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# Capital Inflows and Domestic Investment in Sub-Saharan Africa: Evidence from Pooled Mean Group (PMG) Estimation Approach

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## Abstract

The issue of whether capital inflows promote domestic investment has been of major concern especially in developing countries considering their massive dependence on these inflows. To this end, we make a case for 25 sub-Saharan African countries, using foreign direct investment and external debt as proxies for capital inflows, and the pooled mean group estimator over the period 1981–2010. The results reveal that foreign direct investment positively impacts domestic investment, but external debt has a negative impact on domestic investment in the long run. This implies that increase in foreign direct investment and/or reduction in external debt will promote domestic investment in sub-Saharan Africa. Therefore measures have to be put in place to attract more foreign direct investment and reduce the inflow of external debt in the region.

**JEL: C23, F21, F34, O55, P33**

## Keywords

Foreign direct investment, external debt, domestic investment, pooled mean group, cointegration, sub-Saharan Africa

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## Introduction

In many developing countries, domestic resources are often inadequate to fund investments requisite for growth and development. This can largely be attributed to the low saving rate and chronic budget deficits particularly in sub-Saharan African (SSA) countries. The United Nations Conference on Trade and Development (UNCTAD) report in 2000 corroborated by the United Nations Economic Commission for Africa's (UNECA) report in 2006 shows that the investment rate in SSA has to increase to 22.5 per cent from the low levels of under 20 per cent to reach a sustainable growth rate conducive to reducing poverty and enhancing the development of the region. It is therefore not surprising that many developing countries have in recent years embarked on a number of market reforms and programmes to attract foreign capital.

Regardless of the recent decline in capital inflows to many developing countries, Africa remains one of the very few regions experiencing a continued rise in receipts of foreign capital (UN, 2014). The UNECA (2006) report indicates that foreign capital inflows to SSA increased from $8 billion in 2000 to $45 billion in 2006, which is nearly 6 per cent of its gross domestic product (GDP). The World Bank (2014a) Global Economic Prospects Report indicates that since 2008 capital inflows to SSA have consistently increased from $46.5 billion in 2008 to $56.5 billion in 2009, $59.5 billion in 2010, $62.9 billion in 2011 and $73.6 billion in 2012. In 2013, capital inflows to SSA accounted for 5.3 per cent of the region's GDP (World Bank, 2014b). The World Bank (2014b) report also indicates that due to an estimated increase in capital inflows and household expenditure in the SSA, the growth in the region is expected to increase from 4.7 per cent in 2013 to 5.2 per cent in 2014.

Foreign direct investment (FDI) inflows to developing countries reached a new record high of $759 billion in 2013, which accounts for about 52 per cent of global FDI flows (UNCTAD, 2014). FDI inflows to SSA have increased persistently from an amount of $29 billion in 2010 to $37 billion in 2011, $39 billion in 2012 and $42 billion in 2013 (UNCTAD, 2012, 2014). The story is not different when we consider external debt inflows to SSA, which has shown a persistent increase from the year 2000 to 2011 with the only exceptions being 2006 and 2007. According to the World Bank (2013a), the total external debt stock of SSA which stood at $213.5 billion in the year 2000 increased to $234.4 billion in 2005. After a decline to $193.9 billion in 2006, it surged to $218.5 billion in 2007, $225.3 billion in 2008, $248.6 billion in 2009, $271.2 billion in 2010 and $295.6 billion in 2011. These results clearly indicate that over reliance on external debt is a real phenomenon in SSA countries.

The World Bank (2012) suggests that the recent increase in capital inflows (particularly FDI) to SSA is due to the increased global competition for natural resources, higher commodity prices and a fast rising middle class. Other reports do indicate that the surge in global capital inflows could be attributed to the reduction in interest rate, the global price risk and domestic borrowing costs (Luca & Spataforal, 2012). Since many of the developing countries are short of capital, it is assumed that the new wave of inflows have the potential to raise domestic investment significantly (Mody & Murshid, 2005).

