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Determinants of foreign direct investment in Africa: An analysis of the impact of financial development

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Abstract

This paper investigates the impact of financial development on Foreign Direct Investment (FDI) in 52 African countries under the OLI Dummy's paradigm from 1995 to 2015. The sample is made up of 35 countries without financial market and 17 countries with a financial market. The empirical methodology is based on the Generalized Method of Moments (GMM). Our empirical results show that, money and quasi money, banking credit to private sector and interest rate liberalisation play a positive role on FDI in countries without financial market. Money and quasi money, market capitalisation and financial market value traded positively influence FDI in countries with financial market. The study suggests, with regard to the low level of our estimated coefficients, that African countries need to reinforce their financial reforms.

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1. Introduction

Foreign direct investment (FDI) is now a rich field of study; in terms of theoretical and empirical work. The great number of research studies in this field justifies the importance of FDI in economic development. Indeed, for Adam *et al*. (2017), FDI improves the quality of human resources in the host country. It contributes to the transfer of technology, to the physical capital and to the management techniques of companies. Recent works show that the contribution of FDI to the host country is based on the level of development of the country and on the volume of FDI flows into this country (Ongo, 2016).

Since the mid-1990s, FDI inflows in the world have increased remarkably in the last two decades, from USD 341.15 billion in 1995 to USD 1,746 billion in 2016. According to the United Nations Conference on Trade and Development, FDI inflows in 2017 will reach USD 1,870 billion. This strong performance is due to the revival of growth in the world and especially in the developed countries. All the world's regions have experienced large inflows of FDI. Developing countries, for example, attracted USD 764.67 billion in 2015 from USD 117.760 billion in 1995, an average annual increase of 26.15 percent.

FDI inflows to Africa over the same period have gone from USD 5.65 billion to USD 54.08 billion. This evolution has not been linear. In 2008, after reaching USD 57.72 billion, inflows of FDI into Africa will fall to USD 43.57 billion in 2010. Despite the large FDI inflows into the continent, Africa is still less attractive, since it accounts only for 3.07% of the world's FDI. To understand this observation, which contrasts with the strong economic performance, in particular its high growth, several studies have been carried out on the determinants of FDI in Africa. Macroeconomic factors based on the role of human capital, market size and domestic investment have been more documented (Avom and Ongo, 2013, and Anyanwu and Yameogo, 2015;). Geographical factors that take into account the distance between the home country and the host country as well as natural resources are also a main full determinant of FDI in Africa (Assiedu, 2006, and Naudé and Krugell, 2007). More recent studies also considered institutional determinants in African context (Wei, 2000; Kinda, 2010, and Assiedu and Lien, 2011).

Despite the abundant literature on the determinants of FDI, it is still questioned why few studies have examined the specific role of financial development. Yet, according to authors, the financial system plays an important role in the economic development. Levine (2005) defines at least five main functions of the financial system in the economic development: the mobilisation and collection of savings; production of information; facilitating transactions; diversification and risk management, investment monitoring and control. Financial development is considered as a mechanism in facilitating the adoption of new technology in the domestic economy (Khan *et al.,* 2017, and Ang, 2008).

After the banking system crisis in Africa between 1980 and 1990, several reforms have been taken to stabilise the banking system and to increase the intermediation role of financial institutions. Thus, on the continent, bank credit to GDP ratio has increased. In 1995, it accounted to 14.9%. In 2016, it rises and stabilises at 28.5%. Money and quasi money to GDP ratio also rose from 22.9% to 44.9%. Furthermore, *financial* markets have developed rapidly in the recent period. In 1990, Africa had about 8 *financial* markets. The development of economic activities and the diversification of production have encouraged the creation and the emergence of several *financial* exchange. In 2016, Africa counts 21 *financial* markets, of which 17 are truly functional and dynamic. Market capitalisation to GDP ratio is 40% in the countries with a *financial* market. Also, stock market value traded to GDP ratio is 16.1% for the same countries.

The strong financial development in Africa would reinforce the idea that the financing of long-term activities is guaranteed by the involvement of the bond market and even the equity markets. It seems useful to consider the financial infrastructure as a factor of attractiveness of multinational firms in Africa. The international financial crisis of 2008-2009 can also justify the importance of a stable financial system as determinants of FDI. Indeed, since the crisis of the banking system of the 1980s, Africa has never again experienced such a financial disaster. Our study takes into account both the role of banking system as a determinant of FDI and that of the *financial* market. Financial market is crucial for an economy. It brings about discipline, transparency, accountability and responsibility in the way the society governs itself. Given the work on the determinants of FDI in Africa, our article is among the few studies to integrate the financial market as determinants of FDI.

