Essays on the Effect of Foreign Investment on Growth, Productivity and Competition in Developing Countries

Oluwaseun Aguda

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1. Introduction

In the last three decades, academics and policy makers have focused on financial integration and its effect on the economy of countries which receive them. While financial integration can benefit countries by increasing economic growth, it has also been associated with risks and crises in developing countries (Moreno, 2006). This has led to considerable research on financial integration and its effect on the economic growth of countries. Despite these many studies, the literature is yet to reach a consensus on the benefits of financial integration in developing countries. This thesis contributes to the literature by focusing on financial integration in developing countries. It examines if developing countries benefit from capital inflows received due to financial integration. In addition, it examines the channels through which countries can benefit from financial integration by focusing on foreign direct investment which is the major form of capital flows to developing countries.

The literature on financial integration claims that countries can benefit directly or indirectly from capital inflows through increase in productivity, capital accumulation, financial and institutional development (Kose et al., 2009a). In the early 1980s, developing countries integrated into the global financial markets by opening to capital inflows. Capital inflows received were mainly in form of Foreign Direct Investment (FDI), portfolio debt, portfolio equity and bank loans. This thesis focuses on FDI, portfolio debt and portfolio equity which are the main forms of private capital flows into developing countries.

The literature describes FDI as the most beneficial form of capital inflows. FDI represents foreign ownership of 10% or more of the voting stock of an enterprise. The investor has some control over the affairs of the company and this is expected to improve the management and productivity of the firm. Foreign investors can also introduce better production techniques and provide capital for the firm. Domestic firms may benefit from the activities of foreign investors through imitation of production techniques, linkages and labour turnover by employing workers from foreign firms. FDI can therefore improve investment, productivity, human capital development and growth in the host country (Colen et al., 2009). Portfolio investment comprises of portfolio debt and portfolio equity. They represent source of capital for firms other

than bank loans (Reisen and Soto, 2001). Portfolio investment are traded on the stock markets thus, they exhibit flexibility, liquidity and are negotiable. However, they are subject to reversibility. Portfolio debt and equity differs in terms of their role in reversibility and their repayment characteristics. Portfolio equity plays limited role in reversibility compared to portfolio debt flows (Levchenko and Mauro, 2007). Unlike portfolio equity which represent ownership, portfolio debt is a debt finance which involves repayment of principal and interest at specific times irrespective of the firm's financial status. Hence, they could lead to disruption in the economy (Reisen and Soto, 2001).

The second chapter focuses on the effect of these foreign capital inflows on the economic growth of developing countries. Although several studies have examined the effect of capital inflows on the economic growth of developing countries, the literature is yet to reach a consensus (Aizenman et al., 2013). Some empirical studies have pooled developed and developing countries together in their analysis. In addition, capital flows variables have often been merged together in empirical analysis. Kose et al. (2009a) argued that the merging of capital flows and countries at different level of integration might yield misleading results.

This study contributes to the literature by focusing on the effect of capital flows on the economic growth of countries which became integrated into the global markets since the 1980s. It provides new evidence on the effect of capital inflows by focusing on the period 1990- 2014 which coincides with periods when developing countries experienced economic growth and became well integrated into the financial markets. It focuses on the main forms of capital flows and it distinguishes between portfolio equity and portfolio debt flows which are mostly aggregated in the literature. This research is important in examining if capital inflows contributed to the recent output growth experienced in developing countries and what type of capital inflow has been the most beneficial.

It finds that FDI enhances growth, portfolio equity has an insignificant effect while portfolio debt decreases growth. This effect differs by regional grouping of countries and oil exporting status. The effect of capital flows differs between oil exporting and non-oil exporting countries as portfolio debt hurts economic growth in non-oil exporting countries. In addition, after excluding transition economies from the analysis, this

study finds that capital inflows have no effect on the economic growth of other developing countries. The insignificant effect of portfolio equity and negative effect of portfolio debt flows in non-oil exporting countries shows that portfolio debt and equity flows have different effect on growth and therefore, pulling them together in empirical analysis would give ambiguous and misleading results.

Firms are major recipients of capital inflows. Therefore, firm level research might provide a better way to analyse the direct effect of capital inflows on firms and industries (industrial sectors) that receive them. The thrid chapter uses firm level data to examine the channels through which FDI benefits firms and industrial sectors in host countries. This study focuses on FDI which is the most important and beneficial form of capital inflows. Based on the argument that FDI can improve productivity, human capital development and capital accumulation, developing countries have been trying to attract FDI by offering tax incentives to foreign firms in the last two decades. However, the empirical literature on FDI has yet to reach a consensus on the firm level benefits of FDI. Therefore, examining the channels through which FDI (foreign presence) can improve the productivity of domestic firms is very important. Understanding the channels for productivity spillovers and how country and domestic firms' factors can enhance the benefit from foreign presence can help countries in designing policies to maximize the benefits associated with foreign presence.

The study contributes to the literature by using different measures to examine the different channels through which foreign presence in a sector contributes to the productivity of domestic firms in that sector. Most studies on productivity spillover from foreign direct investment use a single measure to capture horizontal spillover effect from foreign presence. Hence, it is difficult to point out the beneficial and less beneficial channels of productivity spillover. This study focuses on the demonstration, competition and the linkage externality channel of productivity spillover. The paper also provides evidence on the effect of FDI on productivity in low-income countries by focusing on sub-Sahara Africa which comprises mostly of low-income countries.

Using a sample of manufacturing firms in Sub-Sahara Africa between the periods 2003-2016, this study finds that each channel of spillover has different effect on the productivity of domestic firms. In most cases, the results indicate an insignificant demonstration effect, positive linkage effect and a negative competition effect. How-

ever, the magnitude of this effect depends on the structure of foreign ownership as well as the country and domestic firms' characteristics. It finds that large firms, exporters, high productivity firms and firms in low-income countries benefit most from foreign presence. In addition, it finds that domestic firms would benefit more from foreign firms who use local inputs and are more export oriented. Domestic firms are also more likely to benefit from foreign firm with local investors as is the case of partial foreign firms.

A negative competition effect reveals that foreign firms compete with domestic firms for sales hence reducing the market share and productivity of domestic firms. The implication of this is that foreign presence is likely to lead to the exit of less productive domestic firms through the competition effect. The competition measure is based on market sales and thus, it might not capture other channels of competition from foreign firms such as competition for factor inputs and labour.

The fourth chapter focuses on the effect of foreign presence on the level of competition (market power) in their industrial sector. It contributes to the literature by providing evidence on a sample of sub-Saharan African countries. Using markup as a proxy for market power, this study examines if foreign firms have higher markups relative to their domestic counterparts. In addition, it examines if the presence of foreign firms reduces the markup of domestic firms in the host country. According to Aitken and Harrison (1999), the productive assets of foreign firms make them more productive and this could lead to a reduction in their marginal costs given the fixed cost of production in an imperfectly competitive market. This means foreign firms can have higher markups as they can produce more and sell at a lower price relative to the domestic firm. The competition from foreign firms would reduce the market share of domestic firms and can force them to cut prices in order to increase sales and cover costs.

This analysis is important to understand how FDI can affect aggregate productivity through competition which can lead to reallocation of resources to the most productive firms. Markup also has an important implication for resource allocation and consumer's welfare (Feenstra and Weinstein, 2017; De Loecker and Eeckhout, 2017). If competition reduces the markup of domestic firms, it would increase consumers' welfare as firms would charge prices which are closer to their marginal cost. Higher

markups can also worsen resource allocation as firms which charge higher markup can cover cost by producing less output which decreases the demand for labour. With greater competition, less efficient domestic firms might exit the market leading to reallocation to the most efficient producers which would increase aggregate productivity.

The analysis focuses on a two-time period panel of manufacturing firms in sub-Sahara Africa. It implements the methodology of De Loecker and Warzynski (2012) to measure markup for the sample of firms. The paper finds that on average, foreign firms do not have higher markups relative to domestic firms. However, distinguishing firms based on the level of concentration in their industry, the analysis find that foreign firms in highly concentrated sectors had higher markups. In addition, this study finds that foreign presence in a sector reduces the markup of domestic firms in that sector. The effect is larger in highly concentrated sectors, low technology sectors and low-income countries.

This thesis shows that not all forms of capital flows enhance the economic growth of developing countries. While FDI can enhance growth, portfolio equity has an insignificant effect and portfolio debt can hurt growth. FDI can contribute to growth by improving firm productivity through demonstration and linkages channels. On one hand, the competition effect from foreign presence can reduce the productivity of domestic firms and can lead to exit of less productive firms. On the other hand, it can improve aggregate productivity and consumer's welfare through its effect on markup and reallocation of resources to the most productive and efficient firms.

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2. International Capital Flows and Growth: New Evidence from Developing Countries

Abstract

This paper contributes to the literature by providing new evidence on the effect of capital inflows to developing countries using recent data. It focuses on the last two decades when developing countries, became well integrated into the global financial markets and, experienced a considerable increase in the amount and changes in the composition of foreign capital inflows. So far, little attention has been paid to the differences in the forms of capital flows. This study examines the differential impact of each type of capital inflows particularly, different effect of portfolio equity and portfolio debt which are often aggregated. Using a sample of 54 developing countries for the period 1990-2014, this paper finds that not all forms of flows are beneficial to growth. This paper finds that FDI enhances growth, portfolio equity has an insignificant effect while portfolio debt decreases growth. However, this effect differs by grouping of countries and oil exporting status.

