American Research Journal of Humanities & Social Science (ARJHSS)

E-ISSN: 2378-702X
Volume-04, Issue-12, pp-01-13
www.arjhss.com

Research Paper Open Access

VULNERABILITY OF THE BANKING SYSTEM AND ATTRACTIVENESS OF FOREIGN DIRECT INVESTMENTS IN SUB-SAHARAN AFRICA

OrelienTresor FEUMBA TCHAMBA, Fabrice Belmondo TCHIMEUTCHEU, HervéNicanor ONDOUA

Ph.D. Faculty of Economics and Management University of Yaounde II-Soa P.O.BOX: 1365, Yaounde_Cameroon

Ph.D. Faculty of Economics and Management University of Yaounde II-Soa P.O.BOX: 1365, Yaounde_Cameroon

Abstract: The objective of this paper is to identify indicators of banking system vulnerability that make Sub-Saharan African (SSA) countries less attractive to Foreign Direct Investment (FDI). To do so, we used panel data from the World Development Indicator (WDI 2017), the World Wide Governance Indicator (WGI 2017) and the International Monetary Fund (IMF) over the period 2002-2016, and estimated using the double least squares (DLS) method.The results show that the z-score, credit-to-GDP gap, and credit-to-deposit ratio are the indicators of banking system vulnerability that slow down investment in SSA.In addition, the indicators that are most detrimental to the attractiveness of FDI in SSA are those related to the stability of the banking system, such as the credit-to-deposit ratio and the credit-to-GDP gap.It is therefore up to SSA countries to promote a balanced financial environment by carefully monitoring these indicators in order to improve the quality of their investments and make their banking environment attractive.Also, it would be wise for the various SSA countries to diversify their economies in order to increase FDI inflows.

Key words: Banking system vulnerability, FDI, DLS

I. Introduction

Many Sub-Saharan African (SSA) countries depend on foreign capital inflows and are even more dependent on commodity export growth (Naudé, 2009). This has made them particularly vulnerable to shocks. In addition to the latter, the bursting of the US housing bubble in 2007 triggered the global financial crisis; and the repercussions subsequently felt throughout the world. The behavior of banks in their functions made the crisis more acute, which inevitably accentuated the situation of any country that borrowed money. SSA countries were largely isolated at the onset of the crisis, as they are mostly disconnected from international financial markets. Both situations expose vulnerability not only in a general framework, but also in a financial position.

To better specify this concept, several authors and institutions have defined and given indicators of vulnerability, especially in a financial framework. Vulnerability can be defined as the risk of a country being durably affected by exogenous and unforeseen factors (Guillaumont, 2007). It is the product of three elements: the magnitude of these factors generally identified as shocks, the country's exposure to these shocks, and low resilience(i.e., low capacity to cope with them). Vulnerability also indicates the extent to which a banking system as a whole is susceptible to a negative shock (Heather et al., 2018). The negative shock here is equated with the financial crisis that can make a banking system vulnerable. Vulnerability can also be understood as a pre-existing condition that can amplify shocks and propagate them to the entire system (Christensen et al., 2015). For Pasricha et al. (2013), financial vulnerability, a term analogous to banking system vulnerability is defined as conditions that increase the likelihood of stress recurring.

Put differently, the level of vulnerability of a financial system depends, among other things, on the particular risks it faces. The economic literature identifies several indicators of banking system vulnerability, including the z-score, credit volatility, credit-to-GDP gap, credit-to-deposit ratio, non-performing loan ratio and bank capital-to-asset ratio (Benassy-Quéré, 1999; Maswana, 2010; Albulescu and Ianc, 2016). However, the most widely used are those proposed by the International Monetary Fund (IMF), namely: financial soundness indicators, whic

h refer to the assessment of the strengths and weaknesses of member countries' financial systems. Specifically, it is the adequacy of capital of financial institutions, the quality of assets and off-balance sheet positions of banks, profitability and liquidity of banks, the quality of credit expansion. In addition follows the external and domestic debt. It refers here to the maturity profile, repayment schedule, interest rate sensitivity and currency composition. The adequacy of reserves and the corporate sector is another indicator of how well a country would be able to av oid a liquidity crisis.

Adrian et al (2013) show that the measurement of vulnerability is based on a set of amplification mecha nisms that cause contagion, in other words, the diffusion of instability observed in one segment to other parts of t he financial system. Investment, on the other hand, is a process that takes place over time, whose profitability is only discovered as it is carried out, but which requires from the outset a financing plan that bets on the quality of the project (Aglietta, 2005). Investment can also be seen as an important channel for economic growth and thus, a factor in poverty reduction (Ghura, 1997). In a context of great uncertainty, especially delayed uncertainty, inv estment is often seen as an optimal strategy for a firm that must choose between the investment strategy and the r etrenchment strategy (McDonald and Siegel, 1986). Also considered an indicator of a country's economic perfor mance, it can be financed by resident or non-resident agents: it is then referred to as domestic investment or forei gn investment respectively. Foreign direct investment (FDI) indicates a long-term relationship and reflects the en during interest of an entity resident in another country (foreign direct investor or parent company) in an enterpris e resident in a country (recipient enterprise or subsidiary). Investment is the acquisition of goods and services for the domestic production of other goods and services. In national accounting, a fundamental statistical source, in vestment is usually understood through the notion of Gross Fixed Capital Formation (GFCF). This aggregate rep resents "the value of durable goods acquired by resident production units in a territory for use for at least one yea r in the production process. It is considered a measure or indicator of domestic investment.

However, in the literature we have two types of investment financing, namely self-financing and borrow ing. The latter is the mode of financing frequently used by companies. Investment through borrowing creates a li nk between the company and the financial system, i.e. banks and the financial market. In Africa, the majority of i nvestments are debt financed; firms go to banks or countries host FDI (UNCTAD, 2016).

So far, financial systems in SSA countries have shown resilience in the face of global financial turmoil. Despite t he substantial pressures that the crisis has placed on them, money, financial, and foreign exchange markets have continued to follow their usual course. This relative stability is due to several factors, including limited, albeit in creasing, integration with global financial markets, minimal exposure to complex financial instruments, fairly hi gh bank liquidity, moderate dependence on foreign financing, and low institutional leverage (UNCTAD, 2016). The evolution of investment policies is becoming more complicated and uncertain (UNCTAD, 2016 op cit). In ot her words, development issues make investment policies multidimensional and more complex. Faced with these uncontrollable situations, investors find themselves less and less predictable.

However, stylized facts from UNCTAD (2017) reports show that in 2016, global FDI flows declined by about 2% to $1750 billion. There was a more pronounced decline (i.e. -14% of investments) in developing count ries and flows to less developed countries and economically and structurally weak countries remain volatile and modest.

FDI flows to Africa continued to fall in 2016 to $59 billion, (a 3% decline). The recovery of FDI to Egy pt - the main recipient at the regional level - supported inflows to North Africa. In contrast, low commodity price s weakened the economic outlook in SSA and dampened investor interest. In Angola, flows declined again and r emained at relatively low levels in Nigeria and South Africa (IMF, 2015). Multinational companies from develop ing countriesare increasingly present on the continent, but those from developed countries remain the most impor tant investments. According to the IMF (2015), outbound investors from African multinationals increased slightl y (by 1%, to $18 billion), mainly due to the growth of Angolan investors (a 35% increase, to $11 billion), which offset the sharp reduction in flows from South Africa (down 41%, to $3 billion) (IMF, 2015).

