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Foreign direct investment and domestic private investment in Sub-Saharan African countries: crowding-in or out?

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Abstract

With a fall of 42% of Foreign Direct investment (FDI) flows worldwide in 2020, the Covid-19 crisis has raised important concerns about the impact of this source of financing on economic growth in Africa, in particular through its effect on national investment. While FDI is often seen as a welcome boost to economic growth and long run development, its net effect may depend critically on whether it stimulates domestic private investment or crowds it out and over what time horizon. This paper investigates the relationship between FDI and private investment in Sub-Saharan Africa (SSA), using a sample of 40 countries over 1980-2017. To disentangle short term from long-term dynamics, our empirical analysis is based on Pooled Mean Group (PMG), Mean Group (MG) and Dynamic Full Effects (DFE).

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We find that FDI has little effect on private investment in the short run but significant crowding-in effects in the long-run: a one percentage point increase of the share of FDI in GDP leads to a 0.29% rise in private investment, in the long run. Our results also show that FDI interacts with public domestic investment to boost these positive effects. Finally, we show that the impact of FDI on domestic private investment is stronger in non-natural resource exporting diversified countries as opposed to non-diversified commodity exporters.

1 Introduction

Over the last three decades, Foreign Direct Investment (FDI) has grown to be one of the three major sources of external financing in Sub-Saharan countries (SSA), along with remittances and official development aid (see annex 1). In 2020, FDI inflows towards Africa have been more resilient with a drop of 18% (versus -42% worldwide), despite a collapse of 63% of Greenfield project announcements (UNCTAD, 2021). While remittances mostly cover immediate consumption needs (and poverty alleviation), FDI represents a long-run source of capital for investment and economic development, seen by national authorities as essential to alleviate domestic capital accumulation constraints and spur private sector growth. The expected impact of greenfield FDI (95% of overall FDI in Africa) on domestic investment and growth has provided the rationale for FDI promotion policies (investment codes, tax breaks in an attempt to better integrate African countries in Global Value Chains). Such policies were encouraged seeking to leverage increasingly constrained official development aid. However, the positive impact of FDI on investment and growth has proved to be more elusive than expected in the current economic literature.

Seminal research has established the clear link between FDI and growth (Romer, 1986; Dollar, 1992; Harrison, 1996). FDI stimulates economic growth either through their direct impact on overall investment or by generating a number of externalities and positive spillovers. These positive effects stem from market entry (or competition) from multinational companies, which favour the spread of new production processes and technologies, new products and management skills. As some multinational firms acquire labour and raw materials locally, they are potentially sources of new demands for local inputs to local firms and the creation of labour income that stimulate local demand and encourages domestic investment. FDI inflows can also be a source of network effects and agglomeration economies, which attract additional foreign investors and create complementarities with domestic firms (Markusen and Venables, 1999; Driffield and Munday; 2000). Domestic firms may respond to FDI inflows by renewing and increasing their capital stock in order to face competition (De Mello, 1999). Massive FDI inflows may also trigger large local or regional investments in infrastructure that increase the profitability of domestic investment (Cardoso and Dornbusch, 1989).

Other literature strings point to possibly negative impacts of FDI on domestic investment and growth. Since foreign firms are generally technologically superior, they may be in a better position to take advantage more rapidly and efficiently of opportunities that were formerly only accessible to domestic investors (Fry, 1993; Agosin and Mayer, 2000). FDI inflows may lead to a reduction of the market share, or market exit, of some domestic firms, particularly in the case of

significant technological gap between foreign and domestic firms and lack of skilled workers in the host country (Borensztein et al., 1998). FDI is likely to affect domestic investment and growth negatively because of possible exchange rate appreciation resulting from these financial flows, or "Dutch disease" associated with FDI in extraction industries (Cordon and Neary, 1982). FDI flows may increase current account imbalances by increasing imports and worsening the terms of trade (Apergis et al., 2006), leading to a loss of the potential domestic productivity advantage, higher prices of capital goods and a reduction in domestic investment. In parallel, the real effective exchange rate appreciation from FDI inflows and associated exports may reduce the competitiveness and investment of other tradable goods sectors.

Since the early 2000s, a growing body of empirical literature has tried to disentangle such possible crowding-in or crowding-out effects in recipient countries to assess the dynamic net effect of FDI on domestic investment. First, the empirical evidence remains ambiguous because this net impact may depend on significant host country-specific characteristics. Such effects include differences in the quality of governance and local policies to stimulate FDI, the degree of financial development (Alfaro et al, 2004), the size of the technological gap between multinational and domestic firms and the absorptive capacity of local firms (Barrios et al., 2005). Second, the impact of FDI on domestic investment may also depend on sectoral composition and linkage effects which may differ widely between primary, manufacturing and services sectors (UNCTAD, 2018). Compared to similar investments in the primary sector, FDI flows in the manufacturing sector may have a greater impact on the economy through a wide range of potential linkage-intensive activities. As the service sector includes a wide range of different activities such as wholesale and retail trade, finance, infrastructure, real estate and tourism, FDI in this sector may benefit domestic investment through strong backward linkages. Third, the impact of FDI on domestic investment and growth may be higher and more rapid if it is in the form of greenfield versus Mergers and Acquisitions. This latter form of FDI does not immediately increase the host country's productive capacity unless it is accompanied by expansion and new investment (Agosin et al. 2005). However, in the long run it can lead to productivity improvement if the firms acquired make new investments (e.g. privatisation of public utilities). Finally, FDI flows may have opposite effects on domestic competition, depending on the intensity of domestic competition and competitive behaviour of both multinational and domestic firms. Some empirical literature shows significant crowding-out on domestic firms upon entry of multinational enterprises (Misun et al. 2002).

The variety of these possible effects on the magnitude, direction and timing of these deter-

minants, may explain the high variability of empirical results found among developing countries. Agosin and Mayer (2000) found that crowding-in effects benefited Asian countries, and to a lesser extent African countries, whereas crowding out effects were dominant in Latin America. Apergis et al (2006) also find a crowding-in effect for Asian and African countries, deriving from improvements in competition and technology induced by FDI entry and enhanced domestic entrepreneurship. Eregha (2012) finds crowding-in effects for Economic Community of West African States (ECOWAS) countries over the period 1970-2008. Similarly, Merican (2009) found crowding out effects of FDI on domestic investment and growth in four ASEAN members, namely Thailand, Malaysia, Indonesia and the Philippines. Examining the dynamic linkages between FDI, public investment and private investment, Ang (2009) points out that both FDI and public investment are complementary to domestic private investment in Malaysia.

Other cross sectional studies uncovered crowding out effects, mostly reflecting the countries' low level of development, institutional weaknesses and related market distortions. Fry (1993) found that FDI crowds out domestic investment because of domestic market distortions in developing countries. Morrissey and Udomkerdmongkol (2008) underline that the improvements in institutional quality may result in a crowding-in of domestic investment, because of improved business climate and more competitive foreign firms over less productive private firms. Finally, the impact of FDI on domestic investment in different countries appears strongly correlated with national FDI promotion policies, particularly filtering policies designed to minimize crowding out effects that displaces domestic firms or favour new technologies or products that generate crowding-in effects.

When it comes to Sub-Saharan African countries, Kottaridi and Stengos (2010) find that FDI inflows may only enhance private investment beyond a threshold of absorptive capacity in terms of human capital. Some countries, under that threshold, because of a deficit in infrastructure, may show a lower absorptive capacity and the benefits of FDI may take some time to emerge. The insufficiency of FDI flows in key sectors of the economies and their concentration in extraction sectors may also play a role. Finally, the impact of FDI on private investment may be reduced and lagged when it focuses on sectors with weak interconnections with other economic activities.

Our paper improves the current literature on three grounds: (1) by tackling the endogeneity of FDI flows (through PMG estimation methods); (2) distinguishing private from public investment; (3) disentangling short-term from long-term effects.

First contribution, we use Pooled Mean Group (PMG), Mean Group (MG) and Dynamic Full Effects (DFE), as opposed to Ordinary Least Squares (OLS), Fixed Effect (FE) and Random

Effect (RE) to better address issues of variable stationarity and endogeneity, a well as temporal dynamics. In fact, our estimators are built from a dynamic error-correction model (ECM) applied to panel data which allows to use a lag structure to correct potential endogeneity. In addition, these estimators are consistent and present a superior performance compared to standard estimators applied to panel data, with a cointegrating relationship, as demonstrated by Pesaran and Shin (1999).

Second contribution, most studies use total investment as their explained variable. Investment is represented by total gross fixed capital formation which contains both public and private investment. The distinction between the two is important. It is a necessary step in our view to avoid aggregation bias, since the impact of FDI on domestic investment may differ for private and public domestic investment (Saglam et al, 2011; Rath et al, 2014), which may follow a different set of determinants, and because interactions between, private, public and international investors are multi-faceted. First, FDI may generate substantial fiscal revenue and improve domestic revenue mobilization either through taxation of the international sector (oil and mining, telecommunications) or revenue generated by infrastructure (Le et al, 2005). Second, the net impact of FDI on public investment may be affected by cooperative or competitive choices by FDI investors and state-owned enterprises, with possible strong substitution effects with the private sector. Finally, fiscal policy may affect FDI substantially either through the fiscal costs of FDI promotion policies or business opportunities of large public projects launched by Sub-Saharan governments. Infrastructure projects (transport, telecommunications, electricity, civil navigation etc) in particular tend to be intensive in imports and FDI flows. In this particular case, FDI can also potentially create a crowding-in effect by facilitating public investment (Ang, 2009).

Third contribution, to distinguish the various, and sometimes contradictory effects of FDI on domestic private investment, it may be necessary to disentangle short-term and long-term effects. This is premised on the fact that FDI cycles, especially for greenfield investments, may be implemented over several years and their effects on domestic investment, output and structure may occur, with time, in the long-run. Specific crowding-in or -out effects may affect both FDI and private investment in the short-run. The literature highlights the role of international or local business cycles, exchange rate instability, changes in investment policy and exchange rate variations and political instability in explaining investment (Bosworth and Collins, 1999 and Jude, 2019). Thus, the possibility of opposite short and long-run effects of FDI on private investment cannot be excluded.

The remaining of the paper is organised as follows. In Section 2, we present the data. Section

3 is devoted to the empirical analysis. We discuss the results in section 4. Section 5 provides robustness checks. The last section proposes a conclusion and discussion.

2 Data

The data measuring investment flows as a percentage of GDP were collected from the *Investment capital stock* database of the International Monetary Fund (IMF). Other variables were extracted from the *World Development Indicators (WDI)* database of the World Bank and the United Nations Conference on Trade and Development (UNCTAD), *Policy IV* and *the Penn World Table*. We have constructed a panel for the 40 African countries covering the period 1980-2017, excluding countries with insufficient data (Democratic Republic of Congo, Djibouti, Eritrea, Gambia, Liberia, Seychelles, Somalia, Southern Sudan).