JEL Codes: F21, F36, F43.

Keywords: Financial Integration, FDI,Economic Growth, Portfolio Investment, Foreign Capital Flows, Portfolio Debt.

2.1 Introduction

Financial integration is one of the most debated issue by academics and policy makers. According to theory, eliminating restrictions on cross border financial transactions would induce the flow of foreign savings from capital rich countries to capital scarce countries. This would augument domestic savings and contribute to invesment, hence growth in developing countries (Kose et al., 2011). In mid 1980s, developing countries embraced financial integration although maintaining some capital controls. By the early 1990s, most countries were fully opened up to international capital inflows. However, the Asian crisis in 1997 coupled with the global financial crises led to doubt on whether the benefits of financial globalisation outweigh its risks (Moreno, 2006).

Since the early 1990s, developing countries have been contributing most to the world output growth compared to advanced countries ((Mahmood et al., 2014), IMF World Economic Outlook, 2016). Aizenman et al. (2013) associates this faster growth to improvement in financial integration. The 1990s was accompanied with changes in the composition of capital flows as bank loans to developing countries were replaced by foreign direct investment (here after referred to as FDI) and portfolio equity (Kose et al., 2009a). This makes the research question for this study essential. There is a need to examine if capital inflows contributed to the growth of output in these countries and what type of capital inflow has contributed most.

Although a number of studies have examined the effect of capital inflows on the economic growth of developing countries, the literature is yet to reach a consensus (Aizenman et al., 2013). While some studies provide evidence of the positive effect of capital inflows, some other studies find an insignificant or negative effect. Results of studies depend on the measures of capital flows, the sample of countries and the time period studied. Most empirical studies combine portfolio equity and debt flows or merge them with other capital inflows such as FDI or bank loans. As highlighted by Kose et al. (2009a); Aizenman et al. (2013) each type of capital inflow would have different effects on economic growth.

This study differs from other studies as it estimates the different impact of FDI, portfolio equity and portfolio debt flows. In addition, it focuses on recent time period (1990-2014) when developing countries were integrated into the global financial

markets. It finds that FDI enhances growth, portfolio equity has an insignificant effect while portfolio debt dwindles growth. This effect differs by regional grouping of countries and oil exporting status. The effect of capital flows differs between oil exporting and non-oil exporting countries as portfolio debt hurts economic growth in non-oil exporting countries. In addition, after excluding transition economies from the analysis, this study finds that capital inflows have no effect on the economic growth of other developing countries.

The rest of this paper is organised as follows. Section 2 briefly reviews the empirical evidence on the impact of capital flows on growth. Section 3 describes the data and explains the empirical strategy used for this study. Section 4 discusses the main results and some robustness checks while Section 5 gives the conclusion.

2.2 Literature Review

This section examines the several channels through which capital inflows can lead to growth. In addition, it reviews the empirical evidence on the effect of capital flows on growth.

2.2.1 Capital Inflows and Growth: Channels

There are several channels through which capital flows can contribute to growth in developing countries. Alfaro et al. (2004) describes how financial integration has partly contributed to the recent growth experiences of some developing countries. An example described is the garment industry in Bangladesh and car parts industry in India. They claim that financial integration arising from privatisation, mergers and acquisitions coupled with the availability of resources and cheap labour led to the establishment of productions plants in these countries. In some cases, local firms were able to benefit through imitation and employment of skilled labour trained by foreign firms. Reisen and Soto (2001) argue that access to finance in form of portfolio investment through the stock markets also facilitated the expansion of some firms in developing countries.

In addition, the availability of credits from financial institutions which can be attributed to foreign loans received by domestic banks led to the spring up of en-

trepreneur activities which has been a component of growth in these countries. In a bid to encourage more flows, some developing countries embarked on economic reforms to improve financial and institutional development (Kose et al., 2009a). In addition to this, some countries increased investment in infrastructure which further improved productivity in these countries.

FDI can be viewed as the most dominant and least volatile type of capital flow. It is a long-term flow, it is also regarded as the most beneficial and stable form of capital flow (Kose et al., 2009a). It is similar to portfolio equity as they both represent ownership of the enterprise and their returns depend on the profitability of the firm. FDI represents ownership of 10% or more of the voting stock of the enterprise. Thus, it exhibits control with the investor taking part in the day to day activities of the enterprise. This would be expected to affect the management and productivity of the firm. There are different ways through which a developing (host) country could benefit from FDI. FDI provides capital to the firm to finance investment. Aside from providing capital, foreign investors or firms can also introduce better production techniques which would improve productivity. In addition, foreign firms carry out training and skill acquisition programmes to improve the skills of workers. Domestic firms may benefit from foreign firms through imitation of production techniques and labour turnover by employing workers from foreign firms. In this way, FDI would improve investment, productivity and human capital development hence, facilitating growth (Colen et al., 2009).

There are two ways by which a foreign investor can invest through FDI. Investment could be through green field investment or mergers and acquisition. Green field investment involves starting a new firm in the host country. FDI would therefore increase investment in physical capital, employment as well as generating productivity spillovers to domestic firms. In the case of mergers and acquisition, FDI might not improve investment and employment as mergers and acquisitions often involve transfer of existing assets. However, it could contribute to efficiency as firms could become more efficient through improvement in managerial practices (De Mello Jr, 1997; Colen et al., 2009).

Portfolio investment is a source of capital for firms. It eliminates financial constraints on firms by reducing the cost of capital. It provides additional source of capital

for the firm other than bank loans (Reisen and Soto, 2001). Portfolio investment are traded on the stock markets thus, they exhibit flexibility, liquidity and are negotiable. However, they are subject to reversibility. Levchenko and Mauro (2007) finds that portfolio equity plays limited role in reversibility compared to portfolio debt flows. Portfolio equity flow is capable of reallocating funds from lower return activities to higher returns activities (Reisen and Soto, 2001). Portfolio equity could also promote the development of stock market and facilitate consumption smoothing through portfolio diversification (Calvo et al., 1996; Reisen and Soto, 2001).

Unlike portfolio equity, portfolio debt involves repayment of principal and interest at specific times irrespective of the firm financial status. Hence, they could lead to disruption in the economy (Reisen and Soto, 2001). Portfolio debt includes public flows such as government bonds. It could involve repayment in foreign currencies which could led to exchange rate pressures on the economy. Portfolio investment flows could have other indirect impact on the economy as they are mostly accompanied by other reforms such as improvement in corporate governance practices which could improve firm performance. In a bid to attract foreign investors, most countries improve fiscal discipline as well as their financial sector and institutions (Kose et al., 2009a). On the contrary, reversal of portfolio investment could lead to bankruptcies which could slowdown growth and reduce consumption (Levchenko and Mauro, 2007). A review of the description of capital inflows support the argument that each type of flow should be considered separately in analysing their effect on the economy.

2.2.2 Empirical Evidence on Capital Flows and Growth

Earlier studies on the effect of financial integration use the de-jure measure of financial integration. The de-jure measure is an index which ranges from 0-1. It is calculated based on a country's restrictions on capital account transactions. It considers the variety and number of capital controls (controls on outflows and inflows) a country has in place. However, the measure does not consider the effectiveness of these restrictions or controls (Kose et al., 2009a). In addition, this measure also fails to reveal how well integrated an economy is in terms of the level of transactions carried out. A number of studies thereafter measure financial integration as the sum of foreign assets and liabilities. While assets refer to capital outflow, liabilities refer to capital

inflow and as such this measure does not establish the true effect of capital inflow on the economy [1]. In the same vein, studies that measure financial integration as gross liabilities fail to consider the differences in the composition of gross liabilities. The International Monetary Fund classified FDI, portfolio investment, financial derivatives, other investment and net errors with omissions as gross liabilities. Each type of gross liabilities also referred to as inflow have different characteristics thus, different effect on the economy. This study focuses on FDI and portfolio investment which is further classified into portfolio equity and debt. Hence, this paper analyses these flows and explores the literature related to them.

While the theory presents the channels through which capital flows could enhance the economic growth of developing countries, empirical evidence on this effect has been unconvincing. Most of the earlier studies have been based on the effect of FDI. A study by Borensztein et al. (1998) finds that FDI has no effect on growth in a sample of 69 developing countries for the period 1970-1989. However, they find that in countries with high level of human capital development, FDI has an effect on growth. Therefore, olnly countries with high level of human capital development above the threshold will benefit from FDI. This supports a strand of the literature which argues that the effect of capital flows could depend on the level of absorptive capacity in the economy. They claim that countries need to meet the requiste level of financial, institutional and human capital development in order to benefit from capital flows (Alfaro et al., 2004; Kose et al., 2011). In contrast to Borensztein et al. (1998), Carkovic and Levine (2002) find no effect of FDI on the growth of 72 countries for the period 1960-1995. They claim that this insignificant effect does not depend on the level of human capital in the host country. According to Alfaro et al. (2004), the effect of FDI on growth depends on the level of financial market development. However, their sample consists of OECD and non-OECD countries which could be at different levels of financial and economic development. Kose et al. (2009a) points out that the pooling of both developed and developing countries in econometric analysis could affect the results obtained.

In recent years, empirical studies have considered other forms of capital flows such as portfolio equity, portfolio debt and bank loans. A number of studies classify capital flows as FDI and portfolio investment (combining portfolio equity and debt flows).

[1] Kose et al. (2009a) presents a comprehensive review on the literature on financial integration.