The big question is whether the drastic improvement in capital inflows has led to an increase in domestic investment of these countries. This is the key research question the study seeks to investigate. This study therefore seeks to examine the effect of capital inflows on domestic investment in SSA with emphasis on FDI and external debt inflows, which are the main capital inflows into the region in recent years. Answering this question is important for both theoretical and policy reasons in terms of policies favouring liberalization of capital inflows and its macroeconomic effects (Pels, 2010). The UNECA (2006) report, for example, suggests that capital inflows have important implications for domestic investment and labour market, which are critical for sustainable growth. Moreover, advocates of the liberalization of capital flows forecast higher investment, technological advancement, economic growth and speedy development for recipient developing countries (UNTAD, 2013). Obviously, the focus on SSA is important because the region is increasingly recognized as an investment destination, due to its natural resource endowment and recent discovery of oil in many of its countries.

Most of the studies on capital inflows in SSA have focused on the relationship between capital inflows and economic growth (Adams, 2009a, 2009b; Osinubi & Amaghionyeodiwe, 2010). Further, studies on capital inflows and domestic investment have been concentrated on transition economies and other developing countries (Al-Sadig, 2013a; Cohen, 1991; Bosworth & Collins, 1999; Gocer et al., 2014; Lautier & Moreaub, 2012; Mileva, 2008). Many of the African studies also focus mainly on FDI (Adams, 2009b; Eregha, 2012). Accordingly, we contribute to the literature by examining the impact of two major inflows to SSA (FDI and external debt) on domestic investment. Our methodology also allows us to examine the differential effects of FDI and external debt and consequently provide policy implications for the findings of the study. This is achieved by using heterogeneous panel data methods to capture both the static and dynamic effects of capital inflows on domestic investment. The pooled mean group (PMG) estimator (Pesaran et al., 1999) is used because it provides a more accurate outcome and provides remedy for the limitations of other panel estimation methods.

The rest of the paper is structured as follows: the next section gives a brief literature on the subject. In the third, fourth and fifth sections we present the methodological framework, empirical analysis and concluding remarks, respectively.

## Review of Literature

The flow of capital to developing countries and most especially SSA has become an indispensable tool for investment and economic development. Capital inflows in the form of FDI, portfolio investment and other financial instruments hasten economic growth and consumption in recipient countries (Bosworth & Collins, 1999). Other advantages include technology transfer, innovation, management skills, capacity building, risk taking, internationalization of host markets, product

design and branding, efficiency and quality, employment, capitalization among others (Agosin & Mayer, 2000; Javorcik, 2004).

On the other hand, capital flows are blamed for exporting employment to host countries and providing access to other countries' domestic technology (Moosa, 2002). The UNCTAD (2013) report indicates that capital inflows can lead to real exchange rate appreciation and this might have adverse effects on the competiveness and growth of the manufacturing sector. Issues of national security and excessive foreign control have also been cited as negative effects of capital inflows (Kurtishi-Kastrati, 2013; Moosa, 2002).

FDI involves the movement of capital to acquire a stake in a foreign business. It is generally referred to as the acquisition of a 10 per cent or more stake in a foreign enterprise (Feenstra, 1999). The FDI inflows can be explained by the industrial organization and the cost of capital theories (Razin, 2004). The industrial organization theory explains the quest of multinational corporations to expand their market power to other territories different from theirs in order to take advantage of cost advantages that may emanate from economies of scale. The cost of capital theory, on the other hand, has to do with the advantages that may stem from exchange rate differentials among countries. Exchange rate depreciation in a host country may have a positive effect on FDI inflows since this will make cost of production cheaper for multinational corporations (Razin, 2004).

Whether the injection of foreign capital will have positive or negative effects depend on the kind of activities that the foreign investors are engaged in. Foreign investments might cause the crowding-out of domestic firms (especially the inefficient ones) if the investments are in the production of substitute goods or services. Nevertheless, they might cause crowding-in of the domestic firms if the investments are in the production of complementary goods and services (Gocer et al., 2014).

