

FDI and Financial Market Development in Africa*

Isaac OTCHERE, PhD

Sprott School of Business
Carleton University, Ottawa (ON), Canada
Phone: (1) 613 520-2600 Ext. 2731
Fax: (1) 613 520-4427
Email: isaac_otchere@carleton.ca

Issouf SOUMARÉ, PhD (Corresponding author)

Department of Finance, Insurance and Real Estate
Faculty of Business Administration
Laval University, Quebec (QC), Canada
Phone: (1) 418-656-2131 Ext. 4298
Fax: (1) 418-656-2624
Email: issouf.soumare@fsa.ulaval.ca

Pierre YOUROUGOU, PhD

Department of Finance
Whitman School of Management
Syracuse University, Syracuse, NY, USA
Phone: (1) 315 443-8027
Fax : (1) 315 442-1449
Email: pyouroug@syr.edu

This version: October 2011

* This paper was partly finalized while Issouf Soumaré was visiting the Guanghua School of Management at Peking University (Beijing, China). Soumaré would like to thank Professors Li Liu and Longkai Zhao and all the other members of the Department of Finance of the Guanghua School of Management for their hospitality. We thank Yao D. N'Sougan for valuable research assistance. We thank Sirimon Treepongkaruna and seminar participants at the 2010 Global Development Finance Conference in Cape Town (South Africa) and 2011 Global Finance Conference in Bangkok (Thailand). We wish to acknowledge the financial support received from the Fonds Québécois de la Recherche sur la Société et la Culture (FQRSC), the Institut de Finance Mathématique de Montreal (IFM2) and the Social Sciences and Humanities Research Council of Canada (SSHRC). All errors are the authors' sole responsibility.

FDI and Financial Market Development in Africa

Abstract

The development literature on the relationship between foreign direct investment (FDI), financial market development (FMD) and economic growth focuses mainly on two aspects: the relationship between FDI and economic growth and the role played by FMD in that linkage. The literature is almost silent on the relationship and causality direction between FDI and FMD. Although it has been established that FDI contributes more to growth in countries with more developed financial market, it is not clear how FDI and FMD interact with each other. The aim of this paper is to fill this gap in the African context. Particularly, in Africa, where stock markets experience low liquidity and are less transparent, FDI can be an impetus for financial market reforms and serve as a mechanism to improve the transparency and the depth of the financial markets. Also, well functioning financial markets can help channel foreign investments more efficiently into productive sectors, and therefore create more value for investors, hence make the country more attractive to FDI. In short, both FDI and FMD will impact each other simultaneously, which is confirmed by our findings. We also find that FDI contributes to economic growth in Africa after controlling for endogeneity between FDI, FMD and economic growth.

Keywords: FDI, Financial market development, Finance in Africa, Economic growth.

JEL classification code: N27, O12, O19

I. INTRODUCTION

The literature on the relationship between foreign direct investment (hereafter FDI), financial market development (hereafter FMD) and economic growth has focused primarily on the relationship between FDI and economic growth (see Carkovic and Levine (2005) for a thorough literature review) and the role played by FMD in that linkage (e.g., Alfaro et al. (2004, 2010), Allen et al. (2010), Bekaert et al. (2005), Hermes and Lensink (2003), Levine et al. (2000), Levine and Zervos (1998), among many others). The literature is almost silent on a possible direct causality between FDI and FMD. The few empirical papers that address this issue consider the role played by FMD in the channelling of FDI into economic production (e.g., Alfaro et al. (2004), Dutta and Roy (2011), Hermes and Lensink (2003), and Kholdy and Sohrabian (2005, 2008)) or focus on specific regions. For example, Adam and Tweneboah (2009) study the long-run relationship between FDI and stock market development in Ghana, and Al Nasser and Soydemir (2010) conduct Granger causality tests between FDI and financial development variables for Latin American countries. Although, it is established that FDI contributes more to growth in countries with more developed financial market (e.g., Alfaro et al. (2004, 2010)), it is not clear how FDI and FMD interact with each other, especially in Africa, where financial markets are at the very developmental stage.

Despite this lack of empirical studies on the direct causal relationship between FDI and FMD, nevertheless, there are several theoretical rationales for expecting a causal relationship between FDI and FMD. First, an increase in FDI net inflows would contribute to expand the economic activities and lead to an increase in funds available in the economy, which in turn would boost the financial intermediation through available financial markets or the banking system (e.g. Desai et al. (2006) and Henry (2000)). Besides, companies involved in FDI are also likely to be listed on local stock markets as they usually originate from industrialised countries where financing through stock market is a tradition and a must-do for any company that wants to enhance its image among investors. Second, using political economic analysis, one can argue that an increase in FDI would reduce the relative power of the elites in the economy and can prompt them to adopt market friendly regulations, thus strengthening the financial sector (e.g., Kholdy and Sohrabian (2005, 2008), Rajan and Zingales (2003)). Third, a relatively well functioning financial market can attract foreign investors as they will perceive it as a sign of vitality, openness from the countries authorities and market friendly environment, thus compelling them to invest more in the country (e.g., Henry (2000)). In addition, a relatively developed stock market increases the liquidity of listed companies and may eventually reduce the cost of capital, thus making the country

attractive to foreign investments (Desai et al. (2006) and Henry (2000)). Each of these arguments provides a theoretical rationale for a positive relationship between FDI and financial market development.

In this paper, we conduct an empirical study on the direct causal relationship between FDI and FMD in Africa. This study is even more relevant in the African context, since African stock markets vary in terms of the levels of development and most of them experience low liquidity and are less transparent. Furthermore, as reported by Beck et al. (2009), the shallowness of finance or the lack of developed financial market in Africa has dampened economic growth on the continent. On the one hand, FDI can be an impetus for financial market reforms and serve as a mechanism to improve the transparency, liquidity and depth of financial markets in Africa. On the other hand, well-functioning financial markets on the continent can contribute to a more efficient allocation of foreign investments into productive sectors and create more value for foreign investors, hence foster more foreign investments. Therefore, we expect FDI and FMD to simultaneously impact positively on each other in the African context.

Empirically, Alfaro et al. (2004) and Hermes and Lensink (2003), among many others, have shown how important the development of a country's financial system is in channelling FDI to more productive sectors of the economy. From the political economy perspective, the co-existence of advanced financial markets and political stability are shown to be necessary conditions to capture the benefits of FDI, e.g. Dutta and Roy (2011) and Kholdy and Sohrabian (2005, 2008). Other strand of literature, namely, studies on market liberalisation or alleviation of capital control and investment are also closely related to our work in the sense that if one views capital controls or financial repression as a feature of an underdeveloped financial sector, capital market liberalisation can be seen as evidence of major steps toward financial market development. Consistent with this line of argument, Henry (2000) shows that there is usually an increase in the growth rate of private investment as well as FDI following financial liberalization. Desai et al. (2006) argue that because a considerable fraction of the funding for local affiliates of multinational investors often comes from the local debt markets, higher interest rates due to capital control increase the cost of capital and this discourages FDI. Thus capital control affects local investments by multinational firms because it affects local borrowing rates and increases the cost of repatriation. Finally, the costs associated with capital controls undoubtedly discourage many potential investors from establishing affiliates in the first place. Empirically, Desai et al. (2006) using US multinational firms' data, show that liberalization of capital controls are associated with considerable increases in the

activities these firms conduct through their affiliates. Liberalization of capital controls appears to unleash faster growth in the business activities of multinational firms in the host countries. From this literature, the linkage between FDI and FMD passes through the adjustment of the cost of capital because financial market development reduces the cost of capital and therefore spurs investments in local companies or local affiliates of multinationals.

The extant literature has not clearly established, at least empirically, a direct link between FDI and FMD, especially for African countries where stock markets are at their embryonic stages and these countries rely on huge amounts of foreign investments in order to lift their population out of poverty. The forgoing discussion relating to the link between FDI and FMD clearly suggests that the relationship between FDI and FMD is endogenously determined. We therefore use a system of simultaneous equations involving both FMD and FDI variables as dependent and independent variables in assessing this direct relationship between FDI and FMD, while controlling for other factors that affect the inflows of foreign direct investments and the development of financial markets.

Compared to previous studies, we use, in this study, different variables to measure FDI and FMD, as suggested by the literature (e.g., Alfaro (2004), Levine et al. (2000) and Levine and Zervos (1997)). For FDI, we use (i) the ratio of FDI net inflows as a percentage of GDP and (ii) the ratio of FDI net inflows as percentage of gross capital formation (GCF). For FMD, we use six measures namely: (i) stock market capitalisation as a percentage of GDP, (ii) stock market turnover ratio, (iii) stock market value traded as a percentage of GDP, (iv) total credit by financial intermediaries to private sector over GDP, (v) liquid liabilities of the financial system divided by GDP and (vi) ratio of commercial bank assets to commercial bank and central bank assets. We also include in our regressions other variables found in the literature to be key determinants of FDI and FMD.

