Does FDI crowd-in or crowd-out domestic investment?
Evidence from African Economies

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Abstract

This paper investigates the impact of FDI on domestic capital accumulation in 20 African countries for the period 2001 to 2015.The research uses a Panel Vector Autoregressive framework which accounts for possibility of both dynamism and endogeneity issues in the FDI-Domestic investment link, while at the same time providing interesting insight on the link both in the long and short run. The results from the analysis reveal that in the long run, FDI has a positive impact on domestic investment, with a reported 1% increase in FDI contributing to a boost in domestic investment by 0.22% thus confirming a crowding in effect. The other explanatory variables were reported to have the expected sign and significance with the GDP of the country being one of the most important ingredients of domestic investment. The short run estimates overall confirm those of the long run. The smaller short run coefficients suggest that it may take some time for FDI to have its full effect on domestic investment. The lagged of the investment term is observed to be positive and significant implying that investment is of a dynamic nature. Moreover, domestic investment is reported to have a positive effect on FDI, confirming the presence of bi-causality.

Keywords: *FDI, Domestic investment, Causality*
JEL Classification codes: F23, B23

1.   Introduction

A general consensus exists in development economics literature that the inflow of foreign direct investment (FDI) is likely to play a critical role in the growth dynamics of recipient countries (Akinlo, 2004; Buckley et al., 2002 and De Mello, 1997, 1999). FDI inflows in fact represent additional resources a country needs to improve its economic performance and provides both physical capital and employment possibilities that may not be available in the host market. As De Gregorio (1992) argued 'by increasing capital stock, FDI can increase country's output and productivity through a more efficient use of existing resources and by absorbing unemployed resources". There have been a considerable number of studies on the contribution of FDI to economic growth (Borensztein et al., 1997; De Mello, 1999) but empirical evidence has been mixed.

FDI could have a complementary (crowding in) or a substitution (crowding out) relationship with domestic investment. On one hand, due to increased competition and better efficiency, FDI may replace domestic firms and deter their investment plans (Agosin and Machado, 2005). On the other hand, foreign investment may boost domestic investment by increasing demand for local intermediate inputs (Cardoso and Dornbusch, 1989) or through the diffusion of know-how and technology. Since the relationship between FDI and domestic investment demonstrate that there are possibilities for it to be either positive or negative, Governments need to identify the real impact of FDI so as to maximise domestic investment rates and optimise the positive

effects of FDI on domestic investment. If FDI actually crowds out domestic investment, the benefits of FDI on a country could be questioned since this would have long term impacts in terms of encouraging entrepreneurship. This would also cause a reassessment of the development effects of FDI.

There are numerous studies which have been done to explore this relationship both at country and continent level, with the majority of the literature focusing on developed country cases and panel sets. Evidences from developing countries, particularly from African economies have been rather scant and even then the results are quite mixed. Moreover, most of the studies analysing the FDI-Domestic investment nexus, have employed static panel sets with few focusing on the dynamic nature of the relationship, using mostly the GMM dynamic estimator which involves lagging the dependent term (Agosin and Mayer, 2000; Mody and Murshid, 2005; Mileva, 2008; Ndikumana and Verrick, 2012). Additionally, most previous studies were based on data prior to year 2000.

This study focuses on the impact of FDI on domestic capital accumulation in 20 African economies for the period 2001 to 2015. The African continent is still considered as one of the main investment destinations for the future and analysing the impact of FDI on local investment may give an idea into some of the effects of FDI for the region. The research innovatively uses a Panel Vector Autoregressive framework which accounts for possibility of both dynamism and endogeneity issues in the FDI-Domestic investment link, while at the same time providing interesting insight on the link both in the long and short run. This paper is thus believed to supplement the existing body of literature by providing evidences from a more recent time period for a sample of African economies, as well as from more rigorous analysis with respect to dynamism, causality and endogeniety issues.

The rest of the study is organised as follows: section 1 discusses the theoretical relationship between FDI and domestic investment and a review of previous studies on the topic. Section 2 provides a macroeconomic overview of the selected African economies, including the levels of FDI and domestic investment over the recent years. Section 3 specifies the data and methodology used and dwells into the results of the analysis while section 4 concludes.