Insofar as FDI flows are financial investments, they differ from private domestic investment. As pointed out by Agosin and Machado (2005), FDI is a financial balance of payments concept while private domestic investment is a real national account aggregate variable. Consequently, these two types of data are constructed using different conceptual frameworks. Domestic private investment measures the new capital added to the production capacity of a country. FDI measures investments of foreign firms in domestic productive capacity: existing capacity and newly installed capacity. FDI may not necessarily measure actual investment spending by foreign firms because there is no guarantee that these financial flows (entirely or partially) finance fixed investment, even if the FDI is greenfield. Of course, most financial transfers can be assumed to mostly reflect the acquisition of assets, but they may also finance current expenditure (Agosin and Machado, 2005). In the literature some studies have analysed the effect of greenfield and Mergers and Acquisitions separately in order to avoid treating FDI as homogeneous (Agosin and Machado, 2005; Jude, 2019). In our case we have analysed the composition of FDI to Sub-Saharan Africa using the annual issues of the *World investment report* from 2003 until 2018. We find that FDI to Sub-Saharan Africa is dominated by greenfield investment (more than 95% on average, see figure 3 in annex).

We have selected eight explanatory variables supported by strong theoretical foundations and empirical evidence. First, particular attention is paid to the impact of public investment on private investment in our model specification. Public investment in infrastructure provision for transport, communication, energy, and human capital complements private investment. But it may also crowd it out if it competes with private sector investment, or if public spending is financed by a deficit, raising interest rates and the cost of capital for the private sector, as

stressed by the Monetarist approach. The relation between these two variables is ambiguous.

Particular attention has also been paid to macroeconomic stability approximated by inflation, public debt and real effective exchange rates. Inflation is generally perceived as a variable that increases the cost of capital, which in turn reduces its accumulation. However, other models such as Tobin-Mundell argue that higher expected inflation lowers the real interest rate, which can potentially increase real investment (Ghura and Goodwin, 2000). The effect of real effective exchange rate on private investment, may also be ambiguous. On the one hand appreciation of the national currency reduces the competitiveness of firms and on the other hand it signals the strength and the good health of an economy (Jongwanich and Kohpaiboon, 2008; Ndikumana and Verick 2008). We expect public debt (as a percentage of GDP) to discourage private investment (eviction effects highlighted by the Monetarists).

Next, we add the level of financial development, measured by the ratio of domestic credit to the private sector on GDP, to measure the ease to borrow to finance new projects. More credit to the private sector and high access to final services should encourage private investment (Ajide and Lawanson, 2012). We introduce total factor productivity (TFP) from the *Penn World Tables*, which in practice mainly measures labor productivity. Since the countries of our sample are heavily labor abundant and their rate of innovation is low, TFP is mostly labor productivity. In the Schumpeterian view, productivity is a key variable for private investment, as it is a key factor of firm competitiveness. Innovation in processes, for example, provides productivity gains that will be reflected in prices. Thus, firms are likely to sell their products cheaper and gain market share, which in turn will increase their incentives to invest.

Institutional variables measuring political stability (*Policy IV index*) and the corruption perception index (as measured by *Transparency international*) test the effect of Keynes's animal spirit of investors. In so far as they trigger confidence and are associated with a favorable business climate, institutional quality and governance are essential to make African countries more attractive to foreign investors.

We also took into account the level of economic diversification, proxied by the export diversification index. As shown in the literature, the development of the manufacturing sector due to diversification may foster investment growth. Investment tends to be higher if the country has a diversified production. It refers to the diversification of assets in a portfolio choice approach. Because of the lack of detailed data on FDI and GDP broken down by major economic sector, we used the sectoral decomposition of GDP into agriculture, manufacturing and services from the WDI database to explore possible sectoral variations of the FDI impact on private investment. In

order to measure such sectoral effects we interact FDI with sectoral value added (as a percentage of GDP).

Table 1 summarizes all the variables with their sources, while table 2 presents their descriptive statistics.

Table 1: Summary of variables

Variables	**Sources**	**Expected sign**
FDI inflows (FDI)	UNCTAD	+/-
Private investment (PRIVI)	IMF	
Public investment(PUBI)	IMF	+/-
Inflation (INF)	IMF	-
Exchange rate(EXRAT)	IMF	+/-
Political instability (POSTAB)	Policy IV	-
Productivity (PRDTY)	Penn World Table	+
Financial developement (FINDEV)	WDI World Bank	+
Debt (DEBT)	WDI World Bank	+/-
Export diversification	WDI World Bank	+
Manufacturing value added	WDI World Bank	+
Services value added	WDI World Bank	+
Agricultural value added	WDI World Bank	-
Corruption	Transparency international	-

Source: databases mentioned above and compilation by the authors.

Table 2: Summary of descriptive statistics

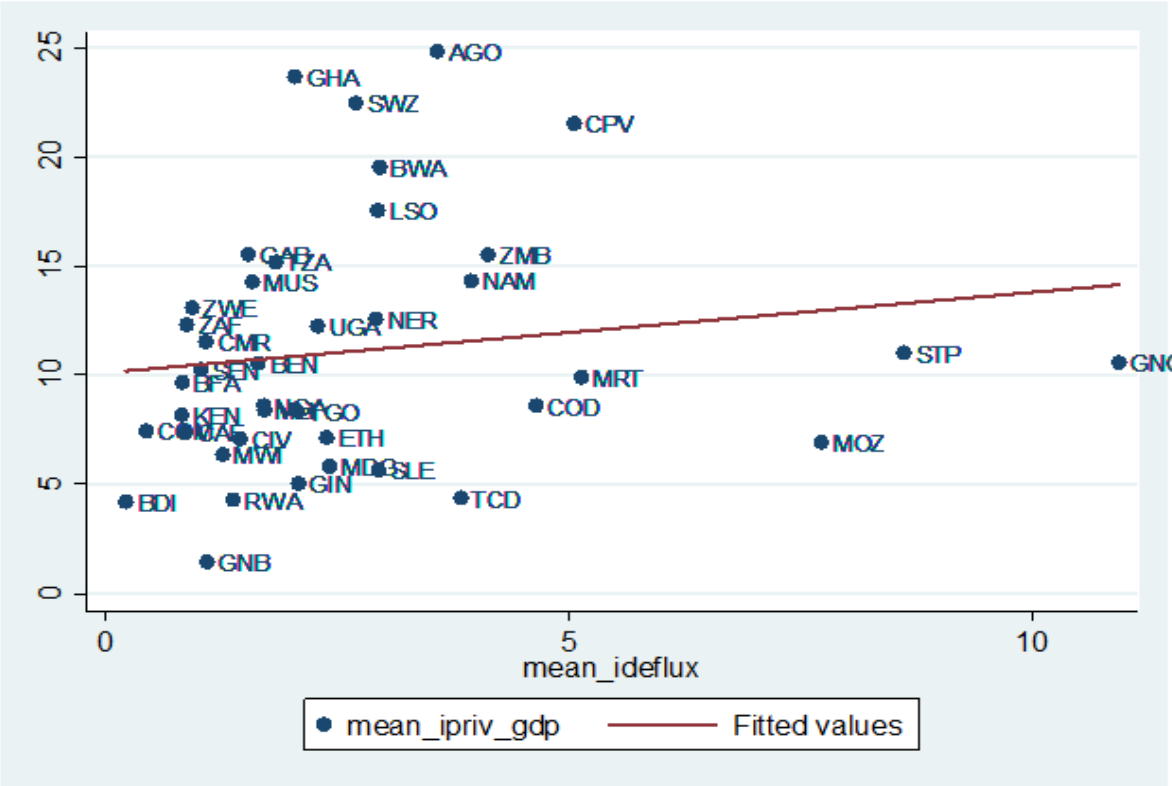
Variables	**N**	**mean**	**sd**	**min**	**max**
FDI	1,464	2.659	5.282	-14.53	72.79
PRIVI	1,520	11.09	7.879	0.000837	60.68
PUBI	1,520	5.729	4.727	0.00144	36.34
INF	1,433	44.07	656.7	-72.73	23,773
EXRAT	1,482	131.2	108.6	28.50	1,954
FINDEV	1,346	15.82	15.24	0.403	151.0
POSTAB	1,316	0.689	1.612	0	10
PRDTY	1,326	0.259	0.302	0.0203	1.876
DEBT	1,393	49.72	40.46	0	300
EXPDIV	1,072	4.414	0.965	1.784	6.336
COR	1,182	35.47	16.73	10	82
MANVA	1,210	11.20	6.048	0.233	35.22
SERVA	1,257	44.94	10.14	18.91	77.02
AGRVA	1,362	24.02	14.07	1.294	71.76

Source: authors calculation from databases.

Table 2 presents a summary of descriptive statistics from our sample. We observe that the maximum value of private investment is 60.68% of GDP. This value corresponds to Angola's private investment in a particular year (1998). We can explain this 60.68% by the oil boom followed by privatisation that took place in this country at the end of the 1990s.

Figure 1 plots the relation between the average ratio of private investment to GDP (horizontal axis) and the average ratio of FDI inflows to GDP (vertical axis), for all the countries, during the period under study. We observe a positive correlation between the ratio of private investment and the ratio of inward FDI. We can also clearly identify three outliers: Equatorial Guinea (GNQ), Sao Tome et Principe (STP) and the Mozambique (MOZ).

Figure 1 : Outliers identification by means calculation.



Sources: UNTCAD, IMF.

3 Empirical methodology

3.1 Econometric model

We make an estimation on panel data for 40 Sub-Saharan African countries over the period 1980-2017. Traditional panel econometrics usually rely on microeconomic data that typically

include thousands of households or hundreds of enterprises, which are surveyed over a few survey rounds. However, this study uses macroeconomic variables that are collected for several African countries over a significant number of years.

The use of panel data sets with these characteristics presents new challenges. To this end, the study uses error-correction estimators on panel data developed by Pesaran and Smith (1995) and Pesaran et al (1999 and 2001): the Pooled Mean Group (PMG), the Mean Group (MG) and the Dynamic Fixed Effects (DFE). These econometric methods fit with our purposes for two reasons. Firstly, like ARDL (Autoregressive Distributed Lags) which allows to estimate both short- and long-term coefficients, thanks to these methods, we can consider the long-run relationship separately from the short-run adjustment, even if the long and short-term effects are estimated jointly. As we aim to identify and distinguish the short from the long-term dynamics between private domestic investment and FDI, these methods are the most adapted. Second, since this family of estimators offers more freedom in the choice of dynamics and the degree of heterogeneity, we can consider possible heterogeneity between countries in our sample. More generally, one of the main advantages of these econometric methods is that, contrary to Hansen, Philipps and Johansen (1990) who argue that a long-term relationship can only occur between variables of the same order of integration, Pesaran and Shin (1999) note that these estimators can be used even if the variables are of a different order of integration, i.e. I(0), I(1) or mixed.