In light of all this, it seems interesting to relate the vulnerability of the banking system to FDI. Thus, our objective is to identify the indicators of banking system vulnerability that make SSA countries less attractive to FDI. This study is of both theoretical and practical interest. On the theoretical level, an addition to the economic literature is made with regard to the determinants of investment. Indeed, studies have been done on the traditiona l determinants of investment but not really on the link between the banking sector, especially when it is vulnerabl e, and its effect on investment. On a practical level, it aims at guiding policymakers towards monitoring the bank ing sector given its role in investment decisions. In other words, it aims to show that the banking system is an im portant element for investment decisions and requires monitoring in case of failure so that this performance indic ator can follow its normal course. Thus, in our study, we present a theoretical framework (2), an empirical appro ach (3), the interpretation of the results in a discussion (4) and finally a conclusion (5).

II. Theoretical framework of the relationship between banking system vulnerability and FDI attractiveness

The fragility of the financial system, financial development and financial instability are topics that have interested many authors and they have related them to growth and sometimes development. According to the lite rature, the notion of vulnerability of the banking system has not yet been addressed in some aspects, depending o n its indicators and its relationship with investment. Thus, the objective of our literature review is to present the main theoretical arguments and empirical work outlining the effects that indicators of financial vulnerability may have on foreign investment.

Various disciplines such as economics, strategic management, economic geography and international tra de have explained the phenomenon of FDI. For centuries, several economists have studied the economic interacti on between countries, with classical trade according to the theory of Ricardo (1987) and Ohlin (1993). More rece ntly, the focus on FDI on international trade has been with the New Trade Theory (Krugman 1979) which is a co llection of economic models of international trade that were developed in the late 1970s and early 1980s, and em phasize the role of the growth of returns to scale and network effects.

A multitude of theories and works has been carried out on the determinants of FDI. The first ones date b ack to Dunning (1973), who gave an economic explanation to FDI flows with his "OLI theory", also known as th e "electrical paradigm". He was particularly interested in the choice of location of multinational firms, and conse quently in the question of the determinants of the geographical distribution of FDI. He has proposed three types of explanatory factors: cost factors (inflation, labor, production factors), business climate factors (political stabili ty, democracy, degree of indebtedness) and market factors (size and growth). A recent development emphasizes i nternational economics and firm characteristics as determinants of FDI. Helpman et al. (2004) theory has shown that only the most productive firms can undertake FDI, as they can afford it with their fixed costs.

Another theory at the macro level outlines the determinants that make a country attractive to FDI. The " pull factor" theory introduced by KindaTidiane (2009), generally characterizes the macroeconomic conditions in a country that can influence private capital flows to a country. These capital flows can be taxation, inflation rate, exchange rate volatility, domestic interest rate and economic growth rate.

Building on the credit rationing theory with Stiglitz and Weiss (1981), they explain that this occurs whe n a bank is incompletely informed about the risk of investment projects proposed by borrowers. In other words, t he bank must impose harsh credit conditions to discourage projects with a low probability of profitability and, th erefore, a lower probability of a project being financed (as shown by Besanko and Thakor, 1987). However, sinc e the financial system is also the financial market, this environment of asymmetric information between banks an d borrowers is an opportunistic threat to the borrower. The FDI could therefore be partly determined by the healt h of the bank and the value of the collateral.

However, empirical work has also been done in this area. Albulescu (2017), establishes a relationship b etween the financial environment and FDI. He makes use of cointegration for heterogeneous panels and DOLD a nd FMOLS estimators in 16 EU countries. He finds that monetary uncertainty has a negative influence on FDI in flows. His study also shows that banking stability (measured here by the z-score) has a positive influence on inw ard FDI flows. Asiedu (2001) in his work on factors affecting direct investment in DCs and SSA shows that a hi gh return on investment and good infrastructure have a positive effect on FDI for Developing countries , but hav e a non-significant impact on FDI for SSA countries. The author adds that openness to trade promotes FDI in de veloped countries and less in SSA countries.

Similarly, making use of Japanese data from 1980 to 2000, Raff et al. (2018) show that collateral and cr edit channels caused by the financial crisis have an impact on FDI. Indeed, they find that financial frictions have significant potential effects on FDI. This is best explained with the credit channel through which the change in th e health of banks affects their lending capacity. Thus, some empirical work has focused on the investment climat e as a determinant of FDI. To this end, Sekkat and VeganzonesVaroudakis (2004) conducted their study on a sa mple of 72 developing countries, during the 1990 period. They use panel data with fixed effects to show that trad e and exchange rate liberalization reforms, as well as the investment climate (political and economic), are import ant determinants of FDI attractiveness. Their results show that some MENA countries (Algeria, Syria, Egypt, an d Iran) suffer from a lack of attractiveness related to the above factors.

John and Rhee (2006), on the other hand, find in their work that the 1997 financial crisis in South Korea brought about a considerable change in the link between inward FDI and interest rates. After the crisis, the initia l role between these two elements became doubtful (wait and see) and explanatory. The authors focused on econ omic variables and natural factors as determinants of FDI. In addition, Froot and Stein (1991) show that deprecia tion of the domestic currency increases the wealth of foreign investors, giving them an advantage over domestic i nvestors in the supply of recovery targets. Klein et al (2002) show the importance of financial constraints on FDI through the weakness of credit markets caused by the declining health of Japanese banks. However, this work h as not been able to establish that shocks to the financial system can make a country less attractive to FDI.

Aligning with these different empirical works, Anyanwu (2012) in his work ranging from the period of 1996 to 2

008 reports the proportion of each indicator he found important in the attractiveness of foreign direct investment in Africa. Testing his hypotheses with Ordinary Least Squares and Feasible Generalized Least Squares (FGLS), he found that trade openness, market size and natural resources have a positive effect on inward FDI but financia l development has an opposite effect in African countries.

III. Methodology for analyzing the effect of banking system vulnerability on FDI attractiveness in SSA

This section is devoted to the presentation of the method adopted in this analysis. These methodological elements relate essentially to the choice of the model and its specification, the description of the study variables and the sampling

1.1. Choice of the econometric model and use of the estimation method

We refer to the work of Albulescu et al. (2010), we adopt a panel data model. However, we want to iden tify the indicators of the vulnerability of the banking system that make sub-Saharan African countries less attract ive to FDI. Therefore, the specification chosen for our equation is the following:

Where FDI representsforeign direct investment, bankingsystem vulnerabilityindicators, otherdeterminants of FDI , hefixed or random country-specificeffect of country i, and the errorterm.
representing countries and yearsrespectively.
More specifically,we have :
(2)

Where : isCredit to GDP gap;isCredit/deposit ratio; ; is Real GDP ; is Commercial opening; is External debt; i s Financial development; ; is Natural resources; iselectricity.