This paper analyses the role of financial development in the attractiveness of FDI in Africa. We start from a theoretical model explained by Dunning (1980, 2009) and Ang (2008) in which we introduce several variables of financial development. Our sample is categorised into two groups. The first is composed of the 35 countries that do not have a stock exchange market and the second is made up of 17 countries that have a stock exchange market. The study period runs from 1995 to 2015. We extend the previous studies by placing a high interest on

the impact of *financial* market on FDI. Also, we study the stability of the results by running robustness test. The estimation technique used is based on the "System GMM" panel estimator of Blundell and Bond (1998).
After this introduction, section two briefly reviews the literature. Section three explains the methodology strategy. Section four presents and discusses the results. Section five concludes and suggests some policy implications.

2. A brief literature review

A vast literature exists on the determinants of foreign direct investment. This literature draws its foundations from theoretical work (Vernon, 1966; Mundell, 1957, and Dunning, 1993). For example, Dunning (1993) found a new approach that for the first time combines three determinants previously treated separately: firm-specific benefits, comparative advantages of the host country and the benefits of internalization. This theory is also called OLI theory which describes why multinational companies undertake foreign direct investment. Indeed, at the firm level, researchers have asked why companies would want to service foreign markets through affiliate production rather than through exporting or licensing arrangements. Dunning (1993) outlines four motives for a firm to engage in this type of investment: access to resources, access to markets, efficiency gains, and acquisition of strategic assets. Policy shifts by governments could impact the efficiency gains companies might experience, and have an effect on the ability of companies to access markets. This in turn motivates the literature on whether country-level factors and conditions can also lead to stronger flows. Whether macroeconomic and other national-level factors can account for cross-country differences in FDI inflows is the focus of the rest of this paper. Indeed, the different motives of multinational companies can be classified into four types: resource seeking, market seeking, efficiency seeking and strategic asset seeking.
Empirical literature has provided a good number of studies in the field of Foreign Direct Investment. We can group these publications into three parts concerning developing countries. First, we have the different studies on macroeconomic determinants. Second, we can consider the institutional determinants and third, we can observe the determinants related to the level of development in the host country.
Market size, degree of openness, the availability of natural resources, skilled and qualified human capital, the infrastructures, foreign aid and Urbanization have been used as the main macroeconomic determinants. Their implication is generally positive and significant (Mijiyawa, 2015, and Cleeve *et al.,* 2015).
Institutional quality has recently been found as a very important determinant of FDI. Institutions are observed as a set of rules governing human behavior (North, 1991). In Africa, there are several studies which have integrated institutions as the main determinant of FDI (Soumar *et al.,* 2016; Mina, 2012; Asiedu and Lien, 2011, and Daude and Stein, 2007). In these studies, the authors differentiate political institutions from governance indicators. If it is generally accepted and verified that institutions facilitate FDI in developed countries, the results are still mitigated in developing countries (Soumare *et al.,* 2016).
Concerning the particular role of financial development in the location of foreign firms, there are few studies which focused on this point in developing countries. However, we can learn more from Anyanwu and Yameogo (2015), Kinda (2008, 2010) and Deichmann *et al.* (2003) who considered that financial development plays a major role in attracting foreign companies. According to these authors, we assume that, there are five main roles of financial services for foreign firms. First, foreign firms use financial services to facilitate their activities by obtaining overdraft, loans or payments to their suppliers of intermediate goods. Second, they have insurance to secure their monetary asset. Third, foreign investors obtain good information provided by financial systems. In this main point, considering the distance between foreign investors and local market, a higher degree of information asymmetry can reduce the investor's engagement. Fourth, the role of financial system here is to facilitate the investment in the long run period. The fifth role is secure workers' salaries and permit them to repatriate money to family members.
The empirical results show that, financial development increases FDI location (Jenkins and Thomas, 2002). A developed financial system mobilizes savings efficiently which, in turn, expand the amount of available resources to finance investment. Deichmann *et al.* (2003) found for example that, for the different samples of their study, bank credit exhibits the highest level of positive significance. In the study, the different facilities of credit increase FDI by 0.04% in European Union and in America. In the Middle East, Transition economies and Asia, bank credit attracts foreign investors by 0.03%. This positive result is mitigated in Africa. Anyanwu and Yameogo (2015) show that, the level of bank credit discourages FDI's attractiveness by 0.07%. The authors use a sample of 17 West African countries in Generalized Method of Moments. Kinda (2010) found that, financing problems discourage FDI in Sub-Saharan Africa by 0.03%. The author applies the instrumental logit fixed-effect (IV FE logit) and Two-Stage Least Square (2SLS) techniques. He explained that financing fixed cost for the foreign

companies is a big challenge when the financial system is underdeveloped. In fact, credit constraints affect firms' decision to invest abroad.

These results are also obtained by Desbordes and Wei (2017) who found that there are two effects of financial development on FDI. The direct effect justifies a large positive influence on Greenfield, expansion and mergers and acquisitions of FDI when financial system directly finance their activities. For this effect, Khan *et al.* (2017) found a positive and significant result in the case of Pakistan over the 1972-2009 period. The indirect effect is explained when financial system promote manufacturing activities or other major activities related to infrastructures, services and human development. In many cases, the indirect effect is not really observed by the foreign companies or it can not affect their activities directly. Therefore, few studies are interested in explaining the different channels by which financial system contribute to the attractiveness of foreign direct investment.