In our model some variables such as FDI flows may suffer from the endogeneity problem due to double causality. Reverse causality may come from the fact that FDI may influence private domestic investment and/or the latter may also influence FDI (Choe, 2003; Kamaly, 2002; Ndikumana and Verick, 2008; Marc et al, 2012). Pesaran and Shin (1999) noted that the PMG produces consistent estimates despite the possibility of endogeneity, as it includes lags of dependent and independent variables. They argue that, in the context of Autoregressive Distributed Lag Models (ARDL), the endogeneity problem can be easily handled by the PMG when the regressors are I(1), subject to certain restrictions (such as a unique cointegrating relationship between the variables). In this case, Pesaran and Shin (1999) show that potential endogeneity can be handled by the lag structure by projecting the errors on the regressors.

The basic assumptions for the consistency of these estimators are the following: the existence of a long-term relationship between the dependent and explanatory variables, the error terms are serially uncorrelated and are distributed independently of the regressors. The relative size of T and N is crucial, as the use of these estimators requires that the individual (N) and time (T) dimensions be relatively large.

We consider the following ARDL model (p, $q_1, q_2, ..., q_k$) :

$y_{it} = \sum_{j=1}^{p} \lambda_{it} y_{i,t-j} + \sum_{j=0}^{q} \delta'_{ij} X_{i,t-j} + \mu_i + \xi_{it}(1) i = 1, 2..., N; t = 1, 2..., T$

Where y_{it} denotes the format dependent variables (k x 1) and X_{it} a matrix of explanatory variables, μ_i represents the individual fixed effects, λ_{ij} are coefficients assigned to the delayed dependent variables ($y_{i,t-j}$), δ'_{it} are coefficient vectors (k x 1). If the variables in equation (1) are cointegrated, then the equation can be reformulated to obtain a panel error-correction model in which the short-term and long-term dynamics between these variables are clear, as shown in the following equation:

$$\Delta y_{it} = (\phi_i y_{t-1} + \beta'_i X_{it}) + \sum_{j=1}^{p-1} \lambda^*_{ij} y_{i,t-j} + \sum_{j=0}^{q-1} \delta^{*\prime}_{ij} X_{i,t-j} + \mu_i + \xi_{it} \quad (2)$$

where $\Delta y_{it} = y_{it} - y_{i,t-1}, \phi_i = -(1 - \sum_{j=1}^{p} \lambda_{ij}), \beta_i = \sum_{j=0}^{q} \delta_{ij}, \lambda^*_{ij} = -\sum_{m=j+1}^{p} \lambda_{im}$,
$\delta^*_{ij} = -\sum_{m=j+1}^{q} \delta_{im}$

By stacking all the observations for each individual in the panel, equation (2) can be reparameterized and expressed as follows:

$$\Delta y_i = \phi_i y_{i,t-1} + X_i \beta_i + \sum_{j=1}^{p-1} \lambda^*_{ij} \Delta y_{i,-j} + \sum_{j=0}^{q-1} \Delta X_{i,-j} \delta^*_{ij} + \mu_i \tau + \xi_{it} \quad (3)$$

Where $y_i = (y_{i1}, y_{i2}, y_{i3})'$ is a matrix of format (Tx1), $X_i = (X_{i1}, X_{i2}, X_{i3})'$ a matrix of format (Txk) and $\tau = (1, 1 \ldots, 1)'$ a matrix of format (Tx1). The parameter ϕ_i is the error correction speed of the adjustment term. If $\phi_i = 0$, so there is no evidence of a long-term relationship between the dependent variable and the independent variables. Pesaran et al (1995) assume that equation (3) is stable. This hypothesis ensures that $\phi_i < 0$, i.e. that the roots of the operator polynomial $1 - \sum_{j=1}^{p} \lambda_{ij} z^j = 0$ lie outside the unit circle reflecting the existence of a long term relationship between y_{it} and X_{it} defined by:

$$y_{it} = -(\beta'_i / \phi_i) X_{it} + \eta_{it} \quad (4)$$

with η_{it} a stationary process.The long-term coefficient is given by $\theta_i = \beta_i / \phi_i$.

Our empirical equation is as follows:

$$\Delta PRIVI_{it} = \mu_i + \varphi_t + \phi_i PRIVI_{i,t-1} + \beta_1 FDI_{it} + \beta_3 PUBI_{it} + \beta_4 INF_{it} + \beta_5 FINDEV_{it}$$

$$+ \beta_6 EXRAT_{it} + \beta_7 DEBT_{it} + \beta_8 EXPDIV_{it} + \beta_9 PRDTY_{it} + \beta_{10} POSTAB_{it} + \beta_{11} COR_{it}$$
$$+ \sum_{j=0}^{q-1} \delta^{*\prime}_{ij} \Delta X_{i,\,t-j} + \xi_{it} \qquad (5)$$

The short term dynamics is given by:

$$\sum_{j=0}^{q-1} \delta^{*\prime}_{ij} \Delta X_{i,\,t-j} = \delta_1 \Delta FDI_{it} + \delta_2 \Delta PUBI_{it} + \delta_3 \Delta INF_{it} + \delta_4 \Delta FINDEV_{it} + \delta_5 \Delta EXRAT_{it}$$

$$+ \delta_6 \Delta DEBT_{it} + \delta_7 \Delta EXPDIV_{it} + \delta_8 \Delta PRDTY_{it} + \delta_9 \Delta POSTAB_{it} + \delta_{10} \Delta COR_{it} (6)$$

with y_{it}, our dependent variable $PRIVI_{it}$ private investment.

ϕ_i captures the error correcting component, β_i captures the long run equilibrium relationships between our dependant and independents variables. $\sum_{j=0}^{q-1} \delta^{*\prime}_{ij} \Delta X_{i,\,t-j}$ capture short run dynamics effects measured by $\delta^{*\prime}_{ij}$, the parameters associated with the matrix X of dependant variables. The error correction term, is a measure of the speed at which the model returns to equilibrium.

Variables description:

- FDI_{it} inflows of foreign direct investment towards a country i in year t in percentage of GDP,
- $PUBI_{it}$ flows of public investment inside country i for year t in percentage of GDP,
- INF_{it} inflation in country i for year t,
- $FINDEV_{it}$ financial development, measured by bank credit accommodated in country i during year t,
- $EXRAT_{it}$ real effective exchange rate of country i in year t,
- $DEBT_{it}$ public debt of country i in year t,
- $PRDTY_{it}$ total factor productivity (proxy of labor productivity) of country i in year t,
- $EXPDIV_{it}$ export diversification of country i for year t,
- $POSTB_{it}$ political instability in country i for year t, and
- COR_{it} corruption in country i for year t.

3.2 Panel stationarity tests

The main problem in panel data, as in time series, is the consequences of regression involving non-stationary and non-cointegrated variables. Given that it is quite rare to find level-stationary macroeconomic series (Nelson and Plosser, 1982), and given that our study uses macroeconomic variables that are collected for several African countries (40) over a significant number of years (38 years), it is very likely that our variables follow a non-stationary unit root process. Unit root tests are therefore a prerequisite for any analysis of the cointegration relationship, especially since the problem of spurious regressions also arises for regressions in panel data. We implement unit root tests of Im, Pesaran Shin -IPS- and Maddala Wu -MW.

The IPS test uses a modification of the Dickey-Fuller regression (ADF). It is based on the following regression:

$$\Delta y_{it}^{*} = \rho_i y_{t-1}^{*} + \sum_{j=1}^{k} \phi_{i,j} \Delta y_{i}^{*}, _{t-1} + \zeta_{i,t}^{*}, i = 1, 2, .., N; t = 1, 2, .., T \tag{7}$$

where $y_{it}^{*} = y_{it} - \bar{y}_i$. Under the null hypothesis, the time series are non-stationary, whereas the alternative assumes the opposite. The assumptions can be written as follows:

H_0: ρ_i= 0 for all i

H_1: $\rho_i < 1$ for at least one i, i= 1,2,..,N_1;$\rho_i = 0$; $i = N_1 + 1, N_1 + 2, .., N$.

3.3 Panel cointegration tests

The conditions for using PMG, MG and DFE estimators is that variables need to be cointegrated. The cointegration analysis allows us to identify one or more long term relationships between at least two variables. The concept of cointegration stipulates that at least two variables are involved in a long term equilibrium relationship and that any imbalance in this relationship generates a correction mechanism by which one or more variables adjust to restore the long term equilibrium. We use Kao's test based on the following long-run relationship :

$$y_{i,t} = \theta_i + \alpha_i^1 x_{i,t}^1 + ... + \alpha_i^m x_{i,t}^m + ... + \alpha_i^M x_{i,t}^M + \zeta_{i,t}. \tag{8}$$

i=1,....,N ; t=1,....,T ; m=1,....,M. $E(\zeta_{i,t}, \zeta'_{j,t}) = \sigma_\zeta^2$ if i=j and 0 if $i \neq j$.

The estimated residuals are represented as follows:

$$\zeta_{i,t} = \rho_i \zeta_{i,t-1} + \mu_{i,t} \tag{9}$$

The null hypothesis that there is no co-integration between the variables is given by: $H_0 : \rho_i = \rho = 1$.

4 Empirical results

4.1 Stationarity and cointegration test results

Tables 3 and 4 provide results of IPS (1997), Maddala and Wu (1999) unit root test for variables stationarity. Table 5 provides results of Kao's cointegration test. IPS test shows that the variables private investment (PRIVI), FDI flows (FDI), public investment (PUBI), inflation (INF), exchange rates (EXRAT), financial development (FINDEV), export diversification (EXPDIV), Corruption (COR), manufacturing value added (MANVA), service value added (SERVA), agricultural value added (AGRVA) are stationary in level. Variables political instability (POSTAB), productivity (PRDTY), debt (DEBT) are stationary in first difference. Stationarity of our variables prevents us from having biased results due to spurious regression. We also used the Maddala and Wu stationarity test which confirmed the results we obtained with the IPS test (see table 4).

Output of Kao cointegration reports values of all test statistics with their respective p-values. All test statistics reject the null hypothesis of no cointegration in favour of the alternative hypothesis of the existence of a cointegrating relation among the variables. A cointegration of variables allows us to identify the long-term dynamics that we are seeking to highlight in this study.