Several estimation methods have been used in the literature to show the influence of financial variables on FDI attractiveness. In particular, we have the work of d'Albulescu (2017), who was able to show the influence of banking stability on FDI attractiveness using DOLS. In addition to him, we have the work of Manova (2012), who was able to establish the relationship between financial constraints and FDI using Ordinary Least Squares (OLS). Maswana (2010), in his work in China, was able to highlight that there is a causal interaction between FDI and financial intermediation. Indeed, as uncertainty increases, access to external financing becomes more difficu lt. From an econometric point of view, this interaction highlights a problem of endogeneity. The main sources of endogeneityare: the omission of relevant explanatory variables in the specification of the model; simultaneity, w hich occurs when the dependent variable and certain explanatory variables are determined "at the same time"; or measurement errors on the dependent and/or independent variables. However, it is appropriate to use the Ordinar y Least Squares (OLS) method since the exogeneity of the explanatory variables is no longer verified. To correct the endogeneity problem, we use the Double Least Squares (DLS) method.

The DLS method consists in assigning to each variable suspected of being endogenous at least one instr umental variable. The latter is a variable correlated with the endogeneity source variable, but which is not correla ted with the error term. In addition, it is also possible in the case of DLSs to use the lagged variables of the endo genous variables as instruments, since they are assumed to be uncorrelated with the residuals. However, there are several estimators of the DLS, such as the fixed-effects DLS estimator and the random-effects DLS estimator. T he random effect DLS estimator still has two dimensions, namely the Balestra and Varadharajan-Krishnakumar (1987) estimator and the EC2SLS (2008) estimator.

To choose between the fixed and random effect model, a specification test must be performed. The most recommended test is the Hausman specification test. When the probability of the test is below the 10% threshold , then the null hypothesis of no correlation between the specific effect and the independent variables is refuted an d the fixed effect model is chosen. On the other hand, if this probability is higher than 10%, the null hypothesis c annot be rejected. However, the test does not allow us to distinguish between the fixed effects model and the ran dom effects model.

We have at this level a main robustness test, the Sargan/Hansen instrument validity test. If the probabilit y of this test is greater than the 10% threshold, then we cannot reject the null hypothesis and we conclude that ou r instruments are valid. Furthermore, we note that for the fixed effects model, the most relevant R2 is the R2-wit hin because it gives an idea of the intra-individual variability of the independent variable explained by those of t he explanatory variables. The R2-between gives an idea of the contribution of the individuals' fixed effects to the model. On the other hand, for the random effects model, the most relevant R2 is the R2 between because it gives an idea of the inter-individual variability of the dependent variable explained by those of the explanatory variabl es. The R2-within gives an idea of the random effects of the country on the model.

1.2. Description of study variables and sampling

The table below presents the variables that were used in our model. These are the indicators of banking system v ulnerability according to Levieuge et Al. (2017), the other determinants of FDI, the governance variables, and so

me dummy variables such as access to the sea that we created.

Variables	Définition	Sources
Foreign direct investment	Measured by net FDI inflows as a percentage of GDP	WDI 2017
Credit-to-GDP gap	Measures the size of the creditcycle;thatis, the deviations of creditfrom the normal range of historicalexperience.	GFD 2016
z-score	Measures the solvency of the bankingsector	GFD 2016
Credit to deposit ratio	Measures the stability of the bankingsector'sfunding	GFD 2016
Exchange rate	Refers to the exchange rate determined by the national authoritiesor the rate determined in the foreign exchange marketsanctioned by law.	WDI 2017
Trade openness	Measured by the sum of exports and imports of goods and services relative to GDP. A high degree of opennessis a sign of economicliberalization and competitiveness.	WDI 2017
Financial development	Measured by the domesticcredit of the privatesector. It highlights the role of financialintermediaries in financing the productive sector, especially the privatesector.	WDI2017
Urban population	Population measured as a percentage of total population	WDI 2017
Human capital	Measures the productivity of employees. Measured by the grossprimaryschoolenrollment rate.	WDI2017
Gross Domestic Product (GDP)	The measurehereis constant GDP (the sum of gross value added by all residentproducers in the economy, plus taxes on products and subsidies not included in the value of the product) and current GDP (whichis GDP atpurchaserprices)	WDI 2017
Natural Resources	Measured by total naturalresourcerentswhich are the sum of oilrents, naturalgasrents, coalrents (hard and soft), mineralrents and forestryrents.	WDI 2017
Infrastructure	Rate of access to electricity	WDI 2017
Civil Liberty	Represents the civil liberty index and is the status of freedom. It ismeasured on a scale of 1 to 7; 1 represents good performance and 7 representspoor civil liberty performance	Freedom House
Controlling corruption	Measures the degree to which public authorityisused for personal gain. This indicatortakes values between -2.5 and +2.5.	WGI 2016
Quality of regulation	Measures the ability of governments to develop and implementsound policies and regulationsthat support privatesectordevelopment. This indicatoralsotakes values between -2.5 and +2.5.	WGI 2017
Open democracy	This is a dummy variable thattakes the value 1 if the political system is open and 0 otherwise.	Freedom House
Closeddemocracy	This is a dummy variable thattakes the value 1 if the politicalregimeis closed and 0 otherwise.	Freedom House

Source: Author's data analysis results

To conduct our study, we will primarily use data from the World Development Indicators (WDI, 2017) for FDI data and other macroeconomic variables, for banking system vulnerability indicators the Global Financial Development (GFD, 2016), for governance indicators the Worldwide Governance Indicators (WGI, 2017), and for political freedom the freedom house. Our study period is from 2002 to 2016. Our scope of study covers countries in Sub-Saharan Africa. However, due to the unavailability of data for a number of countries, we removed them from the sample. In the end, our sample includes 44 countries, with the following countries removed: Eritrea, Somalia, Sudan, and South Sudan.

IV. Presentation of results and discussion

IV.1. Descriptive statistics

Net FDI inflows to Sub-Saharan Africa have been progressively increasing, although they remain lower than in other regions of the world. Looking at the top 10 recipients (Appendix 2) and the bottom 10 recipients (Appendix 1) of FDI, we see that there is a gap between the two groups. The figures indicate that the first group received an average rate of 13.24% FDI from 2002 to 2016 compared to 1.34% for the second group. In addition, we note that the countries in the first group show a large disparity compared to the second group. To illustrate this, in the first group, for an average of 13.24%, the standard deviation is 7.57%, while in the second group, the average is 1.

34% for the standard deviation of 0.33%. In order to clarify these differences, we will first present the influence of the insolvency of the banking system on the attractiveness of FDI in Sub-Saharan Africa, and secondly the influence of the instability of the banking sector on the attractiveness of FDI in Sub-Saharan Africa.

IV.1.1. Influence of the insolvency of the banking system on the attractiveness of FDI in Sub-Saharan Africa

In order to determine the influence of the vulnerability of the banking system on the attractiveness of FDI in Sub-Saharan African countries, we will look at the evolution of the z-score. To do so, we will have two cases, namely the top 10 FDI destinations and the bottom 10.