A study by de Vita and Kyaw (2009) finds that the effect of capital flows depend on the level of economic development of countries. Using a sample of 126 developing countries, they classified countries into low, lower-middle and upper-middle income countries. They find that FDI and portfolio investment had a positive effect on the growth of upper-middle income countries. For lower middle-income countries, they find that only FDI had an effect on growth. In the case of low-income countries, they find no effect of any type of capital flows on growth. Their findings support the view that the effect of capital flows could depend on the level of development of countries. Like the study of de Vita and Kyaw (2009), most studies on portfolio investment failed to distinguish between the equity and debt components. Most of these studies obtain a negative or insignificant effect of portfolio investment (Choong et al., 2010; Shen et al., 2010; Agbloyor et al., 2014). This could be due to the merging of equity and debt portfolio investment. As discussed earlier, equity portfolio flows behave more like FDI compared to debt portfolio flows which behave more like bank loans.

Some other studies classify portfolio debt and bank loans together as debt flows. Kose et al. (2011), find that debt flows (portfolio debt plus loans) hamper growth while FDI plus portfolio equity enhances growth in a sample of 84 countries. In a study of 38 emerging countries, Debbiche and Rahmouni (2014) find that FDI and debt flows increased growth while equity portfolio flows had no effect on growth. Using cross sectional data, Baharumshah et al. (2015) classified capital flows into FDI, portfolio equity and debt inflows. They find that the positive effect of FDI and portfolio equity flows occurs only when countries are above a level of threshold of financial development. In the case of debt flows, countries above the threshold of financial development record an insignificant effect compared to countries below the threshold who experience a negative effect. The studies above classify portfolio debt with bank flows. Levchenko and Mauro (2007) argues that there are differences between bank loans and portfolio debt flows. Although both flows have the same repayment characteristics, bank loans are more volatile, short term, procyclical and exhibit a high role in reversals. They are also usually depressed after any economic crises. Therefore, pooling together portfolio debt and bank loans might give misleading results on how each component affects economic growth.

There are other studies that examine each form of capital flows such as Reisen and

Soto (2001) which classified capital flows into; FDI, portfolio equity, portfolio debt and bank loans. They find that FDI and portfolio equity flows have a positive effect on per capita income in 44 countries from 1986-1997 while portfolio debt flows and bank loans had no effect on growth. In contrast to Reisen and Soto (2001), Durham (2004) finds that FDI and equity portfolio investment has no effect on growth in a sample of 80 high income and non-OECD countries for the period 1979-1998. He argued that the effect of foreign capital inflows in the host country is conditional on the level of financial and legal development. Both studies focus on high and middle income countries, hence, their results might not be applicable to low-income countries. In addition, both studies focus on periods 1980s and 1990s which were early periods of financial integration.

A review of the empirical evidence shows that the effect of capital flows depends on the time period of the study, the sample of countries considered in the analysis as well as how capital flows are classified. This points out the need to assess the different impact of each form of flow on economic growth of developing countries. The use of recent data would provide new evidence on the level of financial integration of developing countries and how capital inflows has contributed to growth in recent years.

2.3 Data and Empirical Strategy

This section describes the empirical strategy used in this analysis. It also gives a description of the variables, the time period considered as well as source of variables used in this study. It describes the capital inflows considered by examining the patterns and the changes in their composition in different regions overtime.

2.3.1 Empirical Strategy

To examine the effect of capital flows on growth, this research employs the System GMM Estimator. There exists an endogeneity problem due to the simultaneous nature of the relationship between capital flows and growth. Countries which receive more capital flows might grow faster. In the same vein, capital might flow to countries which grow faster. This simultaneous relationship leads to endogeneity and contributes to the

biasness and inconsistency of the OLS Estimator. In addition to this, this research considers a dynamic panel model in order to understand the dynamics of adjustment of output (conditional convergence) and the persistence of the dependent variable. Therefore, the lagged level of GDP per capita is included as an explanatory variable in the model. The basic dynamic growth model is specified below:

$$y_{i,t} - y_{i,t-1} = \alpha y_{i,t-1} + \beta_1 cf_{i,t} + \eta_i X_{i,t} + \upsilon_i + \epsilon_{i,t} \tag{2.1}$$

Where $y_{i,t}$ is the logarithm of GDP per capita, $cf_{i,t}$ represent capital flow measures and $X_{i,t}$ is the vector for control variables. υ_i represents country effects and $\epsilon_{i,t}$ is the error term. The subscript i denotes countries and t represents time. The dependent variable in equation 2.1 is the growth rate of GDP per capita.

The dynamic model above comprises of the lagged dependent variable and the country effects. The presence of the lagged dependent variable, endogeneity and the country effects makes the Ordinary Least square Estimator (OLS) biased and inconsistent. The inclusion of the lagged dependent variable in the model leads to autocorrelation as both $y_{i,t}$ and $y_{i,t-1}$ is a function of υ_i. Therefore including $y_{i,t-1}$ as an independent variable violates the OLS classical assumptions as $y_{i,t-1}$ then becomes correlated with the error term $\mu_{i,t}$ which is υ_i + $\epsilon_{i,t}$.

In the case of fixed effects estimator, the within transformation eliminates the country effects (υ_i) but this does not solve the correlation between the lagged dependent variable and the error term. Therefore, the fixed effects estimator is biased. However, the fixed effect estimator is consistent as T increases since the size of its bias decreases (Baltagi, 2008). Despite the consistency of the fixed effects estimator in the case of large time periods, it does not control for the endogenous nature of capital flows.

The generalised method of moments (System GMM) is efficient and consistent in the presence of lagged dependent variable. It builds on the assumptions of the difference GMM. The difference GMM estimator by Arellano and Bond (1991) makes use of the orthogonality conditions between the lagged dependent variable and the error term to generate internal instruments for the regressors. Thereby solving the endogeneity and autocorrelation problem. It eliminates the country effects by taking first difference of the equation:

$$\Delta y_{i,t} = (\alpha + 1)\Delta y_{i,t-1} + \beta_1 \Delta cf_{i,t} + \eta_i \Delta X_{i,t} + \Delta \epsilon_{i,t} \tag{2.2}$$

The lagged explanatory variables can be considered as instrument based on the assumption that they are uncorrelated with the future errors $\mathbf{E}(y_{i,t-k}\Delta\epsilon_{i,t}) = 0$. In addition, it assumes that there is no serial correlation of errors $\mathbf{E}(\Delta\epsilon_{i,t}\Delta\epsilon_{i,t-2}) = 0$. Therefore, Arellano and Bond (1991) proposed a test to check for first and second order serial correlation.

With these conditions, the difference GMM makes use of lagged levels as instrument for equations in first difference. However, the difference GMM is subject to weak instrument problem especially in the case of highly persistent series. In this case, the lagged levels become weak instrument for first difference. To overcome this problem, Blundell and Bond (1998) proposed the system GMM estimator which is a system of equation which includes the use of equation in levels to the equation in first difference. For the equation in levels, the instruments are lagged differences, while for the equations in first difference, the instruments are lagged levels (Roodman, 2009). The system GMM requires an additional condition:

$$\mathbf{E}(\Delta X_{i,t}|\upsilon_i) = 0$$

This means that the change in the regressors are exogenous to the country fixed effects and this allows the lagged differences to be used as instruments for the variables in levels (Blundell and Bond, 1998). Therefore, the system GMM is asymptotically efficient.

For the lagged values to be valid as instruments, there must be no correlation between the lagged values and the error term of the current period. The validity of this condition depends on a restriction on the initial conditions generating y_{i1}. There is no formal test to access this condition. There are other conditions required for the lagged dependent variable to be valid as instrument: no serial correlation and over-identifying restrictions must be satisfied. These conditions can be accessed using formal tests. The first test is the test for serial correlation. There should be a presence of first order serial correlation which should show the dynamic nature of the model. However, there should be absence of second order serial correlation for the lags to meet the ex-

ogeneity condition (Baltagi, 2008). Valid instruments for the endogenous regressors will therefore start from the 2nd lag and above once there is absence of 2nd order serial correlation. Second, over-identifying restrictions must be satisfied. To test for over-identification restrictions, the Hansen test was employed. The non-rejection of the null hypothesis for over-identifying restrictions also makes the instrument set valid (Baltagi, 2013). For each regression, the results from the autocorrelation tests and over identification restrictions (Hansen test) are shown in the lower part of the table.

All regressors are treated as endogenous variables except ICRG index (measure for institutional development) which is treated as predetermined. The *xtabond2* command for System GMM was used. This command allows us to control the instrument set and style as well as controlling for small sample bias. To avoid proliferation of instrument which occurs when instruments over fit the endogenous variables, the *collapse* option of the *xtabond2* command was used. This limits the number of instruments by collapsing instrument for all time periods of each lag distance into one thereby generating one instrument per variable for a lag distance. In other words, it collapses the matrix of instrument into a diagonal block thereby generating an instrument for each row irrespective of the number of columns. Standard errors were corrected for heteroscedasticity and small sample bias using the Windmeijer (2005) correction.

Although the system GMM was designed to overcome the weak instrument problem of the difference GMM, it could also be subject to weak instrument bias which might not be identified from the results (Bun and Windmeijer, 2010). Therefore, the OLS and Fixed effects are also used to check for sensitivity of the GMM results. The OLS is known to exhibit upwards bias as a result of endogeneity and country fixed effects. In the case of fixed effects, it is consistent with large time periods. However, it does not control for endogeneity (Baltagi, 2013).