Using panel data of African countries from 1996 to 2009 and Granger causality tests, we document a bi-directional causality between FDI and FMD. Hence, studies involving both FDI and FMD need to account for potential endogeneity problems. Furthermore, the multivariate regression results of the system of simultaneous equations confirm the positive relationship between FDI and FMD in Africa. We also find that FDI impacts positively and significantly on economic growth after accounting for the endogeneity between FDI, FMD and economic growth.

The remainder of the paper is organized as follows. Section 2 describes the variables and data used, and provides basic univariate statistics. In Section 3, we present the analyses of the relationship between FDI and FMD. We formulate policy recommendations and conclude

the study in Section 4.

II. DATA AND DESCRIPTIVE STATISTICS

We collect data (where available) on all African countries from 1996 to 2009. Table 1 provides detailed description of the variables used in this study and their sources.

INSERT TABLE 1 HERE.

Financial market development (FMD) variables

Following Levine et al. (2000) and Levine and Zervos (1997), we use the following six financial market development (FMD) variables: STKMKTCAP, STKTUR, STKVALTRA, CREDIT, LLIAB and CCB. STKMKTCAP is the ratio of the total stock market capitalisation over GDP and measures the relative size of the stock market and more specifically the depth of financial market. STKTUR is the stock market turnover ratio and equals the total value of domestic shares traded divided by market capitalization. It reflects the stock market liquidity. STKVALTRA is the total stock market value traded expressed as a percentage of GDP and is also an indicator of market liquidity. CREDIT is the ratio of total credit granted by financial intermediaries to the private sector to GDP. LLIAB is equal to the liquid liabilities of the financial system (currency plus demand deposits and interest-bearing liabilities of banks and non-bank financial intermediaries) divided by GDP. CCB is the ratio of commercial bank assets divided by commercial bank plus central bank assets. These last three variables measure the level of access and usage of financial services.

The first three FMD variables (STKMKTCAP, STKTUR and STKVALTRA) are related to stock market development (e.g. Levine and Zervos (1997)). These three variables have been used recently by Allen et al. (2010), Allen, Otchere and Senbet (2011), Senbet and Otchere (2010), and Yartey and Adjasi (2007) in their study of the relationship between stock market development and growth in Africa. The last three variables (CREDIT, LLIAB and CCB) capture the level of financial intermediation or the banking sector development in a country (e.g. Levine et al. (2000)).

The financial market data used in this study are obtained from the World Bank Global Development Finance and the International Monetary Fund (IMF) International Financial Statistics databases.

Foreign direct investment (FDI) variables

Foreign direct investment (FDI) is measured as either the ratio of FDI net inflows over GDP, hereafter FDIGDP, or the ratio of FDI net inflows over gross capital formation (GCF),

hereafter FDIGCF. The data for these variables are from the African Development Indicators (ADI) and Global Development Finance (GDF) databases of the World Bank.

Control variables

We also use the following variables to control for other relevant factors affecting FDI and FMD:

Economic and policy variables:

- GDPGROWTH is the real GDP growth rate;
- EDUCATION is measured by UNESCO's Gross Enrolment Ratio (GER) for all levels of education. The level of a population's education indicates the quality of the country's human capital;
- INFRAS is the Log of main phone lines per 1000 persons. It is used as a proxy for the level of infrastructure development.¹ The level of infrastructure development has been found to be a key determinant of the inflow of FDI into a country;
- NATRES represents the natural resources variable and is measured by the share of fuel and minerals in total exports. Asiedu (2006) shows that natural resources are among the key determinants in the attractiveness of FDI in Africa;
- EXHRATE represents the exchange rate or the value of the local currency and is used as a proxy for macroeconomic stability and the country's attractiveness to foreign investment;
- BALANCE is the current account balance over total GDP. This variable can be seen as a rough indicator of the soundness of the macroeconomic environment;
- SIZE is measured by Log (GDP_{t-1}), where GDP_{t-1} is the initial gross domestic product level of the country. This variable is used to control for the size of the economy;
- OPENNESS reflects the degree of openness of a country to international trade and foreign investors. It is measured by the ratio of total imports plus exports over GDP. This variable measures how friendly a country is to FDI, and as such, it has been identified as a key determinant of a country's attractiveness to FDI;
- INFLATION is measured by the percentage change in GDP deflator. It is a good proxy for macroeconomic stability;

¹ We could use other proxies for infrastructure development, however as argued in Gohou and Soumaré (2011), the data on this infrastructure development variable is readily available for most African countries and for many years. Furthermore, this variable is highly correlated with the other infrastructure development variables.

- INTRATE is lending interest rate adjusted for inflation as measured by the GDP deflator. This rate can be seen as a proxy for the efficiency of financial market. For instance, a too high real interest rate can hamper banks' lending activities, creating an imbalance between credit and deposit activities and excess banks' liquidity;
- GOVSPEND is government spending and is measured by the government total spending over GDP.

Except for the education data which are obtained from the UNESCO database, data for the other variables are from the African Development Indicators (ADI) database of the World Bank.

Governance and institutional quality variables:

- GOVERNANCE measures the level of governance and institutional quality in a country. It is measured by the KKM Index, a broad governance measure developed by Kaufmann, Kraay and Mastruzzi (2009), and consists of the average of six indicators (namely, 1-Voice and accountability, 2-Political stability and absence of violence, 3-Regulatory quality, 4-Government effectiveness, 5-Rule of law, 6-Control of corruption). It can be obtained from the Worldwide Governance Indicators (WGI) website of the World Bank.²

Table 2 presents descriptive statistics of the variables. When using the stock market development variables, we limit our sample to the following countries with stock markets: Botswana, Côte d'Ivoire, Egypt, Ghana, Kenya, Morocco, Mauritius, Malawi, Namibia, Nigeria, Swaziland, Tunisia, Tanzania, Uganda, South Africa, Zambia and Zimbabwe. Given the relatively large size of the stock market in South Africa, we consider it as an outlier. We later perform a robustness check by excluding it from the sample to see whether or not its marginal effect biases the results.

INSERT TABLE 2 HERE.

Table 3 presents the correlations between the variables. The six FMD variables are highly correlated, with correlation coefficients being above 70%. The two FDI variables have a high correlation of 82%. Given this high correlation between the two FDI variables, the results we obtain using either FDIGDP or FDIGCF in our empirical analyses below lead to the same conclusion, therefore, we only report results with FDIGDP. The results with FDIGCF can be obtained from the authors upon request.

² The Worldwide Governance Indicators (WGI) project can be found at <http://info.worldbank.org/governance/wgi/index.asp>.

INSERT TABLE 3 HERE.

III. EMPIRICAL ANALYSES

3.1. Granger Causality test between FDI and FMD

To conduct the Granger causality test between the FDI and FMD variables, we first check for the stationarity of the variables. Since we are using panel data, we use Levin, Lin and Chu (2002) and Im, Pesaran and Shin (2003) unit root tests. The Levin, Lin and Chu (2002) unit root test uses the following equation:

$$\Delta y_{i,t} = \alpha_i + \beta_i t + \rho y_{i,t-1} + \sum_{s=1}^{p_i} \gamma_{i,s} \Delta y_{i,t-s} + \varepsilon_{i,t}, \text{ for } i=1, \dots, N \text{ and } t=1, \dots, T, \quad (1)$$

where $y_{i,t}$ is the variable to be tested for unit root, i is for the country, t for the time, $\varepsilon_{i,t}$ follows a normal distribution $N(0, \sigma_{\varepsilon,i}^2)$, α_i is the constant and $\beta_i t$ is for the time trend. The null hypothesis for the test is $\rho = 0$. The Im, Pesaran and Shin (2003) unit root test assumes heterogeneity of the autoregressive unit root coefficient ($\rho_i \neq \rho_j$ for $i \neq j$) as follows:

$$\Delta y_{i,t} = \alpha_i + \beta_i t + \rho_i y_{i,t-1} + \sum_{s=1}^{p_i} \gamma_{i,s} \Delta y_{i,t-s} + \varepsilon_{i,t}. \quad (2)$$

Table 4 presents the unit root tests results. Panel A of Table 4 presents the results of the unit root tests on the level variables. Both unit root tests support the stationarity of FDIGDP. However, we cannot reject the presence of unit roots for all six FMD variables. We then differentiate the FMD variables and present the results in Panel B of Table 4. The results show that the first differences of the FMD variables are stationary hence we reject the existence of unit roots.

INSERT TABLE 4 HERE.