In applying a dynamic panel data analysis for 30 developing countries for the period 1992–2010, Gocer et al. (2014) find a positive relationship between FDI and domestic investment. Al-Sadig (2013b) studies 91 developing countries over the period 1970–2000 and reports that FDI positively impact domestic investment. Kim and Seo (2003) also find FDI to positively impact domestic investment in Korea over the period 1985–1999.

Ghose (2004) finds out that domestic investment is negatively affected by FDI inflows in 37 low income developing countries over the period 1975–2000. Eregha (2012) examines the case for the Economic Community of West African States (ECOWAS) using the panel cointegration techniques with data from 1970–2008 and finds that FDI negatively affects domestic investment in these countries. Similarly, using the system—generalized method of moments (GMM) estimator and a panel data for 121 developing and transition economies over the period 1990–2010, Al-Sadig (2013a) reports that FDI negatively affects domestic investment. Employing the same technique, for a panel of 30 countries over the period 1992–2002, Apergis, Katrakilidis and Tabakis (2006) find that the impact of FDI on domestic investment is dependent on country characteristics in terms of its location and level of development. Even for countries at the same

level of development, the effect of FDI is not certain. For example, employing the autoregressive distributed lag (ARDL) estimator, Herzer and Schrooten (2008) report that FDI positively impacts domestic investment in the long run in the United States but for Germany this effect is only present in the short run. It is therefore obvious that the effect of FDI depends on country characteristics (Lautier & Moreaub, 2012).

External debt or what has been termed in some studies as international or foreign loan has usually been considered with FDI in trying to find the relationship between capital inflows and domestic investment. Mileva (2008), using static and dynamic panel approaches for 22 transition economies over the period 1995–2005, finds FDI and long-term loans to positively impact domestic investment. Razin (2004) finds FDI inflows to have a more significant impact on domestic investment than international loans and international portfolio investment in 64 developing countries over the period 1976–1997. Using the Johansen cointegration technique and data over the period 1972 to 2013, Ali (2014) finds that foreign capital flows in the form of FDI and foreign loans have negative impact on the economy of Pakistan. Using fixed effects estimation technique, Cohen (1991) considers the relationship between foreign debt and domestic investment in 81 developing countries over the period 1980–1990 and reports a negative but statistically insignificant relationship between the variables.

The mixed results suggest that there is the need for further research on the issue and therefore we contribute to the discussion by examining the relationship between FDI and domestic investment on the one hand, and external debt and domestic investment on the other to help identify differential effects, if any, of the two variables. The methodology and data employed are discussed next.

## Methodology

In this section we describe the methodology adopted for the paper. It consists of three sub-sections: model specification and data, panel unit roots and cointegration tests, and the PMG method of estimation.

### *Model Specification and Data*

Feldstein and Horioka (1980) studied the relation between savings rates and investment rates of OECD countries by specifying their baseline model in the following form:

$$I_i = \alpha + \beta S_i + e_i \tag{1}$$

where $I_i$ is the investment rate (i.e., the ratio of gross domestic investment to GDP) by country $i$ and $S_i$ is the savings rate (i.e., the ratio of gross domestic savings to GDP) by country $i$, $\beta$ is the savings-retention coefficient that indicates the degree of international capital mobility, $e$ is the error term. A larger $\beta$ closer to one

implies capital immobility; in this case domestic investment is financed by domestic savings. On the contrary, capital is mobile if $\beta$ is closer to zero in which case domestic investment is financed solely by foreign savings. Following Feldstein and Horioka several studies (see, for example, Adedeji & Thornton, 2007; Bangake & Eggoh, 2012; Mamingi, 1997; Murthy, 2009) have estimated equation (1) to test the extent of capital mobility of countries. However, given the recent inflows of capital to SSA countries as outlined in the introduction, it is imperative that these variables are considered in the estimation of equation (1). Therefore, we assess the impact of capital inflows on domestic investment in SSA by augmenting the Feldstein and Horioka model with capital inflows variables. For this reason, we specify our model as the following:

$$\begin{aligned} I_{it} &= \alpha_1 + \alpha_2 S_{it} + \alpha_3 X_{it} + \varepsilon_{it} \\ i &= 1,2,3,\ldots,25 \quad t = 1,2,3\ldots,T \end{aligned} \tag{2}$$