In analysing the effect of capital flows on growth, both annual and three year averages of data are considered. Three-year averages of data are used to smoothen business cycle fluctuations which are evident in annual data. In addition, GMM requires a small time period with a large number of cross section unit. Taking averages of data reduces the number of time period considered. With averages of data, it is also possible to obtain long term or medium-term effect of capital flows. An argument for the use of annual frequencies of data is the construction of better instrument. Higher frequencies

of data would be better predictors of contemporaneous values (Mody and Murshid, 2005). For regressions with annual data, the log of initial GDP per capita is replaced with the lagged level of GDP per capita growth rate in order to account for dynamic adjustment in annual frequency data. Time dummies are included in all the regressors to eliminate cross-sectional correlation.

2.3.2 Data

The sample for this study consists of 54 developing countries with annual data spanning from 1990-2014. This period coincides with the time period when most developing countries relaxed capital restrictions and experienced significant increase in capital inflow (Lane and Milesi-Ferretti, 2007). The panel data used is unbalanced as some countries had missing data on capital flows in earlier periods. The group of countries comprises of developing countries which belong to the middle and low-income country classifications and their selection is based on data availability. Due to data limitations, separate analysis could not be conducted for middle- and low-income countries. The sample consists of 18 African countries, 17 Latin American countries, 10 Asian countries and 9 European countries.

Data on capital flows are obtained from the Balance of Payments Statistics of the IMF. They are measured as liabilities which represents gross inflow based on net recording [2]. Capital flows are classified and measured based on the IMF balance of payment manual 6 (BMP6) [3].

FDI is defined as equity investment in which the foreign investor owns 10% or more of the voting stock of the enterprise. In this case, the investor has control or significant degree of influence in the management of an enterprise that is resident outside his economy. Portfolio investment is defined as cross border transactions involving debt or equity securities with non-residents (IMF balance of payment manual 6). Portfolio investment are further classified according to instrument: portfolio debt (debt secuirites) and portfolio equity (equity securities) investment. All capital flow variable are measured as a share of GDP. This captures capital flows relative to the size of the

[2]net recoding means increase and decrease in liabilities (foreign inflows) are netted against each other.

[3]It incorporates changes in clasification,recording and signs of some financial transactions. All previous recording based on BMP5 were converted in September 2015.

economy.

The dependent variable used in this study as a measure of output is GDP per capita growth rate at constant US dollars. Data on this variable is obtained from the World Development Indicators (WDI) of the World Bank. Control variables used in this study include domestic investment which is defined by WDI as gross capital formation which are outlays on additions to fixed assets of the economy plus net changes in the level of inventories. Government expenditure is defined by WDI as all government current expenditures for purchases of goods and services. Trade is measured as import plus export of goods and services. These variables are measured as a share of GDP and obtained from the World development Indicators of the World Bank. Human capital is measured by the average years of total schooling and this was obtained from the Barro and Lee Dataset version 2.1 (2016).

Kose et al. (2009a), Durham (2004) argued that the effect of capital flows could depend on the financial and institutional development of countries. To examine this, financial and institutional development was included in the set of controls [4]. Private credit is used as a measure for financial development and it is defined as private credit by deposit money banks and other financial institutions as a share of GDP. Data on this variable is obtained from the World Bank. The measure of institutional development used is the ICRG index which is an aggregate of political, economic and financial risk. This index was rescaled from 0 to 1 to 0 to 100. Data on ICRG Index is obtained from Quality of Governance Institute, Gothenburg.

2.3.3 Trends in Capital Inflows

Most developing countries opened up to international financial transactions in the mid-1980s with most countries taking on debt flows in form of loans and government bonds. In the same period, FDI started to gain importance as a form of capital flow. By late 1980s, developing countries started opening up their stock markets to portfolio equity flows (Kose et al., 2009a). Portfolio debt flows followed in the early 1990s. Since late 1990s, the volume of capital inflows to these countries have been increased significantly. These surges in capital flow can be explained by privatisation of firms in

[4]the baseline controls plus the financial and institutional development variables will hereafter be regarded as the expanded set of controls.

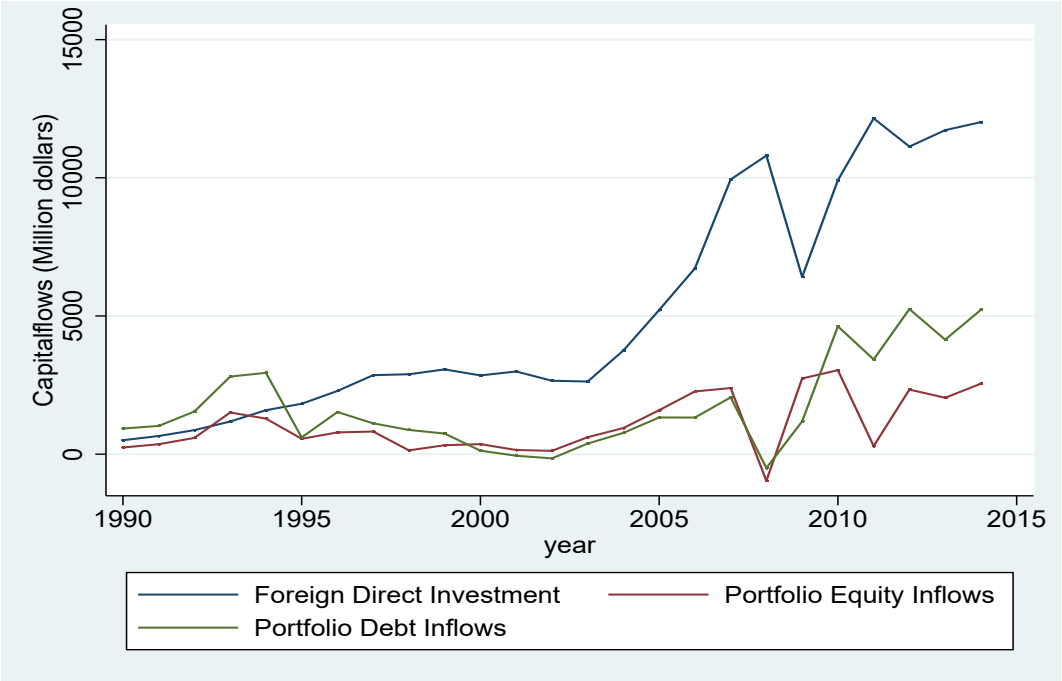

Figure 2.1. Capital Inflows to Developing Countries 1990–2014

developing countries as well as the elimination of restrictions on foreign transactions. However, these countries also experienced some reversals and stops to capital inflows in periods of economic crises which were mostly fuelled by currency issues (Mohan, 2009; De Mello Jr, 1997).

Figure 2.1 shows the evolution and composition of capital inflows to developing countries. This data is based on information for the countries considered in the empirical analysis. Figure 1 reveals the increase in capital flow experienced in the early 1990s then the declines and stops in the late 1990s due to the Tequila crisis in 1995, Asian crisis and the brazil crisis in 1998 (Moreno, 2006) . This period was also accompanied by a fall in portfolio debt flows (bonds).

Figure 2.1 also reveals the significant increase experienced from 2003 which was slowed down by the global financial crisis which started with a contraction in portfolio flows in 2007 followed by a decline in FDI during the crisis period in 2009. The decline in capital flows particularly portfolio investment since 2011 can be attributed to the slowdown in the economic growth of emerging countries.

Table 2.1 reveals the average capital flows to developing countries. From the table, the period 2010-2014 was accompanied by increase in FDI flows in all regions. This can be explained by the increase in the amount of capital flows to low income countries

Table 2.1. In country sample average capital inflow as a percentage of GDP

	1990-1995			2010-2014		
	FDI	Portfolio Equity	Portfolio Debt	FDI	Portfolio Equity	Portfolio Debt
Europe and Central Asia	1.35	0.30	2.45	3.64	0.18	1.78
East Asia and Pacific	2.96	0.71	0.20	3.61	0.14	0.95
South Asia	0.29	0.43	0.23	1.20	0.38	0.20
Middle East and North Africa	1.26	0.22	0.01	2.95	0.07	1.10
Latin America and Caribbean	1.52	0.79	2.06	3.85	0.36	1.73
Sub-Sahara Africa	0.98	0.05	0.42	7.08	0.18	0.86

Note: Sample of countries used, and their classification are included in the appendix.
Source: Author's calculations based on IMF Balance of Payment Statistics.

since the mid-2000s. Low income countries are concentrated in Sub-Sahara Africa and some of these countries have experienced increase in capital flows to their extractive industries (Rodrik, 2014). Despite the increase in FDI to low income countries, portfolio equity and debt flows still remain concentrated in some regions. In the early 1990s, capital flows were concentrated in Latin America and East Asia. Most of the flows into East Asia can be explained by capital flows into China. While those in Latin America can be explained by capital flows into Brazil, Mexico and Chile. The increase in South Asia can be explained by the surges in India.

From Table 2.1, FDI can be viewed as the most dominant form of capital flows in both periods. Portfolio equity gained some importance in the early 2000s when developing countries reduced their debts and opened up their stock markets to international participation. However, the financial crises led to a sharp fall in portfolio equity. There has been an increase in portfolio equity following the crises, but it is yet to return to its pre-crises period value. In addition, there has been less concentration of portfolio equity in regions as was the case in East Asia and Latin America in the early 1990s. In the period 2010-2014, portfolio bonds increased from its 1990s value in most regions as a result of the shift from loans flows to portfolio debt flows (corporate and government bonds).