Table 3 : Panel unit root test: IPS (1997)

Variables	Level		First difference	
	No trend	trend	No trend	trend
PRIVI	-2.1439	-2.7841	-	-
FDI	-3.3321	-4.0070	-	-
PUBI	-2.2584	-2.7325	-	-
INF	-4.6842	-4.2568	-	-
FINDEV	-3.5127	-3.2452	-	-
EXRAT	-2.3019	-2.4588	-	-
DEBT	-1.3483	-1.1975	-5.7545	-4.0691
PRDTY	-1.3649	-2.1076	-6.5420	-6.8851
POSTAB	-1.6792	-3.6628	-7.4829	-7.4427
EXPDIV	-2.1955	-3.0588	-	-
COR	-2.1565	-2.6917	-	-
MANUVA	-2.4842	-2.5447	-	-
SERVA	-2.1955	-2.5082	-	-
AGRVA	-2.2969	-4.9081	-	-

Source: Authors' calculation from the databases.

These value are compared to the following critical value: no trend a 1% *(-1.81), 5% (-1.73), 10% (-1.68). With trend at 1% (-2.44), 5% (-2.36), 10% (-2.32). These critical values are available in IPS 1997*

.

Table 4: Maddala and WU (1999) unit root test

Variables	Level		First difference	
	ADF-Pm	PP-Pm	ADF-Pm	ADF-Pm
PRIVI	20.5279***	7.3203***	-	-
FDI	38.6229***	26.6123***	-	-
PUBI	21.0083***	6.1456***	-	-
INF	60.2686***	52.9623***	-	-
FINDEV	11.7636***	11.1337***	-	-
EXRAT	21.1781***	8.0024 ***	-	-
DEBT	8.9583***	-0.2798	68.7178***	65.6386 ***
PRDTY	10.8577***	-0.0464	91.2051***	110.8250***
POSTAB	13.1527***	0.6875	106.5921***	143.7170***
EXPDIV	19.1651***	6.9225***	-	-
COR	5.4532***	6.9225***	-	-
MANVA	15.5890***	6.3799***	-	-
SERVA	19.1651***	6.9831 ***	-	-
AGRVA	21.2620***	8.1349 ***	-	-

Source: Authors' calculation from the databases.
*Significant at : *** 1% ,** 5% , * 10%*

The results from Maddala and Wu test confirm that private investment (PRIVI), FDI flows (FDI), public investment (PUBI), inflation (INF), exchange rates (EXRAT), financial development (FINDEV), export diversification (EXPDIV), corruption (COR), manufacturing value added (MANVA), service value added (SERVA), agricultural value added (AGRVA) are stationary in level. Political instability (POSTAB), productivity (PRDTY), debt (DEBT) are stationary in first difference.

Table 5 : Panel cointegration test: Kao test

	Statistics	P-value
Modified Dickey-Fuller t	-6.2628	0.0000
Dickey-Fuller t	-6.2835	0.0001
Augmented Dickey-Fuller t	-3.7188	0.0001
Unadjusted modified Dickey-Fuller t	-8.0821	0.0000
Unadjusted Dickey-Fuller t	-6.8743	0.0000

Source: Authors' calculation from the databases.

4.2 Results analysis

4.2.1 Diverging impact on the short term and the long term

Table 6 contains the results of PMG, MG and DFE estimates and Hausman's test to measure comparative effectiveness and consistency between them. The Hausman's test indicates that the PMG estimation is the most efficient estimator and we will use and discuss this estimation technique in the rest of the paper. MG and DFE estimations were also carried out and are available upon request. Our findings underline clear differences between short-term and long-term effects. We find that short-term dynamics are complex: the impact of FDI on private investment is either negative, or non significant (with MG and DFE). Long-term dynamics are much clearer, with consistently significant positive effects on private investment.

Our baseline results in table 7 (column 1) confirm that macroeconomic stability and the quality of the institutional framework are important determinants of private investment in developing countries. In the short term, a high rate of inflation and an appreciation of the currency have a positive effect on domestic investment, mainly reflecting cyclical effects and for the latter the strength or catching up of the economy. Financial development and productivity have a positive effect on domestic investment, as well as export diversification, while high public debt and corruption discourage it.

In the long term, inflation deters private investment, as well as the accumulation of public debt, in line with theory. This stems from the crowding-out effect of public investment, since public investment in developing countries is for a large part financed by public debt, given limited fiscal resources mobilization. In fact, an excessive accumulation of fiscal deficits can have a negative impact on private investment by pushing interest up. We still observe the positive effect of financial development, productivity and export diversification. Corruption also deters private investment by increasing the cost of economic operations and by creating economic distortions. Financial development is associated with higher private domestic investment. As expected, productivity has strongly positive effect on private investment as it plays an important role in the investment decisions of entrepreneurs, especially in developing economies with more labor-intensive and less capital-and innovation-intensive sectors than advanced economies.

When it comes to the impact of foreign direct investment, our results indicate that it has a significant crowding-in effect on domestic investment in long term and a weakly crowding out effect in the short term. Our results are consistent with the findings of Agosin and Mayer (2000) for Asian countries in particular, with the only difference that we use private domestic investment rather than total domestic investment. These results are also consistent with the findings of De

Mello (1999) and Borensztein et al. (1998) for groups of developing countries in Latin America and Asia.

In the short term however, the ability of the private sector to adapt to FDI inflows may be slowed down by low human capital accumulation, market distortions, infrastructure bottlenecks and less favourable business climates found in Sub-Saharan African economies. These weaknesses may limit the capacity of local firms to adapt and face competition from incoming foreign investment in the short run, inducing temporary negative effects on private investment.

This long-term crowding-in effects of FDI on private investment are in line with empirical findings for developing countries such as Kottaridi and Stengos (2010).

4.2.2 FDI public investments composition effects

In the baseline, we find that public investment has opposite effects on domestic private investment in the short and long-run. In the short run, public investment may create business opportunities for the private sector in times of economic growth. It affects private investment negatively in the long run, insofar as it is associated with higher fiscal deficits and higher public debt. These imbalances may exert an upward pressure on interest rates, increase expectations of future tax increases and risks associated with state insolvency and financial instability. In countries with strong interactions between the public and the banking sectors (sovereign-bank nexus), as well as significant information asymmetries between borrowers and creditors, high fiscal deficits and levels of public debt may also limit available financing for the private sector.

We then interacted public investment with FDI to identify the role of the capital inflows linked to investments in the public sector and their impacts on domestic private investment (our sample covers a period of development of public-private partnerships, see column 2 of table 7). Interestingly, we find a crowding-in effect in the long run, reflecting a positive impact of these composition effects on domestic private investment. This result also shows up in the short term estimation (see column 2 table 7). Several studies based on geographical economics and endogenous growth theory also show that the combination between the stock of public infrastructure and FDI can potentially create agglomeration effects and inter-firm externalities that stimulate domestic investment (Kinda, 2007; Barro, 1990; Rieber, 1999). A large number of countries in Sub-Saharan Africa welcome foreign participation in their public investments, particularly in the financing and provision of infrastructure services (UNCTAD, 2018). Increasing pressures on public budgets and general concern about the quality of services provided by operating entities have led to an explosion of FDI in infrastructure in these countries. These FDI inflows tar-

get sectors were traditionally devoted to the public sector and large state-owned enterprises to provide infrastructure such as seaports and airports, telecommunications, electricity, railways, roads, urban infrastructure, industrial parks, mining, etc.

We also explored the relationship between national economic structure and private investment and possible FDI impacts. Because of lack of available sectoral FDI decomposition data, we use export diversification and sectoral breakdown of GDP between agriculture, manufacturing and services. These breakdowns give us a proxy of the economic diversification among activities (as we cannot split FDI into the three main sectors of activity). As posited in the literature, our estimations in column (1) table 7 provide some evidence that private investment is boosted by exports diversification. More decisively, the positive impact of FDI on private investment is significantly enhanced by export diversification, confirming the importance of FDI diversification itself to reap cross-sectoral benefits.

In column (3) table 7, we further investigate the impact of currency appreciation, with an interaction between FDI and real effective exchange rate which confirm a "Dutch disease" effect as highlighted by Cordon and Neary (1982) and a worsening of terms of trade as stated by Apergis et al. (2006).

In column (4) table 7, interacting FDI with sectoral decompositions provides more detailed evidence of the effects of economic diversification: the impact of FDI is magnified when the share of the secondary sector (industry) and tertiary sectors (services) increase in GDP. Given data limitation on sectoral FDI, we cannot conclude on the impact of FDI diversification itself, but these results are consistent with literature streams linking economic diversification, investment and economic growth. Symmetrically, FDI in less diversified countries (dependent on commodity output and exports in resource rich countries), may provide less private investment and economic diversification opportunities, consistently with empirical work on the oil curse (UNCTAD, 2018 and Cordon and Neary, 1982) .

5 Robustness checks

We investigate whether our results are robust to a split of sample by singling out commodity exporting countries, and withdrawing outliers' nations, and to a different period span by examining the effect of the 2008's financial crisis.

As some countries are outliers (Cabo Verde, Equatorial Guinea, Eswatini and Sao Tome and Principe, see figure 1), we have excluded them to test the sensitivity of our results. In table 8, Column 4 contains the results obtained for the baseline sample without these countries. Our

results are robust to this specification.

Then, we examine the extent to which our baseline results vary according to the level of natural resource exports by re-estimating the model for natural resource-exporting and non-natural resource-exporting countries. Securing the supply of raw materials and other natural resources has been recognized as an important objective of foreign direct investment from multinational firms. For these types of resource-seeking or rent-seeking FDI, a weaker correlation with domestic investment is to be expected than in other countries. Moreover, the literature on the Dutch disease and the resource "curse" for instance show that the abundance of natural resources limits the ability of FDI to stimulate domestic investment. To capture this type of economic structure, we introduce an export structure threshold in our sample: we classify countries where manufactured exports account for less than 25 per cent of total exports as resource-rich economies.

Crowding-in effects of FDI are significantly higher in non-natural resource-exporting countries than in resource-exporting countries under long-run, as shown from the comparisons of columns (2) and (3) in table 8.

As for the interaction of FDI with the export diversification index, we consistently find a long-term crowding-in effect. However this impact is more important for non-natural resource exporting countries compared to natural resource exporting countries. This result reflects the fact that the level of diversification of economies conditions the magnitude of the impact of FDI on domestic private investment in Sub-Saharan African countries. As natural resource-exporting countries are relatively more concentrated and less diversified than non resource-exporting countries in Sub-Saharan Africa (UNCTAD, 2018), FDI in these countries tends to be concentrated in resource-exporting sectors and spread very little across the economy and therefore has a low probability of having a strong impact on domestic private investment. In countries that do not export natural resources, FDI tend to be spread over several sectors and therefore have a high probability of impacting the activity of local firms.