Insolvency is a situation that describes the state of vulnerability of a banking system. In fact, it allows us to say whether a banking system has a performance that can allow it to finance investments. The appropriate indicator to measure this is the z-score. For the top 10 countries, the z-score has a relatively low rate. This means that the banking system of this group is insolvent and therefore vulnerable. Specifically, this indicator has an average rate of 5.10% during the period from 2002 to 2016. With more detail, we see that the z-score underwent a slight increase from 2002 to 2003. From 2004 onwards, slight fluctuations (3.67; 3.76; 3.82; 4.83 and 5.15 for the years 2003, 2004, 2005, 2006, 2007 and 2015 respectively). In 2016 we observe a sharp drop or 0.20%.

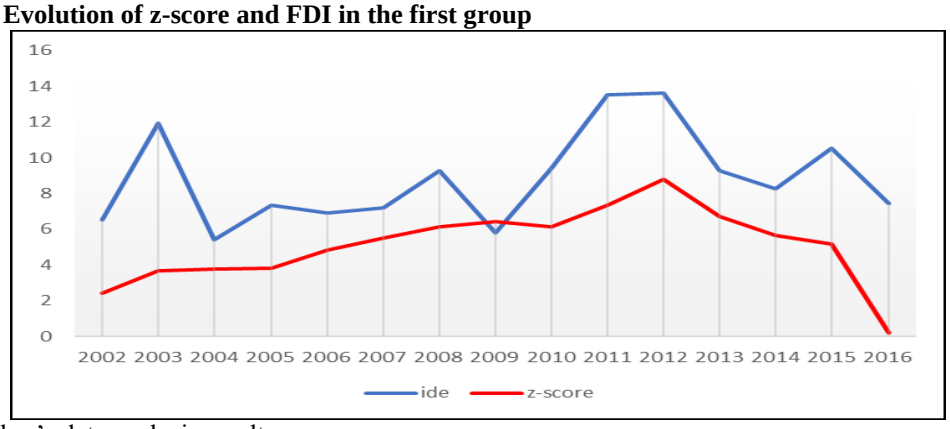
The first country on the list, Liberia, has an FDI inflow of 32.46% for a z-score of 7.75%. This z-score is slightly above average but a paradox is observed in this group because the last country (Chad) on the list seems to have a more solvent banking system with a z-score of 11.14% but records an FDI flow of 6.88%. The other countries have flows close to the average and banking systems with rates not far from the average except for countries like the Republic of Congo and Sao Tome ranked 3rd and 5th respectively but record extremely low z-score rates of 1.56% and 1.01% respectively over the whole period.

Note de bas de page:

Liberia, Mozambique, Republic of Congo, Seychelles, Sao Tome, Mauritania, Equatorial Guinea, Cape Verde, Sierra Leone and Chad.

Guinea-Bissau, Swaziland, Côte d'Ivoire, Zimbabwe, Burkina Faso, South Africa, Benin, Comoros, Kenya and Burundi.

Figure 1.1: **Evolution of z-score and FDI in the first group**

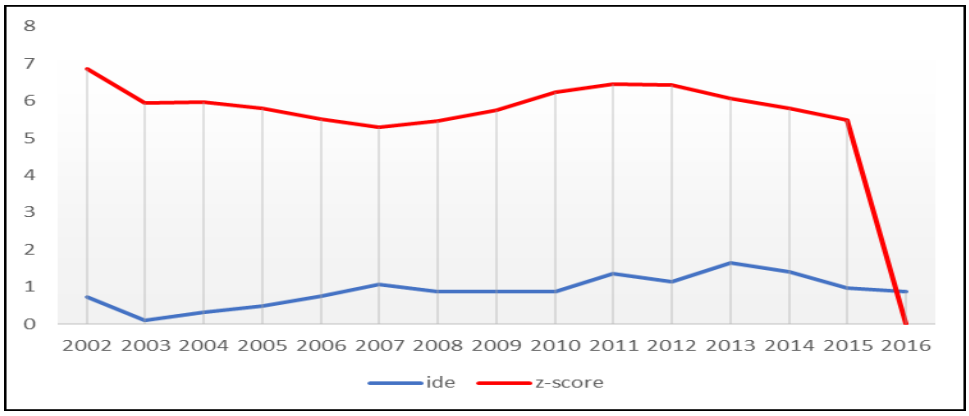


Source: Author's data analysis results

This graph shows us the negative influence that the vulnerability of the banking system through the z-score has on FDI flows in Sub-Saharan Africa. Indeed, when the z-score has a low rate, it simply means that the banking system becomes insolvent and consequently reduces the attractiveness of FDI.

These are the last ten on the list in terms of FDI inflows. Their position can certainly be justified according to the descriptive statistics by the fact that for an FDI flow of 0.89% over the whole period, the average z-score rate is 5.53% over the whole period, which is not too far from that observed in the first group. The evolution of the z-score in this group during 2002 to 2016 is not too catastrophic in general. In this group, it is observed that the average FDI flows are 1.34% for a z-score of 8.30%; a relatively low flow. To illustrate, a paradox is observed. Guinea-Bissau, the country at the top of the list, can justify its FDI flows at such a low level, i.e. 1.72% for an average z-score of 1.87%. Burundi on the other hand has the lowest flow rate of 0.60% but surprises us with a z-score of 10.45%. Swaziland comes in second place with a flow rate of 1.61% for a z-score of 14.74%.

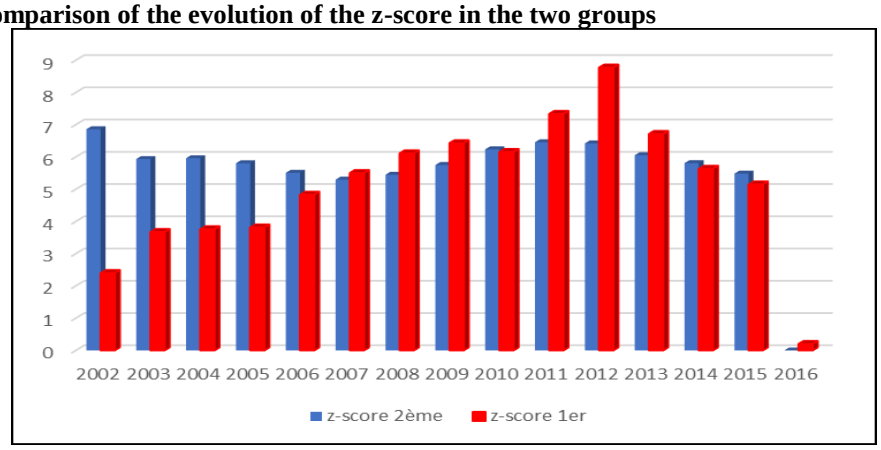
Figure 1.2: Evolution of z-score and FDI in the second group



Source: Author's data analysis results

In this group, the z-score also allows us to see that the vulnerability of the banking system has a negative influen ce on the attractiveness of FDI in sub-Saharan African countries. However, if we compare this group to the one o bserved previously, we find that the banking system is more vulnerable in the first group but the reactions to FDI flows are different.

Figure 1.3: Comparison of the evolution of the z-score in the two groups



Source: Author's data analysis results

From the above, it appears that, in general, the vulnerability of the banking system through the z-score has a neg ative influence on the attractiveness of FDI in Sub-Saharan Africa. In other words, a banking system with a low z-score is not conducive to FDI entry into a country. Thus, after looking at the solvency aspect of the bank, we w ill in the next subsection observe whether vulnerability through the credit-deposit ratio and the credit-to-GDP ga p make African countries in the sub-Saharan zone less attractive to FDI.