Table 2.2 presents the correlation between capital inflows and GDP growth rate. In all regions, FDI is mostly associated with higher GDP growth rate. This also applies to portfolio equity in most regions except Middle East & North Africa and Sub-Sahara Africa where it is associated with lower GDP growth rate. An explanation for this

Table 2.2. Correlation of GDP per Capita growth rate and capital flows

	FDI	Portfolio Equity	Portfolio Debt
Sample countries	0.16	0.09	0.02
Europe and Central Asia	0.13	0.05	0.00
East Asia and Pacific	0.31	0.28	-0.09
South Asia	0.29	0.34	0.25
Middle East and North Africa	0.11	-0.08	-0.16
Latin America and Caribbean	0.16	0.15	0.08
Sub-Sahara Africa	0.22	-0.04	-0.11

Note: Sample of countries used, and their classification are included in the appendix. Capital flows are measured as a share of GDP. Source: Author's calculations based on IMF Balance of Payment Statistics.

might be the low level of portfolio equity flows as a result of low level of stock market and institutional development. In most regions, portfolio debt is associated with a decline in growth. This would mean that an increase in debt flows in these countries is associated with less growth.

Kose et al. (2011) claimed that these countries lack the requisite level of financial and institutional development to reap the growth benefits of portfolio debt flows. This argument applies to countries in East Asia, Middle East & North Africa and Sub-Sahara Africa. These regions comprise mainly of low income and lower middle-income group of countries with low level of financial and institutional development. Correlation does not imply causation. This leads to the aim of this study which is to examine if capital inflows contribute to the growth in these countries and what type of capital inflow has contributed most?

2.4 Empirical Analysis

Table 2.3 below presents a description of variables used in this study. The table reveals a substantial variation in most variables. The values for GDP per capita growth rate between 1990-2014 ranges from -41 percent to 23 percent. This reflects the diverse rate of growth experienced in different countries. FDI ranges from -16 percent of GDP to 51 percent of GDP. This reveals that some countries receive large amount of FDI relative to their gross domestic product.

Countries like Mozambique and Sierra Leone have received a large amount of FDI relative to their GDP. Hence, they would have a high value of FDI as a share of GDP

compared to countries like Bulgaria and Hungary which receive a large and comparable value of FDI and GDP. Portfolio equity represents a low proportion of GDP. In periods 1995-2000, portfoilo equity in some countries were zero. Thereafter, portfolio equity flows experienced a boost in addition to some reversals in periods of economic downturn which makes up the negative values. These values also reflect the level of stock markets development in most countries.

Table 2.3. Summary statistics

Variable	**Mean**	**Median**	**Std. Dev.**	**Min.**	**Max.**
GDP Growth	2.44	2.63	4.55	-40.75	23.00
FDI	3.39	2.52	4.15	-16.07	50.74
Portfolio Equity	0.27	0.07	0.79	-4.64	6.59
Portfolio Debt	0.87	0.27	2.56	-9.41	38.12
Domestic Investment	22.69	21.66	7.36	-2.42	55.36
Years of Schooling	6.52	6.69	2.63	0.89	11.84
Government Expenditure	13.75	13.04	4.93	2.98	63.94
Trade	70.26	61.59	34.12	13.75	220.41
Private Credit	34.47	23.45	30.31	1.12	165.86
ICRG Index	47.62	47.22	13.39	6.012	94.44

All variables are expressed as a share of GDP except Initial GDP, Schooling years and ICRG index.

The empirical analysis starts by examining the long run effect of capital flows on growth through a cross sectional growth regression. Table 2.4 presents the results of the regression. This cross-sectional regression further examines the correlation between capital inflows and growth once other factors are controlled for. Columns 1, 3 and 5 represents the baseline regressions while columns 2, 4 and 6 represents the variables in the baseline regressions with additional controls (extended set of controls which includes private credit and ICRG index). Columns 2, 4 and 6 show evidence of conditional convergence as initial level of GDP per capita was negative and significant.

Table 2.4. Cross sectional Regression

	(1)	(2)	(3)	(4)	(5)	(6)
Initial GDP Per Capita	-0.324	-0.538***	-0.383	-0.723***	-0.321	-0.686***
	(0.254)	(0.160)	(0.245)	(0.163)	(0.253)	(0.203)
FDI (% GDP)	0.116**	0.149***				
	(0.0448)	(0.0439)				
Portfolio Equity (% GDP)			0.0116	-1.704***		
			(0.386)	(0.396)		
Portfolio Debt (% GDP)					-0.207	0.0356
					(0.249)	(0.236)
Domestic Investment (% GDP)	0.153***	0.121***	0.172***	0.125***	0.177***	0.129***
	(0.0541)	(0.0383)	(0.0517)	(0.0302)	(0.0493)	(0.0385)
Years of Schooling	0.120	0.136	0.153	0.218**	0.177*	0.169*
	(0.106)	(0.0815)	(0.109)	(0.0920)	(0.103)	(0.0898)
Government Exp. (% GDP)	-0.0998**	-0.130**	-0.0417	-0.0498	-0.0631	-0.102**
	(0.0441)	(0.0481)	(0.0453)	(0.0438)	(0.0428)	(0.0480)
Trade (% GDP)	-0.00756	-0.0184***	-0.00960	-0.0253***	-0.0110*	-0.0142**
	(0.00612)	(0.00655)	(0.00674)	(0.00514)	(0.00619)	(0.00645)
Private Credit (% GDP)		0.0173*		0.0287***		0.0146
		(0.00871)		(0.00599)		(0.00874)
ICRG Index		0.0462**		0.0482***		0.0465**
		(0.0186)		(0.0171)		(0.0184)
Constant	1.951	2.395**	1.423	2.891***	1.222	3.028**
	(1.425)	(0.986)	(1.268)	(1.067)	(1.423)	(1.248)
Observations	54	51	50	48	52	51

Note: The dependent variable is the average annual growth rate (growth rate over 25 years). Initial GDP is the logarithm of GDP per capita at the beginning of the period. All other variables are averages over the entire period. Robust standard errors are reported in parenthesis. *, ** and *** indicate statistical significance at 10%, 5% and 1% level of significance.

For the capital flows variable, the table shows that FDI is associated with increase in growth. Portfolio equity is only found to be significant and negative when financial and institutional development are controlled for. This could mean that portfolio equity flow is also associated with the level of financial and institutional development and not controlling for them could lead to bias. The negative effect of portfolio equity is large, and it could be an evidence of a large negative correlation between portfolio equity and growth in developing countries. In the case of portfolio debt, it has no significant correlation with growth.

Domestic investment, years of schooling and ICRG index has a positive correlation to growth in most cases. On the other hand, government expenditure and trade mostly have a negative correlation. As described in section 2.2, the composition and amount of capital flows has changed over time. Annual data is able to reflect these changes

through the time series variation in the data. It also makes it possible to examine the short run effect of capital flows on growth.

2.4.1 Annual Data

Table 2.5 presents the results from the FDI regressions. Columns 1- 3 show the results from the baseline regression while columns 4-6 show the results with extended controls. In column 1 with the OLS regression, FDI turns out to be positive and significant. However, once financial and institutional development are included, it loses its significance. This could be explained by the fact that FDI could improve financial and institutional development. Therefore, once they are controlled for in growth regressions, FDI could lose its signifiance (Kose et al., 2009a). In the case of fixed effects where the country fixed effects are controlled for, FDI has no effect on growth. This also applies to the system GMM estimator. Although the coefficient of FDI remains positive, it is insignificant. Once simultaneity is controlled for, FDI has no effect on growth of these countries.

The GMM results satisfy the instrument validity conditions as over identification restrictions are satisfied and there is absence of 2nd order serial correlation. The second and third lag are used as instruments in the regressions. The coefficient of the control variables are as expected and similar to the cross sectional regression results except private credit which becomes negative. As argued by Alfaro et al. (2004), private credit could only be a means to an end. This could also mean private credit in developing countries are allocated to unproductive channels or form part of capital outflows which are invested outside the economy thus, dwindles growth.

Table 2.5. FDI Regression-Annual Data

	OLS	**FE**	**GMM**	**OLS**	**FE**	**GMM**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
GDP Pc Growth(t-1)	0.222 ***	0.166**	0.237 ***	0.157***	0.0464	0.0624
	(0.0458)	(0.0678)	(0.0631)	(0.0489)	(0.0467)	(0.0636)
FDI (% GDP)	0.0577**	0.0312	0.0986	0.0391	0.0179	0.110
	(0.0282)	(0.0388)	(0.0853)	(0.0280)	(0.0342)	(0.126)
Domestic Investment (% GDP)	0.121***	0.101**	0.0776	0.155***	0.151***	0.194**
	(0.0194)	(0.0390)	(0.0746)	(0.0189)	(0.0317)	(0.0773)
Years of Schooling	0.126***	-0.292	0.344	0.172***	0.0785	0.658
	(0.0477)	(0.210)	(0.324)	(0.0542)	(0.244)	(0.507)
Government Exp. (% GDP)	-0.105***	-0.124*	-0.306**	-0.0863***	-0.111 *	-0.391**
	(0.0241)	(0.0629)	(0.144)	(0.0263)	(0.0612)	(0.183)
Trade (% GDP)	-0.00448	0.00155	0.0343	-0.00769**	0.00696	0.0162
	(0.00316)	(0.0114)	(0.0253)	(0.00358)	(0.00936)	(0.0461)
Private Credit (% GDP)				-0.00724**	-0.0772***	-0.0294
				(0.00352)	(0.0146)	(0.0264)
ICRG Index				0.0108	0.0121	0.0746
				(0.0107)	(0.0209)	(0.0685)
Constant	-0.724	3.230 *	-1.396	-0.859	2.193	-4.794
	(0.970)	(1.788)	(4.672)	(0.804)	(2.281)	(4.713)
Observations	1227	1227	1227	1137	1137	1137
Countries	54	54	54	51	51	51
AR(2) Correlation (p-value)			0.586			0.469
Hansen Test (p-value)			0.408			0.120
No. of Instruments			42			48

Note: The dependent is the Growth rate of GDP Per Capita. The lagged dependent variable is instrumented using the second lag. All variables except the ICRG Index are treated as endogenous and instrumented with the second and third lag. The ICRG index is treated as predetermined. Each regression includes time dummies. Robust standard errors are reported in parenthesis. *, ** and *** indicate statistical significance at 10%, 5% and 1% level.