When it comes to the interaction of FDI with the real effective exchange rate, we consistently find a negative interaction term suggesting that exchange rate appreciation reduces the positive impact of FDI inflows on private investment in the long run for both natural resource-exporting and non-natural resource-exporting countries.

In table 9, we test the robustness of our results in different sub-periods of time. Since 2008 global economic crisis induced major shocks to economies. We investigate whether the crisis has impacted the relationship between FDI and domestic private investment. In 2008, international investment experimented a sharp slowdown. More precisely, the decline in global FDI may result

from two major factors affecting domestic and international private investment:

1. the reduced ability of multinational firms to invest because of constraints on access to financial resources;

2. a decreasing propensity to invest in developed countries, source economies of FDI inflows towards developing countries.

To test this, we consider the pre-crisis period 1980-2007(column 2) and the post-crisis period 2008-2017 (column 3) separately. Our results are robust to this specification.

6 Conclusion and policy recommendation.

This paper investigates whether the FDI inflows to Sub-Saharan African countries lead to crowding-in or crowding-out effects on private domestic investment, based on PMG, MG and DFE estimations on a panel of 40 countries over the period 1980-2017. Our results bring to light that FDI inflows have substantial crowding-in effects in the long run: a 1% increase in the ratio of FDI to GDP is associated with a 0.3% increase in the rate of private domestic investment. In the short–run, we find weak evidence that FDI inflows have crowding-out effects. In the short term, competition effects dominate (there are no domino effects), but in the long term the positive effects prevail. The positive benefits of FDI on private investment may take time to materialize because of by implementation lags, domestic capacity to respond to competition, low absorption capacity.

Our study also strives to disentangle effects of FDI on private and public domestic investment. Our estimations show that FDI combined with higher public investment may enhance private domestic investment in the long run. Such positive composition effects may however be undermined by crowding-out effects from higher fiscal deficits and debt, as well as by political instability and corruption. We also find weak eidence that FDI inflows may exacerbate crowding out effects of private investment of real ffective exchange rate appreciation..

Finally, this research highlights the importance of economic diversification and resource endowments to assess the impact of FDI on private investment. Using an export diversification index, we find evidence that such diversification has a positive effect on private investment, particularly if it is associated with FDI inflows. When interacting FDI with the share of manufacturing and services, we also find that the FDI inflows have greater impact on secondary and tertiary sectors that contribute to economic diversification. To establish robustness of our findings, we checked that the positive impact of FDI on private investment is significantly higher in non-resource ex-

porting diversified countries than in resource exporting countries. This is in line with literature concerns on the impact of FDI in enclaved sectors, such as the extractive sector (oil curse), on economic development.

These findings lead us to qualify the conditions of success for investment promotion policies commonly led in Sub-Saharan countries. First, such policies will likely to be more efficient if they are conducted consistently over the long run with a view to favor economic diversification. Such policies need to maximize spillover effects and intra- and inter-sector connections between FDI and domestic private investment over the long run. This is particularly important in the case of highly concentrated resource-exporting sectors where FDI crowding-in effects on private investment are more limited. National FDI strategies should therefore be based on specific country characteristics (natural resources, labor and capital endowments, and type of FDI).

Second, reallocating public spending in favor of high-yield public investment (e.g. reducing infrastructure bottlenecks or increasing human capital) and leveraging scarce public resources partnerships with the private and international investors are also key. Such promotion policies should also be enabled by structural reforms aiming at improving the business climate for both foreign and domestic investors. Our results also show that financial depth, and in particular access to credit by small and medium enterprises are essential to support domestic investment. The financial sector may play an essential role in channeling international financing and direct investment to support domestic investment and economic growth.

Further research is clearly needed on the dynamics between FDI, public and private investment. It may be increasingly necessary to address the impact of changing geographical origins of Sub-Saharan FDI and private investment, with the rise of China and emerging countries and the relative decline of advanced economies with large remaining stocks of FDI. This globalization process itself may be challenged by digitalization and economic crises (the Covid 19 could result in a 25-40% decline in FDI to SSA in 2020) and to trade relocation or regionalization, with possible structural breaks in associated FDI and private investment patterns far more significant than that of the 2008 crisis covered by our study.

Table 6: Comparison of estimations with the three estimators, in long an short period, for all sample

Variables	PMG	MG	DFE
Long term coefficients			
FDI inflows	0.298***	0.313***	0.381***
	(0.0505)	(0.0695)	(0.0886)
Public investment	-0.093**	-0.110*	-0.089*
	(0.0383)	(0.0594)	(0.0467)
Financial development	0.303**	0.326***	0.256***
	(0.1183)	(0.0931)	(0.0673)
Inflation	-0.086*	-0.079	-0.068
	(0.0453)	(0.0652)	(0.0739)
productivity	0.462***	0.343***	0.456***
	(0.0855)	(0.0902)	(0.1223)
Debt	-0.091*	-0.112	-0.083
	(0.0481)	(0.0803)	(0.1063)
Political instability	-0.260***	-0.236***	-0.197***
	(0.0604)	(0.0524)	(0.0428)
Exchange rate	-0.079*	-0.083	-0.070
	(0.0441)	(0.1092)	(0.0786)
Corruption	-0.081*	-0.103	0.068
	(0.0435)	(0.1144)	(0.0552)
Exports diversification	0.063*	0.079	0.046
	(0.0335)	(0.0607)	(0.0380)
Error correction term	-0.265***	-0.253***	-0.189***
	(0.0562)	(0.0668)	(0.0461)
Short term coefficients			
ΔFDI inflows	-0.093*	-0.079	-0.086
	(0.0510)	(0.0823)	(0.0781)
ΔPublic investment	0.212**	0.183**	0.126**
	(0.0854)	(0.0658)	(0.0435)
ΔFinancial development	0.242**	0.283*	0.223***
	(0.0975)	(0.1530)	(0.0464)
ΔInflation	0.080*	0.095*	-0.079*
	(0.0437)	(0.0530)	(0.0427)
Δ Productivity	0.289***	0.203***	0.315***
	(0.0783)	(0.0550)	(0.0809)
Δ Debt	0.072*	-0.063	-0.046
	(0.0411)	(0.0656)	(0.053)
Δ Political instability	-0.227***	-0.198***	-0.209***
	(0.0527)	(0.0512)	(0.0564)
ΔExchange rate	0.062*	0.116*	0.041
	(0.032)	(0.0613)	(0.0493)
Δ Corruption	-0.085	-0.071	-0.039
	(0.1089)	(0.0578)	(0.0423)
Δ Exports diversification	0.059	0.089*	0.050
	(0.0491)	(0.0481)	(0.0556)
Constant	2.589***	2.739***	2.635***
	(0.4598)	(0.4891)	(0.4879)
Observations	1520	1520	1520
Hausman test	0.156	0.156	0.271
Number of contry	40	40	40

Source: Authors' calculation from the databases.
Standard errors in parentheses ;*** p<0.01, ** p<0.05, * p<0.1

Table 7: Estimation with PMG for the whole sample and in the long run (Baseline results)

Variables	(1)	(2)	(3)	(4)
Long term coefficients				
FDI inflows	0.298***	0.304***	0.309***	0.302***
	(0.0505)	(0.0516)	(0.0521)	(0.0534)
Public investment	-0.093**	-0.103**	-0.098**	-0.108**
	(0.0383)	(0.0430)	(0.0395)	(0.0441)
Financial development	0.303**	0.316**	0.308**	0.312**
	(0.1183)	(0.1220)	(0.1162)	(0.1122)
Inflation	-0.086*	-0.091*	-0.103*	-0.099*
	(0.0453)	(0.0523)	(0.0544)	(0.0535)
productivity	0.462***	0.453***	0.426***	0.501***
	(0.0855)	(0.0808)	(0.0946)	(0.1287)
Debt	-0.091*	-0.082*	-0.107*	-0.118*
	(0.0481)	(0.0440)	(0.0578)	(0.0662)
Political instability	-0.260***	-0.273***	-0.251***	-0.289**
	(0.0604)	(0.0781)	(0.0657)	(0.0642)
Exchange rate	-0.079*	-0.094*	-0.088*	-0.059
	(0.0441)	(0.0525)	(0.0494)	(0.0598)
Corruption	-0.081*	-0.078*	-0.101*	-0.092
	(0.0435)	(0.0410)	(0.0528)	(0.0768)
Exports diversification	0.063*	0.057*	0.073*	0.081
	(0.0335)	(0.0308)	(0.0417)	(0.0543)
FDI*public invest		0.227***	0.238***	0.263***
		(0.0598)	(0.0553)	(0.0571)
FDI*exports divers		0.353***	0.371***	0.388***
		(0.0907)	(0.1042)	(0.0917)
FDI*exchange rate			-0.078*	-0.069*
			(0.0433)	(0.0399)
Manufacturing VA*FDI				0.109***
				(0.0343)
Service VA*FDI				0.178***
				(0.0450)
Agriculture VA*FDI				0.056*
				(0.0312)
Error correction term	-0.265***	-0.229***	-0.253***	-0.218***
	(0.0562)	(0.0509)	(0.0527)	(0.0473)
Short term coefficients				
Δ FDI inflows	-0.093*	-0.089*	-0.106*	-0.099*
	(0.0510)	(0.0503)	(0.0572)	(0.0540)
Δ Public investment	0.212**	0.224**	0.217**	0.209**
	(0.0854)	(0.0909)	(0.0789)	(0.0765)
Δ Financial development	0.242**	0.218**	0.237**	0.225**
	(0.0975)	(0.0784)	(0.0967)	(0.0816)
Δ Inflation	0.080*	0.091*	0.086*	0.095*
	(0.0437)	(0.0481)	(0.0472)	(0.0502)
Δ Productivity	0.289***	0.315***	0.326***	0.325***
	(0.0783)	(0.0875)	(0.0724)	(0.0789)
Δ Debt	0.072*	0.049	0.058	0.083
	(0.0411)	(0.0408)	(0.0471)	(0.0691)
Δ Political instability	-0.227***	-0.232***	-0.243***	-0.213***
	(0.0527)	(0.0515)	(0.0574)	(0.0507)
Δ Exchange rate	0.062*	0.067	0.039	0.056
	(0.0321)	(0.0471)	(0.0453)	(0.0583)
Δ Exports diversivication	-0.085	-0.052	-0.035	-0.047
	(0.1089)	(0.0956)	(0.0783)	(0.0546)
Δ Corruption	0.059	0.082*	0.071*	0.037
	(0.0491)	(0.0458)	(0.0398)	(0.0474)
Δ FDI*public invest		0.284***	0.276***	0.283***
		(0.0671)	(0.0652)	(0.0627)
Δ FDI*exports divers		0.293***	0.283***	0.275***
		(0.0759)	(0.0712)	(0.0719)
Δ FDI*exchange rate			-0.053*	-0.072*
			(0.0306)	(0.0412)
Δ Manufacturing VA*FDI				0.068*
				(0.0369)
Δ Service VA*FDI				0.087*
				(0.0465)
Δ Agriculture VA*FDI				0.035
				(0.0392)
Constant	2.589***	2.785***	2.896***	2.562***
	(0.4598)	(0.5157)	(0.6213)	(0.5338)
Observations	1520	1520	1520	1520
Number of contry	40	40	40	40

Source: Authors' calculation from the databases.
Standard errors in parentheses ;*** p<0.01, ** p<0.05, * p<0.1

Table 8: Results for natural and non natural ressources exporting countries and results without outliers (Equatorial Guinea, Sao Tome and Principe, Cabo Verde, Eswatini).

