** | 249050.1 | 242878.8 | 211.7274 | 6.76E+16 | 628.1548 | 3198580 |
| | | | | | | |
| **0bservations** | 263 | 273 | 275 | 273 | 264 | 272 |

Table 5: Correlation matrix

| | DEBT | FDI | FREEDOM | GDPPC | GROWTH | INF | Labor |
|---|---|---|---|---|---|---|---|
| DEBT | 1.0000 | | | | | | |
| FDI | 0.1758 | 1.0000 | | | | | |
| FREEDOM | -0.4218 | 0.0603 | 1.0000 | | | | |
| GDPPC | -0.5076 | -0.0719 | 0.3989 | 1.0000 | | | |
| GROWTH | -0.0931 | 0.0582 | 0.2120 | -0.0589 | 1.0000 | | |
| INF | 0.4439 | -0.1383 | -0.3728 | -0.1503 | -0.3498 | 1.0000 | |
| LABOR | -0.1343 | -0.0183 | -0.0034 | 0.0362 | 0.2996 | -0.1098 | 1.0000 |
| NATUR | 0.1926 | 0.0937 | -0.3272 | 0.0282 | -0.2451 | 0.1852 | 0.0223 |
| OPEN | 0.0625 | 0.3108 | 0.1737 | 0.3867 | -0.0876 | -0.0733 | -0.3152 |
| POLITRISK | -0.1137 | 0.1032 | 0.5085 | 0.1803 | 0.1873 | -0.3110 | -0.3531 |
| POP | -0.2199 | -0.1953 | -0.0053 | 0.1812 | -0.1645 | 0.2294 | 0.0276 |
| SCHOOL | -0.3339 | -0.0562 | 0.2131 | 0.6682 | -0.2964 | -0.0358 | -0.1182 |
| INFRA | -0.4346 | -0.0730 | 0.3669 | 0.8993 | -0.0605 | -0.1181 | 0.0186 |

| | NATUR | OPEN | POLITRISK | POP | SCHOOL | INFRA |
|---|---|---|---|---|---|---|
| NATUR | 1.0000 | | | | | |
| OPEN | 0.1059 | 1.0000 | | | | |
| POLITRISK | -0.4016 | 0.3023 | 1.0000 | | | |
| POP | 0.1331 | -0.3961 | -0.3347 | 1.0000 | | |
| SCHOOL | 0.2934 | 0.3902 | -0.1149 | 0.2585 | 1.0000 | |
| INFRA | -0.1053 | 0.3766 | 0.2905 | 0.1132 | 0.5669 | 1.0000 |

The Tables 3, 4 and 5 show the descriptive statistics of the data used in this model so what can see and mention clearly that there are no big correlations between the chosen variables so the biggest one was 60% and we could see that most of results make us not refusing any variables

## 2.3 Determinants of FDI in African Countries

The sample of African countries contains N = 25 for T = 11 periods (2000 to 2010) or 275 observations. The test of Breusch-Pagen / Cook-Weisberg indicates the presence of heteroscedasticity. The adjusted coefficient of determination $R^2$ is 56% and the econometric adjustment adjusted $R^2$ is higher than average quality.

Table 6: Determinants in African countries

| Dependent Variable: FDI | | | | |
|---|---|---|---|---|
| Method: Pooled Least Squares | | | | |
| Included observations: 21 | | Cross-sections included: 25 | | |
| Sample 2000 to 2010 | | | | |
| Total pool (unbalanced) observations: 451 | | | | |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| C | -0.344909 | 0.768450 | -0.448837 | 0.6538 |
| DEBT | -0.369217* | 0.156324 | -2.361868 | 0.0186 |
| FREEDOM | -0.007046 | 0.012168 | -0.579039 | 0.5629 |
| GDPPC | -0.000543* | 0.000141 | -3.837668 | 0.0001 |
| INF | -0.007345* | 0.001893 | -3.880625 | 0.0001 |
| LABOR | 7.74E-05* | 3.55E-05 | 2.182067 | 0.0296 |
| NATUR | 0.004640 | 0.004106 | 1.129961 | 0.2591 |
| OPEN | 0.041063* | 0.005804 | 7.075303 | 0.0000 |
| POLITRISK | 0.091127 | 0.160252 | 0.568649 | 0.5699 |
| POP | 1.08E-08 | 9.47E-09 | 1.140684 | 0.2546 |
| SCHOOL | 3.23E-06 | 3.05E-05 | 0.105811 | 0.9158 |
| INFRA | 0.000660* | 0.000191 | 3.444719 | 0.0006 |
| GROWTH | -0.004242 | 0.011996 | -0.353617 | 0.7238 |
| R-squared | 0.55649 | Mean dependent var | | 1.550140 |
| Adjusted R-squared | 0.52565 | S.D. dependent var | | 1.843909 |
| S.E. of regression | 1.612492 | F-statistic | | 12.53601 |
| Sum squared resid | 1138.858 | Prob(F-statistic) | | 0.000000 |