The main consideration of financial development in our study goes beyond the previous works. We emphasize specially on the role of the financial system by taking into account both financial intermediaries (banks) and stock market. This contribution is justified by the profound changes that the African financial system has undergone since the 1990s. Thus, as shown by Alfaro *et al.* (2009), Agbloyor *et al.* (2014) and Baharumshah *et al.* (2015); *financial* market, while playing a positive role of attractiveness of FDI, can also facilitate their contribution to economic growth in the host country. Finally, the literature mentioned above, considers very few African countries in their sample. If we integrate all African countries into the study by differentiating those with a *financial* market (financially developed countries) from those with no stock markets, the results may not be the same, since the negative significance obtained in their works might be due to the fact that they integrate all the countries as if they have the same level of financial development. Such an approach may reduce the efforts made in many African countries and ignores the reality of the current development of the financial system in Africa. Our study then, fills this analysis gap.

3. Methodology strategy

3.1 Empirical model

Following Suliman and Mollick (2009), Kinda (2010) and Anyanwu and Yameogo (2015), we estimate the determinants of FDI by specifying the following equation:

$$FDI_{it} = \alpha + \gamma\, FDI_{i,t-1} + \beta Finance_{i,t} + \pi X_{i,t} + u_i + v_t + \varepsilon_{it} \quad (1)$$

where FDI_{it} is net FDI inflows in percentage of GDP; $FDI_{i,t-1}$ is the lagged FDI. It measures the agglomeration effects. Usually, new foreign investors may be attracted to countries with existing investment. The presence of old foreign investors increases the trust to the potential investors. The expected sign should be positive.

$Finance_{i,t}$ represents the different six indicators for financial development for country i at time t. We adopt these indicators to explain variables that can promote a high level of FDI inflows. We also need to take into account the specificity of Africa according to the level of financial development and finally, we desire to express relevant policy recommendations to the financial system authorities. The variables are:

(1) Money and quasi money to GDP (M2/GDP), it is used to describe highly liquid assets other than cash that can be quickly exchanged for cash. Usually, it measures the current level of the money supply in the country. Foreign investors can easily engage their activities if they have facilities to purchase materials. They also increase their transactions. We expect a positive impact of this variable (Agbloyor *et al.,* 2014).

(2) Private credit to GDP is domestic credit provided by the banking sector to private sector. This main variable explains the degree of access to credit. As shown in the literature, the facilities to increase innovative activities are based on the level and the quality of private credit. The expected sign should be positive (Desbordes and Wei, 2017).

(3) Gross domestic savings to GDP captures the degree of liquidity of bank. In some cases, it can also measure deposit level of the banking system. There is a relative view of its impact on FDI. But as shown by Aghion *et al.* (2016), growth can result by innovation generated by banking sector which provide to local investor resources to increase their equipment. We expect a positive impact of savings on FDI.

(4) Real interest rate (interest rate) in the theoretical frame work on financial development, interest plays a role of appreciation of financial liberalisation and the cost of credit. In the African case, financial reforms played a main role after the banking crisis in 1980 (Chouchane-Verdier, 2004). The expected sign should be positive.

(5) *Market capitalisation of listed companies to GDP (Capitalisation)* measures the degree of value of financial market. We divide it by the real GDP to have an overview of financial market in the economy (Choon *et al.,* 2010). A higher degree of capitalisation means a strong long term financing. We expect a positive sign of market capitalisation on FDI in Africa.

(6) *Stock market value traded to GDP (Trade market)* measures stock market liquidity in an economy-wide basis. For Levine and Zervos (1998) this measure is considered as one of the best measure of financial market activity. It explains *financial* market as well as the interaction with the size of the economy. As shown by Baharumshah *et al.* (2015), we expect a positive and significance impact on FDI.

Vector $X_{i,t}$ includes to others macroeconomic variables usually used to explain FDI determinants. These variables are:

(1) *Human capital* which plays a role of absorptive capacity. It facilitates foreign investors to realize theirs investments. The main reason is that, a high human capital in the host country, reduces the cost of foreign companies to import skill labor force (Anyanwu , 2012).

(2) *GDP per capita* explains the market size and the level of purchasing goods. It can replace the level of population's growth. A large consensus emerges on its positive impact on FDI (Moosa, 2009). FDI inflows are attracted by a large market or by a growing market. We also expect a positive sign of this variable. However, in the case of Africa, the growth of population in many countries is correlated with poverty growth. In this, case, the purchasing power is slow. We can definitely have a negative sign of the variable or none significant term.

(3) *Domestic investment (Gross Fixed Capital Formation):* it is generally accepted that FDI and domestic investment are complementary when economic development in the host country reaches a certain level: this is the "crowding in effect of FDI" on domestic investment (Steven and Lipsey, 1992). But in Africa, this result is not always verified. Indeed, empirical studies found inverse relationship between the two variables: this is "crowding out effect of FDI" on domestic investment (Moosa, 2009).