Variables	(1)	(2)	(3)	(4)
Long term coefficients				
FDI inflows	0.309***	0.418***	0.904***	0.315***
	(0.0521)	(0.0972)	(0.1910)	(0.0810)
Public investment	-0.098**	-0.104**	-0.079*	-0.110**
	(0.0395)	(0.0326)	(0.0443)	(0.0381)
Financial development	0.308**	0.216***	0.189***	0.324**
	(0.1162)	(0.0675)	(0.0542)	(0.1255)
Inflation	-0.103*	-0.245*	-0.078	-0.081*
	(0.0544)	(0.1376)	(0.0652)	(0.0433)
productivity	0.426***	0.413***	0.486***	0.453***
	(0.0946)	(0.0915)	(0.1249)	(0.1065)
Debt	-0.107*	-0.179**	-0.061	-0.152**
	(0.0578)	(0.0675)	(0.0508)	(0.0617)
Political instability	-0.251***	-0.189***	-0.287***	-0.249***
	(0.0657)	(0.0481)	(0.0717)	(0.0682)
Exchange rate	-0.088*	-0.072*	-0.081	-0.073*
	(0.0494)	(0.0389)	(0.0983)	(0.0386)
Corruption	-0.101*	-0.084	-0.057	-0.093*
	(0.0528)	(0.0636)	(0.0721)	(0.0522)
Exports diversivication	0.073*	0.116*	0.206*	0.061*
	(0.0417)	(0.0644)	(0.1113)	(0.0321)
FDI*publique ivest	0.238***	0.304***	0.164***	0.208***
	(0.0553)	(0.0718)	(0.0431)	(0.0569)
FDI*exports divers	0.371***	0.352***	0.978***	0.337***
	(0.1042)	(0.0904)	(0.2309)	(0.0965)
FDI*exchange	-0.078*	-0.053	-0.042	-0.082*
	(0.0433)	(0.05955)	(0.0308)	(0.0448)
Error correction term	-0.253***	-0.282***	-0.387***	-0.268***
	(0.0527)	(0.0587)	(0.0782)	(0.0582)
Short term coefficients				
Δ FDI inflows	-0.106*	-0.045*	-0.083*	-0.110*
	(0.0572)	(0.0248)	(0.0448)	(0.0582)
Δ Public investment	0.217**	0.159**	0.119**	0.225**
	(0.0789)	(0.0593)	(0.0479)	(0.0814)
Δ Financial development	0.237**	0.256***	0.275***	0.242**
	(0.0967)	(0.0691)	(0.0723)	(0.0902)
Δ Inflation	0.086*	0.068	0.048*	0.090*
	(0.0472)	(0.0567)	(0.0265)	(0.0513)
Δ Productivity	0.326***	0.289***	0.252***	0.342***
	(0.0724)	(0.0746)	(0.0673)	(0.0803)
Δ Debt	0.058	0.049	0.064*	0.063
	(0.0471)	(0.0547)	(0.0365)	(0.0484)
Δ Political instability	-0.243***	-0.176***	-0.209***	-0.235***
	(0.0574)	(0.0517)	(0.0558)	(0.0663)
Δ Exchange rate	0.039	0.079*	0.087	0.045
	(0.0453)	(0.0431)	(0.0967)	(0.0505)
Δ Corruption	-0.035	-0.069*	-0.091	-0.050
	(0.0783)	(0.0372)	(0.0758)	(0.0498)
Δ Exports diversivication	0.071*	0.044	0.064	0.076*
	(0.0398)	(0.0338)	(0.0534)	(0.0431)
Δ FDI*public invest	0.276***	0.220**	0.116**	0.264***
	(0.0652)	(0.0578)	(0.0453)	(0.0665)
Δ FDI*exports divers	0.283***	0.186*	0.321**	0.278***
	(0.0712)	(0.0712)	(0.1193)	(0.0698)
Δ FDI*exchange rate	-0.053*	-0.075*	-0.052	-0.061*
	(0.0306)	(0.0396)	(0.0658)	(0.0322)
Constant	2.896***	2.658***	2.674***	2.539***
	(0.6213)	(0.5424)	(0.4362)	(0.4156)

Source: Authors' calculation from the databases.

Standard errors in parentheses ;*** p<0.01, ** p<0.05, * p<0.1

Table 9: Estimation for period 1980-2007 (before 2008's economic crisis) and 2008-2017 (after 2008's crisis)

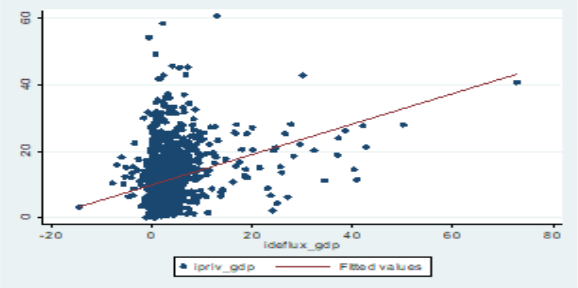
Variables	(1)	(2)	(3)
Long term coefficients			
FDI inflows	0.309***	0.278***	0.288***
	(0.0521)	(0.0591)	(0.0793)
Public investment	-0.098**	-0.089*	-0.118**
	(0.0395)	(0.0470)	(0.0445)
Financial development	0.308**	0.203***	0.315***
	(0.1162)	(0.0821)	(0.0881)
Inflation	-0.103*	-0.109*	-0.081*
	(0.0544)	(0.0521)	(0.0462)
productivity	0.426***	0.598***	0.489***
	(0.0946)	(0.1032)	(0.1137)
Debt	-0.107*	-0.167*	-0.196**
	(0.0578)	(0.0954)	(0.0790)
Political instability	-0.251***	-0.486***	-0.472***
	(0.0657)	(0.0972)	(0.1258)
Exchange rate	-0.088*	-0.090*	-0.084*
	(0.0494)	(0.0470)	(0.0444)
Corruption	-0.101*	-0.078*	-0.062*
	(0.0528)	(0.0421)	(0.0360)
Exports diversivication	0.073*	0.060*	0.079*
	(0.0417)	(0.0310)	(0.0441)
FDI*publique ivest	0.238***	0.286***	0.225***
	(0.0553)	(0.0732)	(0.0578)
FDI*exports divers	0.371***	0.289***	0.249***
	(0.1042)	(0.0831)	(0.0625)
FDI*exchange rate	-0.078*	-0.043*	-0.045*
	(0.0433)	(0.0226)	(0.0252)
Error correction term	-0.253***	-0.345***	-0.289***
	(0.0527)	(0.0756)	(0.0459)
Short term coefficients			
ΔFDI inflows	-0.106*	-0.057*	-0.078*
	(0.0572)	(0.0309)	(0.0412)
ΔPublic investment	0.217**	0.248**	0.214**
	(0.0789)	(0.0887)	(0.0835)
ΔFinancial development	0.237**	0.283***	0.348***
	(0.0967)	(0.0658)	(0.0773)
Δ Inflation	0.086*	0.053*	0.085*
	(0.0472)	(0.0278)	(0.0488)
Δ Productivity	0.326***	0.316***	0.389***
	(0.0724)	(0.0685)	(0.1010)
Δ Debt	0.058	-0.098*	-0.156**
	(0.0471)	(0.0518)	(0.0518)
Δ Political instability	-0.243***	-0.236***	-0.249***
	(0.0574)	(0.0502)	(0.0629)
Δ Exchange rate	0.039	0.043*	0.068*
	(0.0453)	(0.0226)	(0.0359)
Δ Corruption	-0.035	-0.052	-0.049
	(0.0783)	(0.0764)	(0.0764)
Δ Exports diversivication	0.071*	0.040	0.058
	(0.0398)	(0.0363)	(0.0544)
Δ FDI*publique ivest	0.276***	0.207**	0.241**
	(0.0652)	(0.0716)	(0.0899)
Δ FDI*exports divers	0.283***	0.189***	0.216***
	(0.0712)	(0.0675)	(0.0571)
Δ FDI*exchange rate	-0.053*	-0.053*	-0.075*
	(0.0306)	(0.0278)	(0.0419)
Constant	2.896***	3.154***	2.895***
	(0.6213)	(0.5087)	(0.6433)

Source: Authors' calculation from the databases.

