



Foreign Direct Investment, Sectoral Effects and economic Growth in Africa

Eric Evans Osei Opoku, Muazu Ibrahim, Yakubu Awudu Sare

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Eric Evans Osei Opoku*, Muazu Ibrahim† and Yakubu Awudu Sare‡

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Abstract

Earlier studies on the impact of foreign direct investment (FDI) on economic growth have not been instructive largely on their failure to examine the sectoral transmission channels through which FDI affects overall growth. We re-examine the impact of FDI on economic growth in Africa relying on panel data from 38 African countries over the period 1960–2014. Results from the system generalised method of moments (GMM) reveal that, while FDI positively and unconditionally spurs economic growth, its growth-enhancing effect is imaginary when the conditional sectoral effects are introduced. On the channels of manifestation, we notice that the pass-through impact of FDI is only significant for the agricultural and service sectors and for most part, negative for the manufacturing sector albeit insignificantly. These findings are robust to model specifications. We discuss some key implications for policy.

Keywords: FDI; sectoral value additions; economic growth; GMM

JEL: F02; F04; P04

1 Introduction

Foreign direct investment (FDI) and its probable growth impact especially in developing countries has been a major subject of scrutiny in both the fields of international economics and development. This follows the widespread view that FDI has the potential of positively affecting economic development. The United Nations Conference for Trade and Development (UNCTAD) for example strongly supports this view as it believes that FDI is a potent ‘instrument through which economies are being integrated at the level of production into the globalizing world economy by bringing a package of assets, including capital, technology, managerial capacities and skills, and access to foreign markets’ (UNCTAD, 1996: 11).

*Department of Economics and Finance, City University of Hong Kong, Hong Kong

†Department of Banking and Finance, School of Business and Law, University for Development Studies, UPW 36, Upper West region, Wa, Ghana

‡Department of Banking and Finance, School of Business and Law, University for Development Studies, UPW 36, Upper West region, Wa, Ghana

The limelight on developing countries has also been necessitated by its enormous receipt of FDI inflows in recent years. For instance, as global inflows of FDI has been declining for some time now, inflows to developing countries have been on the ascendancy. In 2014, inflows to developing countries reached its peak of \$681 billion, representing a 2% rise from the previous year (UNCTAD, 2015a). Kosova (2010) asserts that from the mid-1990s, FDI has become the major source of external finance for countries in the developing region, and this accounts for more than twice as large as official development assistance. Lipsey (1999) also recounts that FDI has become the most dependable source of foreign investment for developing countries. FDI has been crucial for the formation of capital in developing countries and developed countries alike.

Like many other developing countries, countries in Africa substantially lack domestic financial resources to propel the needed economic growth, and as result FDI is considered a significant source of funding (Okada & Samreth, 2014). In the quest to lure investors, many governments in Africa have adopted an open policy in the last couple of decades. This policy and other inducement packages have rendered FDI the major and most dependable source of capital inflows (UNCTAD, 2013a) in Africa. The 2015 World Investment Report asserts that though the inflows of FDI to developed and transition economies declined substantially in 2014, the inflows to sub-Saharan Africa (SSA) saw a surge of 5% to US\$42 billion (UNCTAD, 2015a). The total inflows to the whole of Africa remained somehow flat at US\$54 billion. Apart from FDI augmenting the inadequate domestic financial resources, it is believed to enhance human capital skills and physical capital stock accumulation, promote technology spillovers, inspire knowledge transfer, expand infrastructure, increase government revenue, increase industrialization and domestic investment, induce job and export expansion among others (Borensztein, 1998; Yao and Wei, 2007; Kemeny, 2010; Tang and Tan, 2017).

Considering the enormous FDI inflows to Africa in recent years, the question worth asking and investigation is whether these inflows have had any positive impact on economic growth. This has attracted quite a chunk of literature but the results have been largely inconclusive (see for example Seetanah, 2009; Agbloyor et al., 2014; Gui-Diby, 2014; Adams & Opoku, 2015). In addition, results from these studies are not also instructive since they obscure the sectoral channels through which FDI affects economic growth. To the extent that FDI influences overall growth through its impact of sectoral value additions requires far more nuanced and in-depth analysis. In the current paper, we re-examine the impact of FDI on economic growth in Africa by taking into account the sectoral transmission mechanism. This paper thus makes several contributions to the literature and policy direction as it answers the main question of how FDI affects growth and more importantly the sectors governments to focus on in luring FDI into their countries. Much emphasis is still needed to be placed on the growth effect of FDI in Africa since its vast natural resources have been unable to propel growth to the level needed to reduce poverty. However, if these resources largely account for a number of foreign investments flowing into the region, then how these inflows can affect growth is necessary.

Employing the system generalized method of moments (GMM) estimator, and data from 38 African countries over the period 1960–2014, our results reveal that, while FDI is good for economic growth, its growth-enhancing effect is imaginary when the conditional sectoral effects are introduced. On the channels of manifestation, we notice that the pass-through impact of FDI is only significant for the agricultural and service sectors and for most part, negative for the manufacturing sector albeit insignificantly.

The rest of the paper is structured as follows; Section two covers an overview of FDI and economic growth in Africa, Section three entails an extant literature review (both theoretical and empirical) on the topic, Section four discusses data and the methodological framework, Section five presents empirical results and discussion, and Section six concludes the study with some policy implications.

2 FDI Inflows and Economic Growth in Africa: Facts and Figures

In the 21st Century FDI forms a significant part of the investment stock in Africa. The 2014 African Economic Outlook for instance indicates that for the 2001-2011 period FDI amounted to approximately 16% of domestic investment in Africa, compared to an average of 11% for the world. In recent years FDI has become a very important source of external financing for Africa, outperforming other traditional sources such as official aids and remittances (United Nations Economic Commission for Africa, UNECA, 2013; World Bank, 2014). Though the extractive sector has accounted for a chunk of the FDI inflows into the region, in recent years, inflows to the services sector have been remarkable.