(4) *Infrastructures development (Infrastructures)* is explained in the theoretical framework as location advantage. Well-developed infrastructural facilities increase the productivity potential. In several studies, many variables can be used as infrastructures (energy, transport, internet, communication) and in some cases we have social infrastructures (school, health center) (Wekesa *et al.,* 2016). In this study, we measure infrastructure by number of telephone lines per 1,000 people. It characterizes the access to information. We expect a positive and significant impact on FDI (Nyaosi, 2011).

Country and time specific effects are taken into account by u_i and v_t ; while ε_{it} is the remaining of error term.

3.2 Estimation technique

Two options are commonly available in the literature to estimate regressions in panel data: fixed effect and random effects models. The main difference between the two is that fixed effects model allows for a nonzero correlation between country fixed effects and explanatory variables, while the random effects model postulates that there is no correlation. In the case of a correlation between the explanatory variables and the fixed country effects, the results of the random model are non-consistent. The Hausman specification test is recommended to choose between the two models.

The fixed effect model can reduce the bias of the omitted variables by controlling the fixed country and time effects. However, within the framework of the dynamic panel data, the endogeneity bias is solved according to the estimators used. For Hansen (1982) and Hayashi (2000), generalised method of moments (GMM) have been used extensively in economics, especially in macroeconomics and finance. Their estimator is unbiased, convergent and asymptotically distributed (White, 2001, and Davidson, 2000). In practice, the validation of the GMM follows a precise approach.

Consider the following equation:

$$FDI_{it} = \alpha FDI_{i,t-1} + \pi X_{i,t} + u_i + v_t + \varepsilon_{it} \quad (2)$$

Where FDI is foreign direct investment as a percentage of GDP, X represents the explanatory variables of the model, u_i the country-specific effect, v_t the temporal specific effect; ε_{it} the error term; i the country index and t the time index.

In this model, the presence of the delayed dependent variable does not allow the use of standard econometric techniques. GMM is used to control for the individual and temporal specific effects and to compensate for the

endogeneity biases of the variables. The endogeneity problem can be observed by the causality between FDI and financial development (Menyah *et al.,* 2014). There are two types of estimators: (a) the Difference GMM and (b) the System GMM. Note that the use of these two estimators presupposes the quasi-stationarity of the variables of the equation in level and the absence of autocorrelation of the residuals.
In the Arellano and Bond's (1991) estimator or Different GMM, the objective is to respond to a possible bias of omitted variables related to the specific effects and to differentiate equation 2 in level. We obtain the equation:

$$FDI_{it} - FDI_{it-1} = \alpha\left(FDI_{i,t-1} - FDI_{i,t-2}\right) + \pi(X_{i,t} - X_{t-1}) + (v_t - v_{t-1}) + (\varepsilon_{it} - \varepsilon_{it-1}) \quad (3)$$

The first difference eliminates the country-specific effect and therefore the bias of omitted invariant variables over time $\left(FDI_{i,t-1} - FDI_{i,t-2}\right)$. By construction, the error term $(\varepsilon_{it} - \varepsilon_{it-1})$ is correlated with the variable delayed in difference. The first differences in the explanatory variables of the model are instrumented by the delayed (level) values of these variables. The aim is to reduce simultaneity bias and the bias introduced by the presence of the dependent variable in the left member.
Assuming that the explanatory variables of the model are weakly exogenous (they may be replaced by past values of the FDI, but remain uncorrelated to future realizations of the error term) and that the error terms are not auto-correlated, the following moment conditions apply for the first difference equation.

$$E[y_{it-s}.(e_{it} - e_{it-1})] = 0 \ for \ s \geq 2, t = 3, \dots, T \quad (4)$$
$$E[X_{it-s}.(e_{it} - e_{it-1})] = 0 \ for \ s \geq 2, t = 3, \dots, T \quad (5)$$

The problem with this indicator is that it suffers from the weakness of the instruments, which leads to considerable bias in the finished samples and its accuracy is asymptotically low. More precisely, the delayed values of the explanatory variables are instruments of the first-difference equation. Moreover, the differentiation of the equation in level eliminates inter-country variables and only takes into account intra-country variations.
The estimation of the generalized method of moments in system makes it possible to lift this limit. It combines the equation in difference with that in level. The first difference equation is estimated simultaneously with the level equation by the generalized methods of moment. In the level equation, the variables are instrumented by their first differences. Blundell and Bond (1998) tested this method using Monte Carlo simulations. The system GMM method on dynamic panel data combines the first difference equation with the level equation. Indeed, Blundell and Bond (1998) constructed unbiased, convergent and asymptotically distributed estimators. They showed that the endogeneity problem comes either from a strong relation between the dependent variable and some independent variables (reverse causality); or of a multicollinearity between the explanatory variables. Instrumental variables can resolve this problem. Sargan and Hansen test is used to test their validity (Roodman, 2009). The advantage of this method is that, it allows to control for country-specific effects and the potential endogeneity of the explanatory variables.