Table A1 in the appendix shows the results for the regressions with the interaction terms. As argued in the literature that the effect of capital flows depends on the level of financial and institutional development in the country (Durham, 2004; Alfaro et al., 2004; Kose et al., 2011). This study does not find evidence of absorptive capacity. Hence, the effect of capital flows on growth in these countries might not depend on the level of financial and institutional development.

Table 2.6. Portfolio Equity Regression-Annual Data

	OLS	**FE**	**GMM**	**OLS**	**FE**	**GMM**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
GDP Pc Growth(t-1)	0.228***	0.138**	0.179*	0.209***	0.0854	0.139
	(0.0500)	(0.0655)	(0.103)	(0.0511)	(0.0575)	(0.104)
Portfolio Equity (% GDP)	0.318*	0.493**	0.111	0.438***	0.495**	0.585
	(0.164)	(0.207)	(1.395)	(0.165)	(0.187)	(1.028)
Domestic Investment (% GDP)	0.159***	0.155***	0.194*	0.177***	0.193***	0.134**
	(0.0206)	(0.0347)	(0.106)	(0.0231)	(0.0394)	(0.0632)
Years of Schooling	0.144***	-0.134	0.354	0.159***	0.196	0.317
	(0.0503)	(0.279)	(0.616)	(0.0593)	(0.289)	(0.626)
Government Exp. (% GDP)	-0.0520**	-0.0450	-0.0180	-0.0440*	-0.0547	-0.0904
	(0.0233)	(0.0498)	(0.258)	(0.0230)	(0.0516)	(0.191)
Trade (% GDP)	-0.00408	0.0074	0.0091	-0.0018	0.0148	0.0029
	(0.0030)	(0.0153)	(0.0327)	(0.0035)	(0.0140)	(0.0389)
Private Credit (% GDP)				-0.0125***	-0.0726***	-0.0196
				(0.00423)	(0.0143)	(0.0211)
ICRG Index				0.0028	-0.0286	0.0574
				(0.0111)	(0.0211)	(0.127)
Constant	-2.258**	-1.057	-3.471	-0.952	0.206	-3.549
	(0.883)	(2.219)	(7.442)	(1.036)	(2.757)	(7.679)
Observations	844	844	844	796	796	796
Countries	50	50	50	48	48	48
AR(2) Correlation (p-value)			0.400			0.441
Hansen Test (p-value)			0.109			0.298
No. of Instruments			42			48

Note: The dependent is the Growth rate of GDP Per Capita. The lagged dependent variable is instrumented using the second lag. lag. The ICRG index All variables except the ICRG Index are treated as endogenous and instrumented with the second and third is treated as predetermined. Each regression includes time dummies. Robust standard errors are reported in parenthesis. *, ** and *** indicate statistical significance at 10%, 5% and 1% level.

Table 2.6 presents the results on the effect of portfoilo equity on growth. OLS and Fixed effects regressions give a positive effect of portfolio equity on growth. However, once endogeneity is controlled for using the system GMM estimator, the coefficient loses its significance. The results of the OLS and Fixed effects implies that there exists a positive correlation between portfolio equity and growth. However, the GMM results do not provide evidence that portfolio equity causes growth. Conclusions on the effect of portfolio equity cannot be based on the OLS and fixed effects estimates due to their inability to control for endogeneity. The coefficient of the control variables are as expected although most of them lose their significance in the fixed effects and GMM regressions. The GMM regressions satisfy the instrument validity condition of no over identification and second order serial correlation.

Table 2.7. Portfolio Debt Regression-Annual Data

	OLS	**FE**	**GMM**	**OLS**	**FE**	**GMM**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
GDP Pc Growth(t-1)	0.317***	0.240***	0.289***	0.275***	0.147**	0.215**
	(0.0469)	(0.0630)	(0.0804)	(0.0477)	(0.0471)	(0.0966)
Portfolio Debt (% GDP)	-0.0528	-0.00748	-1.133**	-0.0572	0.00557	-1.131*
	(0.0407)	(0.0467)	(0.520)	(0.0416)	(0.0540)	(0.640)
Domestic Investment (% GDP)	0.147***	0.145***	0.128	0.159***	0.165***	0.161
	(0.0190)	(0.0318)	(0.103)	(0.0195)	(0.0353)	(0.108)
Years of Schooling	0.191***	0.00777	-0.0940	0.186***	0.211	0.808
	(0.0523)	(0.262)	(1.050)	(0.0604)	(0.257)	(1.104)
Government Exp. (% GDP)	-0.0644***	-0.113	0.0787	-0.0647***	-0.101	0.0354
	(0.0221)	(0.0710)	(0.233)	(0.0230)	(0.0713)	(0.204)
Trade (% GDP)	-0.0096***	-0.0034	-0.0062	-0.0083**	0.0054	0.0045
	(0.0037)	(0.0124)	(0.0348)	(0.0035)	(0.0108)	(0.0543)
Private Credit (% GDP)				-0.0058*	-0.0676***	-0.0409
				(0.0035)	(0.0147)	(0.0375)
ICRG Index				0.0115	-0.0008	0.102
				(0.0110)	(0.0227)	(0.108)
Constant	-0.634	-0.0605	0.619	-0.768	0.720	-10.72
	(0.853)	(2.325)	(9.938)	(0.953)	(2.454)	(10.69)
Observations	898	898	898	868	868	868
Countries	52	52	52	51	51	51
AR(2) Correlation (p-value)			0.674			0.578
Hansen Test (p-value)			0.699			0.642
No. of Instruments			42			42

Note: The dependent is the Growth rate of GDP Per Capita. The lagged dependent variable is instrumented using the second lag. All variables except the ICRG Index are treated as endogenous and instrumented with the second and third lag. The ICRG index is treated as predetermined. Each regression includes time dummies. Robust standard errors are reported in parenthesis. *, ** and *** indicate statistical significance at 10%, 5% and 1% level.

To examine absorptive capacity, interaction terms of portfolio equity with financial and institutional development was included in the expanded set of controls in table A2. In some cases, with the OLS and fixed effects regression, the interaction term of private credit with portfolio equity was negative and significant. However, they become insignificant in GMM regressions.

For portfolio debt, table 2.7 shows a negative effect of portfolio debt in system GMM regressions. The absorptive capacity effect with financial development also shows a negative coefficient on table A3. A negative effect would mean that portfolio debt flows hampers growth in developing countries particularly countries with more developed financial sector. The magnitude of this effect casts some doubt on the use of annual data for system GMM regressions. Annual data exhibit business cycle fluctuations which might affect our results. To smoothen out business cycle fluctuations,

in the next section, three-year non-overlapping averages of data are taken, and the regression equations are re-estimated.

2.4.2 Three year Averages of Data

One of the conditions for the use of GMM is that **T** is small while **N** is large (Roodman, 2009). To reduce the size of **T** relative to **N**, three year non-overlapping averages of data is used. Another argument for the use of three-year averages of data is to smoothen out business cycle fluctuations.

Table 2.8. FDI Regression-Three Year Averages Panel

	OLS	**FE**	**GMM**	**OLS**	**FE**	**GMM**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Initial GDP Per Capita	-0.333	-6.077***	0.0513	-0.590***	-5.349***	-1.233
	(0.238)	(1.242)	(1.162)	(0.172)	(1.417)	(0.999)
FDI (% GDP)	0.0498	0.0513	0.235*	0.0181	0.00940	0.169*
	(0.0383)	(0.0497)	(0.137)	(0.0298)	(0.0312)	(0.0943)
Domestic Investment (% GDP)	0.0947***	0.0666**	0.0856	0.108***	0.0831***	0.0411
	(0.0157)	(0.0305)	(0.0626)	(0.0153)	(0.0277)	(0.0478)
Years of Schooling	0.194*	-0.339	0.354	0.343***	-0.000140	1.147**
	(0.108)	(0.425)	(0.493)	(0.0675)	(0.291)	(0.381)
Government Exp. (% GDP)	-0.0777***	-0.158*	-0.269**	-0.0481**	-0.0606	-0.144
	(0.0240)	(0.0916)	(0.132)	(0.0217)	(0.0517)	(0.108)
Trade (% GDP)	-0.0046	-0.0039	-0.0047	-0.0075**	0.0091	-0.0179
	(0.0031)	(0.0150)	(0.0209)	(0.0033)	(0.0088)	(0.0200)
Private Credit (% GDP)				-0.0017	-0.0312***	-0.0210
				(0.0031)	(0.0087)	(0.0131)
ICRG Index				0.0081	-0.0040	-0.0014
				(0.0098)	(0.0143)	(0.0356)
Constant	1.222	49.51***	0.231	1.971	41.38***	6.883
	(1.496)	(10.34)	(7.731)	(1.208)	(10.35)	(6.689)
Observations	417	417	417	389	389	389
Countries	54	54	54	51	51	51
AR(2) Correlation (p-value)			0.649			0.529
Hansen Test (p-value)			0.129			0.480
No. of Instruments			26			32

Note: The dependent is the Growth rate of GDP Per Capita over each three year period . Initial GDP per capita is instrumented using the first lag. All variables except the ICRG Index are treated as endogenous and instrumented with the second and third lag. The ICRG index is treated as predetermined. Each regression includes time dummies. Robust standard errors are reported in parenthesis. *, ** and *** indicate statistical significance at 10%, 5% and 1% level.