2. Literature review

2.1 Theoretical Review

FDI can either act as a substitute to domestic investment or it can complement domestic investment. However, the exact impact of FDI on domestic investment depends on several factors. Firstly, the competitive nature of the sector where the investments are directed dictates the impact of FDI. If FDI is channelled in sectors with little competition, the net effect on capital formation will be positive due to the transmission of knowledge, technology and investment (Agosin and Machado, 2005). Along the same vein, if FDI is channelled into a competitive sector, the lower marginal cost of MNCs further increases the level of competition, resulting in a crowding out effect (Aitken and Harrison, 1999). Secondly, the impact of FDI also depends on knowledge and technological spillovers. Blomström and Kokko (1998) contend that by gaining exposure to foreign firms, domestic firms are able to initially observe and later integrate the practices and technologies in the local firms, thus boosting domestic investment. However, Kogut and Zander (1996) argue that MNC's sometimes try to internalise any advantage they possess and as such, domestic investment can in fact be crowded out. Thirdly, labour turnover also affects the impact of FDI on domestic investment. Since foreign firms often provide higher wages to employees (Dunning, 1983), the quality and the quantity of managers available for local firms decrease, resulting in a crowding out of domestic investment. However, these employees can provide valuable insights on the strategies and the

ways in which MNEs operate (Meyer, 2004) if they later work with a local firm, thereby enhancing domestic investment.

2.2 Empirical Evidences

While there is ample literature on the effects of FDI on economic growth, relatively less attention has been dedicated to its impact on domestic investment specifically. Borensztein et al. (1998) were among the first to test this relationship in the developing countries. Their results show that FDI actually stimulated domestic investment. This crowding in effect was mainly attributed to the complementarity of activities from FDI with established local ones. Bosworth and Collins (1999) decided to investigate the drawbacks and advantages of capital inflows following the currency crisis in east-Asian markets and how it affects domestic activity. Their results shows that FDI appeared to have a positive effect on domestic investment, but with a near one-to-one relationship.

De Mello (1999) on the other hand measured the effects of FDI on capital accumulation, output and total factor productivity growth and found "no time series evidence of linear endogenous growth derived from FDI" for the OECD sample, De Mello contended that the panel data demonstrated a complementary relationship between foreign investment and domestic investment, especially in indigenous sectors with relatively less investment. Moreover, he concluded that domestic investment is boosted through the introduction of new inputs, foreign technologies and the transfer of labour.

One of the pioneering studies for subsequent research on the crowding-in or crowding-out effect of FDI was performed by Agosin and Mayer (2000). The study included a variable for FDI while domestic investment had to be specifically modelled through different variables. The results from the analysis differed for the three regions. While Asian countries experienced a significant crowding-in, there was a strong crowding-out effect in Latin America. African countries also experienced crowding-in of domestic investment but to a lesser extent compared to Asian countries.

De Backer and Slewaegen (2003) found in their studies that FDI may "discourage entry and stimulate the exit of domestic entrepreneurs", hence decreasing domestic investment in the short run. While De Backer and Sleweaegen (2003) focussed on labour, Harrison and McMillan (2003) investigated if foreign firms ease the credit constraints of local firms or further exacerbate them. They concluded that domestic firms are crowded out by the foreign ones since the latter receive preference for credit facilities from banks and this forces many domestic firms out of business due to lack of financing.

3.0. Methodology and Analysis

3.1 Model specification

The purpose of this section is to empirically model the possible impact of FDI on domestic investment. The specific issue to be explored is whether FDI actually crowds in or crowds out domestic investment. The impact of FDI is measured on total investment as compared to making a distinction between private and public domestic investment. The analysis of the effects of FDI is based on the identity that total investment (I_t) is the sum of domestic investment (I_d) and foreign investment (I_f).

$$I_t = I_{d,\,t} + I_{f,\,t}$$

Foreign investment is considered to be a function of FDI but these resources are not often used at once to finance real investment. Thus, as stipulated by Agosin and Machado (2005), I_f "will depend not only on contemporaneous FDI but also on its lagged values." Mody and Murshid also introduced lagged investment. This variable accounts for the persistence of the investment rate and also underlines the dynamic nature of the investment framework.

Building on the two models of domestic and foreign investment described above from Agosin and Machado (2005) and complementing it with the frameworks of Mody and Murshid (2005) and Jude (2015), the following equation is obtained:

$$I_{i,t} = \alpha + \beta_1\, FDI_{i,t} + \beta_2\, G_{i,t} + \beta_3\, Interest_{it} + \beta_4\, M2_{i,t} + \beta_5\, TO_{i,t} + \varepsilon_{it} \qquad (1)$$

Where I is the gross fixed capital formation (GFCF) expressed as a percent of GDP, , FDI is the FDI/GDP ratio, G is GDP. **Interest** represents the real interest rate and, **M2** is a proxy for financial liquidity and **TO** acts a proxy for trade openness. α is a constant while ε_{it} is the error term.

The data series are transformed into their log values for ease of interpretation and also for direct comparison (they will be thus explained in terms of % change).

The data for all the variables were collected from the World Development Indicators from the World Bank Database. The data spans from 2001 to 2015 for 20 African countries.