3.3 Data

The data set consists of cross-country observations for 52 African countries over the 1995-2015 period. We exclude Somalia and South Sudan for a lot of missing data. The sample is divided into two groups (Appendix 1). The data used for this study come from three sources. All the variables are in percentage. The logarithm of natural resources is used to simplify the size of data and linearise them (see Appendix 2 for the sources of data).

4. Empirical results and discussion

According to the two sets of our sample, we first present the results on the 35 African countries without *financial* market. Secondly, we analyse the results for 17 African countries with *financial* market.

4.1 Empirical results in countries without financial market

The system GMM estimation results are reported in table 1. In column 1.1, we present the results of control variables. In columns 1.2., 1.3., 1.4 and 1.5, we present the different results of the financial development variables where, we include respectively money and quasi money, deposit, credit and interest rate.

Table I. FDI and financial development: GMM system estimation results, 35 African countries without financial market

	Dependent variable: FDI inflows in Africa / GDP				
	1.1	1. 2	1.3	1.4	1.5
FDI/GDP$_{t-1}$	0.274***	0.134**	0.075*	0.091	0.018
	(0.055)	(0.058)	(0.024)	(0.014)	(0.041)
Human Capital	-0.058***	-0.067**	-0.004*	-0.041	-0.121
	(0.021)	(0.027)	(0.015)	(0.021)	(0.014)
	0.254***	0.192**	0.091**	0.047***	0.018*
GDP per capita growth rate	(0.080)	(0.091)	(0.095)	(0.145)	(0.041)
	0.217*	0.1887***	0.125*	0.094**	0.152*
Domestic investment (GFCF/GDP)	(0.013)	(0.036)	(0.012)	(0.425)	(0.312)
Infrastructure	-0.023*	0.039*	0.041***	0.015*	0.085*
	(0.013)	(0.020)	(0.001)	(0.027)	(0.186)
		0.015*			
Money and quasi money (M2/GDP)		(0.048)			
			-0.050*		
Deposit /GDP			(0.035)		
				0.002**	
Credit to private sector/GDP				(0.073)	
					0.006*
Interest rate					(0.040)
	-1.171	1.189	1.024	0.985**	0.842
Constant	(0.805)	(1.150)	(0.175)	(0.174)	(0.134)
Number of obs.	287	183	194	187	192
Number of countries	35	35	35	35	35
Hansen p-value	0.256	0.182	0.194	0.413	0.365
AR(2) p-value	0.365	0.465	0.426	0.241	0.331

*Source: Author, Note: (1) Heteroskedasticity robust standard deviations are given in parentheses; (2) ***, **, and * denote statistical significance at 1%, 5% and 10% respectively; (3) Hansen's statistic tests the null hypothesis of non-correlation between instruments and error terms; (4) The statistics of Arellano and Bond (AR 2) test the null hypothesis of non-correlation of the second order of the residuals; (5) The Hansen and AR (2) test results show that the instruments and residuals are uncorrelated and confirm the absence of autocorrelation; (6) The number of instruments is less than the number of countries (Roodman, 2009); (7) We use the delayed variables of the independent variables and the dependent variable as instruments.*

The results show that all the control variables significantly affect FDI in this sample. The agglomeration effect captured by the lag of FDI positively impact FDI (Anyanwu and Yameogo, 2015). The sign of human capital is negative and significant. This can be explained by the weakness in the quality of human capital. Indeed, if investors are not satisfied with the domestic workforce, they will be tempted to import a skilled workforce. The policy increases the cost of production and discourages the location of firms. Also, higher amount of human capital increases production in the country and an increase of supply makes business less profitable and reduce attractiveness of FDI. This explanation can change positively, if qualified labor force increases return to capital in the country (Fedotenkov *et al.,* 2014). In term of significance, our results verify those obtained by Cleeve *et al.* (2015). GDP per capita growth rate significantly increases FDI. The results justify the role of market size as a determinant of FDI. The recent economic growth of Africa plays in this line a positive role. Domestic investment significantly increases FDI for the considered countries. Infrastructures do not increase FDI. Indeed, it is generally accepted that infrastructures in Africa are of low quality. African countries should do more in this sector if they need to increase FDI.

The results of the role of financial development on FDI on the sample are relevant according to the recent and rapid changes in financial system. Money and quasi money increases FDI in Africa; this means that money supply plays a major role in terms of liquid money provided in the system. In the same analysis, Rose and Van Wincoop (2001) found that currency union reduces trade barriers associated with national borders. This can support our result because in the 35 African countries of the sample, 13 are members of monetary union (7 in the West African Economic and Monetary Union and 6 in Central African Economic and Monetary Community). The coefficient of deposit/GDP is significant but negative. This result is not consistent with the theoretical framework which supposes a positive role of deposit ratio (Choong *et al.,* 2010). Domestic credit given to private sector encourages

FDI's attractiveness. Our result is not supported by Anyanwu and Yameogo (2015) who found a negative and significant impact of domestic credit on FDI in West Africa. However, Manova (2013) and Manova *et al.* (2015) explained that at the level of firm, high domestic credits increase trade and domestic firms' activities. We can justify the low level of our coefficient by the level of credit in the sample, and credits constraints reduce potentially domestic firms to borrow and to realize their different activities (Foley and Manova, 2015). Interest rate liberalization plays a positive and significant role on FDI in Africa. Indeed, when the restructuration process ended, banking firm had the possibilities according to their internal policies, to increase or reduce the level of interest rate. The policy encourages foreign firms to diversify their activities in the host country. In general, financial development in countries without stock market increases FDI. However, the impact is not very high.