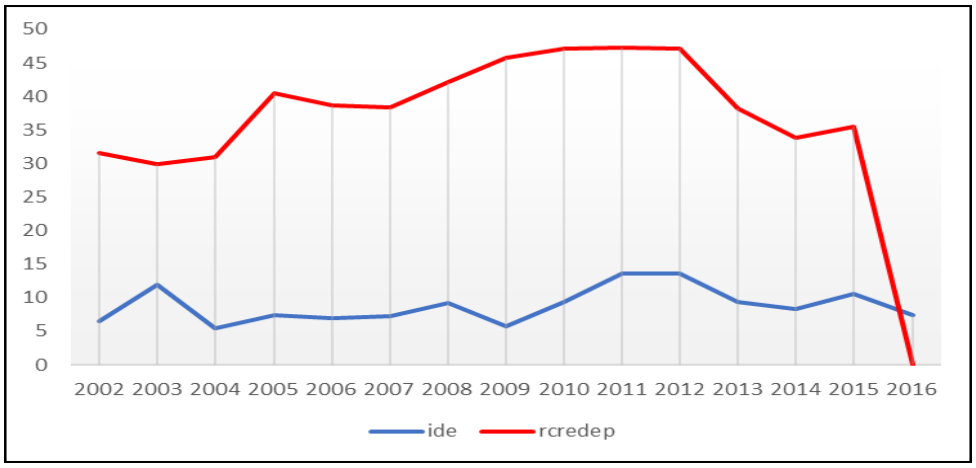
IV.1.2. The influence of banking sector instability on FDI attractiveness in Sub-Saharan Africa

Here, we further track the evolution of the vulnerability of the banking system in Sub-Saharan Africa over the pe riod from 2002 to 2016, while changing the indicators this time. Thus, to capture the link between banking syste m vulnerability and FDI attractiveness, we use the credit-deposit ratio and the credit-to-GDP gap. In the same vei n as the previous sub-section, we distinguish between the top 10 countries and the bottom 10 in terms of FDI des tination.

The vulnerability of the banking system is captured here by the credit/deposit ratio and the credit/GDP gap. Inde ed, as far as the credit-to-deposit ratio is concerned, the higher it goes, the more vulnerable the banking system b ecomes. In other words, a high ratio simply tells us that the banking system has stability problems. The average s core of this indicator recorded in this group is 54.67%. The countries with the most vulnerable The countries wit h the most vulnerable banking systems are Chad, Sao Tome, Cape Verde and Mauritania with scores of 79.05%, 74.88%, 67.02% and 66.62% respectively. They are the most vulnerable but are ranked among the countries rece iving the most FDI. The average FDI rate in this group is 13.24%, yet they have the most unstable banking syste ms: a paradox. Despite this, some countries have still been able to have stable banking systems, notably the Repu blic of Congo, Sierra Leone and the Seychelles, which has a rate of 33.84%, well below the group average.

As for the credit to GDP gap, it has a similar interpretation to the z-score. In fact, when the rate is high, the banki ng system is stable, but when it is low, it becomes unstable. The figures then show us that in this group, the avera ge rate of this indicator is 14.60%. The most unstable countries are: the Republic of Congo, Chad, Sierra Leone a nd Equatorial Guinea. This indicator seems to better describe the vulnerability of a banking system.

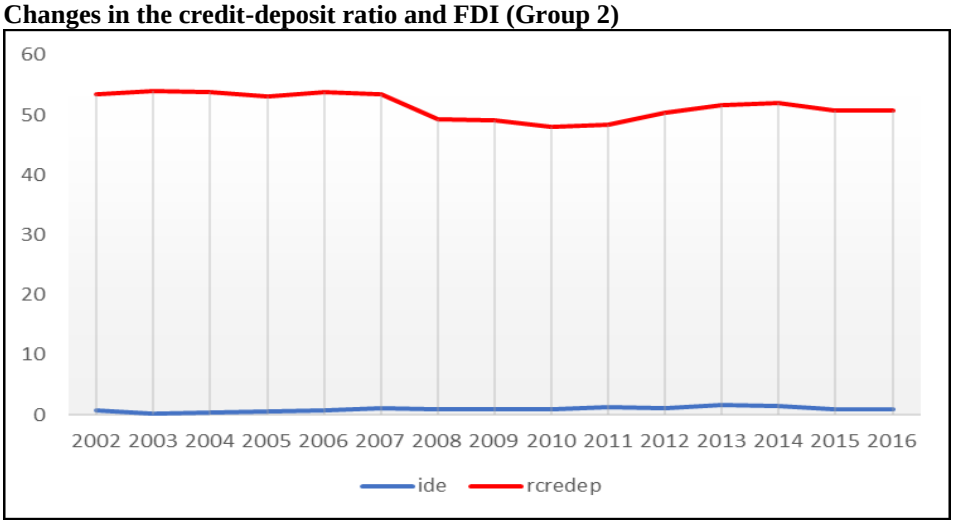
Figure 1.4: Evolution of the credit-deposit ratio and FDI for the top 10 countries



Source: Author's data analysis results

This group of countries includes low FDI recipients in Sub-Saharan Africa. These countries have more vulnerable banking systems than the first group. Indeed, the average credit-deposit ratio in this group is 72.157 percent compared to 54.67 percent in the first group. Burundi and Kenya, Burkina Faso and Swaziland are the countries on the list that confirm the above finding. They recorded the highest credit-deposit ratio, respectively 85.84%, 73.55 %, 87.83% and 82.81%. The other countries, on the other hand, did not record such high scores, but their FDI flows are no different from the others.

Figure 1.5: Changes in the credit-deposit ratio and FDI (Group 2)



Source: Author's data analysis results

It is clear from these analyses that if the top 10 countries receive more FDI, this is justified by the health of their banking systems, which seem to be less vulnerable than those of the bottom 10. Nevertheless, in the bottom 10 list, we have noted some countries that have broken away from this situation of vulnerability, but their FDI flows remain low. This descriptive analysis already allows us to establish a negative relationship between a vulnerable banking system and FDI attractiveness in these Sub-Saharan African countries. Thus, in order to obtain more relevant results, we will use econometric methods

IV.2. Presentation of the econometric results

The objective of this study is to identify the indicators of banking system vulnerability that make Sub-Saharan African countries less attractive to FDI. Based on the work of Albulescu (2010), we have opted for a panel data model that we have estimated using the DLS method. More precisely, in our estimations, we used our variables of interest in pairs. Indeed, in model (1) we used the credit-to-GDP spread (Log) and the credit-to-deposit ratio (Log). In model (2), we used the spread of credit to PIB (Log) and the z-score (Log). Obviously, we did not skimp on other determinants and macroeconomic variables. The summary presentation of our results is in the following Table 2:

Table 2: FDI estimation results

VARIABLES	Random effects models	Random effects models
	(1) FDI (Log)	(2) FDI (Log)

ln (ecréditPIB)	1.161*[a] (0.666)	1.593* (0.880)
libertécivile	-0.3522**[b] (0.167)	-0.205 (0.181)
r e g u l a t i o n		0.543 (0.811)
corruption		-0.416 (0.580)
ln (PIBréel)	0.446 (0.460)	1.786* (1.039)
ln (rcréditdépot)		1.096 (0.677)
ln (educ_prim)	1.963***[c] (0.562)	1.240* (0.745)
ln (ouvcom)	1.031*** (0.344)	0.414 (0.494)
inflation		0.011 (0.013)
ln (devfin)	-1.528** (0.670)	-1.597** (0.808)
ln (detteExt)	0.035 (0.058)	0.034 (0.060)
	-0.0003* (0.0001)	-0.0003** (0.0002)
ln (ressourcenaturelle)	0.190*** (0.070)	0.060 (0.106)
démocratie	-0.390 (0.332)	-0.211 (0.363)
stabilitépolitique	0.038 (0.206)	
ln (zscore)	0.207 (0.200)	
Constant	-19.37*** (3.908)	-12.68** (5.245)
Observations	347	278
Number of countries	37	37
Fisher (p-value)	0.0000	0.0000
R-Square	0.7173	0.7053
Sargan/Hansen test (p-value)	0.5809	0.1652
Specification test ofHausman	Prob>chi2 = 0.1466	Prob>chi2 = 0.2071

Notes: Values in parentheses are standard deviation. (c)*** p<0.01 significant at 1%, (b)** p<0.05 significant at 5%, (a)* p<0.1 significant at 10%.

Source: Author's data analysis results

IV.3. **Interpretations**

On the theoretical side, our results are mostly in line with those obtained in the literature, both for our variables o f interest and for the traditional determinants. As regards the link between the vulnerability of the banking syste m and FDI, we were able to establish a negative and significant relationship. The indicator that allowed us to do t his is the credit-deposit ratio, which is significant at 10% for both models. This result had already been establishe d by Maswana (2010). By doing his study in China he was able to show that the more uncertainty increases in th e banking system the more difficult the access to financing becomes, and thus FDI becomes less attractive. Albul escu (2010) was also able to arrive at this result. For him, when the instability of the banking system increases, a ccess to foreign financing is hindered. The banking system is generally a source of investment financing. Howev er, if it is easily vulnerable, it will make foreign investors feel reluctant to deploy their funds to these areas. With respect to Sub-Saharan African countries, it is noted that the financial systems are more dominated by the banki ng sector. Since the banking sector in this area is not yet sufficiently developed, a smaller shock could make the m vulnerable and will follow the reduction of FDI.

As for the z-score, although it is not significant, it still shows that a vulnerable financial system makes F

DI less attractive. The z-score is in fact the indicator of the vulnerability of the banking system, which is concern ed with the solvency of the bank. To do this, when it is high it means that the bank is solvent and when it has a lo w rate it is the opposite effect. Making his study in 16 EU countries, Albulescu (2017) establishes a positive link between the z-score and the attractiveness of FDI. In other words, a solvent banking system positively influences FDI. It is from this result that we can make the counterpart by showing that a vulnerable banking system makes FDI flows into a country less attractive.

Our results establish a negative relationship between financial development and inward FDI in Sub-Sah aran Africa. At first glance, this result seems surprising but, it is however, not new since Anyanwu (2012) had alr eady obtained it. We can justify this result by saying that financial development leads to a decrease in foreign fir ms' profits as they see new local firms entering the market. For Sub-Saharan Africa, this result leads us to further deplore the low level of financial development and the weakness and ineffectiveness of banking supervision me chanisms that lead banking institutions to adopt moral hazard behavior. Illustratively, this hinders the efficient all ocation of resources and prevents MNFs from accessing the external financing on which they are highly depende nt (Rajan and Zingales, 1998).

Trade openness in our estimates has the expected sign is significant at 1% in model (1) and 10% in mod el (2). This result establishes a positive relationship between trade openness and FDI. In theory, a more open eco nomy provides more opportunities for firms, as it allows them access to neighboring markets. This is in line with the findings of Helpman (1984) regarding vertical FDI. Real GDP measuring market size also has a positive rela tionship with FDI. In model (1) it is positive but not significant and in model (2) it is positive and significant at t he 10% level. A clearer explanation is that as market size increases, foreign firms are encouraged to come and in vest in a country. In addition, it allows these firms to take into account economies of scale and thus the expected gains are similar to those obtained for trade openness. Results that had already been established by Asiedu (2002, 2006) and Anyanwu (2012).

Natural resources and infrastructure have a positive effect on FDI attractiveness in Sub-Saharan Africa. In our results, these are significant at the 1% level and model positive (1). Asiedu (2006) had already obtained th is result in his study from 1984 to 2002 in 22 Sub-Saharan African countries. Also, Anyanwu (2012) also obtaine d it that time from a cross-sectional approach on 53 African countries. As far as infrastructure is concerned, whe n it is of good quality it improves the productivity of investments since it reduces the operating costs associated with the establishment of foreign firms.

As regards the governance variables, particularly the quality of regulation, our results show a positive link b etween FDI inflows and regulation. This link, although not significant, has the expected sign. This result is simil ar to that of AtanganaOndoa (2013) who established a positive relationship between regulation and economic gro wth in Africa. Indeed, the author shows that the ability of public authorities to define and apply good regulatory policies favorable to private sector development favors entrepreneurship.

V. Conclusion

Several authors have found a positive relationship between a stable banking system and FDI flows. Ho wever, this relationship becomes inverse when the banking system is attacked by an exogenous shock. Thus, the purpose of this chapter was to identify indicators of banking system vulnerability that make Sub-Saharan African countries less attractive to FDI. We conducted an econometric analysis using panel data and estimated with the DLS method. We were able to obtain that when a banking system is insolvent, when it is unstable, this reduces t he flow of FDI in this area and the area becomes less attractive to foreign investment. Thus, we can say that a vul nerable banking system has a negative effect on FDI. However, we have found a positive relationship between tr ade openness, natural resources and infrastructure have a positive relationship with FDI. However, if SSA countr ies manage to keep their banking systems less vulnerable, this will allow them to receive a higher rate of FDI tha n they already do. It is therefore wise to promote a balanced financial environment through careful monitoring of the above-mentioned indicators in order to improve the quality of their investments and make their banking envi ronment attractive. In addition, the various SSA countries need to diversify their economies.

Bibliographic reference

[1]. Adrian T., Covitz D. et Liang N., (2013), « Financial Stability Monitoring », *Federal Reserve Bank Staff Reports*, N° 601.

[2]. Aglietta M., (2005) *Macroéconomiefinancière*, Repèresquatrièmeédition, Paris.

[3]. Albulescu, C. T. et A. M. Ionescu. 2016. « The long-run impact of monetary policy uncertainty and banking stability on inward FDI in EU countries », *Research in International Business and Finance*, Vol. 10, PP 133-158.

[4]. Albulescu, C. T. et N. B. Ianc. 2016. « Fiscal policy, FDI and macroeconomic stabilization. », *Review of Economics and Business Studies*, Vol. 9, PP 131-146.