Next, we run the Granger causality test between FDI and FMD variables. We use the following standard equation for the Granger causality test between our variables:

$$y_{i,t} = \alpha_i + \sum_{k=1}^q \gamma^k y_{i,t-k} + \sum_{k=1}^p \beta_i^k x_{i,t} + e_{i,t}, \quad (3)$$

where x and y are two stationary variables, i is for the country and k for the time lag. Following Hood III, Kidd and Morris (2008), to test whether variable x Granger causes variable y , first, we run an homogeneous non causality (HNC) test consisting of testing the

null hypothesis of all coefficients β_i^k being simultaneously equal to zero (for all i and k). If the null hypothesis is accepted, then the test ends and we conclude no causality. Otherwise, we proceed next with the homogeneous causality (HC) test consisting of testing the null hypothesis: $\beta_i^k = \beta^k$ for each k and all i . If we cannot reject the null hypothesis, we conclude that the causality is homogeneous; otherwise, the causality is heterogeneous. Heterogeneous causality means that in some countries (at least one) we have causality between x and y , while in others we don't have causality; or it can be that the causality structure is different across countries.

The results of the Granger causality tests presented in Table 5 support the existence of bidirectional Granger causality between all six financial market development indicators variables and FDIGDP. In both causality directions, we reject the null hypothesis of homogenous non causality. We also reject the hypothesis of homogenous causality, which means that the causality relation structure is not the same for all countries of the sample.

INSERT TABLE 5 HERE.

Having shown the existence of bidirectional causality between FDI and FMD, next we conduct further analyses by means of multivariate regressions by controlling for other factors pertaining to financial sector development and attractiveness of FDI.

3.2. Multivariate analysis of the relationship between FDI and FMD

For the multivariate analysis, we consider the following system of two simultaneous equations:

$$FDI = a_0 + a_1 FMD + a_2 EDUCATION + a_3 SIZE + a_4 INFLATION + a_5 OPENNESS + a_6 INFRAS + a_7 EXHRATE + a_8 NATRES + a_9 GOVERNANCE, \quad (4a)$$

$$FMD = b_0 + b_1 FDI + b_2 BALANCE + b_3 EDUCATION + b_4 SIZE + b_5 INFLATION + b_6 EXHRATE + b_7 INTRATE + b_8 GOVERNANCE, \quad (4b)$$

where the variables are as described above. We use two alternative measures of FDI and six FMD variables. The control variables used in both regressions are drawn from previous empirical works, e.g., Asiedu (2002, 2006), Alfaro et al. (2004), Allen et al. (2010), Allen, Otchere and Senbet (2011), Senbet and Otchere (2010), Yartey and Adjasi (2007).

Table 6 presents the three-stage least squares (3SLS) regression results using FDIGDP as a measure of foreign direct investment. For all FMD variables, we find that both FDI and

FMD impact positively and significantly each other.³

INSERT TABLE 6 HERE.

The control variables have the expected signs, although not always significant in most regressions. For instance, EDUCATION impacts positively and significantly on financial market development. Exchange rate has a positive impact on FDI and a negative impact on FMD. Consistent with the results of the literature on the determinants of FDI, OPENNESS has a positive impact on FDI, although not significant in most regressions. As in Asiedu (2002), NATRES, the natural resources variable, has a positive impact on FDI. The GOVERNANCE variable, the KKM Index, a mixed average of several governance and institutional quality measures, has a positive and significant impact on both FDI and FMD, when the coefficient is significant.

Since South Africa is considered an outlier in terms of stock market size, we exclude it from the sample and rerun our simultaneous regression equations using the 3SLS estimation method. The results are presented in Table 7. As we can see from these results, the positive bidirectional relationship between FDI and FMD is confirmed even when South Africa is excluded from the sample.

INSERT TABLE 7 HERE.

3.3. Robustness check using Arellano-Bond dynamic panel data estimation method

For robustness check, we use the dynamic panel data estimation method of Arellano and Bond (1991) to overcome some of the limitations of cross sectional estimators in dealing with omitted variables biases, country-specific effects, endogeneity problems, and use of lagged dependent variables in regressions encountered with panel data regressions (e.g. Levine et al. (2000)). The suggested dynamic model uses the lag of the dependent variables as explanatory variables. In that case, the residuals are correlated with the lagged variables and the standard OLS estimators can no longer be used. The estimation is then done with Generalized Method of Moments (GMM) estimators. The dynamic model has the following general form:

$$y_{i,t} = \alpha y_{i,t-1} + \beta x_{i,t} + \mu_i + \varepsilon_{i,t}. \quad (5)$$

To eliminate country-specific effects, we take the first difference of this equation which yields:

³ Using either FDIGDP or FDIGCF, we obtain the same conclusion; therefore, we use FDIGDP. The results using FDIGCF can be obtained from the authors upon request.

$$\Delta y_{i,t} = (1 - \alpha) \Delta y_{i,t-1} + \beta \Delta x_{i,t} + \Delta \varepsilon_{i,t} . \quad (6)$$

This first difference, however, does not eliminate the correlation between the error term and the lagged variables, since $\Delta y_{i,t-1}$ and $\Delta \varepsilon_{i,t}$ remain correlated. The model is then estimated with GMM estimation technique using lagged values of the explanatory variables as instruments (e.g., Arellano and Bond (1991)).

In our study, it is appropriate to use this dynamic estimation technique since from the causality tests we found bi-directional causality between FDI and most of our FMD variables. We also have country-specific effects. In order to be able to compare the results obtained here with the 3SLS regressions results given above, we use the one step GMM system estimation approach of Arellano and Bover (1995) and Blundell and Bond (1998) with level and lagged values of the variables used as instruments. This is an improvement from the GMM in difference of Arellano and Bond (1991).

The regression results presented in Table 8 confirm the strong positive relationship between FDI and FMD. Again, the control variables have the expected sign.

INSERT TABLE 8 HERE.

3.4. Explaining growth by controlling for the simultaneous effects of FDI and FMD

Since many studies have been devoted to the relationship between FDI and economic growth (for study on Africa see Gohou and Soumaré (2011)), and between FMD and economic growth (for study on Africa see Allen et al. (2010), Beck et al. (2009), Senbet and Otchere (2010), and Yartey and Adjassi (2007)), we use a system of three simultaneous equations involving FDI, FMD and economic growth to study the relationship between the three variables:

$$FDI = a_0 + a_1 FMD + a_2 GDPGROWTH + a_3 EDUCATION + a_4 SIZE + a_5 INFLATION + a_6 OPENNESS + a_7 INFRAS + a_8 EXHRATE + a_9 NATRES + a_{10} GOVERNANCE, \quad (7a)$$

$$FMD = b_0 + b_1 FDI + b_2 GDPGROWTH + b_3 BALANCE + b_4 EDUCATION + b_5 SIZE + b_6 INFLATION + b_7 EXHRATE + b_8 INTRATE + b_9 GOVERNANCE, \quad (7b)$$

$$GDPGROWTH = c_0 + c_1 FDI + c_2 FMD + c_3 EDUCATION + c_4 SIZE + c_5 INFLATION + c_6 EXHRATE + c_7 OPENNESS + c_8 GOVSPEND + c_9 GOVERNANCE, \quad (7c)$$

where GDPGROWTH is the growth rate of real GDP, all the other variables are as defined.

The 3SLS regression results given in Table 9 show that FDI impacts positively and significantly on economic growth in Africa irrespective of the type of FMD indicator used.

Also, GDPGROWTH impacts positively on FDI in all regressions. This positive relationship between FDI and GDPGROWTH split the explanatory power of both variables in the FMD equation. This explains why in the FMD equations, both FDI and GDPGROWTH coefficients are not significant in most regressions, however when the coefficients are significant, their signs are positive. The same results are confirmed in unreported results using the Arellano-Bond dynamic panel data estimation technique. Overall, the three variables impact positively and significantly on each other; and not accounting for this fact may bias the estimation results and lead to inaccurate results.

INSERT TABLE 9 HERE.

IV. CONCLUSION

This paper studies the direct causal relationship between FMD and FDI in Africa. We use data from 1996 to 2009 for African countries where such data were available. Granger causality tests and multivariate analyses support the bidirectional positive relationship between FDI and FMD. We also find that FDI impacts positively and significantly on economic growth in Africa when we control for the simultaneous effects of both FDI and FMD. Therefore studies involving both FDI and FMD should account for this potential endogeneity issue.