4.2 Empirical results in countries with financial market

We present the results for the second sample. These results are compiled in table 2. Column 2.1 presents the results of control variables. Columns 2.2; 2.3; 2.4 and 2.5 regroup control variables and financial indicators of banking system. Columns 2.6 and 2.7 present the results take into account the impact of market capitalization and stock market value traded on FDI.

Table II. FDI and Financial development: GMM system estimation results, 17 African countries with financial market

	Dependent variable: FDI inflows in Africa / GDP						
	2.1	2.2	2.3	2.4	2.5	2.6	2.7
FDI/GDP$_{t-1}$	0.324***	0.327***	0.304***	0.331***	0.239***	0.252***	0.265***
	(0.047)	(0.049)	(0.051)	(0.057)	(0.054)	(0.054)	(0.054)
Human Capital	0.027***	0.026***	0.025***	0.024***	0.019**	0.036***	0.045***
	(0.008)	(0.008)	(0.009)	(0.008)	(0.008)	(0.010)	(0.012)
GDP per capita growth rate	-0.008	-0.027	-0.022	-0.026	-0.035*	-0.0128	-0.007
	(0.013)	(0.018)	(0.018)	(0.018)	(0.019)	(0.016)	(0.015)
Domestic investment	-0.023	-0.043	-0.024	-0.026	-0.033	-0.045	-0.056
	(0.031)	(0.035)	(0.035)	(0.032)	(0.036)	(0.036)	(0.036)
Infrastructure	-0.005**	-0.011***	-0.005	-0.009**	-0.004*	-0.006*	-0.007**
	(0.0027)	(0.004)	(0.004)	(0.004)	(0.003)	(0.003)	(0.003)
Money and quasi money (M2/GDP)		0.019**					
		(0.010)					
Bank deposit /GDP			0.002				
			(0.012)				
Credit to private sector/GDP				0.017			
				(0.013)			
Interest rate					0.014		
					(0.015)		
Capitalisation						0.110***	
						(0.040)	
Stock market value traded							0.028***
							(0.008)
Constant	1.115	1.082	1.264	1.127	1.748**	1.115	0.491
	(0.760)	(0.788)	(0.830)	(0.802)	(0.781)	(0.866)	(0.878)
Observations	217	214	210	215	169	174	173
Number of countries	15	15	15	15	13	15	15
Sargen p-value	0.169	0.171	0.098	0.146	0.115	0.374	0.201
AR(2) p-value	0.024	0.015	0.021	0.025	0.396	0.081	0.093

*Source: Author, Note: (1) Heteroskedasticity robust standard deviations are given in parentheses; (2) ***, **, and * denote statistical significance at 1%, 5% and 10% respectively; (3) the other notes remain the same for the first estimation.*

The results of control variables are different in terms of sign and the degree of significance. Lagged FDI and human capital play positive and significant roles on FDI. We can observe that, in terms of human capital, a country like Botswana has more young people enrolled in secondary school while in Burkina Faso and Angola have less. As presented in the first sample, countries with financial markets benefit of a higher amount of labor force and return to capital which make them more attractive. Many cases can be taken for the other variables. This means that, the degree of development creates high absorptive capacities of FDI. However, GDP per capita growth rate and domestic investment have a negative impact on FDI. This can be explained by the high level of informal sector in these countries. Money and quasi money plays a positive and significant role of FDI. Bank deposit; credit to private sector and interest rate do not have impact on FDI for these countries. Stock market capitalization to GDP ratio plays a positive and significant role on FDI. The result can be justified by a rapid increment of the number of companies in the stock market. In Johannesburg Stock Exchange in South Africa for example, more than 350 companies are listed with a level of market capitalization to GDP ratio to 234% in 2015 (WDI, 2017). Market capitalization rate grew by 15% annually. Because financial market plays a positive role in economic development, its performance can facilitate FDI's attractiveness (Choong *et al.,* 2010). Stock market value traded impacts significantly FDI in Africa. Because stock market value trade measures markets liquidity, it can justify the permanent liquidity of the market and provide financial insurance for FDI's activities. On the other hand, a high liquidity gives an opportunity for the market to increase the number of shares and also permit the diversification of firms' activities. In general, intermediation variables are not significant excepted broad money.