The sign (*) indicates a coefficient significant at 5%. The sign (+) indicates a coefficient significant at 10%. Sample of 25 African countries.

From Table 6, The Fisher test gives the F statistic= 12.536, the model is globally explanatory. The significant predictors for the Economies of African countries the conventional thresholds of 5% are: **DEBT** Size of external debt in the economy of host countries, **OPEN** the degree of economic openness, **INFRA** Depreciation infrastructure of the host country**, INF:** Inflation rate in the host country, **LABOR:** Labor productivity in the host country and **GDPPC:** GDP per capita. The coefficients of all significant variables have the expected sign.

The GDP per capita, depreciation infrastructure and degree of openness have the biggest impact on the change in the FDI to GDP. An appreciation of 1% in the GDP per capita will drive, if and only if all other things are same, to a depreciation of the percentage of the net FDI inflows on GDP by 0.00543 which is the same result given by Asiedu (2002) that means investment in economies with higher real GDP per capita is expected to pay low capital and we can take in this case Libya on the most biggest oil exporter in the world and that have US$ 77.912 billion GDP ,Libya is one of the African countries that has not big inflows of FDI and in the opposite situation we can take the example of Egypt one of the biggest countries in Africa by its population which makes GDPPC very low and we can see that Egypt is in TOP5 African countries in attracting FDI and the first in

attracting FDI without petroleum sector in Africa. The GDP per capita has shown one of the highest significance in our model.

When an addition in 1% of the labor productivity in the country will give an appreciation in FDI to GDP by 7.74exp-6 .The employed population means the subset of people who are employed (including trainees and apprentices paid) so the significant sign of the labor productivity show that the FDI inflows are really influenced by the productivity of the population shown in Morocco when the productivity of the population is really high which make investors more interested to invest in morocco, so an invest would prefer to invest in country where the population production is quit high.

Size of external debt in the economy of host countries shows a good significance on probability of 5% with a negative sign just as was expected in our model. In the 80s Algeria has lost 70% of foreign investors in Algeria because of the external debt( the country was going to the bankruptcy), at that time the price of the barrel of oil was less 12dollars and since oil is the most important revenue to the Algerian government who couldn't pay it debt and took Algeria to bankruptcy if the world bank didn't accept to reschedule the Algerian debt and offer new loans to Algerian government.

Asiedu (2002) refers to two indices to measure the degree of economic openness in the host country: the first measure is the weight of foreign trade in the economy (imports plus exports to GDP) that this is available in the database of World Development Indicators World Bank (2007). The second measure is the economic freedom index developed by the Heritage Foundation so the proxy used in our model -the degree of economic openness (imports plus exports to GDP)- shows how opened is the country economy to world trade and world economy. It has shown the best significance in our model and this means an investor would not invest in a country where the economy is not open to the international trade.

The rate of annual change in the index of consumer prices, it reflects the economic stability and inflation, and in our model it shows really high significant which means investors would prefer to invest where there is not economic stability in prices

Van Huffel (2001) argues that when the host country develops its infrastructure, it improves its attractiveness to the extent that it reduces the cost of transporting goods, and increases labor productivity by reducing costs displacement of labor. The significance of this proxy was expected therefore an investor always prefers to invest where there are a good infrastructure and where the communication could be made easily (up to our proxy).

We can see that in our model that most of the macroeconomic variables chosen were statistically significant with the sign expected which mean that in most African countries the macro economics determinants are so important for the investor to choose where to invest and for the governor to try to attract more FDI inflow to his country.

The non significance of some variable could be explained by the proxy used in the model of even, like the variable SCHOOL was chosen for the average years of education for the population older than 15years old and we could explain it that in Africa a lot people leave school so earlier which doesn't really mean that they are not really educated or well educated, in Africa a lot young people have to leave school for finding jobs and helping their selves and their families.