The inflows of FDI into Africa in recent years compared to the 1970s and 1980s have been impressive. As developing countries (as a group) received almost quadruple inflows, by increasing receipts from under US\$6 billion for the period 1970-1979 to an average of US\$20 billion for 1980-1989, inflows to Africa only doubled in the same period, increasing from a little over US\$1 billion to US\$2.2 billion (see Table 1).

Following this, Africa's share of FDI relative to developing countries declined substantially from 19.5% to 10.7% for the period. Its share of FDI in the world also reduced from 4.7% to 2.37% in the same period. The story has however been different since the late 1980s and more significantly the 1990s. It is believed that a number of reforms encouraging the private sector, openness and macroeconomic stability have contributed to this (UNCTAD, 1999). The World Bank (2012) ascribes it to Africa's relative political stability and attractive economic growth in the last couple of decades, the rising competition for natural resources, and the rapid growth in the middle class.

In addition, a number of countries in Africa have adopted policies and affiliated themselves with agreements – such as the Multilateral Investment Guarantee Agency and Convention on the Settlement of Investment Disputes – that protect FDI. As a result, Africa has become comparable with other regions of

the world regarding FDI policy framework. A very drastic measure has however been the establishment of government supported investment promotion centres in almost all countries to directly lure foreign investors.

The 1990s believed to be a major turnaround for Africa regarding FDI, saw its average inflows increasing to about US\$6.8 billion from an average of US\$2.2 billion in the previous decade. Regardless, Africa's share in the world and developing countries declines almost by half from the previous period. As its share in the world declined from 2.4% to 1.74%, its share of developing countries fell from 10.7% to 5.9%. The turn of the New Millennium was a success story for Africa as the 2000-2009 period saw its inflows increased by about a factor of 5 from the previous decade to a little over US\$30 billion. With this, its share of FDI in the world and developing countries also increased substantially from the previous period. The same success story can also be said for SSA for the period under discussion.

With an increasing trend of inflows to Africa in 2010 and 2011, inflows fell in 2013 and 2014. In 2013, it fell from the previous period amount of US\$56.44 billion to US\$53.97 billion and further to US\$53.91 in 2014. Analysts have argued that the fall in inflows in these periods was as a result of political upheavals in the Northern Africa (for the 2013 period) and the Ebola epidemic in West Africa (particularly 2014). This argument corroborates with the data as in Northern Africa, inflows fell from the 2012 amount of US\$17.15 billion to US\$13.66 billion (2013) and further to US\$12.24 billion (2014). In West Africa, inflows declined from US\$14.21 billion (2013) to US\$12.76 billion (2014). It must however be stated that though Africa as a whole saw a decline from 2012 to 2014, SSA saw a surge albeit marginally, US\$42.00 billion (2013) to US\$42.95 billion (2014). This increase might be explained by the surge in inflows to Middle (Central) Africa for the period.

Though over the years FDI inflows to Africa have generally been increasing, its share in the world and developing countries has not been encouraging. For example, Africa's share in the world dropped from 4.72% (1970-1979) to 1.71% (1990-1999), relative to a rise from 7.99% to 17.65% for same period for developing Asia. Though it has been rising after the 1990s, it currently accounts for just about 4.4% (2014), which is incomparable to developing Asia's performance of about 38%. This notwithstanding, developing countries share in the world has been increasing substantially, from 24.19% (1970-1979) to an average of 31.53% (2000-2009). It has risen from its share of 43.66% in 2010 to 55.47% in 2014, outperforming the share of developed countries (40.61%). With an increasing share of developing countries in the world, Africa accounts for only 7.91% share in developing countries. This is an indication that, Africa, the second largest continent with about a billion population and one of the fastest growing regions in the world has to re-strategize.

Just like the inflows, the stock of FDI in Africa (also in SSA) has generally been increasing since the 1990s. For example, FDI stock in Africa almost doubled from its 1980-1989 period average of US\$45.15 billion to US\$89.71 billion in the 1990-1999. SSA followed a similar trend with FDI stock increasing from US\$30.26 billion to US\$57.52 billion. In Africa, the 1990s amount rose

to an average of US\$289.77 in the 2000-2009 period. In 2010 the stock of FDI stood at US\$586.5 billion, increasing further to US\$709.17 billion in 2014. Although these statistics are good for Africa, it must be emphasized that its share in the world and developing countries has been small; it has dwindled from 12.14% (1980-1989 average) to 8.5% (2014) as a share of developing countries, and 4.20% to 2.88% as a share of the world for the same period.¹

Despite natural resources largely influencing the inflows of FDI to Africa, the contribution of economic growth in the last couple of decades cannot be downplayed. Impressive growth records attained by countries such as Sierra Leone, Niger, Cote d'Ivoire, Liberia, Ethiopia, Burkina Faso, Rwanda, Mozambique, Zambia and Ghana among others in recent years are worth mentioning in explaining the increase in FDI inflows. Economic growth in Africa has been quite not smooth especially in post-independence, in the 1960s and 1970s. UNCTAD (1999) asserts that weak economic performance of the continent especially in the 1970s and 1980s affected its receipts of FDI during the period. Relative to economic growth rates in the 1980s and 1990s, the average rate of growth in the new millennium has been higher than that of the world economy. The average economic growth rate for Africa was 5.29% for the 2001-2010 period (see Table 1), though a little lower than the average of developing countries (5.83%), it outperformed the developed countries (1.49%) and that of the world (2.62%). It must however be emphasized that growth in 2011 (0.96%) was abysmal, and this follows good performance rate of 5.15% in 2010. The 2011 performance is the least since 1994. The economy however picked up in 2012 (5.05%) outperforming growth rates in developing countries (4.66%), developed countries (1.07%) and the world (2.18%). Although growth rates in Africa dropped in 2013 and 2014 from the 2012 rate, it did better than the average for developed countries and the world for the period.