4.3 Robustness analysis

To check for robustness of our results, we focus on two mechanisms. First, we substitute the first control variables by population growth, institutions and natural resources variables. Second, we calculate a simple index of financial development to pressure two objectives. The first objective is to verify if, with a financial development index, we find the same results. The second objective is to verify if, there is a non-linear relationship between financial development and FDI as presented in the literature (Rioja and Valev, 2004; Deidda and Fattouh, 2002). Indeed, as found by Aghion *et al*. (2005), in a cross-country sample, financial development plays a positive role in economic growth after a certain threshold. Kendall (2012) pressured the same diagnosis test and he found a negative and significance coefficient of the square of credit. In our study, we consider their methodology. Results are compiled in table 3.

Table III. FDI and Financial development: GMM system estimation results in robustness analysis

	Dependent variable: FDI inflows in Africa / GDP			
	Substitution of control variables		Substitution by a financial development index	
	3.1	3.2	3.3	3.4
FDI/GDP$_{t-1}$	0.470***	0.133	0.244***	0.268***
	(0.058)	(0.140)	(0.058)	(0.072)
Population growth	-1.449	0.096*	-0.055	0.295
	(1.213)	(0.140)	(0.044)	(0.226)
Natural resource (Log(Oil production)	0.792	0.015**	0.929	-0.231
	(0.888)	(0.312)	(0.999)	(0.208)
Institutions (Polity2)	-0.180*	0.034***	0.108	0.060**
	(0.154)	(0.021)	(0.159)	(0.027)
Money and quasi money(M2/GDP)	0.075**	0.001*		
	(0.129)	(0.001)		
Deposit /GDP	-0.136*	-0.028		
	(0.081)	(0.018)		
Credit to private sector/GDP	0.022***	0.024**		
	(0.167)	(0.020)		
Interest rate	0.234***	0.007*		
	(0.060)	(0.012)		
Capitalization		0.004***		
		(0.003)		
Stock market value traded		0.014*		
		(0.003)		

Financial Development Index			0.004	-0.008
			(0.043)	(0.009)
Financial Development Index square				0.012
				(0.014)
Constant	10.77***	2.347**	0.793	1.792**
	(3.623)	(1.136)	(2.127)	(0.817)
Number of obs.	398	199	173	197
Number of countries	52	52	52	52
Sargen p-value	0.35	0.524	0.181	0.110
AR(2) p-value	0.12	0.353	0.301	0.1177

*Source: Author, Note: (1) Heteroskedasticity robust standard deviations are given in parentheses; (2) ***, **, and * denote statistical significance at 1%, 5% and 10% respectively; (3) the other notes remain the same for the first estimation.*

The general observation shows that with the substitution of the first control variables by population growth rate, natural resources and institutions, the significance of the financial development variables remain the same. Money and quasi money, credit to private sector and interest rate play a positive role in attracting of FDI. The financial development index, calculated by a simple arithmetic mean formula, gives a positive result but not significant. In this case, the results indicate that financial development weakly affects FDI in Africa. We can confirm the position according to other studies (Anyanwu and Yameogo, 2015; Boateng et *al.,* 2015; Desbordes and Wei, 2017).

5. Conclusion and policy implications

The paper analysed the impact of financial development on foreign direct investment in Africa from 1995 to 2015. The econometric technique is based on generalized method of moment. The sample is composed by 52 African countries divided in two groups: 35 countries without financial market and 17 countries with financial market. The results support the positive and significant influence of certain financial variables on FDI. In particular, money and quasi money to GDP ratio, credit to private sector provided by bank and interest rate encourage FDI in the first sample. Broad money, market capitalization and stock market value traded are significant in the second sample. Deposit to GDP ratio is positive but not significant in the second samples. But generally, if the significance of variables is obtained, the value of estimated coefficients is very low.

Our findings have strong implications for both future research and also development policy in the two groups of countries. Regarding development policy, African countries need to improve the access to financial services, to reinforce financial reforms, to create better conditions to the entrance of companies in stock market. To increase the number of listed companies in the financial market, it will be very important to provide firms with incentives to list their shares on the local stock markets. One of the main recommendations to increase credit rate is to reduce the spread between deposit and lending interest rate. This process can be observed if investment climate is improved. Indeed, we also suggest that credit guarantees be created for specific borrowers such as SMEs, export's companies, and agricultural industries. Concerning the future researches, our findings suggest that when we analyze the role of financial development on the economic growth in Africa, we need to separate the sample on the one hand and to distinguish the different major variables of financial development on the other hand.