[5]. Albulescu, C.T., L. Briciuset S. I. Coroius. 2010. « Determinants of Foreign Direct Investment in CEECs: the role of financial stability », *Scientific Annals of the AlexandruIoanCuza* ,University of Iasi,

Economic Scientific Special Issue 85-96.
[6]. Anyanwu, J.C. 2012. « Why does Foreign Direct Investment go where it goes?: New evidence fom African Countries », *Annals of Finance*,Vol.13, PP 425-462.
[7]. Arellano, C. et E. G. Mendoza. 2002. « Credit Frictions and Sudden Stops in Small Open Economies: An Equilibrium Business Cycle Framework for Emerging Markets Crises », *NBER WorkingPaper*N°. 8880 National Bureau of Economicresearch.
[8]. Aschauer, D. et J. Greenwood. 1983. « A further exploration in the theory of exchange rate regimes », *Journal of PoliticalEconomy*, Vol. 91, issue 5, 868-75
[9]. Asiedu, E. 2001. « On the determinants of foreign direct investment to developing countries: Is Africa different? », *World Development*, Vol 30, and No. 1, PP 107-119.
[10]. AtanganaOndoa, H. 2013. « Gouvernance et Croissance Economique en Afrique », *AfricanDevelopmentReview*, Vol. 25, N°2, PP 130-147.
[11]. Balestra, P. et J. Varadharajan-Krishnakumar. 1987. « Full information estimation of a system of simultaneousequationswithError component structure », *EconometricTheory*, Vol. 3, No. 2, pp. 223-246.
[12]. Besanko, D. et A. Thakor. (1987). « CompetitiveEquilibrium in the CreditMarketunderAsymmetric Information », *Journal of EconomicTheory*, 42, 167-182.
[13]. Biglaiser, G et K. DeRouen. 2005. « Economicreforms and inflows of foreign Direct Investment in Latin America », *Latin American ResearchReview*, Vol. 41, No. 1. Pp. 51-75
[14]. Botrić, V. et L. Škuflić. 2006. « Main Determinants of Foreign Direct Investment in the Southeast European Countries. », *Transaction Studies Review*, Vol. 13, PP 359-377.
[15]. Caprio, G. et D. Klingebiel. 1997. « Bank insolvency: bad luck, bad policy, or bad banking? », In Michael Bruno and Boris Pleskovic, eds., *Annual World Bank Conference on Development Economics 1996*, Washington, D.C.: World Bank
[16]. Demekas, D.G., H. Horváth, E. Ribakovaet Y. Wu. 2005. « Foreign Direct Investment in Southeastern Europe : How (and How Much) Can Policies Help ? », *IMF Working Papers*
[17]. Demirgüç-Kunt, A. ; E. Detragiache.et P. Gupta. 2006. « Inside the crisis: An empirical analysis of banking systems in distress », *Journal of International Economics*,Vol 25, PP 702–718
[18]. Desbordes, R. et S. Wei. 2014. « The effects of financial development on Foreign Direct Investment », *Policy Research Working Paper*. N°7065.
[19]. Dunning, J. H. 1981. « International Production and the multinational Enterprise ».*Boston: Allen and Unwin*.
[20]. Eichengreen, B. et A.K. Rose. 1998. « Staying afloat when the wind shifts: External factors and emerging market banking crises », *NBER Working paper*, No. 6370, National Bureau of Economic Research.
[21]. Ghura D. et Goodwin B., (2000), « Determinants of private investment: a cross regional empirical investigation», *Applied Economics*Vol. 32 No.14, PP 1819–1829.
[22]. Ghura D., (1997), « PrivateInvestment and EndogenousGrowth: Evidence fromCameroon. » *IMF workingpaper* 97/165.
[23]. Gopinath, G. 2004. « Lending booms, sharp reversals and real exchange rate dynamics. », *Journal of International Economics*, Vol.62, No.1, PP 1–23.
[24]. Guillaumont S. J., et Kangni, K. (2006), « Développement Financier, InstabilitéFinancière et CroissanceEconomique », *Economie et Prévision*, Vol. 3, N°174, PP 87-111.
[25]. Heather D., Gibson, Hall S. G. et Tavlas G. S., (2018), « Measuring systemic vulnerability In European banking systems », *Journal of Financial Stability*, Vol 36, PP 279-292.
[26]. Helpman E. et P. Krugman. 1985. « Market structure and foreign trade : increasing returns, imperfect competition and the international economy », *Wheatsheaft Books*, Harvester Press, Brighton.
[27]. Helpman, E. 1984. « A simple theory of trade with multinational corporations », *Journal of Political Economy*, Vol. 92, N°3, PP 451-471.
[28]. Helpman, E., M.J. Metlizet S.R. Yeaple. 2004. « Export versus IDE with heterogeneous firms », *American Economic Review*, Vol. 94, N°1, PP 300-316
[29]. Hymer, S.H. 1976. « The international operations of multinational firms: A study of Direct Foreign Investment », M.I.T. Press, Cambridge, Massachusetts. (Phd thesis, 1960)
[30]. Kaminsky, G.L. et C. Reinhart. 1999. « The twin crises : The causes of banking and balanceof-payments problems », *American Economic Review*, Vol.89, N°3, PP 473-500.
[31]. Kinuthia, B.K. et S.M. Murshed. 2015. « FDI determinants : Kenya and Malaysia Compared », *Journal of Policy Modeling*, 37(2).
[32]. Krugman P. 1979. « A Models of Balance-of-Payments Crises », *Journal of Money Credit and Banking*, Vol. 11, N°3, PP 311-325.
[33]. Levine, R. 1997. « Financial Development and Economic Growth : Views and Agenda », *Journal of*