Although the share of agriculture to GDP has historically been the largest, the recent growth can largely be explained by the increasing role played by the service sector. For example, the share of services increased from an average of 45.8% to 49.0% from the period 2001-2004 to 2009-2012 (UNCTAD, 2015b). For the 2009-2012 period, services contributed to more than 50% to economic growth in 21 African countries. It accounted for as high as 80% in Seychelles. The surge in service share to economic growth might be explained by the increasing share of FDI flows into this sector. For example, in 2012 services accounted for 48% of the entire FDI stock in Africa relative to 21% and 31% for the manufacturing and primary sectors respectively (UNCTAD, 2015b). At the same period, it accounted for 40% (a jump from 24% in 2011) of FDI inflows (UNECA, 2015).

Between 2001 and 2012 services FDI stock in the region quadrupled making it the largest sector in Africa's stock of FDI. North Africa as a whole and more importantly Morocco takes the lead in the services FDI stock in Africa. However, in SSA FDI stock in services is concentrated more in South Africa. Services FDI stock is mainly in the finance sector followed by infrastructure (predominantly

¹These statistics have been computed with data from the UNCTADStats (2015), online. It is not shown in Table 1.

telecommunication and transport). Considering the importance of the services sector to economic transformation in Africa in recent years, UNECA (2015) describes the sector as a magnet for attracting FDI.

3 Literature Review

Under this section we review pertinent theory and empirical studies pertaining to FDI and economic growth.

3.1 *Theoretical Review*

In the conventional neoclassical growth models, less emphasis is placed on the potential role of FDI on the economy. This is due to the fact that, with the assumption of diminishing marginal returns to capital, FDI can only have effect on the level of income without affecting long-run growth rate. The probable effect of FDI on growth is limited to the short-run, and the extent of the effect depends on the transitional dynamics to the steady-state growth path (De Mello, 1997). Though FDI augments capital inputs, with the diminishing marginal returns to capital assumption, the host country would revert to the steady state even with the inflows of capital, and the economy will seem as if it has not received any addition to capital in the form of FDI.

Spearheaded by Romer (1986, 1990) and Lucas (1988), economists sought to develop economic growth models that endogenized (internalized) the growth process. With this focus, these models have been termed the endogenous growth models (theories) or simply the new growth theories. In these models, the growth rate of developing countries is believed to significantly depend on their capacity to acquire and utilize technologies which the developed countries have produced (Hermes and Lensink, 2003). In this regard, Balasubramanyam et al., (1996) argue that FDI remain the doorway to acquire these technologies. FDI can affect growth through permanent technological shocks. In these new growth models, it can be shown that FDI has impact on long-run growth as long as it is seen to cause increasing returns in production via externalities and productivity spill-overs. Unlike the neoclassical growth models in which policy measures are seen to have short-lived effect on growth, with the endogenous growth models, policy measures can have a long-run effect on growth. In this case, policy measures of the government in making the host countries more attractive to receive foreign investment can induce permanent increase in the rate of growth (De Mello, 1997).

In the endogenous growth theories, technology is emphasized as one of the major elements necessary for economic growth. Therefore, a country's ability to produce and adopt technology determines its rate of growth and catching-up with the developed countries. Differences in technology explains largely the income disparities between the developed and developing economies (Kemeny, 2010). However, in developing countries, it is virtually impossible to produce all the needed technology. Yao & Wei (2007) however stress that developing

countries have an advantage over developed countries as they can acquire the same technologies faster. This is the case as some of the technologies are easily imitated.

What we should then be concerned with is how these technologies that the developing countries do not produce get to them or get imitated by them. Two possible ways identified are; through importation and through FDI. However, FDI is the most direct way to get access to these technologies (Yao and Wei, 2007; Kemeny, 2010). Multinational companies (MNCs) have access and possess better technologies and are more productive than domestic firms (Seyoum et al., 2015). This is partly due to the fact that MNCs account for the chunk of the world's research and development (R&D) activities (Javorcik, 2013).

To a large extent technology is regarded to possess the characteristics of a public good. It is non-rival as the use of a particular technology by one firm does not prevent its use by another firm. It could also be regarded as non-excludable, implying that firms which have not directly incurred cost in producing the technology could still exploit it at no extra cost (Kemeny, 2010). This indicates that the more MNCs from developed countries enter developing countries, the more the latter gets access to the innovative ways of production in the former. It is theoretically believed that domestic players can convert knowledge spillovers from FDI into domestic technology improvement. Considering the fact that knowledge spillovers are localized imply MNCs are better source of this externality than international trade (Hofmann, 2013).

In essence, developing countries get access to the world's most cutting-edge techniques of production and organizational skills. The advantage to developing countries therefore is that, FDI brings the needed technologies which helps improve production efficiency and hence push its production frontier, thereby improving its total factor productivity. Conventional justifications for total factor productivity centres on the use of inputs such as high skilled labour and technology in production.

3.2 *Empirical Review*

At the empirical front, the impact of FDI on economic growth has not been unanimous. Balasubramanyam et al., (1996) show that the impact of FDI on economic growth is enhanced by the trade policy regime. Using a sample of 46 developing countries over the period 1970–1985 while employing the ordinary least squares (OLS) and generalized instrumental variable estimation. The authors find the impact of FDI on economic growth to be stronger in countries following an outwardly-focused trade policy regime (export promotion) than those pursuing an inwardly one such as the import substitution. Borensztein et al. (1998) analyses data for 69 developing countries over the period 1970-1989 by relying on the use of the seemingly unrelated regression method and find that though FDI contributes more positively to economic growth than it does to domestic investment, the FDI-growth impact depends largely on the human capital stock in the host countries.

Bengoa and Sanchez-Robles (2003) employ the fixed effects method and

data for the period 1970-1999 for 18 Latin American countries and find that FDI is positively related to economic growth, however the countries require sufficient human capital, economic stability and liberalization of markets to take advantage of long-term FDI. Using data for 71 developing and developed countries for the period 1975-1995, Alfaro et al. (2004) find that, while FDI has ambiguous effect on economic growth, its growth – enhancing effect is huge in countries with well-developed financial markets relative to financially under-developed economies.