where $i$ represents each of the 25 countries used in the study, $t$ is the time period considered (i.e., 1981–2010),[1] $I$ and $S$ are as previously defined, $X$ is a vector of variables representing capital inflows, $\varepsilon$ is the error term, $\alpha_1$ and $\alpha_2$ that respectively measures the impact of domestic savings and capital inflows on domestic investment are coefficients to be determined. We consider two types of capital inflows: foreign direct investment to GDP (denoted FDI) and external debt to GDP (denoted DEBT). Data on all variables are obtained from the World Bank (2013b).

## *Panel Unit Roots and Cointegration Tests*

Before testing for cointegration to verify whether there is a long-run relationship between domestic investment, domestic savings and the capital inflows variables, we first need to establish the order of integration of the variables. In determining the order of integration of the panel data, the study opts for the use of Breitung and Hadri unit roots tests. Breitung (2001) puts forward a test that does not employ a bias adjustment, whose power is significantly higher than that of other tests like the Levin, Lin and Chu (2002) and Im, Pesaran and Shin (2003) tests. Hadri (2000) proposes a residual-based Lagrange Multiplier (LM) test with a null hypothesis of; no unit root for each cross section unit (series in the panel) and an alternative hypothesis of; a unit root in the panel.

In testing for the panel cointegration, the study opts for the use of the bootstrap-based panel cointegration test developed by Westerlund (2006, 2007) and Westerlund and Edgerton (2007). This test is based on the famous LM test of McCoskey and Kao (1998). It permits the accommodation of correlation both within and between the individual cross-sectional units. The bootstrap employs the use of a sieve sampling scheme which has an advantage of substantially minimizing distortions of the asymptotic test. The test has a joint null hypothesis that all units (countries) in the panel are cointegrated and an alternative hypothesis that the units are not cointegrated.

It is important to note that lately the literature on panel unit root and cointegration tests has increased enormously and now distinguishes between first-generation tests established on the assumption of the cross-sectional independence and second-generation tests that permit cross-sectional dependence across the different units (panels). The difference in these tests is seen in their ability to eliminate the factors of structural dependence. Panel unit root tests that ignore cross-section dependence can lead to the generation of spurious results if substantial degree of error cross-section dependence is present and this is ignored. Accordingly, prior to making a decision on an appropriate choice of a panel unit root and cointegration tests, evidence on the degree of error cross-section dependence should be known. For this reason we use the cross-section statistic developed by Breusch and Pagan (1980) appropriate for $N < T$ panels to test the presence of cross-section dependence among the variables. The results of the Breusch and Pagan statistic for equation (2) reported in Table A1 in the Appendix, rejects the null hypothesis of cross-section independence for all models estimated. This implies that we need to control for cross-section dependence in the panel unit root and cointegration tests as well as the estimation of the long-run and the short-run models.

Having identified the existence of cross-section dependence across the countries, we apply the panel unit root test developed by Breitung (2001) and Hadri (2000) to test the order of integration of the variables. These tests are carried out to ensure that no series exceeds $I(1)$ order of integration. In all the test specifications, deterministic time trend is included. In both tests, cross-sectional means are subtracted in order to minimize problems arising from cross-sectional dependence. The results of the Breitung (2001) and Hadri (2000) panel unit roots tests reported in Table A2 in the Appendix show evidence of non-stationarity among all the variables. All the variables contain unit root and are therefore integrated of order one, $I(1)$.

Westerlund (2006, 2007) panel cointegration and Westerlund and Edgerton (2007) panel bootstrap cointegration tests are used to determine whether there exists cointegration in equation (2). The bootstrap cointegration test is particularly appropriate for $N < T$ panels as it permits dependence both within and between the cross-sectional units. Moreover, it is robust in the presence of structural breaks as it allows for the possibility of multiple structural breaks in the cointegrated panel regression (see Westerlund, 2006). Table A3 in the Appendix summarizes the results of the cointegration test. The results demonstrate that all models estimated are cointegrated and thus there is a long-run relationship among the variables.