REFERENCES

- Adam, A. M. and G. Tweneboah, 2009, Foreign Direct Investment and Stock market Development: Ghana's Evidence, *International Research Journal of Finance and Economics*, 26, 178-185.
- Al Nasser, O. M. and G. Soydemir, 2010, Domestic and International Determinants of Foreign Direct Investment in Latin America, FMA Annual Meeting, New York, USA.
- Alfaro, L., Chanda, A., Kalemli-Ozcan, S. and S. Sayek, 2010, Does Foreign Direct Investment Promote Growth? Exploring the Role of Financial Markets on Linkages, *Journal of Development Economics*, 91 (2), 242-256.
- Alfaro, L., Chanda, A., Kalemli-Ozcan, S. and S. Sayek, 2004, FDI and Economic Growth: The Role of Local Financial Markets, *Journal of International Economics*, 64 (1), 89-112.
- Allen, F., Carletti, E., Cull, R., Qian, J. and L. Senbet, 2010, The African Financial Development Gap, Working Paper, Wharton School, University of Pennsylvania.
- Allen, F., Otchere, I., and L. Senbet, 2011, African Financial Systems: A Review, *Review of Development Finance*, 1, 79-113.
- Arellano, M., 2003, *Panel Data Econometrics*, Oxford University Press.
- Arellano, M. and S. Bond, 1991, Some Tests of Specification for Panel Data: Monte Carlo Evidence and An Application to Employment Equations, *Review of Economic Studies*, 58, 277-297.
- Arellano, M. and O. Bover, 1995, Another Look at the Instrumental Variable Estimation of Error-Components Models, *Journal of Econometrics*, 68 (1), 29-51
- Asiedu, E., 2002, On the Determinants of Foreign Direct Investment to Developing Countries: Is Africa Different?, *World Development*, 30 (1), 107-19.
- Asiedu, E., 2006, Foreign Direct Investment in Africa: The Role of Natural Resources, Market Size, Government Policy, Institutions and Political Instability, *The World Economy*, 63-77.
- Beck, T., Fuchs, M., and M. Uy, 2009, Finance in Africa: Achievements and Challenges, World Bank Policy Research Working Paper 5020.
- Bekaert, G., C. R. Harvey, and C. Lundblad, 2005, Does Financial Liberalization Spur Growth?, *Journal of Financial Economics*, 77, 3-56.
- Blundell, R. and S. Bond, 1998, Initial Conditions and Moment Restrictions in Dynamic Panel Data Models, *Journal of Econometrics*, 87 (1), 115-143.
- Carkovic, M. and R. Levine, 2005, Does Foreign Direct Investment Accelerate Economic Growth?, in "Does Foreign Direct Investment Promote Development", Edited by Moran, T. H., Graham, E. M., and M. Blomstrom, Institute for International Economics, Washington DC, 195-220.
- Desai, M. A., C. F. Foley, and J. R. Hines Jr., 2006, Capital Controls, Liberalizations, and Foreign Direct Investment, *The Review of Financial Studies*, 19, 1434-1464.
- Dutta, N. and S. Roy, 2011, Foreign Direct Investment, Financial Development and Political Risks, *The Journal of Developing Areas*, 44 (2), 303-327.
- Gohou, G. L. and I. Soumaré, 2011, Does Foreign Direct Investment Reduce Poverty in Africa and Are There Regional Differences?, *World Development* (forthcoming).

- Henry, P. B., 2000, Do Stock Market Liberalizations Cause Investment Booms?, *Journal of Financial Economics*, 50, 301-334.
- Hermes, N. and R. Lensink, 2003, Foreign Direct Investment, Financial Development and Economic Growth, *Journal of Development Studies*, 40 (1), 142-163.
- Hood III, M. V., Kidd, Q. and I. L. Morris, 2008, Two Sides of the Same Coin? Employing Granger Causality Tests in a Time Series Cross-Section Framework, *Political Analysis*, 16 (3), 324-344.
- Im, K.S., Pesaran, M.H. and Y. Shin, 2003, Testing for Unit Roots in Heterogeneous Panels, *Journal of Econometrics*, 115 (1), 53-74.
- Kaufmann, D., Kraay, A. and M. Mastruzzi, 2009, Governance Matters VIII: Aggregate and Individual Governance Indicators 1996-2008, World Bank Policy Research Working Paper #4978. Washington, DC.
- Kholdy, S. and A. Sohrabian, 2005, Financial Markets, FDI, and Economic Growth: Granger Causality Test in Panel Data Models, Working Paper, California State Polytechnic University.
- Kholdy, S. and A. Sohrabian, 2008, Foreign Direct Investment, Financial Markets and Political Corruption, *Journal of Economic Studies*, 35 (6), 486-500.
- Levin, A., Lin, C.F., and C.S.J. Chu, 2002, Unit Root Test in Panel Data: Asymptotic and Finite Sample Properties, *Journal of Econometrics*, 108, 1-24.
- Levine, R. N. Loayza, and T. Beck , 2000, Financial Intermediation and Growth: Causality and Causes, *Journal of Monetary Economics*, 46, 31-77.
- Levine, R., and S. Zervos, 1998, Stock Markets, Banks, and Economic Growth, *American Economic Review*, 88, 537-558.
- Rajan, R.J. and Zingales, L., 2003, Saving Capitalism from the Capitalists: Unleashing the Power of Financial Markets to Create Wealth and Spread Opportunity, Princeton University Press, Princeton, NJ.
- Senbet, L. and I. Otchere, 2010, African Stock Markets, in M. Quintyn, & G. Verdier (Ed), *African Finance in the 21st Century* (pp. 104-142), International Monetary Fund volume (Palgrave).
- Yartey, C. A. and C. K. Adjasi, 2007, Stock Market Development in Sub-Saharan Africa: Critical Issues and Challenges, IMF Working Paper #WP/07/209.

Table 1: Description of the variables and sources of the data

VARIABLE	DESCRIPTION	SOURCE OF DATA
FDI variables		
FDIGDP	FDI / GDP	These variables are from the African Development Indicators (ADI) and Global Development Finance (GDF) databases of the World Bank
FDIGCF	FDI / GCF	
FMD variables		
STKMKTCAP	Stock market capitalisation / GDP	The financial data are from the World Bank Global Development Finance (GDF) ¹ and the International Monetary Fund (IMF) International Financial Statistics (IFS) databases
STKTUR	Stock market turnover ratio	
STKVALTRA	Stock market value traded / GDP	
CREDIT	Total credit by financial intermediaries to private sector / GDP	
LLIAB	Liquid liabilities of the financial system (currency plus demand deposits and interest-bearing liabilities of banks and non-bank financial intermediaries) divided by GDP	
CCB	Ratio of commercial bank assets divided by commercial bank plus central bank assets	
Economic and policy variables		
GDPGROWTH	Real GDP growth	These variables are from the African Development Indicators (ADI) database of the World Bank
GOVSPEND	Government consumption / GDP	
INFLATION	Percentage change in GDP deflator	
INFRAS	Log(Main phone lines per 1000 persons)	
OPENNESS	(Import + Export) / GDP	
SIZE	Log(GDP _{t-1})	
NATRES	Share of fuel and minerals in exports	
EXHRATE	Exchange rate	
BALANCE	Current account balance / GDP	
INTRATE	Lending interest rate adjusted for inflation as measured by the	

¹ The link to the Global Development Finance data is:

<http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH/0,,contentMDK:20696167~pagePK:64214825~piPK:64214943~theSitePK:469382,00.html>

EDUCATION	<p>GDP deflator</p> <p>Gross Enrolment Ratio (GER) for all levels of education</p>	<p>The education variable is obtained from the UNESCO database</p>
GOVERNANCE	<p>Governance and institutional quality variables</p> <p>Measured by the KKM index, an average of six Worldwide Governance Indicators (WGI) developed by Kaufmann, Kraay and Mastruzzi (2009):</p> <ol style="list-style-type: none"> 1. Voice and accountability, 2. Political stability and absence of violence, 3. Regulatory quality, 4. Government effectiveness, 5. Rule of law, 6. Control of corruption 	<p>The Worldwide Governance Indicators (WGI) project can be found at http://info.worldbank.org/governance/wgi/index.asp</p>

Table 2: Descriptive statistics

This table presents descriptive statistics of the variables for all African countries using panel data from 1996 to 2009 when available. The term “(excl. SA)” means excluding South Africa. Financial market development (FMD) variables are: STKMKTCAP is the stock market capitalisation over GDP, STKTUR is the stock market turnover ratio, STKVALTRA the total stock market value traded as a percentage of GDP, CREDIT is the total credit by financial intermediaries to private sector over GDP, LLIAB represents the liquid liabilities of the financial system (currency plus demand deposits and interest-bearing liabilities of banks and non-bank financial intermediaries) divided by GDP, CCB is the ratio of commercial bank assets divided by commercial bank plus central bank assets. Foreign direct investment (FDI) variables are: FDIGDP the ratio of foreign direct investment net inflows over GDP, FDIGCF the ratio of foreign direct investment net inflows over gross capital formation (GCF). The description of the other variables is provided in Table 1.