Li & Liu (2005) investigate the impact of FDI on economic growth over the period 1970-1999 for 84 developed and developing countries using the fixed, random effects and the three stage least squares (3SLS) estimation techniques, and find that FDI positively impacts economic growth, even when it is interacted with human capital. However, when FDI is interacted with the technology gap, it is found to have negative impact on economic growth in the developing countries among the sample. By employing a model based on the idea of threshold effects, Azman-Saini et al. (2010) find that FDI has positive effect on economic growth only when the development of the financial market surpasses a certain level of threshold. Studying 23 Asian countries over the period 1986-2008, and employing the random effect method, Tiwari and Mutascu (2011) find that FDI promotes economic growth.

In the case of Africa, Gui-Diby (2014) used data for 50 African countries over the period 1980-2009 in examining FDI-growth nexus. Results from their system-GMM technique show differential effect of FDI over the sample. For instance, while FDI inflows negatively and significantly affects economic growth for the period 1980-1994, it enhances growth for the period 1995-2009. Using the GMM-instrumental variable technique and data for the period 1990-2007, Agbloyor et al. (2014) find that FDI on its own negatively affects economic growth in 14 African countries. However, with stronger domestic financial markets, these countries are able to convert the negative effect of FDI to positive. In a study of 22 SSA countries using the GMM estimation technique and data over the period 1980-2011, Adams & Opoku (2015) find FDI to only impact economic growth in the presence of strong regulations namely credit market, business and labour market regulations. In a very recent study, Iamsiroj (2016) finds that generally FDI has a positive impact on economic growth, using a sample of 124 countries over the period 1971-2010 and the 3SLS squares methodology.

Using the GMM estimation method and data over the period 1978-2011 in China, Liu et al. (2014) study the impact of FDI on economic growth through various aspects of the economy. The results show that FDI increases economic growth through its positive effect on physical and human capital; has negative effect on growth through the crowding out of domestic investment, the reduction in local government revenue, the rise in the opportunity cost of technological development and innovations on the national level. They also find that FDI has lessened the inter-regional (eastern, coastal and interior) growth disparity through the channels of industry, balance of trade, the extent of openness and the accumulation of human capital. However, through the channels of total factor productivity and physical capital accumulations, FDI accelerates growth

disparity among the regions.

Indeed, while evidence abound on the role of FDI in the growth process, what we know so far is limited regarding the transmission channels through which FDI impacts on growth. More importantly, FDI affects overall growth through its effect on the various sectors of the economy. Hitherto, literature is mute on such indirect effects. Beyond the direct effect of FDI, this study investigates the transmission channels through which FDI affects economic growth by using the various sectors of the economy as a conduit. We discuss our methodology in the next section.

4 Methodology

4.1 *Data and Preliminary Findings*

Annual data from 38 countries sourced from the World Development Indicators of World Bank spanning 1960–2014.² We are unable to cater for all the countries in Africa as some of them substantially lack data on our variables of interest. Following from existing empirical studies (Levine et al., 2000; Ibrahim & Alagidede, 2018; Adam et al., 2017), we proxy economic growth by real GDP growth rate. FDI is the net inflows of investment and taken as the sum of equity capital, reinvestment of earnings, other long-and short-term capital. More importantly, the FDI variable shows net inflows (new investment inflows less disinvestment) in the reporting economy from foreign investors and computed as a percentage of GDP. To examine the sectoral transmission channels of FDI, we rely on four sectors namely manufacturing, agricultural, service and industrial sectors. The manufacturing value addition is the net output of the sector after adding up all outputs and subtracting intermediate inputs while the agriculture value addition is the net output of the agricultural sector after adding up all outputs and subtracting intermediate inputs. The service sector value addition is the value additions in wholesale and retail trade (including hotels and restaurants), transport, and government, professional, and personal services such as education, health care and real estate services while the industrial value addition is the value addition in mining, construction, electricity, water and gas and comprise the net output of these metrics less intermediate input. The sectoral value additions are expressed as a percentage of GDP. Indeed, these value additions have been used by existing literature to proxy the growth of each sector (see Kumi et al., 2017; Ibrahim & Alagidede, 2018; Sare et al., 2018).

We also include other standard controls. For instance, we incorporate domestic investments to permit the investigation of exogenous impact of FDI on growth while controlling for domestic investment rate effect on growth. The

²The countries are Benin, Botswana, Burundi, Burkina Faso, Cape Verde, Cameroon, Chad, Central African Republic, Congo, Rep., Cote d'Ivoire, Congo, Dem. Rep., Gabon, Ghana, Ethiopia, Gambia, Guinea-Bissau, Kenya, Lesotho, Liberia, Malawi, Mali, Mauritius, Mozambique, Namibia, Morocco, Nigeria, Niger, Rwanda, Senegal, Sierra Leone, South Africa, Swaziland, Sudan, Togo, Tunisia, Uganda, Zambia and Zimbabwe.

inclusion of domestic capital will also permit the comparison of the relative effect of foreign and domestic investment in the growth process. Thus, in this study, we include domestic capital accumulation proxied by gross fixed capital formation as a proportion of GDP. Financial sector development is indicated by private sector credit as percentage of GDP. This measure captures credit advanced to the private sector. It is therefore a quality-based indicator of finance since it restricts the allocation and utilization of financial resources to more efficient and productive activities (King & Levine, 1993; Levine et al., 2000; Ibrahim & Alagidede, 2018; Ibrahim & Alagidede, 2017a, b, c; Ibrahim and Sare, 2018; Sare et al., 2018). Government expenditure is expressed as a percentage of GDP and measures final government consumption expenditure. This is used to proxy the size of government. Trade openness is measured as the sum of imports and exports to GDP ratio and used to proxy countries' integration with the rest of the world. We present the descriptive and correlation statistics of these variables in Table 2 below.