3.2 Estimation Methodology: Panel Vector Autoregressive Model (PVAR)

The research adopts a dynamic vector autoregressive model (PVAR) to perform the analysis since it is a framework which captures the dynamic behavior of the stipulated linkages in a panel setting, while at the same time, taking into consideration issues regarding endogeneity and causality. In fact the VAR model is a common framework which is adopted to describe the dynamic interrelationships between variables which are stationary.

The following first order VAR model is specified

$$Z_{it} = \Gamma_0 + \Gamma_1 Z_{it-1} + \mu_i + \varepsilon_t$$

where z_t is a six variable vector *(I, FDI, G, Interest, M2, TO)* and the variables are as defined previously. T_0 is the constant term and T_1 is the parameter, while $\square_i$ are fixed effects[1], ε is the error term.

Before proceeding with the estimation of the model, a few preliminary tests are carried out. First, it is important to determine whether the time series under investigation are stationary. To do so, the Im, Pesaran, and Shin (1995) panel unit root tests are applied on the dependent and independent variables. Results of this test revealed that our data series were stationary only at the first difference at the 5 per cent significance level for each variable. This being the case, it becomes important to test if the variables are co-integrated, and the Pedroni Co-integration test confirm the existence of co-integration and thus a long run relationship and thus allowing for both long and short run analysis.

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[1]This is used to overcome the restriction on parameters and to allow for 'individual heterogeneity' (see Love and Zicchino 2006).

4.0 Analysis

4.1 Long Run Cointegrating Estimates

The summary of the Long Run co-integrating estimator results is available in the table below.

Table 1
Long Run Estimation results

Variable	Coefficient	t-Statistic
LN_FDI	0.220798	2.4344*
LN_GDP	0.64566	2.767***
LN_M2	0.41865	2.357**
LN_RIR	-0.332043	-1.818*
LN_T_O	0.462101	2.2673**

*, ** and *** indicate significance at 10%, 5% and 1% respectively

The results suggest that FDI has a positive impact on domestic investment, validating the crowding in hypothesis. An increase in FDI of 1% contributes to a boost in domestic investment by 0.22%. The findings are in line with the theoretical underpinnings on the link between FDI and domestic investment. Indeed, the positive effects may be related to spillovers in terms of knowledge, technology or productivity in general. The countries in the sample may also have benefited from forward or backward linkages. The findings support those of other studies in Africa like Agosin and Mayer (2000), Bosworth and Collins (1999) and Ndikumana and Verrick (2008) among others. However, the results from our analysis contradict the findings of Adams (2009), Erega (2011) and Morissey and Udomkerdmongkol (2012). These studies identified a net crowding out effect in African countries. Adams (2009) pointed to the fact that multinationals possessed advantages which discouraged local investment. Erega (2011) also contended that while foreign firms brought know-how in terms of productivity and technology, diffusion of this knowledge was often limited. An important aspect brought forward by Morissey and Udomkerdmongkol (2012) was that governance indicators and political stability had an important influence on causing the crowding-out effect. The possible reasons why the SADC countries did not experience the crowding out effect may be due to the fact most of these countries possess politically stable environments. The level of development of some of these countries also indicates an improvement in the use of technology. Furthermore, as stated by Backer (2002), ex-employees of MNEs may use the experience they gained to start local businesses. This may explain the boost over time in domestic investment.

The coefficient for the effect of GDP, significant at 5%, shows that an increase in GDP positively affects domestic investment. This is in line with the economic rationale and with previous studies such as De Mello (1999), Kim and Seo (2003), Bloningen and Wang (2004), Mileva (2008), Pilbeam and Oboleviciute (2012) and Jude (2015) among others. This effect can be explained since the development of a country's economy through total goods produced will help increase the capital stock, including domestic capital formed. It also creates expectations about future economic prospects which will then encourage domestic investment. It is

noteworthy that GDP appear to be the most important ingredient of investment as judged by its coefficient.

The impact of the real rate of interest was deemed negative on investment level and confirms the fact that the higher the cost of capital, the lower would be the level of investment. One should not forget that African economies are mostly bank-based economies and are thus very sensitive to changes in interest rate. Financial liquidity shows an expected positively impact on domestic investment with an elasticity coefficient of 0.25, confirming theoretical underpinnings. Mody and Murshid (2005), Mileva (2008) and Jude (2014) also found similar results. Finally, the coefficient of the proxy for trade openness, significant at 5% level, also confirms the positive link between trade and investment levels. As trade policies become more liberal, it is expected that both foreign and domestic investment would be boosted (Jude, 2015).

4.2 Regression results from PVECM

A summary of the regression results is given below.