Variables	Obs	Mean	Std. Dev	Min	Max
<i>FMD Variables</i>					
STKMKTCAP	192	0.3429	0.4968	0.0072	3.0843
STKTUR	193	0.0980	0.1172	0.0001	0.5962
STKVALTRA	185	0.0805	0.2432	0.0000	1.9740
CREDIT	520	0.1916	0.2332	0.0055	1.6242
LLIAB	518	0.3124	0.2303	0.0412	1.2795
CCB	633	0.6882	0.2467	0.0173	1.2645
STKMKTCAP (excl. SA)	179	0.2289	0.2254	0.0072	1.4102
STKTUR (excl. SA)	180	0.0781	0.0875	0.0001	0.5077
STKVALTRA (excl. SA)	172	0.0268	0.0669	0.0000	0.4416
CREDIT (excl. SA)	507	0.1637	0.1548	0.0055	0.7235
LLIAB (excl. SA)	505	0.3084	0.2317	0.0412	1.2795
CCB (excl. SA)	620	0.6822	0.2457	0.0173	1.2645
<i>FDI Variables</i>					
FDIGDP	643	0.0426	0.1022	-0.8289	1.4520
FDIGCF	599	0.1965	0.4814	-0.5272	9.6789
FDIGDP (excl. SA)	630	0.0432	0.1031	-0.8289	1.4520
FDIGCF (excl. SA)	586	0.1988	0.4862	-0.5272	9.6789
<i>Economic variables</i>					
GDPGROWTH	649	5.0215	7.6399	-31.3000	106.2798
INTRATE	453	7.7071	15.2004	-96.8698	60.6879
EXHRATE	650	641.4153	1478.4370	0.1280	14470.0000
SIZE	655	22.2030	1.6031	18.1523	26.3713
GOVSPEND	597	14.8373	7.3978	2.2875	69.5428
EDUCATION	524	50.9687	18.3905	9.7303	96.1372
OPENNESS	631	0.7622	0.3933	0.1786	2.8344
NATRES	305	0.1720	0.2954	0.0000	0.9970
INFLATION	649	30.5189	263.4807	-24.0764	5399.5260
BALANCE	637	-5.1448	12.7339	-124.5570	44.5810
INFRAS	627	2.4468	1.4829	-2.3026	5.6602
<i>Governance and inst. quality variables</i>					
GOVERNANCE	507	-0.6662	0.6403	-2.3598	0.8561

Table 3: Variables correlation matrix

This table presents the Pearson correlation matrix of the variables used in the study. We use panel data for all African countries from 1996 to 2009 when available. The description of the variables is provided in Table 1.

	STKMKTCAP	STKTUR	STKVALTRA	CREDIT	LLIAB	CCB	FDIGDP	FDIGCF	GDPGROWTH	INTRATE	EXHRATE	SIZE	GOVSPEND	OPEN	NATRES	INFLATION	BALANCE	INFRAS	EDUCATION	GOVERNANCE
STKMKTCAP	1.00																			
STKTUR	0.69	1.00																		
STKVALTRA	0.77	0.89	1.00																	
CREDIT	0.79	0.39	0.34	1.00																
LLIAB	0.84	0.51	0.46	0.97	1.00															
CCB	0.33	0.07	0.03	0.55	0.47	1.00														
FDIGDP	0.00	0.14	0.29	-0.43	-0.35	-0.49	1.00													
FDIGCF	0.01	0.24	0.38	-0.43	-0.33	-0.56	0.95	1.00												
GDPGROWTH	-0.14	0.09	0.09	-0.25	-0.19	0.03	0.42	0.38	1.00											
INTRATE	-0.14	-0.23	-0.23	0.01	-0.04	-0.09	0.19	0.09	-0.07	1.00										
EXHRATE	-0.46	-0.34	-0.24	-0.61	-0.60	-0.72	0.58	0.55	0.19	0.13	1.00									
SIZE	0.54	0.69	0.55	0.45	0.59	0.26	-0.15	-0.08	0.06	-0.37	-0.40	1.00								
GOVSPEND	0.01	-0.29	-0.19	0.04	-0.03	0.39	-0.11	-0.26	-0.09	0.08	-0.25	-0.03	1.00							
OPEN	0.31	-0.17	-0.05	0.44	0.30	0.36	-0.19	-0.30	-0.23	0.13	-0.15	-0.42	0.09	1.00						
NATRES	0.56	0.78	0.70	0.36	0.50	-0.03	-0.06	0.04	-0.09	-0.28	-0.31	0.76	-0.30	-0.28	1.00					
INFLATION	-0.23	-0.17	-0.11	-0.36	-0.36	-0.54	0.17	0.23	-0.09	-0.47	0.46	-0.32	-0.35	-0.04	-0.13	1.00				
BALANCE	0.41	0.32	0.27	0.48	0.50	0.68	-0.29	-0.36	0.11	-0.18	-0.59	0.60	0.32	-0.02	0.38	-0.55	1.00			
INFRAS	0.82	0.41	0.39	0.91	0.89	0.49	-0.24	-0.31	-0.25	0.03	-0.54	0.33	0.02	0.58	0.36	-0.30	0.45	1.00		
EDUCATION	0.59	0.38	0.40	0.60	0.61	0.25	-0.15	-0.22	0.09	0.03	-0.35	0.32	-0.06	0.27	0.46	-0.34	0.46	0.65	1.00	
GOVERNANCE	0.31	-0.17	-0.16	0.50	0.39	0.51	-0.05	-0.20	0.00	0.29	-0.28	-0.27	0.27	0.60	-0.36	-0.24	0.20	0.62	0.33	1.00

Table 4: Stationarity (Unit root tests)

This table presents the unit root tests of the key FMD and FDI variables. We use panel data from 1996 to 2009 when available for all African countries. Foreign direct investment (FDI) is measured by FDIGDP the ratio of foreign direct investment net inflows over GDP. Financial market development (FMD) variables are: STKMKT CAP the stock market capitalisation over GDP, STKTUR the stock market turnover ratio, STKVALTRA the total stock market value traded as a percentage of GDP, CREDIT the total credit by financial intermediaries to private sector over GDP, LLIAB the liquid liabilities of the financial system (currency plus demand deposits and interest-bearing liabilities of banks and non-bank financial intermediaries) divided by GDP, CCB the ratio of commercial bank assets divided by commercial bank plus central bank assets. *** is for significance level of 1%, ** for 5% and * for 10%.

Panel A: Level

Variable	Levin-Lin-Chu Test (LLC)		Im-Pesaran-Shin (IPS)	
	Constant & trend	Constant, but no trend	Constant & trend	Constant, but no trend
FDIGDP	-7.499***	-15.19502***	-3.326***	-4.099***
STKMKT CAP	-1.14316	3.50631	2.682	1.791
STKTUR	-2.47751***	-2.29759**	-1.026	-2.177**
STKVALTRA	-1.05656	-2.67864***	0.403	1.976
CREDIT	-3.25776***	-4.70479	3.132	0.028
LLIAB	-1.33698*	0.78938	-1.396	-0.993
CCB	-4.50624 ***	3.22780	-1.858	-0.536

Panel B: First Difference

Variable	First difference			
	Levin-Lin-Chu Test (LLC)		Im-Pesaran-Shin (IPS)	
Variable	Constant & trend	Constant, but no trend	Constant & trend	Constant, but no trend
Δ STKMKT CAP	-14.15338***	-4.56505***	-1.741**	-2.071**
Δ STKTUR	-10.93996***	-9.91006***	-7.008***	-9.096***
Δ STKVALTRA	-4.97696***	-6.08797***	-4.325***	-7.050 ***
Δ CREDIT	-9.82536 ***	-9.35742***	-6.120***	-8.104***
Δ LLIAB	-10.25048***	-8.85864 ***	-2.786***	-2.470***
Δ CCB	-19.54699 ***	-15.92566 ***	-3.656 ***	-3.240 ***

Table 5: Causality tests

This table presents the Granger causality tests between FMD and FDI variables. We use panel data from 1996 to 2009 when available for all African countries. Financial market development (FMD) variables are: STKMKT CAP the stock market capitalisation over GDP, STKTUR the stock market turnover ratio, STKVALTRA the total stock market value traded as a percentage of GDP, CREDIT the total credit by financial intermediaries to private sector over GDP, LLIAB the liquid liabilities of the financial system (currency plus demand deposits and interest-bearing liabilities of banks and non-bank financial intermediaries) divided by GDP, CCB the ratio of commercial bank assets divided by commercial bank plus central bank assets. Foreign direct investment (FDI) variables are: FDIGDP the ratio of foreign direct investment net inflows over GDP, FDIGCF the ratio of foreign direct investment net inflows over gross capital formation (GCF). *** is for significance level of 1%, ** for 5% and * for 10%.

Null hypothesis	Homogenous non causality test (HNC)		Homogenous causality test (HC)	
	Wald F_{HNC} - stat	Critical value at 1% level	Wald F_{HC} -stat	Critical value at 1% level
Δ STKMKT CAP does not cause FDIGDP	2.576***	2.067	2.587***	2.106
FDIGDP does not cause Δ STKMKT CAP	5.791***	2.067	6.161***	2.106
Δ STKTUR does not cause FDIGDP	2.150***	2.067	1.839** †	2.106
FDIGDP does not cause Δ STKTUR	3.038***	2.067	2.993***	2.106
Δ STKVALTRA does not cause FDIGDP	2.729***	2.406	2.752***	2.469
FDIGDP does not cause Δ STKVALTRA	6.878***	2.406	7.161***	2.469
Δ CREDIT does not cause FDIGDP	2.244***	1.544	2.135***	1.550
FDIGDP does not cause Δ CREDIT	3.820***	1.544	3.835***	1.550
Δ LLIAB does not cause FDIGDP	3.944***	1.382	2.915***	1.342
FDIGDP does not cause Δ LLIAB	2,460***	1.382	2,400***	1.342
Δ CCB does not cause FDIGDP	6.260***	1.339	4.369***	1.342
FDIGDP does not cause Δ CCB	3.092***	1.339	2.763***	1.342

†: The Critical value at 5% level for this test is 1.696.