All the variables are averaged 1960–2014. The mean value of FDI inflows over the period is 2.752% while real GDP growth rate is 3.923% with a corresponding standard deviation of 6.792. For the four sectors, average value addition in the service sector is higher relative to the other three sectors, with the manufacturing sector recording the least value additions. With regards to the financial sector, private credit is averaged 17.513% affirming the relatively lower financial sector development while domestic investment, government expenditure and trade openness respectively average 19.442%, 14.739% and 65.228%. To allow inter-volatility comparison across the variables, we compute the coefficient of variation (CV) as the ratio of standard deviation to mean. Higher (lower) values of CV implies higher (lower) volatility. Given the values of the CV, we find that for all our variables, FDI is the most volatile variable followed by real GDP growth while the service sector is the least volatile. We also notice that, fluctuations in the manufacturing and agricultural sectors are similar although the latter is slightly higher. The positive values of the skewness suggest that all our variables are skewed to the right. Turning to the correlation coefficients, we find that apart from private credit and manufacturing sector, FDI is positively correlated with all the variables. This notwithstanding, FDI correlations with real GDP and sectoral value additions are weak.

We conduct a simple regression of FDI and economic growth as shown in Figure 1 below.

A plot of FDI (as a percentage of GDP) against real GDP growth rates produce a preliminary indication of a positive relationship between FDI and GDP. With a coefficient of 0.0797 and a t -test statistic of 3.38, this finding reveals that FDI inflows significantly spurs overall growth. Given the overarching objective of this study, we discuss a more nuanced empirical strategy in examining the impact of FDI and its sectoral transmission channels in the next section.

4.2 Empirical strategy

We examine the impact of FDI on economic growth by constructing a growth equation where the economic growth trajectory is made to depend on FDI, sectoral value additions and other standard controls as shown in equation (1) below:

$$GRO_{it} = f(FDI_{it}, SEC_{it}, X_{it}, \varepsilon_{it}) \quad (1)$$

where GRO_{it} is real GDP growth rate; FDI_{it} is foreign direct investment, SEC_{it} is a vector of sectoral value additions while X_{it} is the vector of control variables including financial sector development, gross fixed capital formation, government expenditure and trade openness. We denote the error term by ε_{it} while i and t respectively denote country and time indices.

We explicitly specify equation (2) to determine the impact of FDI on economic growth where real GDP growth rate is also made to depend on its one period lag.

$$GRO_{it} = \gamma_o GRO_{it-1} + \gamma_1 FDI_{it} + \gamma_2 SEC_{it} + \gamma_3 X_{it} + \alpha_i + \varrho_t + \varepsilon_{it} \quad (2)$$

where GRO_{it-1} is the lag growth rate used to capture the countries' (di)convergence to steady state; α_i is the country-specific fixed effects; ϱ_t is the time effects while ε_{it} is the idiosyncratic error term.

From equation (E2), the direct impact of FDI and sectoral value addition is respectively measured by γ_1 and γ_2 . To examine the transmission channel, we include in equation (E2), a multiplicative interactive term of FDI and sectoral value additions and in doing so, we estimate equation (E3) below:

$$GRO_{it} = \gamma_o GRO_{it-1} + \gamma_1 FDI_{it} + \gamma_2 SEC_{it} + \gamma_3 X_{it} + \eta(FDI_{it} \times SEC_{it}) + \alpha_i + \varrho_t + \varepsilon_{it} \quad (3)$$

where the indirect effect of FDI on growth via the four sectors is measured by η .

From equations (2) and (3), the inclusion of the lagged economic growth which accounts for the (di)convergence bring to fore issues of endogeneity and simultaneity given that the initial condition may potentially correlate with the error term (Greene, 2003). To contain the issues of endogeneity, we estimate our equations using the system generalized methods of moments (GMM) developed by Arellano & Bond (1991) and Arellano & Bover (1995). Arellano & Bond (1991) offered the use of lags of the explanatory variables as valid instruments. We use the system GMM which blends a regression in the first difference estimations and regression in levels (Arellano & Bover, 1995; Blundell and Bond, 1998). Indeed, estimating the system GMM necessitates additional moments that relies on the stationarity property of the variables (Blundell & Bond, 1998). To avoid biased results and influence of possible business cycles that may be present in our data, we use 5-year averages (1960–1964; 1965–1969; ...; 2010–2014) which produces 11 non-overlapping periods. To the extent that $T = 11 < N = 38$ makes the GMM suitable for this study in addition to its

advantage of controlling for the prospective endogeneity and simultaneity bias (see Arellano & Bond, 1991). We determine the efficacy of our estimates using the serial correlation test and the Sargan tests which respectively test for the validity of our instruments and over-identifying restriction.

The next section discusses the findings and discussions of the empirical results on the effect of FDI, sectoral value additions and other controls on economic growth.

5 Empirical Results

In this section, the results of the study are presented and discussed. The results we present are based on a 5-year averaged data from 1960-2014. In Tables 1 and 2, we presented the summary and correlation statistics of the variables.

In Tables 3 and 4, we subject our data to a more rigorous econometrics analysis, by presenting results based on the system GMM. As emphasized, our main objective is centred on the sectoral channels through which FDI impacts on economic growth. To authenticate the efficacy of the estimates of the system GMM technique, it is imperative to report the diagnostics of the estimator. The two most important diagnostics to be met are; i) the absence of second-order correlation in the errors (Roodman, 2009). The estimates show that in all the estimated models (Tables 3-4), we cannot reject the null hypothesis of no serial correlation between the errors as the estimates are highly statistically insignificant. This is an indication that the instruments generated from the lags of the variables are valid. ii) the overall validity of the instruments which is tested by the Sargan test. Acceptance of the null hypothesis of the Sargan test gives support to validity of the instruments in the models. The Sargan test results suggest that the models are correctly specified, and the instruments are valid (see Tables 3-4). Meeting these two most important criteria of the system GMM implies that the estimations passed the validity tests for the instruments.

In Table 3, we display six models; Model 1 presents the baseline model, and starting from Model 2, we augment the baseline model with an extra variable (trade openness). Models 3-6 are distinguished by respectively including the following sectoral variables; manufacturing, agricultural, service and industrial value additions.

We find the coefficient of the lagged dependent variable to be all negative (however in some cases statistically insignificant). This points to a general indication of growth convergence among the sampled countries to their unique steady states.