## *The PMG Method of Estimation*

After establishing the level of integration and cointegration among the variables, the study goes ahead to estimate the model as given in equation (2) using the PMG estimation method. The PMG is an intermediate estimator between the Mean Group (MG)[2] and the traditional pooled estimators such as the fixed and

random effects estimators[3] (Pesaran et al., 1999). The PMG estimator permits the intercept, the short-run parameters and the error variances to be significantly distinct between groups while restricting equality of the long-run coefficients among the countries (Pesaran et al., 1999). The implication here is that the PMG imposes homogeneity in the long-run coefficients while at the same time permitting heterogeneity in the short-run coefficients and the error variances. Contrary to other estimators such as the dynamic ordinary least squares (DOLS) and the fully modified OLS: (i) the error terms are serially uncorrelated and are independently distributed among regressors, (ii) the long-run parameters are the same across cross-section and (iii) the PMG provides consistent and efficient long-run estimates when parameter homogeneity holds. These notwithstanding, all these estimators assume long-run relationship between the dependent and independent variables.

In addition, the PMG approach is also opted over approaches such as the MG estimator that produces long-run estimators which are consistent but inefficient if coefficient homogeneity holds. Unlike the MG, the PMG approach also provides estimates that are less sensitive to outliers. More so the dynamic panel GMM estimator permits only the constant terms to differ across groups but allows the slope coefficient to be alike. However, Im et al. (2003) argue that this may be inappropriate if panel time dimension is long. The PMG approach resolves this issue.

For all the reasons and arguments raised, the PMG estimator is deemed most appropriate to examine the connection among variables in dynamic heterogeneous panel models, for our large $N$ and $T$ panel.

The PMG method of estimation is in line with the ARDL model (Pesaran et al., 1999) applied to panel data and can be specified as an error correction equation of the following form:

$$\Delta y_{it} = \pi_i (y_{i,t-1} - \theta' W_{it}) + \sum_{i=1}^{p-1} \gamma'_{ij} \Delta y_{i,t-i} + \sum_{j=0}^{q-1} \vartheta'_{ij} \Delta W_{i,t-j} + \beta_i + \alpha_i t + \varepsilon_{it} \quad (3)$$

where $y_{it}$ is the dependent variable, $W_{it}$ is a vector representing the independent variables (S, FDI and DEBT), $\theta$ is the vector of long-run coefficients, $\pi_i$ is the short-run error correction term that measures the speed of adjustment towards the long run, $(y_{i,t-1} - \theta' W_{it})$ is the deviation from the long-run equilibrium, $\vartheta$ is a vector of short-run coefficients, $\beta$ and $\alpha$ are country-specific effects, $\varepsilon_{it}$ is the error term whose variance differ across groups. Pesaran et al. (1999) put forward that the PMG estimators obtained are consistent and normally distributed asymptotically.

## Empirical Results and Discussion

We have established in the previous section that the variables in equation (2) exhibit unit root properties and are cointegrated. In this section we present and discuss the empirical long-run and short-run panel results.

## *Long-run and Short-run Results*

We apply the PMG estimator to estimate the long-run and short-run relationships in equation (2). With the PMG, the long-run coefficients are assumed to be homogeneous, while the short-run coefficients are allowed to be heterogeneous. Under the null hypothesis of long-run homogeneity, the PMG estimator is consistent and more efficient. That is, long-run homogeneity assumption across countries gives efficient and consistent estimates when the restrictions are true. Therefore, if the PMG estimator's restriction is not true then its estimates are inconsistent and the MG estimates are consistent.