Table 6: 3SLS regression results of the simultaneous equations FDI/GDP and FMD

This table presents the three-stage least squares (3SLS) regression results of the simultaneous equations of FMD and FDI. We use panel data for all African countries from 1996 to 2009 when available. Financial market development (FMD) variables are: STKMKT CAP the stock market capitalisation over GDP, STKTUR the stock market turnover ratio, STKVALTRA the total stock market value traded as a percentage of GDP, CREDIT the total credit by financial intermediaries to private sector over GDP, LLIAB the liquid liabilities of the financial system (currency plus demand deposits and interest-bearing liabilities of banks and non-bank financial intermediaries) divided by GDP, CCB the ratio of commercial bank assets divided by commercial bank plus central bank assets. FDIGDP is the ratio of foreign direct investment net inflows over GDP. The description of the other variables is provided in Table 1. *** is for significance level of 1%, ** for 5% and * for 10%.

Dependent var.	System 1		System 2		System 3	
	FDIGDP	ΔSTKMKT CAP	FDIGDP	ΔSTKTUR	FDIGDP	ΔSTKVALTRA
Intercept	0.159958 (0.71)	-0.34414** (-2.34)	0.197556* (1.82)	-0.31457** (-2.06)	0.084090 (0.43)	-0.24574** (-2.18)
FDIGDP		1.335496*** (3.82)		1.660828** (2.67)		1.228609*** (3.98)
ΔFMD	0.362420*** (3.64)		0.337097*** (3.31)		0.535906*** (4.38)	
BALANCE		-0.00029 (-0.21)		-0.00082 (-0.48)		-0.00054 (-0.51)
EDUCATION	-0.00011 (-0.17)	0.001073 (1.01)	-0.00072 (-1.04)	0.002273* (1.70)	-0.00056 (-0.92)	0.001681** (2.10)
SIZE	-0.00571 (-0.56)	0.012376 (1.67)	-0.00585 (-1.31)	0.006763 (0.91)	-0.00084 (-0.10)	0.005257 (0.94)
INFLATION	0.000385 (0.81)	-0.00191 (-1.33)	-0.00025 (-0.61)	-0.00056 (-0.37)	-0.00009 (-0.23)	0.000123 (0.12)
OPENNESS	0.003079 (0.14)		0.000145 (0.01)		0.012717 (0.69)	
INFRAS	-0.00393 (-0.57)		0.000043 (0.01)		-0.00601 (-0.95)	
EXHRATE	0.000010*** (3.11)	-0.00000926 (-1.06)	0.000014*** (4.62)	-0.00002* (-1.89)	0.000012*** (4.31)	-0.00002** (-2.33)
NATRES	0.023825 (0.88)		0.032090 (1.42)		0.023198 (0.98)	
INTRATE		-0.00078 (-0.39)		-0.00104 (-0.53)		0.000216 (0.16)
KKM	0.011306 (0.58)	-0.00979 (-0.39)	0.01408 (0.93)	-0.02177 (-0.82)	0.024864 (1.33)	-0.01266 (-0.61)
R-Square	0.4989	0.4617	0.1879	0.1202	0.4924	0.4073
Chi2-stat	51.38***	44.70***	46.78***	27.78***	58.57***	44.27***
Nb. Obs	41	41	48	48	40	40

Dependent var.	System 4		System 5		System 6	
	FDIGDP	ΔCREDIT	FDIGDP	ΔLLIAB	FDIGDP	ΔCCB
Intercept	-0.0551 (-0.83)	0.038313 (1.07)	-0.0210658 (-0.22)	0.0869543 (1.24)	0.0524777 (0.61)	-0.1506299 (-1.18)
FDIGDP		0.572663*** (6.08)		0.4827481* (1.95)		0.0069127 (0.01)
ΔFMD	1.466143*** (6.12)		0.4874153** (2.22)		0.0557326 (0.32)	
BALANCE		-0.00000902 (-0.04)		-0.0006928 (-0.77)		-0.0002626 (-0.14)
EDUCATION	-0.00043 (-1.53)	0.000268 (1.52)	-0.0001221 (-0.40)	0.0001715 (0.41)	-0.0003262 (-0.85)	0.0004948 (0.60)
SIZE	0.003906 (1.31)	-0.00243 (-1.47)	0.0018782 (0.47)	-0.0036621 (-1.17)	-0.0010103 (-0.27)	0.0044963 (0.78)
INFLATION	0.000298 (1.08)	-0.00027 (-1.30)	-0.0001067 (-0.42)	-0.0005129 (-0.91)	-0.0001473 (-0.56)	0.0006258 (0.57)
OPENNESS	0.002643 (0.35)		0.0111375 (0.89)		0.006387 (0.50)	
INFRAS	-0.00079 (-0.32)		-0.002427 (-0.47)		0.0017638 (0.25)	
EXHRATE	0.00000878** (2.31)	-0.00000489** (-2.45)	0.0000111*** (4.23)	-0.00000916** (-2.59)	0.00000873** (2.37)	0.0000184*** (2.79)
NATRES	0.000497 (0.05)		0.0092199 (0.81)		0.0045351 (0.39)	
INTRATE		-0.00009 (-0.40)		-0.0004189 (-0.51)		0.0014911 (0.92)
KKM	-0.00569 (-0.67)	0.005789 (1.27)	0.0042639 (0.58)	0.0062257 (0.81)	0.0001565 (0.02)	-0.0108419 (-0.72)
R-Square	-0.7767	-0.5634	0.0098	0.0564	0.1478	0.1713
Chi2-stat	55.96***	66.45***	24.09***	17.16***	19.15**	20.56***
Nb. Obs	110	110	94	94	96	96

Table 7: 3SLS regression results of the simultaneous equations FDI/GDP and FMD (by excluding South Africa)

This table presents the three-stage least squares (3SLS) regression results of the simultaneous equations of FMD and FDI. We use panel data for all African countries (South Africa excluded) from 1996 to 2009 when available. Financial market development (FMD) variables are: STKMKT CAP the stock market capitalisation over GDP, STKTUR the stock market turnover ratio, STKVALTRA the total stock market value traded as a percentage of GDP, CREDIT the total credit by financial intermediaries to private sector over GDP, LLIAB the liquid liabilities of the financial system (currency plus demand deposits and interest-bearing liabilities of banks and non-bank financial intermediaries) divided by GDP, CCB the ratio of commercial bank assets divided by commercial bank plus central bank assets. FDIGDP is the ratio of foreign direct investment net inflows over GDP. The description of the other variables is provided in Table 1. *** is for significance level of 1%, ** for 5% and * for 10%.

Dependent var.	System 1		System 2		System 3	
	FDIGDP	Δ STKMKT CAP	FDIGDP	Δ STKTUR	FDIGDP	Δ STKVALTRA
Intercept	0.167344 (0.74)	-0.34876** (-2.35)	0.161915 (0.66)	-0.31591* (-1.83)	0.078005 (0.39)	-0.24920** (-2.20)
FDIGDP		1.218810*** (3.21)		0.999645* (1.98)		1.123785*** (3.42)
Δ FMD	0.392695*** (3.15)		0.329947* (1.91)		0.501869*** (3.75)	
BALANCE		-0.00032 (-0.23)		-0.00110 (-0.63)		-0.00057 (-0.51)
EDUCATION	-0.00009 (-0.14)	0.001101 (1.03)	-0.00064 (-0.76)	0.002005 (1.65)	-0.00049 (-0.80)	0.001698** (2.12)
LOG(GDP _{t-1})	-0.00601 (-0.59)	0.012572 (1.69)	-0.00453 (-0.42)	0.009015 (1.05)	-0.00071 (-0.08)	0.005479 (0.98)
INFLATION	0.000439 (0.89)	-0.00188 (-1.29)	-0.00023 (-0.47)	-0.00153 (-0.98)	-0.00012 (-0.29)	0.000087 (0.09)
OPENNESS	0.003669 (0.17)		0.004546 (0.20)		0.013521 (0.71)	
INFRAS	-0.00473 (-0.66)		-0.00073 (-0.10)		-0.00639 (-0.97)	
EXHRATE	0.0000099*** (2.94)	-0.00000815 (-0.92)	0.000015*** (4.21)	-0.00001 (-1.17)	0.000012*** (4.32)	-0.00001** (-2.07)
NATRES	0.023569 (0.87)		0.034969 (1.17)		0.026735 (1.08)	
INTRATE		-0.00073 (-0.36)		-0.00249 (-1.13)		0.000154 (0.11)
KKM	0.012446 (0.64)	-0.01037 (-0.41)	0.017576 (0.79)	-0.01869 (-0.60)	0.026133 (1.37)	-0.01307 (-0.64)
R-Square	0.6530	0.4813	0.4619	0.3873	0.4924	0.4073
Chi2-stat	107.33***	57.59***	36.91***	31.42***	58.57***	44.27***
Nb. Obs	37	37	36	36	40	40