In Table 3, we find the coefficient of FDI to be positive and statistically significant at the 1% level in all the estimated models. This implies that an increase in the inflows of FDI can boost economic growth in Africa. This is not surprising as FDI is noted to come along with lots of value additions in the form of capital and technology transfer, employment and boosting of exports among others are expected to improve growth in developing countries. While the finding is consistent with Balasubramanyam et al., (1996) who argue that

FDI remain the doorway to acquire the needed technologies necessary to propel growth, our evidence also contrasts Adams & Opoku (2015) and Agbloyor et al., (2014). Indeed, our estimates are justified based on the longer time span (1960-2014) of our sample. For example, Adams & Opoku (2015) and Agbloyor et al. (2014) were based on a very limited sample size; 1980-2011 and 1990-2007 respectively and relatively fewer countries. Gui-Diby (2014) for example noted that FDI had a negative impact on economic growth for the period 1980-1994, and positive for 1995-2009.

Models 3-6 of Table 3 show that value additions of manufacturing, agricultural, service and industrial sectors are generally positive and statistically significant. While the impact of manufacturing value additions is positive albeit statistically insignificant in e model 3, the impact gains significance once the other sectors are controlled for. Overall, the results depict manufacturing value added having the greatest impact reflected in its relatively larger coefficients. In model 6, the effect of manufacturing sector is at least 7.7 and 8.3 times larger than the agricultural and service sectors respectively. This suggest that a boost in the manufacturing sector can have a greater impact on the economy relative to the other sectors of the economy. This corroborates Kaldor's growth hypothesis that manufacturing is a great enhancer of economic growth, given its coefficients and as the greater sectoral spill over effects. This is consistent with Hansen & Zhang (1996), Haraguchi et al. (2017) and McCausland & Theodossiou (2012) among others.

With regard to the controls, government expenditure does not promote economic growth given the negative and significant coefficients. Our evidence here suggests that a unit percentage rise in government size reduces growth between 0.101% to 0.355%. Anecdotally, unbridled public spending predicates higher future tax rates. Indeed, Devarajan et al., (1996) note that general public expenditure inhibits overall growth since higher taxes which are often required to finance the consumption expenditure lowers the returns on investment hence economic growth. In fact, relying on data from 29 SSA countries, Ibrahim & Alagidede (2018) argue that higher government expenditure not necessarily support economic growth and that the quality of spending is exceedingly relevant.

Turning to gross fixed capital formation, we notice that all the coefficients are positive suggesting that investment in capital formation enhances economic growth. These effects are significant at conventional levels except when manufacturing and service sectors are controlled for. We also observe that finance significantly influences overall growth. More precisely, this impact is robust to model specification and confirms the evidence that well-developed domestic financial sector development spurs economic growth given its functions inter alia efficient resource allocation, ameliorating information asymmetry and providing opportunities for risks transfer (Levine, 1997, 2005; Levine et al., 2000; Ibrahim & Alagidede, 2018). Similarly, trade openness positively impacts on growth revealing integration with international markets improve on long run growth although the impact is not robust. Openness can be seen in boosting economic growth in a number of ways including technology transfer, bait for FDI, source of foreign exchange, and means of getting access to capital equipment to enhance

development.

Beyond the direct effect of FDI, we investigate for transmission channels of FDI to growth by including in our growth equation, a multiplicative interactive term of FDI and sectoral value additions. We present the results in Table 4.

Interestingly, while FDI effect is robustly positive and significant in the earlier finding, the impact of FDI on economic growth remains positive albeit insignificant once we control for the transmission channels. Focusing on the interactions between FDI and the value additions of the various sectors of the economy, we find the following results; the manufacturing sector does not serve as a good channel through which FDI impacts on economic growth in the Africa. This is the case as the coefficients of the interactive terms between manufacturing value addition and FDI are found to be largely negative and statistically insignificant. The implication is that, large FDI inflows does not propel overall growth via the manufacturing sector. Indeed, the under-developed manufacturing sector in the sub-region may account for its weak transmission channel. This outcome is akin to using the industrial sector given the insignificance of the coefficients of the interactive term. Our evidence is not surprising as FDI inflows in the region have largely been concentrated in areas other than the manufacturing and industrial sectors. For example, the Global Alliance for Trade Facilitation (GATF) notes that only about 5% of the entire FDI inflows to SSA go to the manufacturing sector (GATF, 2017). This is not surprising as Africa has been described to persistently lack industrialization (African Development Bank, 2016; Gui-Diby & Renard, 2015).

With regard to FDI-growth via agricultural sector, we find consistently positive and significant coefficients of the interaction terms. This finding is robust to model specification suggesting that higher agricultural value additions magnify the impact of FDI on growth. The agricultural sector is therefore seen as a promising channel through which FDI can impact economic growth in Africa. For a noticeably long time, the inflows of FDI has been massive in the natural resource (agricultural) sector, where Africa unarguably has comparative advantage. In 2013 for instance, natural resource rich countries in Africa accounted for as much as 95% of the total inflows into the region (African Economic Outlook, 2014). Further results show positive and statistically significant coefficient of the interactive term of service value additions and FDI. This portrays the service sector as a potent area for FDI to impact economic growth in Africa. While the indirect effects of agricultural and service sectors are both positive, the latter effect is large. This is not surprising since in recent decades, there has been enormous inflows of FDI in the service sector in Africa, particularly in areas of banking, insurance and telecommunication. The service sector is currently the driving force of economic growth in Africa. In fact, since 1990, the contribution of the sector to economic growth has average about 50%.

We find the results of the control variables to be largely consistent with the earlier finding and existing empirical literature. The coefficient of government expenditure is generally found to be negative and statistically significant suggesting possible crowding out of private investment which has consequential effect on growth. Domestic investment proxied by gross fixed capital formation

and financial development are positively related to economic growth. Although trade openness positively affects growth, its impact is sensitive to model choice.