We use the Hausman test to determine the difference in the PMG and MG and the desired specification method. The results of the Hausman test of the three models—(i) model with *I*, *S* and FDI; (ii) model with *I*, *S* and DEBT; and (iii) model with *I*, *S*, FDI and DEBT reported in Tables 1, 2 and 3, respectively, support the use of the PMG estimator because in all cases the null hypothesis that difference in coefficients between the MG and PMG estimators are not systematic are not rejected. This result indicates that there are identical long-run parameters across the countries. We therefore conclude that under the null hypothesis, the PMG estimator is the consistent and efficient estimator, which

**Table 1.** Results of the Long-run and Short-run Models (Model with *I*, *S* and FDI)

| Dependent Variable: I | MG | PMG | CCEPMG |
|---|---|---|---|
| Speed of adjustment | –0.449 | –0.360 | –0.311 |
| | (0.039)*** | (0.033)*** | (0.032)*** |
| Long-run coefficients | | | |
| *S* | 0.433 | 0.309 | 0.262 |
| | (0.108)*** | (0.044)*** | (0.046)*** |
| FDI | 0.913 | 0.666 | 0.530 |
| | (0.291)*** | (0.123)*** | (0.137)*** |
| Short-run coefficients | | | |
| *S* | 0.298 | 0.289 | 0.270 |
| | (0.068)*** | (0.060)*** | (0.058)*** |
| FDI | 0.322 | 0.320 | 0.243 |
| | (0.096)*** | (0.074)*** | (0.204)*** |
| Hausman Test | 1.24 | | |
| | (0.5374) | | |
| Observations | 725 | | |
| Number of countries | 25 | | |

**Source:** Authors' construct (2015)
**Note:** *** represent 1 per cent level of significance.
CCEPMG, common correlated effects pooled mean group.

**Table 2.** Results of the Long-run and Short-run Models (Model with *I*, *S* and DEBT)

| Dependent Variable: I | MG | PMG | CCEPMG |
|---|---|---|---|
| Speed of adjustment | –0.478 | –0.355 | –0.341 |
| | (0.053)*** | (0.043)*** | (0.038)*** |
| Long-run coefficients | | | |
| S | 0.514 | 0.256 | 0.212 |
| | (0.126)*** | (0.043)*** | (0.045)*** |
| DEBT | –0.231 | –0.032 | –0.020 |
| | (0.177)*** | (0.008)*** | (0.007)*** |
| Short-run coefficients | | | |
| S | 0.324 | 0.299 | 0.275 |
| | (0.070)*** | (0.060)*** | (0.060)*** |
| DEBT | –0.003 | 0.010 | 0.008 |
| | (0.014) | (0.014) | (0.016) |
| Hausman test | 4.86 | | |
| | (0.0880) | | |
| Observations | 725 | | |
| Number of countries | 25 | | |

**Source:** Authors' construct (2015)
**Note:** *** represent 1 per cent level of significance.

**Table 3.** Results of the Long-run and Short-run Models (Model with I, S, FDI and DEBT)

| Dependent Variable: I | MG | PMG | CCEPMG |
|---|---|---|---|
| Speed of adjustment | –0.553 | –0.341 | –0.309 |
| | (0.051)*** | (0.043)*** | (0.049)*** |
| Long-run coefficients | | | |
| S | 0.439 | 0.479 | 0.497 |
| | (0.096)*** | (0.043)*** | (0.045)*** |
| FDI | 0.927 | 0.852 | 0.691 |
| | (0.334)*** | (0.120)*** | (0.125)*** |
| DEBT | –0.116 | –0.032 | –0.040 |
| | (0.067)*** | (0.007)*** | (0.006)*** |
| Short-run coefficients | | | |
| S | 0.335 | 0.299 | 0.306 |
| | (0.074)*** | (0.060)*** | (0.056)*** |

*(Table 3 Continued)*

*(Table 3 Continued)*

| Dependent Variable: I | MG | PMG | CCEPMG |
|---|---|---|---|
| FDI | 0.335 | 0.344 | 0.255 |
| | (0.105)*** | (0.086)*** | (0.085)*** |
| DEBT | 0.004 | 0.021 | 0.015 |
| | (0.013) | (0.014) | (0.017) |
| Hausman test | 1.2 | | |
| | (0.752) | | |
| Observations | 725 | | |
| Number of countries | 25 | | |

**Source:** Authors' construct (2015)
**Note:** ***represent 1 per cent level of significance.

we prefer. Thus, our analysis will focus on the estimates obtained with the favourable PMG outcomes.