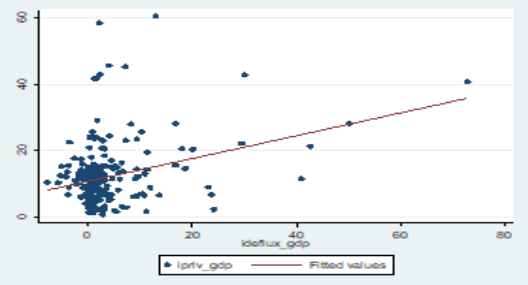
ANNEX

Figure 2: Correlation between FDI and domestic private investment

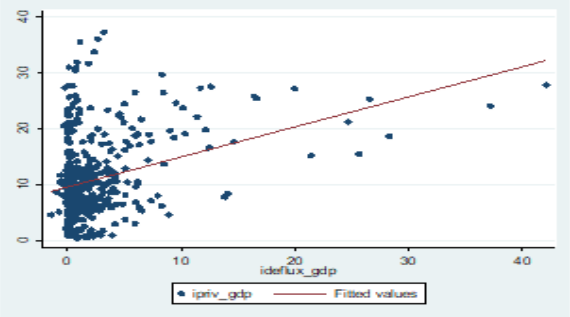
All sub-Saharan African countries



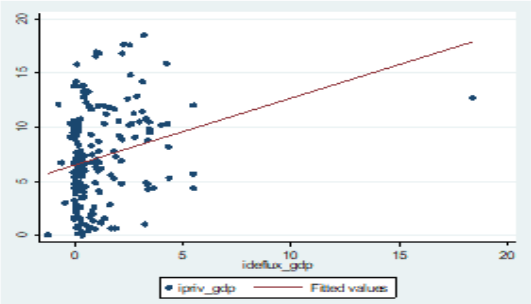
Central African countries



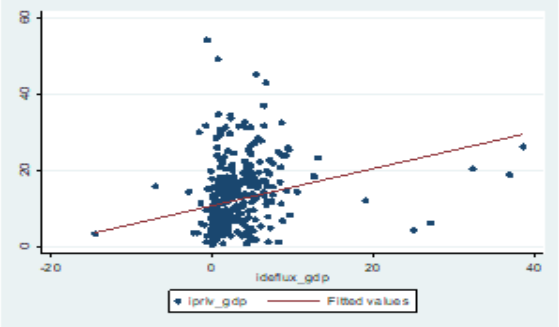
Western African countries



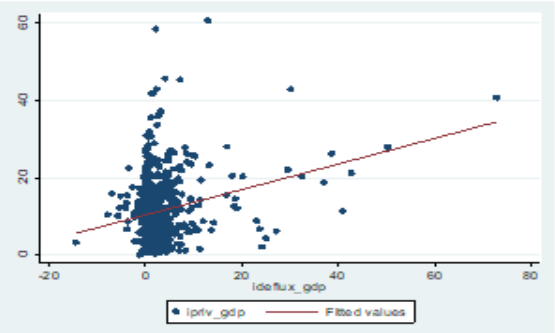
Eastern African countries



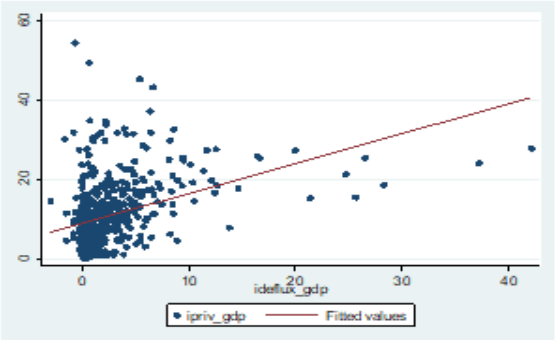
Southern African countries



Natural ressource exporting countries

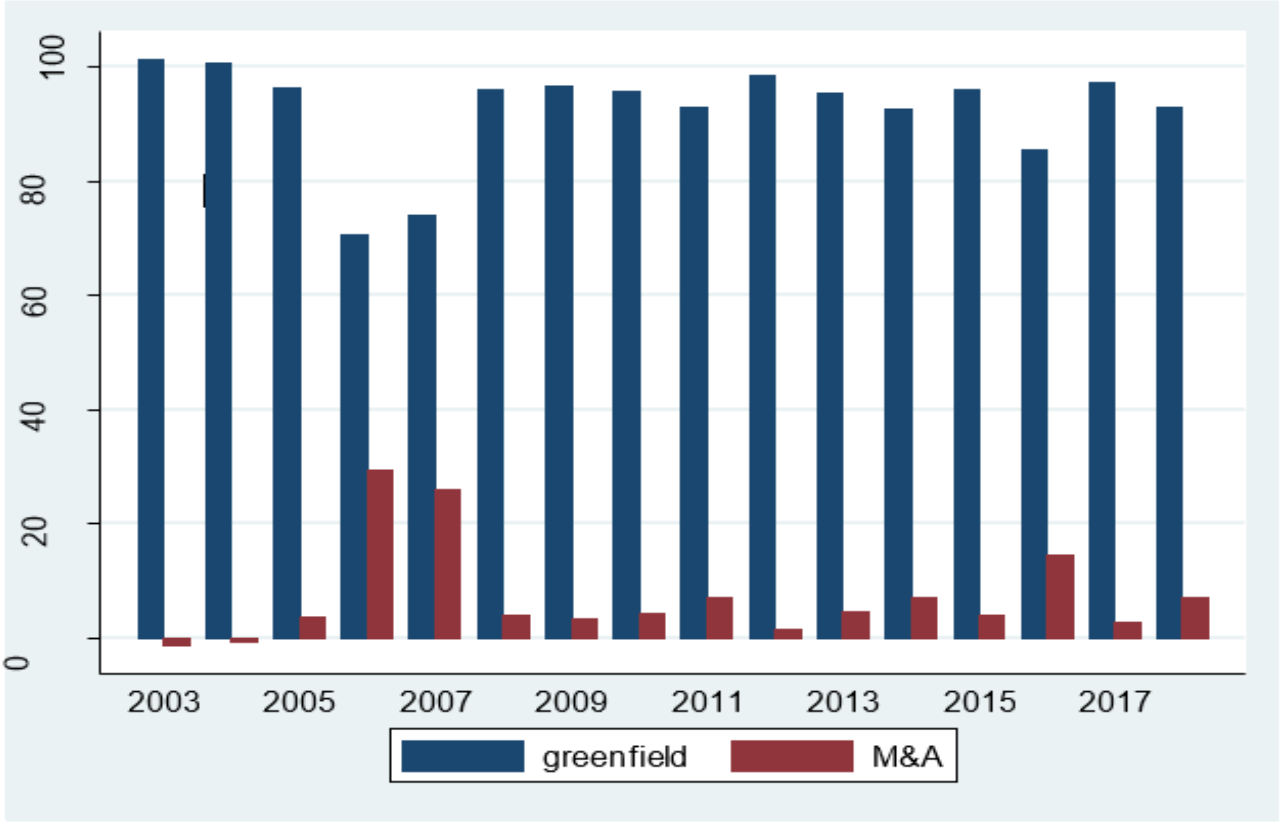


Non natural ressource exporting countries



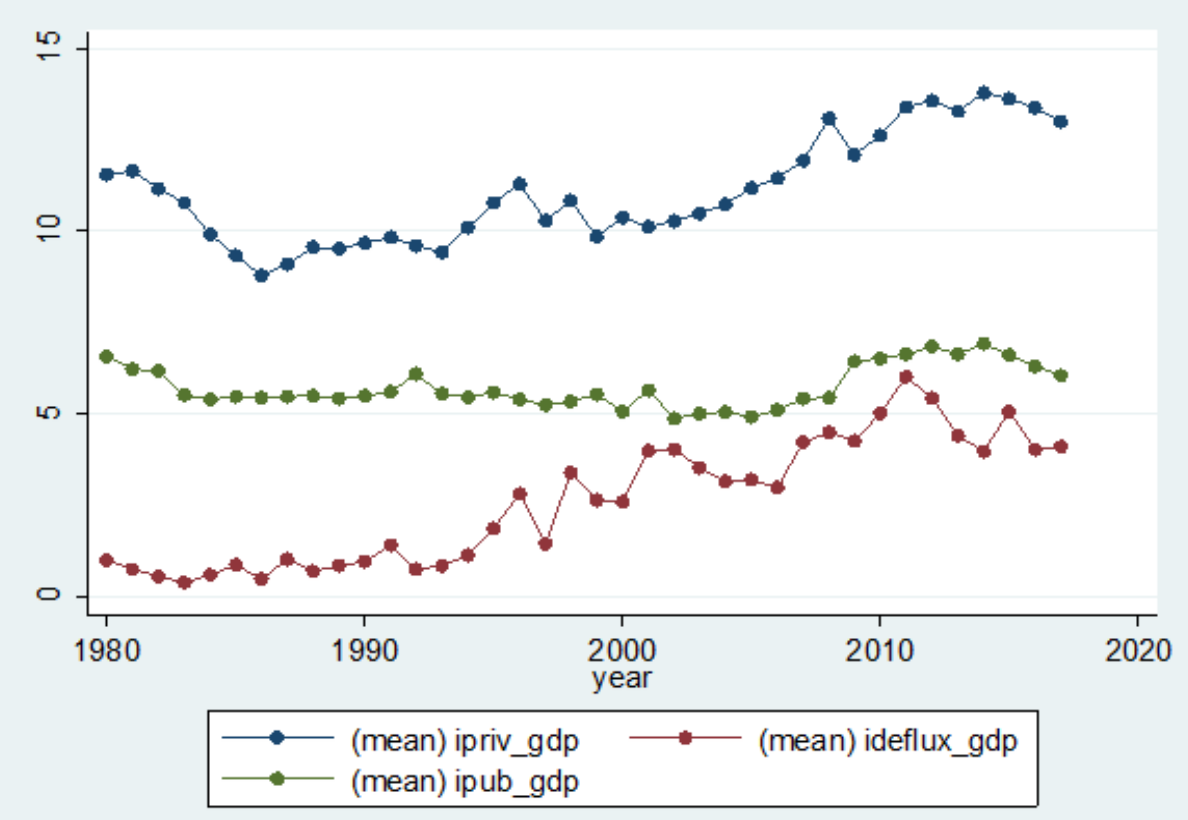
Sources: IMF investment capital stock data, UNTCAD.

Figure 3: Greenfield FDI versus MA FDI.



Source: UNTCAD.