Table 2
Regression results from PVECM (Short Run Estimates)

	ΔL_INVT	ΔL_FDI	ΔL_GDP	ΔL_M2	ΔL_RIR	ΔL_TO
L_INVT(-1)	0.777*	0.3672**	0.2841**	0.07855*	0.2537	0.07545**
L_FDI(-1)	0.0676**	0.70554*	0.1054**	0.0132**	-0.0945	0.0571**
L_GDP(-1)	0.1427***	0.0725**	0.8379***	0.1245*	-0.28517**	0.0784**
L_M2(-1)	0.1305**	-0.07518	0.08482**	0.6205*	-0.1028	-0.05354
L_RIR(-1)	-0.115**	-0.00924	-0.0807**	0.0175	0.2225*	-0.01433
L_TO(-1)	0.024599	0.10763*	0.05765	0.1172*	-0.2231	0.86359**
ECM	-0.454*	-0.325*	0.375**	-0.217*	0.052626	0.418*

*, ** and *** indicate significance at 10%, 5% and 1% respectively*

The short run estimates overall confirms those of the long run obtained earlier. The variable of interest, FDI, is significant in explaining any change in domestic investment, measured through the gross fixed capital formation. All the other variables consisting of GDP, deviation in broad money, real interest rate and trade openness are also significant in explaining the dependent variable. It is noteworthy that the coefficients in the short, has a smaller coefficients in the short run, suggesting that it may take some time for FDI to have its full effect on domestic investment. Similar findings are obtained for the rest of the estimated coefficients. Nonetheless, such positive although very small has been observed by several other studies. Agosin and Machado (2005) even contended that the effect of FDI on domestic investment might even be considered as neutral.

The PVAR framework offers the possibility to gain more insights on dynamic and endogeneity issues. Similar method was used by Fauzel et al (2014). The lagged of the investment term is observed to be positive and significant implying that investment is of a dynamic nature. Considering the FDI equation, it can actually be seen that domestic investment has a positive and significant effect on FDI confirming the presence of a reverse causality where an increase of 1% in domestic investment increases FDI by 0.37%. Ndikuman and Verrick (2008) also found that domestic investment positively influenced FDI in Sub-Saharan Africa but these findings are not in line with the conclusions of Harrison and Revenga (1995) and MacMillan (1999).

Real interest rate is seen to have a negative impact on domestic investment. An increase in interest rate would discourage investment as the cost of capital would increase. Mody and Murshid (2005) and Wang (2010) came up with similar negative coefficients but their coefficients were not significant. Finally, the proxy for trade openness is significant and positive and is consistent to the findings of Jude (2015). It is expected that as the degree of trade openness would increase, there would be a boost in domestic investment due to the increased mobility of goods, especially in export-oriented sectors. This may be explained by the fact that intense competition from the foreign firms dampens the ability to invest locally.

Moreover the coefficient of the lagged error correction term is -0.45 which indicate that there is an adjustment to the long run equilibrium and implies that about 45% of the disequilibrium is corrected in the next period.

5.0 Conclusions

This paper investigated the impact of FDI on domestic capital accumulation in 20 African economies countries for the period 2001 to 2015.The research uses a Panel Vector Autoregressive framework which accounts for possibility of both dynamism and endogeneity issues in the FDI-Domestic investment link, while at the same time providing interesting insight on the link both in the long and short run.

Results from the analysis reveal that in the long run, FDI has a positive impact on domestic investment, with a reported 1% increase in FDI contributing to a boost in domestic investment by 0.22% thus confirming a crowding in effect. Such findings support those of other studies in Africa like Agosin and Mayer (2000), Bosworth and Collins (1999) and Ndikumana and Verrick (2008) among others. All of these studies in Africa suggest that this positive effect may be brought about through spillovers in terms of knowledge, technology or productivity in general. These countries also benefit from forward or backward linkages. The other explanatory variables were reported to have the expected sign and significance with the GDP of the country being one of the most important ingredients of domestic investment.

The short run estimates overall confirms those of the long run obtained earlier. The variable of interest, FDI, is significant in explaining any change in domestic investment, measured

through the gross fixed capital formation. All the other variables consisting of GDP, deviation in broad money, real interest rate and trade openness are also significant in explaining the dependent variable. It is noteworthy that the coefficients in the short, has a smaller coefficients in the short run, suggesting that it may take some time for FDI to have its full effect on domestic investment.

The lagged of the investment term is observed to be positive and significant implying that investment is of a dynamic nature. Moreover, domestic investment is reported to have a more positive effect on FDI although the coefficient is not significant in the short run. Nonetheless, this coefficient suggests a reverse correlation. Finally an adjustment to the long run equilibrium is noted and that about 45% of the disequilibrium is corrected in the next period.

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