We introduce the common correlated effects pooled mean group (CCEPMG) estimator, which is a generalization of the PMG estimator to control for cross-section dependence. This is achieved by augmenting the PMG estimator with the cross-sectional averages of the dependent and independent variables. The long-run and the short-run results of the MG, PMG and the CCEPMG for the three models are reported in Tables 1, 2 and 3, respectively. Domestic savings show a consistently significant positive relationship with domestic investment both in the short run and long run in all the three models. This is an indication that increases in domestic savings are crucial for increases in domestic investment.

With all the estimation results, the coefficient of FDI is positive and statistically significant at the 1 per cent level in both the long run and the short run regardless of the estimator (PMG, CCEPMG) used. The results indicate that FDI contributes positively to domestic investment in SSA for the countries studied. The long-run coefficients show that a 1 per cent increase in FDI inflow into SSA is capable of increasing domestic investment between 0.5 and 0.8 per cent. With the short-run results, a 1 per cent increase in FDI inflow will lead to 0.2–0.3 per cent increase in domestic investment. During the 1980s, most SSA countries embarked on a series of market reforms and liberalized their economies, which resulted in a massive FDI inflow into the region. It is therefore not surprising that FDI is found to have a positive impact on domestic investment in SSA. The result conforms to a number of related studies in countries with quite similar economic characteristics as those considered in the study (see, for example, Al-Sadig, 2013a; Gocer et al., 2014; Razin, 2004).

The long-run coefficient of external debt shows a statistically significant negative relationship with domestic investment for both the PMG and CCEPMG estimators. This implies that an increase in external debt in SSA reduces domestic investment in the long run. It is not unexpected that external debt has a negative impact on domestic investment in SSA. This is due to the fact that a chunk of

the resources that emanates from external debts to SSA are directed into financing recurrent expenditures instead of activities that boost domestic investment in the region in the long term. Besides, the payment of the interest and principal of such loans take money that could have been used to support domestic investment out of the domestic economy. This finding is consistent with that of Borensztein (1990), Cohen (1991) and Ali (2014). In the short run, however, the coefficient of external debt is statistically insignificant regardless of the estimator used. The results show an indication that although external debt does not have any significant impact on domestic investment in the short run, it does have long-run detrimental effect.

Overall, the results show statistically significant long-run and short-run coefficients for both savings and FDI implying these increase domestic investment. Regarding external debt, both the PMG and CCEPMG indicate that it has a statistically significant negative impact on domestic investment in the long run. However in the short run, external debt is found to have no significant impact on domestic investment.

It can be inferred from all the estimated models that the coefficient of the speed of adjustment term is expectedly signed negative and statistically significant at the 1 per cent level. This ensures convergence to equilibrium in the long run (cointegration) following a shock in the short run. The coefficients of the speed of the adjustment term for our preferred models range between –0.309 and –0.360. This suggests that the estimated speed of adjustment to the long-run relationship is between 31 and 36 per cent annually.

## Concluding Remarks

This paper has investigated the impact of capital inflows on domestic investment in SSA. FDI and external debt were used as proxies for capital inflows. The panel cointegration methodology was employed for a panel of 25 SSA countries for the period 1981–2010. The results show that FDI has a statistically significant positive relationship with domestic investment in both long run and short run. Although external debt is found to have no significant impact on domestic investment in the short run, it is found to have a statistically significant negative impact in the long run. It can therefore be concluded that FDI crowd-in domestic investment, while external debt is found to crowd-out domestic investment in the region. From the policy perspective therefore it can be concluded that FDI has been more supportive of the domestic economy than external debt and consequently policy choices should reflect this priority in terms of boosting domestic investment to promote economic growth.