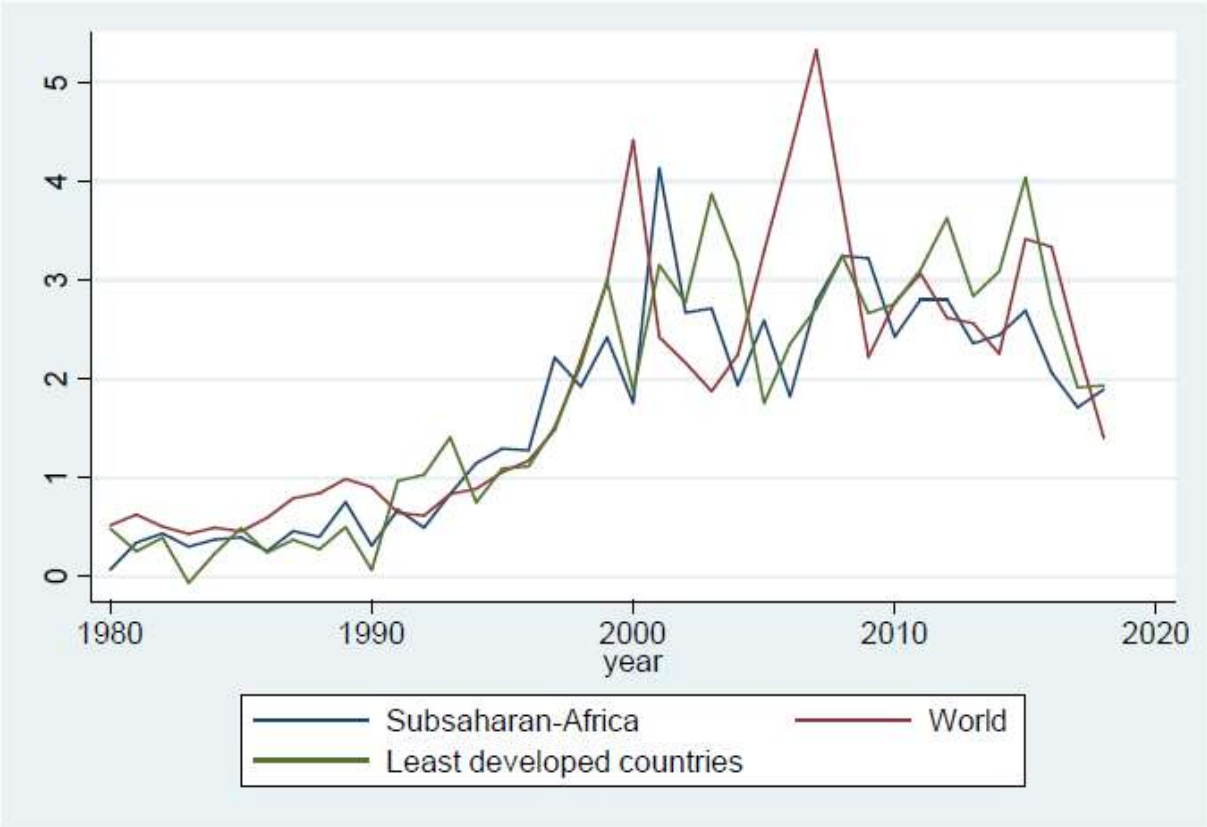
Figure 4: Correlation between FDI, domestic private and public investment



Sources: IMF investment capital stock data, UNTCAD.

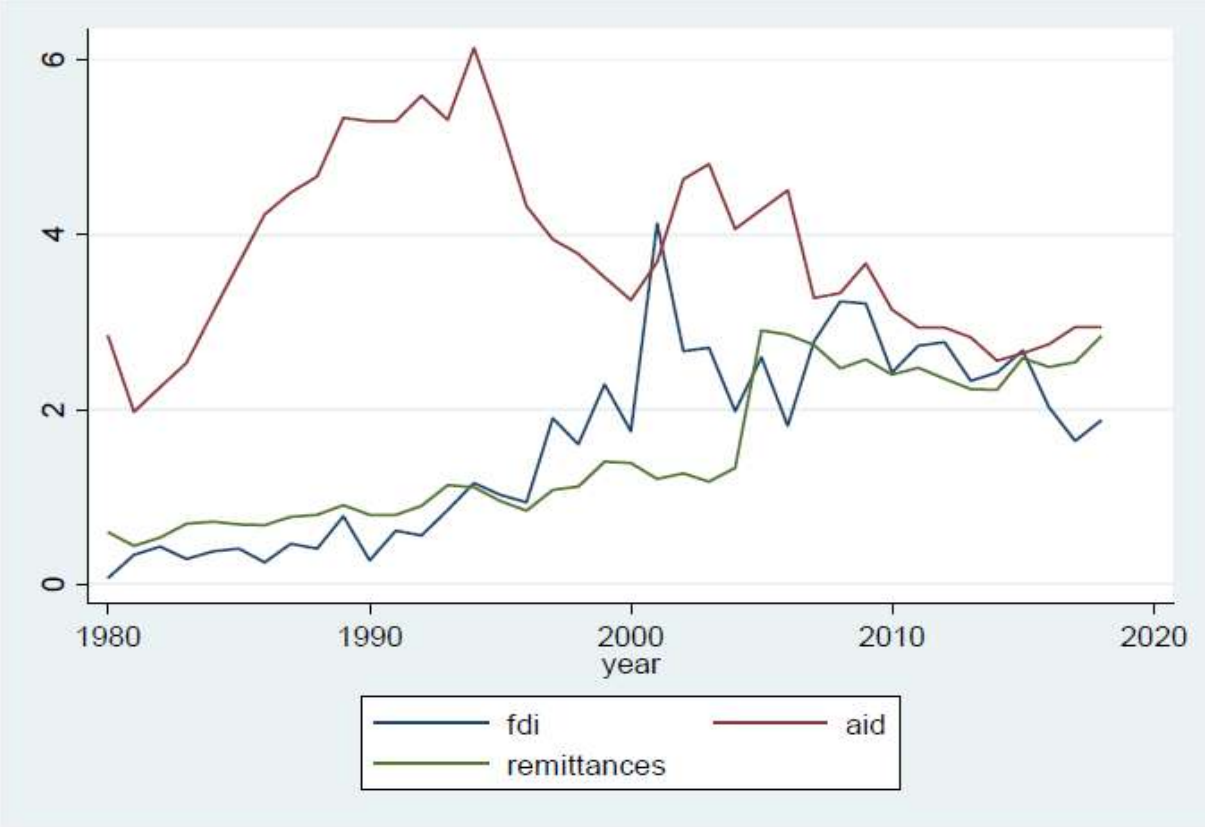
Recent trends of foreign direct investment in Sub-Saharan Africa region This section presents recent trends of foreign direct investment flows in Sub-Saharan African countries. As shown by figure 5, FDI flows to Sub-Saharan Africa have followed a rising trend over the last three decades. FDI is now comparable to development aid, until recently the main source of external financing of countries (figure 6). The rising attractiveness of SSA reflects the improvements in macroeconomic policy and stability, as well as more favorable business climatesbrought by structural reforms carried out since the 1990s by most SSA states, under the guidance of the World Bank and the IMF . These reforms include opening up to international trade, financial liberalization, privatization, simplification of FDI policies and institutional reforms. However, Sub-Saharan Africa's share in global FDI flows remains lower than other emerging and developing regions, partly due to a number of factors: structural barriers in African manufacturing, which have led to a decline in manufacturing flows, small, sluggish and highly fragmented markets, due to high domestic and international transport costs.

Figure 5: FDI inflows to Sub-Saharan African, World and Least developed countries (% of GDP) from 1980 to 2018.



Source: UNTCAD.

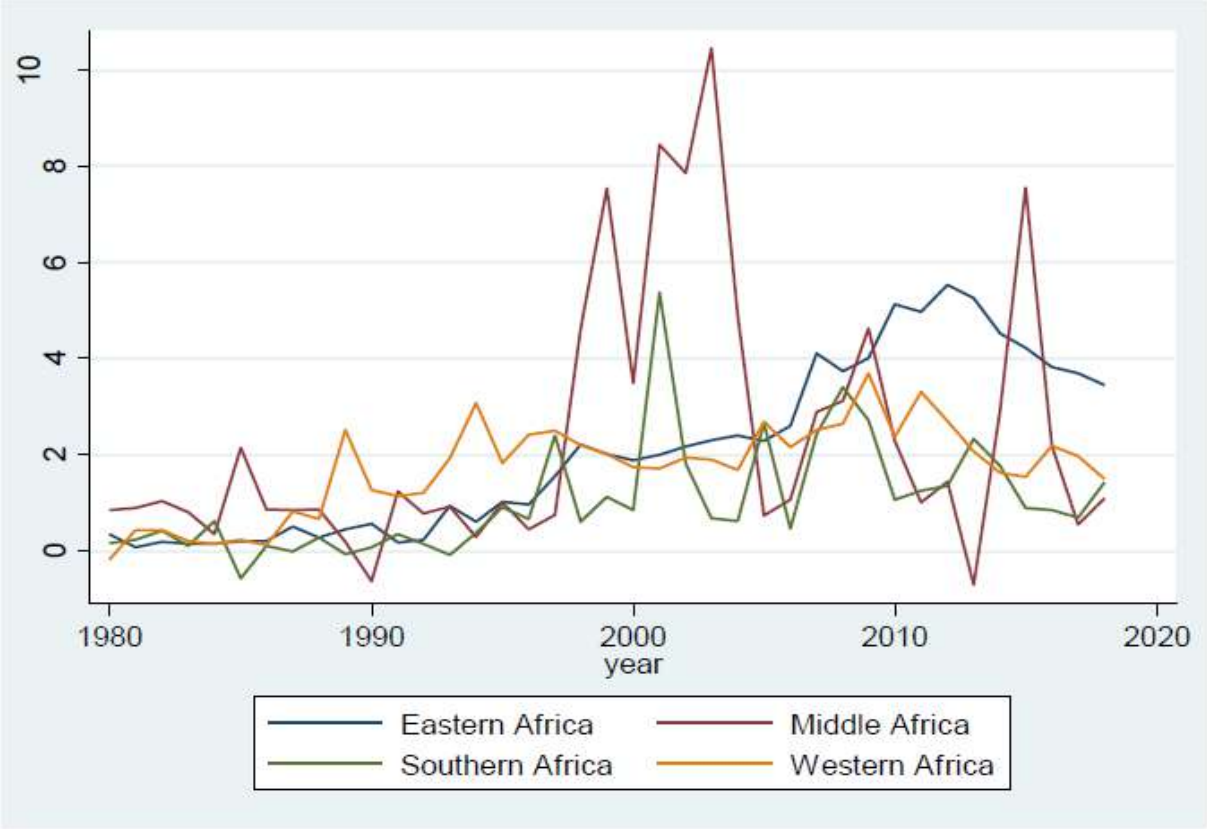
Figure 6: FDI compared to aid and remittances (% of GDP) from 1980 to 2018.



Sources: WDI World Bank , OECD , UNTCAD.

A detailed analysis(see figure 7), however, reveals that there are heterogeneities between the different sub-regions and that the trend in inflows differs from one sub-region to another. Central Africa and South Africa have been the least performing regions in terms of FDI attraction. FDI flows have been unstable and more volatile in these two regions. This poor performance can be explained in part by the socio-political instability and civil wars affecting some countries in this sub-region. On the contrary, the Eastern and Western African regions have been more successful in attracting FDI. the good performance in western Africa may be explained by the economic, political and social reforms undertaken in this zone. There is also the fact that Western Africa mainly receives FDI in the mining and oil sectors, especially with Nigeria, a major oil producer, which attracts massive foreign investment. Concerning Eastern Africa, the performance in terms of attracting FDI can be explained by the fact that countries such as Ethiopia, Kenya, Tanzania and Uganda, which have natural resources and a significant market size, are present in this region.

Figure 7: Regional distribution of FDI (% of GDP) from 1980 to 2018.



Source: UNTCAD.

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