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APPENDICES

Appendix 1. List of countries in the sample

African countries without stock market	African countries with stock market
Cameroon, Congo, Angola, Gabon, Equatorial Guinea, Central African Republic, RD Congo, Niger, Senegal, Sierra Leone, Togo, Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Rwanda, Seychelles, Sudan, Sao-Tome and Principe, Chad, Lesotho, Madagascar, Mozambique, Algeria, Libya, Mauritania, Benin, Burkina-Faso, Cape Verde, Gambia, Guinea-Bissau, Liberia, Mali.	Botswana, Côte d'Ivoire, Ghana, Nigeria, Morocco, Uganda, Malawi, Mauritius, Namibia, South Africa, Tunisia, Tanzania, Swaziland, Zambia, Zimbabwe, Egypt., Kenya

Source : Author

Appendix 2. Source of variables

Variable	*Source*
Foreign direct investment (FDI/GDP)	*United Nations Conference on Trade and Development, database (UNCTAD, 2017)*
Human Capital	*World Development Indicators (2017)*
GDP per capita growth rate	*World Development Indicators (2017)*
Domestic investment (GFCF/GDP)	*World Development Indicators (2017)*
Infrastructure	*World Development Indicators (2017)*
Money and quasi money (M2/GDP)	*World Development Indicators (2017)*
Deposit /GDP	*Global Financial Development (2017)*
Credit to private sector/GDP	*Global Financial Development (2017)*
Interest rate	*Global Financial Development (2017)*
Capitalization	*Global Financial Development (2017)*
Stock market value traded	*Global Financial Development (2017)*

Source : Author

Appendix 3. Descriptive statistics in sample of 35 countries without financial market

Variables	Obs.	Mean	Stand. Dev.	Min	Max

FID/GDP	713	5.91	12.57	-82.89	161.82
Human Capital (Schooling)	441	34.85	24.21	0	114.36
GDP per Capita	715	4.99	9.73	-62.07	149.97
Domestic investment (GFCF)	604	22.43	21.27	-34.13	219.06
Infrastructures	662	26.06	36.48	0	214.75
Money and quasi money (M2/GDP)	698	31.82	25.16	0	150.68
Deposit/GDP	625	24.83	23.16	0.55	131.62
Credit	700	13.51	10.14	0	65.27
Interest rate	517	9.01	13.89	-94.21	78.27
Institutions (Polity2)	693	0.66	5.03	-7	10
Population growth rate	700	2.58	1.66	-0.27	17.62
Natural resources	735	0.71	1.09	0	3.29

Source: Author

Appendix 4. Correlation matrix in sample of 35 countries without financial market

	1	2	3	4	5	6	7	8	9
FID/GDP=1	1								
Human Capital (Schooling) = 2	0.08	1							
GDP per Capita = 3	0.29*	0.06	1						
Domestic investment (GFCF) =4	0.52*	0.20*	0.*	1					
Infrastructures = 5	0.04	0.14*	-0.09*	0.04	1				
M2/GDP =6	-0.01	0.45*	-0.13*	0.02	0.15*	1			
Deposit/GDP =7	0.02	0.41*	-0.07*	0.07	0.13*	0.050*	1		
Credit = 8	0.03	0.43*	-0.08*	0.05	0.24*	0.66*	0.52*	1	
Interest rate =9	0.07	-0.11*	0.15*	0.13*	-0.06	-0.10*	-0.03	-0.01	1

Source: Author

Appendix 5. Descriptive statistics in sample of 17 countries with financial market

Variables	Obs.	Mean	Stand. Dev.	Min	Max
FID/GDP	357	2.923	2.394	-2.773	10.695
Human Capital (Schooling)	217	63.159	27.831	5.216	138.382
GDP per Capita	357	10.221	19.807	-7.652	117.663
Domestic investment (GFCF)	335	22.777	13.873	2.000	86.102
Infrastructures	357	52.283	66.540	0.835	315.034
Money and quasi money (M2/GDP)	346	147.510	13.55	10.479	183.47
Deposit/GDP	331	37.354	25.594	7.016	92.676
Credit	347	30.003	23.232	2.746	106.260
Interest rate	286	14.12	49.696	-43.572	572.936
Institutions (Polity2)	334	2.155	5.947	-9	10
Population growth rate	339	2.751	1.243	-1.397	7.988
Natural resources	357	0.786	1.074	0	3.403
Capitalization	280	40.942	82.733	0.009	99.693
Stock market value traded	280	16.045	66.90	0.009	108.112

Source: Author

Appendix 6. Correlation matrix in sample of 17 countries with financial market

	1	2	3	4	5	6	7	8	9	10	11
FID/GDP=1	1										
Human Capital (Schooling) = 2	0.13*	1									
GDP per Capita = 3	-0.08	-0.14*	1								
Domestic investment (GFCF) =4	-0.008	0.30*	-0.06	1							
Infrastructures = 5	-0.06	0.38*	-0.09	0.23*	1						
M2/GDP =6	0.07	0.23*	-0.01	0.42*	0.03	1					
Deposit/GDP =7	-0.21*	0.16*	-0.08	0.37*	0.08	-0.04	1				
Credit = 8	-0.11*	0.35*	-0.01	0.19*	0.16*	-0.06	0.76*	1			
Interest rate =9	-0.09	-0.004	0.63*	-0.16*	-0.07	0.03	-0.07	-0.04	1		
Capitalisation =10	-0.17*	0.09	0.38*	-0.100	0.09	-0.03	0.18*	0.41*	0.42*	1	

Stock market value trade =11	0.10	0.005	-0.01	0.052	-0.02	-0.01	0.09	0.10	-0.03	0.001	1

Source: Author