6 Conclusion and Policy Implications

Undoubtedly, FDI as an important foreign capital inflow provides additional financial and technological resources for countries to improve on their growth prospects. However, existing literature on the precise impact of FDI on economic growth have not been instructive largely on their failure to examine the channels through which FDI affects overall growth. In other words, while FDI is taken to influence growth, little is known on the transmissions through which FDI is linked to growth. Apart from the direct impact of FDI, this study posits that, FDI largely impacts on growth through its effect on the various sectors of the economy. On this score, we re-examine the impact of FDI on economic growth in SSA relying on panel data from 38 African countries over the period 1960–2014. Results from the system GMM show that, while FDI positively and unconditionally spurs overall growth, its growth-enhancing effect is imaginary when the conditional sectoral effects are accounted for. On the channels of manifestation, we find that the pass-through effect of FDI is only significant for the agricultural and service sectors and for most part, negative for the manufacturing sector albeit insignificantly. Our findings can there be considered as an important contribution to the empirics on FDI-growth nexus.

We document two important implications for policy in relation to the direct and indirect impact of FDI. First, without the indirect effect, FDI directly and significantly contributes to economic growth in Africa. The direct effect can be related to FDI's role in stimulating the region's domestic savings as well as spurring technological progress in addition to increasing the multiplicity of goods and services. Second, FDI significantly improves growth in economies with well-developed agricultural and service sectors. Indeed, a range of positive spill-overs are crucial indirect effects of FDI because they amplify the existing contributions of sectoral value additions of recipient countries' economic growth. However, rather than complementarity, what is vivid is substitutability of the direct and indirect effect of FDI. Thus, given the direct impact of FDI, sectoral channels of manifestation are benign. Similarly, FDI potentially has no direct effect on growth once its indirect effect is controlled for. If foreign capital inflows and sectoral transmission channels are alternatives, then countries FDI inflows would not exogenously influence economic growth.

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Table 1: FDI Inflows in Africa, 1970-2014 (Millions of US\$)

	1970-79	1980-89	1990-99	2000-2009	2010	2011	2012	2013	2014
World	23,805.15	93,004.31	397,724.64	1,074,179.63	1,328,215.31	1,564,934.67	1,403,115.47	1,467,149.02	1,228,283.32
Developing	5,757.45	20,559.87	114,890.88	338,680.86	579,890.60	639,135.17	639,021.52	670,789.92	681,386.67
Developed	18,047.70	72,436.33	278,798.14	691,833.58	673,223.42	828,446.73	678,960.20	696,770.44	498,784.41
Africa	1,124.28	2,201.64	6,791.53	30,662.25	44,072.22	47,704.97	56,435.44	53,968.73	53,912.12
SSA	942.27	1,313.38	4,869.56	19,885.57	30,391.06	41,891.70	41,595.59	41,998.27	42,948.35
Share in world (%)									
Developing	24.19	22.11	28.89	31.53	43.66	40.84	45.54	45.72	55.47
Developed	75.81	77.88	70.10	64.41	50.69	52.94	48.39	47.49	40.61
Africa	4.72	2.37	1.71	2.85	3.32	3.05	4.02	2.86	3.50
SSA	3.96	1.41	1.22	1.85	2.29	2.68	2.96	2.75	3.39
Share in developing countries (%)									
Africa	19.53	10.71	5.91	9.05	7.60	7.46	8.83	8.05	7.91
SSA	16.37	6.39	4.24	5.87	5.24	6.55	6.51	6.26	6.30
Share of GDP (%)									
Africa	0.26	0.38	0.94	2.83	3.11	3.34	3.76	3.47	3.36
SSA	0.29	0.32	0.98	2.63	3.05	4.04	3.87	3.74	3.67

Source: All data are from UNCTADStats (2015), online. GDP is in US\$ (constant 2005). Developed and developing imply developed and developing economies. Africa is divided into Eastern, Middle, Northern, Southern and Western Africa based on UNCTAD's classifications.

Table 2: Descriptive statistics

	FDI	GDP growth	MANU	AGRIC	SERV	INDU	Priv. credit	GFCF	GEXP	TRA
Mean	2.752	3.923	11.870	29.340	44.741	26.051	17.513	19.442	14.739	65.228
Std. Dev	7.266	6.792	6.761	16.827	11.097	12.918	15.929	8.739	5.401	32.778
CV	2.640	1.731	0.570	0.574	0.248	0.496	0.910	0.449	0.366	0.503
Minimum	-82.892	-51.031	0.237	2.032	4.141	1.882	0.154	-2.424	0.000	11.087
Maximum	89.476	106.28	39.465	94.846	74.769	77.414	106.26	60.562	54.515	311.355
Skewness	4.376	1.013	1.203	0.444	-2.207	1.020	1.994	0.785	0.880	1.424
Kurtosis	62.958	37.323	4.898	2.915	2.989	4.037	7.440	4.303	6.042	7.391
Percentiles										
25%	0.228	1.18	6.751	14.73	37.281	16.266	7.17	13.189	10.976	42.087
50%	1.12	4.093	10.381	30.32	45.368	23.317	13.021	18.893	14.367	57.728
75%	3.101	6.683	15.605	40.269	52.184	32.7	20.805	24.473	17.746	82.423
Correlations										
FDI	1.000									
GDP growth	0.085	1.000								
MANU	-0.160	-0.045	1.000							
AGRIC	0.018	-0.007	-0.464	1.000						
SERV	0.049	-0.004	0.355	-0.626	1.000					
INDU	0.020	0.020	0.293	0.745	-0.052	1.000				
Priv. credit	-0.036	-0.007	0.341	-0.529	0.561	0.191	1.000			
GFCF	0.219	0.197	0.045	-0.443	0.236	0.367	0.342	1.000		
GEXP	0.014	-0.006	0.178	-0.364	0.285	0.238	0.303	0.291	1.000	
TRAD	0.327	0.101	0.145	-0.382	0.118	0.399	0.247	0.419	0.361	1.000

Notes: CV = Coefficient of variation; Priv. credit = private credit; GDP growth = real GDP growth rate; FDI = Foreign direct investment; GFCF = Gross fixed capital formation; GEXP = Government expenditure; TRAD = Trade openness; MANU = Manufacturing, value added; AGRIC = Agriculture, value added; SERV = Service, value added; INDU = Industry, value added.