Economic Literature, Vol. 35, No. 2. (Jun., 1997), pp. 688-726
[34]. Lucas, R. 1982. « Interest rates and currency prices in a two-country world », *Journal of Monetary Economics*, Vol. 10, issue 3, 335-359.
[35]. Manova, K., Wei S-J. et Zhang Z. (2015), « Firm Exports and Multinational Activity under Creit Constraints», *Review of Economics and Statistics*, Vol. 97 PP 574-588
[36]. Markusen, J. R. 1984. « Multinationals, multi-plant economies, and the gains from trade », *Journal of International Economics*, 16(3-4), 205-226.
[37]. Maswana, J.C. 2010. « Assessing the banking intermediation and inward foreign direct investment in China. », *International Journal of Economics and Business Research*, Vol. 2, PP 329-34
[38]. McDonald R. l., et Siegel D., (1986), « The value of Waiting to invest », *The Quaterly Journal of Economics*, Vol. 101, N°4,PP 707-27.
[39]. McKinnon, R.I. 1988. « Monetary and exchange rate policies for international financial stability: A proposal », *Journal of Economic Perspectives*, 2 (1): 83-103.
[40]. Mendoza E. G. Smith et A. Katherine. 2006. « Quantitative implications of a debt deflation theory of sudden stops and asset prices », *Journal of International Economics*,Vol.70, N°1, PP 82-114.
[41]. Mendoza, E. G. 2006a. « Lessons from the Debt Deflation Theory of Sudden Stops», *NBER Working Paper* N°. 11966, National Bureau of Economic Research, Cambridge,MA..
[42]. Mendoza, E. G. 2006b. « Endogenous sudden stops in a business cycle model with collateral constraints: a Fisherian deflation of Tobin's Q. », *NBER Working Paper* N°. 2007-2146, Fond Monétaire International.
[43]. Mishkin, F. S. 1997. « Understanding financial crises : a developing country perspective », *Working Papers* N°5600, National Bureau of Economic Research.
[44]. Naudé (2009), « The financial crisis of 2008 and the developing countries », *Working Paper,* N°1810, The United Nations University World Institute for Development Economics Research
[45]. Nonnenberg, M.C.B., et M.J. Mendonca. 2004. « The determinants of Foreign Direct Investment in develooping countries », *SSRN Electronic Journal*.
[46]. Oviatt, B. et P. McDougall. 1994. « Toward a theory of international new ventures », *Journal of International Business Studies*,Vol. 25, N°1, PP 45–64.
[47]. Pasricha G., Roberts T., Christensen I. et Howell B., (2013), « Assessing Financial System Vulnerabilities : An Early Warning Approach. », *Bank of Canada Review,* Vol. 2013 PP 10–19.
[48]. Raff, H., M. Ryan. et F. Stähler. 2018. « Financial friction and forein direct investment: evidence from Japanese microdata », *Journal of International Economics*Vol 112, PP 109-122.
[49]. Rajan, R. G. et L. Zingales. 1998. « Financial Dependence and Growth », *American Economic Review*, Vol. 87, N° 4, PP 545-564.
[50]. Saleem, A.B., A. Ayaz, K.J. Jeffey, K.D. Harris, et M. Carandani. 2013. « Integration of visual motion and locomotion in mouse visual cortex », *Nat. Neurosci*. 16, 1864-1869.
[51]. Sayek, S. 2009. « Foreign Direct Investment and inflation », *Southern Economic Journal*, Vol. 76(2). pp 319-443.
[52]. Sekkat, K. etVeganzones-Varoudakis, M.A. 2004. « Trade and foreign exchange liberalization, investment climate and FDI in the MENA Countries », *Working Paper*, Series n° 39, 1- 27p.
[53]. Stiglitz, J.E. et A. Weiss. 1981. « Credit rationing in market with imperfect information », *American Economic Review*,Vol 71, PP 393-410.
[54]. Stockman, A.C. 1981. « Anticipated inflation and capital stoc in a cash in-advance economy », *Journal of Monetary Economics*, Vol. 8(3), pp 387-393.
[55]. Tang, C. F., C. Y. Yip. et I. Ozturk. 2014. « The determinants of foreign direct investment in Malaysia : A case for electrical and electronic industry », *Economic Modelling* Vol. 43, PP 287–292
[56]. TidianeKinda. 2009. « Determinants, consequences and a policy response to private capital flows in developing countries », *Humanities and Social Sciences*, Universitéd'Auvergne - Clermont-Ferrand I.
[57]. Torlak, Elvisa (2004) : « Foreign Direct Investment, technology transfer, and productivity growth in transition countries : Empirical evidence from panel Data », *cege Discussion Papers*, No. 26, University of Göttingen, Center for European, Governance and Economic Development Research (cege), Göttingen
[58]. Wint, A. G. et D. A. Williams. 2002. « Attracting FDI to developing countries : A changing role for government ? », *The International Journal of Public Sector Management*,Vol. 15, PP 361-374

Appendix

Appendix 1: Vulnerability of the banking system in the 10 countries with the lowest rates of inward FDI

Countries	**Rank**	**FDI inflows**	Z-score	**Credit/deposit ratio**	**Credit to GDP gap**
Guinea-Bissau	1	1,729112338	1,87705533	43,68612	5,2440256

			3		
Swaziland	2	1,611226179	14,74181333	82,81556	16,06499933
IvoryCoast	3	1,582011857	7,8133	79,78162667	14,39125333
Zimbabwe	4	1,549778532	2,647426667	23,70116	3,758738
Burkina Faso	5	1,471620528	6,732546	87,83322	16,72920667
South Africa	6	1,417995207	14,48668	111,0482	63,45515333
Benin	7	1,252357298	11,524516	76,99354	16,41156733
Comores	8	1,137640599	0	56,31926	12,716444
Kenya	9	1,049991952	12,76638667	73,55323333	26,60205333
Burundi	10	0,608158652	10,45433867	85,84236667	16,00679333
Average		**1,34098931**	**8,30440627**	**72,1574287**	**19,1380234**

Source: Author's data analysis results

Appendix 2: Vulnerability of the banking system in the 10 countries with the highest rates of inward FDI

Countries	**Rank**	**FDI inflows**	Z-score	**Credit/deposit ratio**	**Credit to GDP gap**
Liberia	1	32,46458171	7,751554667	42,00687333	7,529096667
Mozambique	2	16,30349666	3,17898	55,95022	15,87401133
Republic of the Congo	3	14,42402786	1,56602	38,01438	5,700734
Seychelles	4	14,11056108	6,825122	33,84840667	20,45494
Sao Tome and Principe	5	13,53725919	1,013984	74,88798667	22,34599467
Mauritania	6	11,63669184	21,35545333	66,62126667	13,06583333
Equatorial Guinea	7	7,9928053	6,471592	55,22216	4,721821333
Cap vert	8	7,617176486	12,29254	67,02524	48,1171
Sierra Leone	9	7,46419189	5,087457333	34,16454	4,059047333
Chad	10	6,880896938	11,01497333	79,05498	4,138134
Average		**13,2431689**	**7,65576767**	**54,6796053**	**14,6006713**

Source: Author's data analysis results

Appendix 3: Descriptive statistics on banking system vulnerability in Sub-Saharan Africa

Variables	**Observations**	**Average**	**Standard deviation**	**Minimum**	**Maximum**
Z-score	554	2.111991	.5713171	.0683967	3.793528
Credit/deposit ratio	590	22.18069	1.676793	16.89792	26.89042
Credit to GDP gap	587	20.51927	1.884855	15.20399	26.34462

Source: Author's data analysis results

Appendix 4: Descriptive statistics on macroeconomic variables

Variables	**Obs.**	**Average**	**Standard deviation**	**Minimum**	**Maximum**
FDI inflows	628	19.0658	1.985091	10.36072	23.01428
Financial development	631	20.66091	1.92632	14.79513	27.08969
Commercial opening	629	22.3988	1.444859	18.49718	26.24711
Externaldebt	660	18.25776	1.981332	10.37349	23.26899
Natural resources	656	20.02499	2.401361	11.80916	25.03971
Importations	629	21.83604	1.351424	18.05672	25.54041

Exportations	629	21.49278	1.611009	17.4651	25.69943
Real GDP	660	2.78e+10	7.37e+10	1.25e+08	4.64e+11
GDP per capita	660	2.43e+10	6.66e+10	7.99e+07	5.68e+11
Urban population	660	38.77269	15.67045	8.682	87.366
Schoolenrolment rate	534	101.3234	20.32604	39.51496	149.3073
Inflation	647	48.33464	960.5611	-35.83668	24411.03
Access to electricity	720	35.22256	25.60193	.01	100

Source: Author's data analysis results