Dependent var.	System 4		System 5		System 6	
	FDIGDP	ΔCREDIT	FDIGDP	ΔLLIAB	FDIGDP	ΔCCB
Intercept	0.046188 (0.56)	0.055882 (1.09)	-0.0210658 (-0.22)	0.0869543 (1.24)	0.0524777 (0.61)	-0.1506299 (-1.18)
FDIGDP		0.289262 (1.35)		0.4827481** (1.95)		0.0069127 (0.01)
ΔFMD	0.582876** (2.39)		0.4874153** (2.22)		0.0557326 (0.32)	
BALANCE		-0.00045 (-1.42)		-0.0006928 (-0.77)		-0.0002626 (-0.14)
EDUCATION	-0.00027 (-1.05)	0.000218 (1.08)	-0.0001221 (-0.40)	0.0001715 (0.41)	-0.0003262 (-0.85)	0.0004948 (0.60)
LOG(GDP _{t-1})	-0.00058 (-0.16)	-0.00243 (-1.06)	0.0018782 (0.47)	-0.0036621 (-1.17)	-0.0010103 (-0.27)	0.0044963 (0.78)
INFLATION	0.000051 (0.21)	-0.00041 (-1.51)	-0.0001067 (-0.42)	-0.0005129 (-0.91)	-0.0001473 (-0.56)	0.0006258 (0.57)
OPENNESS	-0.00876 (-0.67)		0.0111375 (0.89)		0.006387 (0.50)	
INFRAS	0.000854 (0.27)		-0.002427 (-0.47)		0.0017638 (0.25)	
EXHRATE	0.000011*** (4.66)	-0.00000299 (-1.10)	0.0000111*** (4.23)	-0.00000916** (-2.59)	0.000000873** (2.37)	0.0000184*** (2.79)
NATRES	0.020107* (1.68)		0.0092199 (0.81)		0.0045351 (0.39)	
INTRATE		-0.00048 (-1.38)		-0.0004189 (-0.51)		0.0014911 (0.92)
KKM	0.003450 (0.36)	0.015305*** (3.00)	0.0042639 (0.58)	0.0062257 (0.81)	0.0001565 (0.02)	-0.0108419 (-0.72)
R-Square	0.0556	0.1103	0.0098	0.0564	0.1478	0.1713
Chi2-stat	32.43***	36.75***	24.09***	17.16**	19.15**	20.56***
Nb. Obs	84	84	94	94	96	96

Table 8: Arellano-Bond dynamic panel data estimation method with one-step GMM system of the simultaneous equations FDI/GDP and FMD

This table presents regression results using Arellano-Bond dynamic panel data estimation method with one-step GMM system. We use panel data for all African countries from 1996 to 2009 when available. Financial market development (FMD) variables are: STKMKT CAP the stock market capitalisation over GDP, STKTUR the stock market turnover ratio, STKVALTRA the total stock market value traded as a percentage of GDP, CREDIT the total credit by financial intermediaries to private sector over GDP, LLIAB the liquid liabilities of the financial system (currency plus demand deposits and interest-bearing liabilities of banks and non-bank financial intermediaries) divided by GDP, CCB the ratio of commercial bank assets divided by commercial bank plus central bank assets. FDIGDP is the ratio of foreign direct investment net inflows over GDP. The description of the other variables is provided in Table 1. *** is for significance level of 1%, ** for 5% and * for 10%.

Dependent var.	System 1		System 2		System 3	
	FDIGDP	Δ STKMKT CAP	FDIGDP	Δ STKTUR	FDIGDP	Δ STKVALTRA
Intercept	-0.0823559 (0.748)	0.0428963 (0.13)	0.0267992 (0.16)	-0.0687898 (-0.18)	-0.5720184 (-0.99)	-0.2722046 (-1.02)
FDIGDP		1.076492** (2.02)		1.788271** (2.15)		1.15095** (2.38)
Δ FMD	0.3068103*** (2.52)		0.3541802*** (4.42)		0.3824883*** (4.10)	
BALANCE		-0.0094952 (-1.54)		-0.0124039* (-1.92)		-0.0028184 (-1.08)
EDUCATION	-0.0004001 (-0.94)	0.0023718 (1.56)	-0.00052 (-1.36)	0.0011273 (0.15)	0.0005904 (0.480)	0.0012323** (2.19)
SIZE	0.0059721 (0.57)	0.0002511 (0.02)	0.0022137 (0.32)	0.0077178 (0.37)	0.024587 (0.279)	0.0112601 (1.03)
INFLATION	0.0000338 (0.06)	-0.0085385** (-2.37)	-0.0010346 (-0.91)	-0.0136108* (-1.65)	0.0007482 (0.48)	-0.0038349 (-1.43)
OPENNESS	0.025627 (0.80)		0.0268895 (1.28)		0.0396046 (0.78)	
INFRAS	-0.010339 (-0.91)		-0.0110066 (-1.54)		-0.0139164 (-1.18)	
EXHRATE	0.0000149*** (2.87)	0.000002.6 (0.16)	0.0000168*** (3.63)	0.0000162 (0.60)	0.0000104*** (3.23)	0.00000159 (0.15)
NATRES	0.024523 (1.12)		0.0544678 (1.47)		-0.066622 (-0.80)	
INTRATE		-0.0152624** (-2.07)		-0.0181258* (-1.93)		-0.0060098 (-1.19)
KKM	0.0331631 (1.44)	0.0153182 (0.37)	0.0420998** (2.46)	-0.0735696 (-0.67)	0.0094571 (0.61)	0.0069625 (0.28)
Nb. Obs	56	60	66	54	45	62
Wald Chi-Stat	725.55***	65.02***	587.52***	103.30***	317.53***	316.78***
Arellano-Bond test for AR(2) in first differences	1.09	-1.37	0.99	-0.03	1.22	0.85
P-value of Arellano-Bond test for AR(2)	0.275	0.171	0.324	0.979	0.221	0.393
Hansen test of over identification restrictions	1.08	5.23	6.87	2.34	0.19	1.57
P-value of the Hansen test	0.983	0.155	0.143	0.505	0.667	0.814

Dependent var.	System 4		System 5		System 6	
	FDIGDP	ΔCREDIT	FDIGDP	ΔLLIAB	FDIGDP	ΔCCB
Intercept	-0.085851 (-0.71)	0.0445843 (0.59)	-0.0792794 (-0.60)	0.190122* (1.85)	-0.136891 (-0.71)	-0.2548022 (-0.41)
FDIGDP		0.3604457** (1.99)		-0.0431061 (-0.28)		0.0851535 (0.84)
ΔFMD	1.447951*** (3.34)		0.4236878** (2.22)		0.0233151 (0.51)	
BALANCE		0.0001984 (0.28)		-0.0000664 (-0.10)		-0.0009779 (-0.35)
EDUCATION	0.0000849 (0.22)	0.000176 (0.56)	0.0001884 (0.12)	0.0004646 (0.61)	-0.0005519 (-0.70)	-0.0000262 (-0.02)
SIZE	0.0047194 (0.96)	-0.0023524 (-0.74)	0.0027857 (0.43)	-0.009401* (-1.65)	0.0067157 (0.93)	0.0105976 (0.44)
INFLATION	-0.0003167 (-1.02)	-0.0015038* (-1.71)	0.0012486 (1.09)	-0.0002103 (-0.80)	0.0001711 (0.64)	-0.0002545 (-0.54)
OPENNESS	0.0097826 (0.58)		-0.0037089 (-0.14)		0.0323958 (1.23)	
INFRAS	-0.0074257 (-0.99)		0.0023935 (0.21)		0.0004908 (0.12)	
EXHRATE	0.0000105*** (4.61)	-0.00000248 (-0.90)	0.0000163* (1.76)	-0.00000940 (-0.72)	0.00000943** (2.03)	0.0000255 (1.30)
NATRES	0.0126686 (0.47)		-0.0233318 (-0.57)		0.004553 (0.13)	
INTRATE		0.0008451 (0.61)		0.000479 (0.56)		0.0011839 (0.58)
KKM	0.0047969 (0.24)	0.0006491 (0.09)	-0.0151723 (-0.59)	-0.0160053 (-0.57)	-0.0109673 (-0.45)	-0.003488 (-0.16)
Nb. Obs	84	108	152	190	154	237
Wald Chi-Stat	89.56***	31.93***	20.54**	36.46*	22.69***	22.12***
Arellano-Bond test for AR(2) in first differences	1.02	1.09	0.47	1.23	0.94	0.40
P-value of Arellano-Bond test for AR(2)	0.307	0.275	0.637	0.219	0.349	0.690
Hansen test of over identification restrictions	6.21	3.87	26.15	25.25	19.21	22.69
P-value of the Hansen test	0.516	0.694	0.126	0.236	0.379	0.251