Table 3: FDI–economic growth nexus based on GMM estimations

	1	2	3	4	5	6
Constant	7.064 (2.010)	6.630 (1.772)	-1.561 (9.294)	-8.285 (6.167)	2.651 (11.561)	2.876 (5.227)
Lagged GDP	0.011 (0.058)	-0.129 (0.095)	-0.058 (0.072)	-0.137 (0.098)	-0.182** (0.092)	-0.256* (0.153)
Government expenditure	-0.146* (0.077)	-0.101* (0.061)	-0.296*** (0.084)	-0.201* (0.109)	-0.355*** (0.120)	-0.355** (0.151)
Gross fixed capital formation	0.087** (0.034)	0.078*** (0.019)	0.049 (0.038)	0.019 (0.042)	0.069*** (0.015)	0.087*** (0.020)
Foreign direct investment	0.039*** (0.009)	0.034*** (0.008)	0.062*** (0.007)	0.132** (0.067)	0.052*** (0.009)	0.051*** (0.010)
Financial development	0.126*** (0.022)	0.150* (0.022)	0.073*** (0.015)	0.083*** (0.023)	0.189*** (0.053)	0.172*** (0.052)
Trade openness		0.014* (0.009)	0.021*** (0.008)	0.046** (0.021)	0.012 (0.009)	0.007 (0.012)
Manufacturing value additions			0.785 (0.804)	0.766* (0.433)	1.071* (0.618)	1.273* (0.672)
Agricultural value additions				0.194** (0.084)	0.107 (0.110)	0.165* (0.092)
Service value additions					0.145* (0.080)	0.153* (0.081)
Industrial value additions						-0.036 (0.118)
Diagnostics						
Wald chi-squared [p-value]	146.61 [0.000]	327.77 [0.000]	549.49 [0.000]	111.70 [0.000]	601.83 [0.000]	402.66 [0.000]
Sagan test chi-squared [p-value]	29.664 [1.000]	22.052 [1.000]	24.133 [1.000]	19.969 [1.000]	18.483 [1.000]	17.882 [1.000]
AR(1) z-test [p-value]	-3.022 [0.002]	-2.567 [0.010]	-3.377 [0.001]	-3.119 [0.002]	-2.698 [0.007]	-3.211 [0.001]
AR(2) z-test [p-value]	-0.281 [0.778]	-1.226 [0.220]	-0.445 [0.656]	-0.915 [0.360]	-1.271 [0.204]	-0.811 [0.405]

Notes: *, ** and *** denote 10, 5 and 1% significance level respectively. Robust standard errors.

Table 4: FDI, economic growth and transmission channels

	1	2	3	4	5	6	7
Constant	-1.342 (6.180)	-7.421 (6.711)	4.614 (1.821)	-13.653 (8.471)	-4.950 (5.653)	2.651 (11.561)	1.477 (12.173)
Lagged GDP	-0.158 (0.116)	-0.209* (0.114)	-0.110 (0.085)	-0.218** (0.110)	-0.115 (0.112)	-0.182** (0.092)	-0.134 (0.111)
Government expenditure	-0.301*** (0.105)	-0.366*** (0.091)	-0.144 (0.103)	-0.379*** (0.102)	-0.560** (0.228)	-0.355*** (0.120)	-0.180* (0.105)
Gross fixed capital formation	0.087*** (0.018)	0.068*** (0.020)	0.069** (0.033)	0.072* (0.040)	0.044*** (0.011)	0.069*** (0.015)	0.093*** (0.025)
Foreign direct investment	0.028 (0.183)	0.037 (0.178)	0.127 (0.085)	0.204 (0.193)	0.065 (0.056)	0.040 (0.067)	0.006 (0.009)
Financial development	0.124*** (0.040)	0.144*** (0.039)	0.071*** (0.021)	0.143*** (0.040)	0.294*** (0.089)	0.189*** (0.053)	0.122* (0.064)
Trade openness	0.019 (0.023)	0.028 (0.022)	0.027*** (0.007)	0.007 (0.009)	0.040** (0.016)	0.029*** (0.010)	0.029*** (0.010)
Manufacturing value additions	0.815* (0.464)	1.088** (0.526)	–	1.446** (0.625)	1.363** (0.634)	1.071* (0.618)	1.109* (0.653)
Agricultural value additions	–	0.159** (0.065)	0.008 (0.056)	0.281*** (0.099)	0.126* (0.064)	0.122* (0.064)	0.044*** (0.102)
Service value additions					0.035*** (0.010)	–	0.193** (0.077)
Industrial value additions					–	0.040 (0.067)	0.076 (0.081)
Channels							
MANU × FDI	0.001 (0.017)	-0.008 (0.016)	–	-0.003 (0.009)	–	–	-0.192 (0.130)
AGRIC × FDI	–		0.005*** (0.001)	0.006** (0.002)	–	–	0.112*** (0.034)
SERV × FDI					0.145* (0.081)	–	0.189*** (0.053)
INDU × FDI					–	0.107 (0.110)	0.012 (0.009)
Diagnostics							
No. of obs	965	965	1,055	965	965	965	965
Wald chi-squared [p-value]	386.40 [0.000]	167.24 [0.000]	675.59 [0.000]	156.02 [0.000]	760.40 [0.000]	401-04 [0.000]	579.44 [0.000]
Sagan test chi-squared [p-value]	21.288 [1.000]	17.147 [1.000]	25.601 [1.000]	17.215 [1.000]	15.482 [1.000]	21.301 [1.000]	19.032 [1.000]
AR(1) z-test [p-value]	-2.525 [0.012]	-2.419 [0.015]	-2.977 [0.003]	-2.545 [0.011]	-2.992 [0.032]	-2.828 [0.040]	-2.771 [0.051]
AR(2) z-test [p-value]	-0.925 [0.355]	-1.232 [0.218]	-1.011 [0.312]	-1.617 [0.106]	-1.201 [0.191]	-1.331 [1.222]	-1.221 [0.196]

Notes: *, ** and *** denote 10, 5 and 1% significance level respectively.

Figure 1: Simple regression of FDI on economic growth