Taking three-year averages of data gives 8 time periods. The regressions for FDI, portfolio equity and portfolio debt are restimated using these new data. Table 8 show the results from three-year averages of data for the effect of FDI on growth. In the

OLS and fixed effects regressions, FDI has no significant effect on growth. In the GMM regressions, a positive effect of FDI was found. The magnitude of this effect reduces once financial and institutional development are controlled for. The GMM results satisfy the instrument validity conditions as shown in table 2.8. This result supports the propositions of the literature that FDI would bring about technological spillovers, human capital development and finance investment in developing countries (Alfaro et al., 2004). As argued in the literature that financial and institutional development would further increase the effect of FDI on growth, the absorptive capacity effect was re-estimated using three-year averages of data. Their interaction term with FDI was insignificant and FDI becomes insignificant as well. This does not support the evidence in the literature which finds that financial development enhances the effect of FDI on growth (Alfaro et al., 2004). The results on interaction term with absorptive capacity can be found in table A1.

Re-examining the effect of portfolio equity flow using three-year averages of data gives a positive effect of portfolio equity in the fixed effects regressions. The results on table 2.9 is similar to the results on annual data in table 2.6. This effect becomes negative and insignificant in the GMM regressions. However, all the variables in GMM regressions with extended controls except the time dummies are insignificant. It is possible that the regressions on portfolio equity exhibit weak instrument problem due to the highly volatile nature of portfolio equity flows. The results for the regressions with the interaction terms of portfolio equity and financial and institutional development are in table A2 in the appendix. There is also no absorptive capacity effect in the GMM regressions.

In the case of portfolio debt, using three-year averages of data further re-inforce the evidence of the annual data in table 2.7. Table 2.10 shows the results for the effect of portfolio debt on growth using three-year averages panel regressions. The coefficient for portfolio debt in the OLS and GMM regressions are significant and negative. This supports the evidence of the literature that debt hurt growth in developing countries (Kose et al., 2009a). Developing countries might lack the level of financial development to manage debt flows. In addition, the servicing of debt might affect the resources available for growth and development purposes.

Table 2.9. Portfolio Equity Regression-Three Year Averages Panel

	OLS	**FE**	**GMM**	**OLS**	**FE**	**GMM**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Initial GDP Per Capita	-0.467**	-5.741***	0.435	-0.583***	-5.382***	-0.130
	(0.200)	(1.237)	(1.038)	(0.197)	(1.449)	(1.023)
Portfolio Equity	0.274	0.566*	-0.456	0.292	0.536**	-0.484
	(0.222)	(0.283)	(0.924)	(0.228)	(0.239)	(1.090)
Domestic Investment (% GDP)	0.112***	0.0708*	0.126***	0.123***	0.0881**	0.103
	(0.0166)	(0.0387)	(0.0444)	(0.0171)	(0.0380)	(0.0637)
Years of Schooling	0.293***	-0.0320	0.130	0.337***	0.0154	0.497
	(0.0808)	(0.272)	(0.335)	(0.0739)	(0.317)	(0.395)
Government Exp. (% GDP)	-0.0299	-0.0670	-0.141	-0.0192	-0.0536	-0.177
	(0.0249)	(0.0596)	(0.175)	(0.0212)	(0.0599)	(0.123)
Trade (% GDP)	-0.00397	0.0075	-0.0041	-0.0055	0.0129	-0.0071
	(0.00282)	(0.0111)	(0.0219)	(0.0034)	(0.0104)	(0.0265)
Private Credit (% GDP)				-0.00482	-0.0256**	-0.00599
				(0.0039)	(0.0111)	(0.0225)
ICRG Index				0.0124	0.0103	0.0009
				(0.0108)	(0.0182)	(0.0396)
Constant	1.189	44.38***	-3.575	1.047	40.87***	-0.0381
	(1.370)	(9.682)	(6.315)	(1.501)	(10.85)	(6.385)
Observations	304	304	304	287	287	287
Countries	50	50	50	48	48 48	
AR(2) Correlation (p-value)			0.820			0.982
Hansen Test (p-value)			0.652			0.640
No. of Instruments			21			26

Note: The dependent is the Growth rate of GDP Per Capita over each three year period . Initial GDP per capita is instrumented using the first lag. All variables except the ICRG Index are treated as endogenous and instrumented with the second lag. The ICRG index is treated as predetermined. Each regression includes time dummies. Robust standard errors are reported in parenthesis. *, ** and *** indicate statistical significance at 10%, 5% and 1% level.

The interaction terms for portfolio debt with financial and institutional development is insignificant as shown in table A3 in the appendix. This would mean that the overall effect of portfolio debt given the level of financial development of the country is negative and hence, financial development does not serve as absorptive capacity factor for these countries. Portfolio debt could increase capital accumulation, but it is more likely to hamper growth as a result of the risks and financial crisis associated with debt flows (Kose et al., 2009a).

In the next section, some sensitivity checks are undertaken to examine if these results are influenced by outliers or regional grouping of countries considered.

Table 2.10. Portfolio Debt Regression-Three Year Averages Panel

	OLS	**FE**	**GMM**	**OLS**	**FE**	**GMM**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Initial GDP Per Capita	-0.388*	-4.932***	0.0528	-0.512**	-4.463***	-0.584
	(0.213)	(1.174)	(1.371)	(0.205)	(1.366)	(1.116)
Portfolio Debt (% GDP)	-0.132**	-0.0325	-0.771**	-0.141**	-0.0449	-0.593**
	(0.0665)	(0.0720)	(0.346)	(0.0667)	(0.0774)	(0.275)
Domestic Investment (% GDP)	0.114***	0.0840***	0.146**	0.114***	0.0894***	0.130**
	(0.0154)	(0.0293)	(0.0576)	(0.0148)	(0.0279)	(0.0504)
Years of Schooling	0.306***	0.205	0.860*	0.337***	0.256	0.728*
	(0.0847)	(0.329)	(0.502)	(0.0760)	(0.285)	(0.429)
Government Exp. (% GDP)	-0.0490**	-0.116*	-0.235	-0.0425**	-0.0854	-0.125
	(0.0227)	(0.0650)	(0.163)	(0.0205)	(0.0622)	(0.111)
Trade (% GDP)	-0.0066**	-0.0035	-0.0128	-0.007**	1 0.0018	0.0133
	(0.0032)	(0.0094)	(0.0269)	(0.0032)	(0.0081)	(0.0233)
Private Credit (% GDP)				-0.0006	-0.0260***	-0.0153
				(0.0031)	(0.0097)	(0.0127)
ICRG Index				0.0109	0.0021	-0.0052
				(0.0107)	(0.0161)	(0.0363)
Constant	1.305	38.47***	-2.656	1.546	34.49***	1.187
	(1.585)	(9.620)	(8.587)	(1.640)	(10.66)	(7.366)
Observations	326	326	326	316	316	316
Countries	52	52	52	51	51	51
AR(2) Correlation (p-value)			0.440			0.860
Hansen Test (p-value)			0.503			0.418
No. of Instruments			21			26

Note: The dependent is the Growth rate of GDP Per Capita over each three year period . Initial GDP per capita is instrumented using the first lag. All variables except the ICRG Index are treated as endogenous and instrumented with the second lag. The ICRG index is treated as predetermined. Each regression includes time dummies. Robust standard errors are reported in parenthesis. *, ** and *** indicate statistical significance at 10%, 5% and 1% level.

2.4.3 Robustness Analysis

For robustness analysis, the exclusion of outliers, the inclusion of regional dummies and the exclusion of eastern European countries was considered. This section will only focus on the results from the three-year averages regressions. As discussed in the previous section. Three-year averages of data smoothen out business cycle fluctuations which could affect the results.

Extreme values in the data (outliers) are eliminated by dropping top and bottom 1% of the observations. The results of FDI and portfolio equity remains the same while portfolio debt becomes insignificant. This would mean that the significance and magnitude of the results of portfolio debt flows was driven by outliers. The results from the sensitivity analysis are in the appendix.

Including regional dummies to three-year averages panel regression do not change the results for both FDI and portfolio equity. In the case of portfolio debt flows, its coefficient in the GMM becomes insignificant. This would mean that the effect of portfolio debt on growth could differ by region of countries. As shown on table 2, the direction of correlation between portfolio debt flows and economic growth depends on regional groupings.

There might be a reason to think that capital flows might have a different effect on eastern European countries relative to other countries in the sample. These countries are also known as transition economies. They are former communist economies which undertook market reforms and opened up to capital flows in the 1990s. At this time, most of the sectors were state dominated (Mileva, 2008). Therefore, capital flows could behave differently in these countries. In the three-year averages panel, excluding transition economies changes the results of capital flow variables. All capital flow variables become insignificant in the GMM regressions.