# 3 Conclusion

FDI now represents the largest component of capital flows to developing countries. In 2005, FDI accounted for 60% of total capital inflows in developing countries, against 25% in 1995 and 6% in 1980. This reflects a change in attitude of host countries towards FDI. During the '80s, most countries were skeptical or even hostile to FDI and multinational enterprises. Today, quite the contrary, FDI is often presented as a catalyst for development and a potential source of economic growth for host countries, particularly those in developing and transition economies. The purpose of our thesis is to try to answer the following question: What are the determinants of FDI in African countries?

To address this problem, we articulated our thesis into three chapters. The first chapter aims to supply basic concepts of our research on FDI. The third chapter presents a brief literature review of the impact of FDI in host economies. The fourth chapter presents an econometric analysis of macroeconomic determinants of inward FDI in African countries.

Our thesis addresses two reasons: First, help the policy maker in African policy to adopt towards FDI. The problem that arises in African countries is to define the conditions for basic data (infrastructure, human capital, economic growth ...) needed to improve their attractiveness towards FDI. Then, based on the observation that many African countries offer significant incentives in order to attract more FDI. We wonder about the relevance of these incentives. In other words, we seek an economic justification for many incentives for FDI. To do this we have panel data from 25 African host countries observed from 2000 to 2010 just before the Arabic spring.

Our econometric analysis of macroeconomic determinants of FDI flows in African countries, is based mainly on the eclectic theory of Dunning (1979), but also on empirical work of Asiedu (2002), Onyeiwu (2000), Neumayer and Spess (2005) and Noorbakhsh et al. (2001). From our econometric analysis that the explanatory variables significant at the conventional 5% are: **DEBT** Size of external debt in the economy of host countries, **OPEN** the degree of economic openness, **INFRA** Depreciation infrastructure of the host country**, INF:** Inflation rate in the host country, **LABOR:** Labor productivity in the host country and **GDPPC:** GDP per capita. The coefficients of all significant variables have the expected sign.

Our results encourage us to make the following recommendations: to improve their attractiveness towards FDI, African countries should improve their labor productivity. Productivity of labor contributes to the inflow of FDI but weakly. Moreover, GDP per capita has the expected negative sign. The 1% increase of this variable, all else being equal, a decrease of 0.00543 of the variable to explain. Economies where capital is scarce tend to have a GDP per head rather low. GDP per capita can be used to measure the return on capital in the host country. The investment in economies with real GDP per capita is expected to lead to higher pay low capital (Asiedu 2002).

The provisions of infrastructure also contribute to the influx of FDI in African countries. The infrastructure of the host country and the services that accompany them can significantly affect the attractiveness of the country toward FDI. Good infrastructure, especially in the areas of transport and telecommunications, are often portrayed as potential determinants of inward FDI (Wheeler and Mody 1992, and Bouklia Zatla 2001, Asiedu 2002). Poorly developed infrastructures (especially telecommunications) increased production costs in the host country and thus reduce the profitability of investments.

The degree of economic openness of the host country contributes significantly to the inflow of FDI in African countries. Economic openness increases the productivity of FDI projects in that it allows firms unconstrained access to all types of inputs. When FDI is export oriented, while an open economy is likely to be more attractive because the restrictions on foreign trade increased transaction costs associated with exports (Chakrabarti 2001, Noorbakhsh and al. 2001, Asiedu 2002).

The African countries still suffer from some problems to attract more FDI such education and political stability and most part of the FDI are for mining and have nothing with economic growth of great of worth, the African labor still weak and has a low level of education and work abilities

During the work on this thesis, I had found lot problems in collecting the data, and I could not get the recent data of all the countries and that why the study was till 2010 beause of the Arabic spring but the determinants of FDI have a macro effect which does not change in a short time. Collecting data wasn't easy and lot of African countries doesn't have any data even at International monetary foundation. The largeness of the sample gives less statistic significance to the model because different countries different politic different results.

The African countries got a lot of advantages to attract more and more FDI in their countries. This study opens more opportunities to study the impact of this FDI inflow in the growth of the African countries, and can be a good support for it. After this study we can start thinking about new proxy of determinants consisting African countries , such education, infrastructure and freedom. Dividing Africa to some part geographically like north Africa, south Africa, sub Saharan area and discuss the determinants of each area cause countries of each area have almost same characteristique.

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