We therefore recommend that policies to attract FDI should be strengthened by the various governments in the region. A business environment favourable to foreign investors should be adopted so as to ensure sustained FDI inflows. It is also recommended that policies be put in place to attract more FDI into sectors more capable of boosting domestic investment as compared to current major flows of FDI to the extractive sector. Heavy reliance on external debt should drastically be

reduced since it is found to negatively affect domestic investment in the long run. The SSA countries should develop means of attracting more capital inflows such as FDI to supplement the required capital funds needed rather than increasing external debt. Besides, the payment of the principal and interest on debt draws resources from the region hence affecting domestic investment. Governments of the region should focus on efficiently managing the proceeds from FDI and also identify innovative ways of increasing internally generated revenues so as to minimize their dependence on external debt.

## Appendix

**Table A1.** Test for Cross-section Dependence

| | Model with *I*, *S*, FDI | Model with *I*, *S*, DEBT | Model with *I*, *S*, FDI, DEBT |
|---|---|---|---|
| Statistic | 892.823 | 857.929 | 849.572 |
| | (0.000) | (0.000) | (0.000) |

**Source:** Authors' construct (2015)
**Note:** Probability values in parenthesis.

**Table A2.** Results of Panel Unit Root Test

| | Breitung | | | | | |
|---|---|---|---|---|---|---|
| | Levels | | First Difference | | Hadri | |
| Variable | Statistics | *P* Value | Statistics | *P* Value | Statistics | *P* Value |
| I | –0.236 | 0.407 | –4.152 | 0.000 | 33.6982 | 0.000 |
| S | –0.990 | 0.161 | –7.307 | 0.000 | 21.1942 | 0.000 |
| FDI | –0.102 | 0.459 | –7.294 | 0.000 | 15.459 | 0.000 |
| DEBT | 1.43 | 0.924 | –8.635 | 0.000 | 40.463 | 0.000 |

**Source:** Authors' construct (2015)
**Note:** All test statistics are robust in the presence of cross-section dependence. The null hypothesis of Breitung test is thus the series are non-stationary in the levels while that of Hadri test is that they are stationary in levels.

**Table A3.** Panel Cointegration Test Results

| | Model with *I*, *S* and FDI | | | |
|---|---|---|---|---|
| Statistic | Value | *Z* value | *P* Value | Robust *P* Value |
| $G_t$ | –2.479 | –2.413 | 0.008 | 0.000 |
| $G_a$ | –8.006 | 0.892 | 0.814 | 0.000 |
| $P_t$ | –11.074 | –2.429 | 0.008 | 0.000 |
| $P_a$ | –6.604 | –0.661 | 0.254 | 0.000 |

*(Table A3. Continued)*

*(Table A3. Continued)*

| Model with *I*, *S* and DEBT | | | | |
|---|---|---|---|---|
| Statistic | Value | *Z* value | *P* Value | Robust *P* Value |
| $G_t$ | –2.522 | –2.647 | 0.004 | 0.000 |
| $G_a$ | –9.078 | 0.037 | 0.515 | 0.000 |
| $P_t$ | –11.728 | –3.062 | 0.001 | 0.000 |
| $P_a$ | –7.995 | –1.905 | 0.028 | 0.060 |
| Model with *I*, *S*, FDI and DEBT | | | | |
| Statistic | Value | *Z* value | *P* Value | Robust *P* Value |
| $G_t$ | –2.728 | –2.623 | 0.004 | 0.000 |
| $G_a$ | –8.066 | 2.062 | 0.98 | 0.000 |
| $P_t$ | –11.701 | –1.985 | 0.024 | 0.000 |
| $P_a$ | –6.759 | 0.535 | 0.704 | 0.340 |

**Source:** Authors' construct (2015)

**Note:** $G_t$ and $G_\alpha$ are group mean tests. $P_t$ and $P_\alpha$ are panel tests. Robust P values indicate the results are robust to cross-sectional dependence.

## Notes

1. Benin, Botswana, Burkina Faso, Cameroun, Central African Republic, Democratic Republic Congo, Congo Republic, Gabon, Ghana, Kenya, Lesotho, Malawi, Mali, Mauritania, Mauritius, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, Sudan, Swaziland, Togo, Zambia and Zimbabwe. The selection of countries and time period has been limited by data availability.
2. It produces consistent estimates of the average of the parameters.
3. They allow the intercepts to differ across groups while all other coefficients and error variances are constrained to be the same.

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