Table 9: 3SLS regression results of the simultaneous equations FDI/GDP, FMD and GDP Growth

This table presents the three-stage least squares (3SLS) regression results of the simultaneous equations of FMD and FDI. We use panel data for all African countries from 1996 to 2009 when available. Financial market development (FMD) variables are: STKMKT CAP the stock market capitalisation over GDP, STKTUR the stock market turnover ratio, STKVALTRA the total stock market value traded as a percentage of GDP, CREDIT the total credit by financial intermediaries to private sector over GDP, LLIAB the liquid liabilities of the financial system (currency plus demand deposits and interest-bearing liabilities of banks and non-bank financial intermediaries) divided by GDP, CCB the ratio of commercial bank assets divided by commercial bank plus central bank assets. FDIGDP is the ratio of foreign direct investment net inflows over GDP. The description of the other variables is provided in Table 1. *** is for significance level of 1%, ** for 5% and * for 10%.

Dependent var.	System 1			System 2			System 3		
	FDIGDP	ΔSTKMKT CAP	GDPGROWTH	FDIGDP	ΔSTKTUR	GDPGROWTH	FDIGDP	ΔSTKVALTRA	GDPGROWTH
Intercept	0.2150613 (1.40)	0.3181815 (0.67)	7.583046 (0.50)	0.0354204 (0.35)	-0.3049419* (-1.75)	13.57511 (1.51)	-0.0532556 (-0.24)	-0.3291349*** (-2.80)	36.22696* (1.96)
FDIGDP		0.6170663 (0.40)	29.59526 (0.91)		0.605628 (1.23)	55.49079*** (2.84)		1.063645*** (3.72)	75.9272*** (4.29)
FMD	0.0120045 (0.18)		1.46236 (0.28)	0.0731887 (0.58)		6.452094 (0.55)	0.2636159* (1.68)		-7.709349 (-0.54)
GDPGROWTH	0.0018609 (0.80)	-0.0119331 (-0.81)		0.00892*** (3.02)	0.0045811 (0.82)		0.0081864*** (3.66)	-0.0021186 (-0.59)	
BALANCE		-0.0248355 (-2.62)			-0.0003633 (-0.14)			-0.0006706 (-0.34)	
EDUCATION	-0.000733 (-0.76)	0.0048243* (1.79)	0.0123283 (0.21)	-0.0007741 (-1.20)	0.0021627** (2.40)	0.004708 (0.09)	-0.000675 (-1.04)	0.0010645 (1.28)	0.0575604 (0.95)
SIZE	-0.0060751 (-0.74)	-0.0079238 (-0.42)	-0.0777927 (-0.11)	-0.0011811 (-0.29)	0.00622 (0.92)	-0.4107643 (-1.08)	0.0025191 (0.26)	0.0110639** (1.97)	-1.321267 (-1.61)
INFLATION	-0.0007777 (-0.93)	-0.0234605** (-2.40)	-0.1676883** (-2.31)	-0.0000221 (-0.04)	-0.0001039 (-0.04)	-0.0457433 (-0.85)	0.0005638 (0.88)	0.0004821 (0.32)	-0.1091528* (-1.72)
OPENNESS	0.017926 (0.44)		-0.5912154 (-0.37)	0.0105513 (0.48)		-1.348809 (-1.11)	0.0354435 (1.40)		-3.16971* (-1.93)
INFRAS	-0.0092557 (-0.72)			0.0016166 (0.16)			-0.0067467 (-0.49)		

EXHRATE	0.0000134** (2.50)	0.0000246 (0.70)	0.0004619 (0.95)	0.0000108*** (3.25)	-0.0000117 (-1.07)	-0.0002186 (-0.53)	0.0000105*** (3.18)	-0.0000155** (-2.29)	-0.0006858 (-1.65)
NATRES	0.1824095 (1.29)			0.0677589 (0.75)			0.0951724 (0.76)		
INTRATE		-0.0247562*** (-2.82)			-0.0014259 (-0.52)			-0.00000686 (-0.00)	
GOVSPEND			-0.0993821 (-0.67)			0.0460449 (-0.51)			-0.1212028 (-0.84)
KKM	0.038205 (1.00)	0.0257682 (0.59)	0.2034038 (0.25)	0.0090652 (0.38)	-0.035651** (-2.53)	0.4727276 (0.57)	0.0220883 (0.69)	-0.0185049 (-0.90)	1.108584 (0.59)
R-Square	0.4659	0.0168	0.2547	0.1682	0.3873	0.1913	0.3488	0.5236	0.1701
Chi2-stat	36.95***	23.50***	11.47	44.15***	27.77***	17.28**	57.59***	43.92***	30.57***
Nb. Obs.	49	49	49	54	54	54	35	35	35

Dependent var.	System 4			System 5			System 6		
	FDIGDP	ΔCREDIT	GDPGROWTH	FDIGDP	ΔLLIAB	GDPGROWTH	FDIGDP	ΔCCB	GDPGROWTH
Intercept	0.1267879* (1.71)	0.0870826** (2.13)	-6.328609 (-0.82)	0.040401 (0.48)	0.0893483 (1.20)	-3.074456 (-0.41)	-0.0862189 (-0.38)	0.0360533 (0.15)	18.32872* (1.69)
FDIGDP		0.1010384 (0.90)	98.41792*** (6.00)		0.4165927* (1.75)	107.1053*** (6.15)		0.19727 (0.29)	77.80492*** (3.02)
FMD	0.2256548 (1.16)		17.17503 (0.66)	0.2409057 (1.53)		-5.281589 (-0.31)	-0.0072907 (-0.07)		7.133389 (0.50)
GDPGROWTH	0.0065409*** (6.59)	0.000276 (0.32)		0.0072278*** (5.17)	-0.0022461 (-0.96)		0.005047* (1.89)	0.0020257 (0.36)	
BALANCE		-0.0002426 (-0.52)			-0.0028545** (-2.53)			0.0027274 (0.98)	
EDUCATION	-0.0004177 (-1.42)	0.0001611 (0.71)	0.0177036 (0.57)	-0.00031 (-1.02)	0.0008389 (1.62)	0.0235087 (0.76)	-0.0006712 (-1.52)	-0.0002201 (-0.20)	0.0845117* (1.82)
SIZE	-0.0054638 (-1.65)	-0.0035291* (-1.94)	0.3049316 (0.86)	-0.0018869 (-0.51)	-0.0042256 (-1.25)	0.1464866 (0.44)	0.0049394 (0.50)	-0.0025496 (-0.25)	-0.923617* (-1.89)
INFLATION	0.00000822 (0.02)	-0.000335 (-0.88)	-0.0304851 (-0.66)	0.0001402 (0.38)	-0.0013827* (-1.70)	-0.030637 (-0.65)	0.000544 (0.91)	0.0011917 (0.79)	-0.1221618*** (-2.75)
OPENNESS	-0.0065837 (-0.64)		-0.2868236 (-0.24)	0.004615 (0.40)		-0.6864638 (-0.64)	0.0053684 (0.27)		-1.259837 (-1.00)
INFRAS	0.0056612* (1.75)			0.0006798 (0.16)			-0.0009627 (-0.10)		
EXHRATE	0.00000812*** (3.12)	-0.0000017 (-0.87)	-0.0003412 (-1.00)	0.00000788*** (2.96)	0.00000983** (-2.53)	-0.0004804 (-1.33)	0.00000719* (1.84)	0.0000174** (2.20)	-0.000347 (-0.73)
NATRES	0.0102473 (0.80)			0.0168437 (1.20)			-0.0013088 (-0.04)		
INTRATE		-0.0005642 (-1.31)			-0.0017832* (-1.94)			0.0032452* (1.69)	
GOVSPEND			0.0492228			0.0770742			0.2215086

			(0.58)			(0.68)			(0.92)
KKM	-0.0060577	0.0112967***	0.3596055	0.0014738	-0.0000382	0.4234183	-0.0087346	0.0164753	0.7542755
	(-0.86)	(2.72)	(0.47)	(0.21)	(-0.000)	(0.60)	(-0.55)	(0.501)	(0.74)
R-Square	0.1038	0.1146	0.0651	0.0948	0.001	0.0442	0.2536	0.1979	0.0717
Chi2-stat	66.85***	21.99***	45.23***	70.39***	20.02**	54.28***	38.21***	21.87***	36.24***
Nb. Obs.	89	89	89	92	92	92	72	72	72