Foreign participation in the extractive industries of some countries particularly in Africa has contributed to the recent growth experienced by some natural resource rich countries (Rodrik, 2014). The effect of capital flows could depend on the sector invested. FDI invested in the manufacturing sector will generate more spillovers and have more effect compared to FDI in the primary sector (Alfaro, 2003). Therefore, FDI might have less effect on resource rich countries with more FDI in the primary sector. To ascertain that the results are not driven by resource rich countries, oil exporting countries are excluded from the regressions for robustness checks. In the GMM regressions, FDI and portfolio equity had no effect on the economic growth of non-oil exporting countries while portfolio debt had a negative effect on the growth of these countries. This means that the effect of capital flows differs between non-oil and oil exporting countries.

Doing a similar analysis on oil exporting countries shows that capital inflows has no effect on growth in oil exporting countries. However, the GMM regressions results does not pass the Hansen test for over identification as the number of countries (N) is not significantly greater than the time period (T). This results also shows that there is need for further research into the effect of FDI on growth based on sectors invested.

2.4.4 Discussion

This study sets out to assess the effect of capital inflows on growth. This study finds that not all forms of capital inflows are beneficial to growth. Hence, the benefits of financial integration depend on the types or forms of capital inflows (financial liabilities). This study finds evidence that FDI might promotes growth. According to the literature, FDI is the most beneficial form of capital flows as it could improve financial development, physical capital, human capital development as well as productivity.

As argued by Kose et al. (2009a), a reason for the insignificant effect of capital flows could be due to the fact that capital flows work through different channels to influence growth. It could work through improvement in financial and institutional development, productivity gains as well as through trade and human capital development. Controlling for these other channels in the regressions could bring about an insignificant effect of capital flows on growth. It might be difficult to segregate the effect of capital flows particularly portfolio equity from these reforms.

The literature has argued that portfolio debt flows could hurt growth in developing countries. A mismanaged and poorly supervised financial sector could lead to inefficient allocation of portfolio debt (Kose et al., 2009a). In addition, a large amount of debt could contribute to currency risks and financial crises since countries with unfavourable conditions (more volatile and riskier) might rely more on debt. An economy might also experience macroeconomic volatility at low levels of financial integration. As countries become more open, they would benefit from financial integration. Good macroeconomic policies would also help to mitigate the adverse effect of financial integration (Kose et al., 2003).

Total factor productivity (TFP) and output growth might have different adjustment timing to capital inflows (Kose et al., 2009b). It could be that financial integration contributes to TFP growth by introducing new technologies and making human capital and physical capital obsolesce. Therefore, an effect of financial integration on output growth would give an insignificant result as the effect on the components of growth would cancel out. It could also take some time for human and physical capital to adjust to financial integration. In the long run, when human and physical capital have adjusted, financial integration might have a positive effect on growth.

The effect of portfolio debt and equity could be affected by lack of adequate data as

some countries have missing observations in the first 10-year periods. This would be due to non-reporting of portfolio flows or countries opening up to portfolio flows in the late 1990s and early 2000s. As shown in table 2.2, the correlation of capital flows with GDP growth differs by region of countries. As data improves and more time periods become more available, it might be useful to split countries by regional grouping.

2.5 Conclusion

This paper provides a recent evidence on the differential effect of capital inflows on the growth of developing countries. It examines the differential effect of each form of capital inflow. A positive effect of FDI is obtained in some cases. Portfolio equity has an insignificant effect on growth while portfolio debt decreases growth. However, these results are not robust to some sensitivity checks.

The insignificant effect of portfolio equity and negative effect of portfolio debt flows in non-oil exporting countries could shed some light on the insignificant effect of portfolio investment flows obtained by most studies in the literature. This would mean that portfolio debt and equity flows have different effect on growth and therefore, pulling them together in empirical analysis will give ambiguous and misleading results.

The Latin America Crisis of the 1990s presents an example of how portfolio equity and portfolio debt flows can contribute differently to economic crises. During the Mexican crisis in 1994, higher US interest rate lead to reversals of capital flows like portfolio equity. Capital outflows contributed to a fall in foreign reserves and exchange rate. Despite these losses, Mexico was faced with the debt burden from portfolio debt and loans (Turner, 1995). Portfolio debt was mostly in form of government securities indexed to the dollar exchange rate and a fall in exchange rate increased the debt burden. The difficulty of financing the debt burden affected the banking system and the economy. The debt like characteristics (repayment of fixed interest and principal at maturity) of portfolio debt flows could put economic and financial pressures on an economy particularly in periods of economic slowdown.

On absorptive capacity effect, this paper does not find any evidence that the effect of capital flows on growth might depend on the level of financial and institutional development in the country. Nonetheless, these factors are important in the development

and growth process of countries. From the analysis, there exist a correlation between FDI and financial sector development as its inclusion in the regression reduces the significance and coefficient of FDI. This shows that financial development matters for country to receive more FDI flow. There may also exist a negative relationship between growth and financial development which can be explained by the allocation problem inherent in most developing countries. It could be that increasing financial development does not benefit firms with financial constraints or the firms and sectors which contributes most to growth.

In summary, this empirical analysis finds that each type of capital flow has a different on growth. Although portfolio debt and equity flows are both traded on the stock market and could have some similar characteristics, they are different. Therefore, there is a need to differentiate between each form of flow. FDI and portfolio equity mostly flow into firms. It would be interesting to examine how these flows affect the firms that receive them.

2.A Appendix A

Name of countries: Albania, Argentina, Armenia, Bangladesh, Benin, Bolivia, Botswana, Brazil, Bulgaria ,Cambodia, Chile, China, Colombia, Dominican Republic, Ecuador, Egypt, El Salvador, Guatemala, Hungary, India, Indonesia, Jamaica, Jordan, Kazakhstan, Malawi, Malaysia, Mali, Mexico, Morocco, Mozambique, Namibia, Nicaragua, Niger, Pakistan, Panama, Paraguay, Peru, Philippines, Poland, Romania, Senegal, Sierra Leone, South Africa, Swaziland, Tanzania, Thailand, Togo, Tunisia, Turkey, Uganda, Ukraine, Uruguay, Venezuela, Zambia.

Countries in each region

Europe and Central Asia: Albania, Armenia, Bulgaria, Hungary, Kazakhstan, Poland, Romania, Turkey, Ukraine.

East Asia and Pacific: Cambodia, China, Indonesia, Malaysia, Philippines, Thailand.

South Asia: Bangladesh, India, Pakistan.

Middle East and North Africa: Egypt, Jordan, Morocco, Tunisia.

Latin America and the Caribbean: Argentina, Bolivia, Brazil, Bulgaria, Chile, Colombia, Dominican Republic, Ecuador, El Salvador, Guatemala, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, Venezuela.

Sub-Sahara Africa: Benin, Botswana, Malawi, Mali, Mozambique, Namibia, Niger, Senegal, Sierra Leone, South Africa, Swaziland, Tanzania, Togo, Uganda, Uruguay, Zambia.

Oil Exporting Countries: Argentina, Bolivia, Brazil, China, Colombia, Ecuador, Egypt, India, Indonesia, Kazakhstan, Malaysia, Ukraine, Venezuela.

Table A1. FDI Regressions with Interaction terms

	Annual Data				Three Year Averages of Data			
	FE	**GMM**	**FE**	**GMM**	**FE**	**GMM**	**FE**	**GMM**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Lagged Dependent Variable	0.0465	0.0590	0.0464	0.0571	-5.369***	-0.854	-5.328***	-1.100
	(0.0468)	(0.0642)	(0.0467)	(0.0623)	(1.429)	(1.238)	(1.416)	(1.325)
FDI (% GDP)	-0.0015	0.328	0.0213	0.334	-0.0007	0.320	0.0390	0.465
	(0.0716)	(0.258)	(0.142)	(0.358)	(0.0636)	(0.257)	(0.118)	(0.511)
Domestic Investment (% GDP)	0.153***	0.130	0.150***	0.180**	0.0846***	0.00845	0.0811***	0.0536
	(0.0331)	(0.0833)	(0.0324)	(0.0688)	(0.0281)	(0.0696)	(0.0285)	(0.0585)
Years of Schooling	0.0834	0.472	0.0784	0.954*	0.0027	0.869*	-0.0030	1.167***
	(0.245)	(0.462)	(0.244)	(0.496)	(0.293)	(0.477)	(0.292)	(0.382)
Government Exp.(% GDP)	-0.111*	-0.414**	-0.111*	-0.385**	-0.0604	-0.183	-0.0607	-0.200
	(0.0609)	(0.193)	(0.0612)	(0.187)	(0.0517)	(0.167)	(0.0518)	(0.134)
Trade (% GDP)	0.0071	0.0132	0.0069	0.0227	0.0092	0.0030	0.0087	-0.0125
	(0.00927)	(0.0443)	(0.00931)	(0.0379)	(0.0087)	(0.0236)	(0.0087)	(0.0198)
Private Credit (% GDP)	-0.0791***	-0.0122	-0.0772***	-0.0379*	-0.0320***	-0.0046	-0.0310***	-0.0218*
	(0.0157)	(0.0377)	(0.0145)	(0.0215)	(0.0102)	(0.0310)	(0.0087)	(0.0129)
ICRG Index	0.0127	0.0930	0.0123	0.0478	-0.0038	-0.0033	-0.0031	-0.0004
	(0.0207)	(0.0585)	(0.0220)	(0.0557)	(0.0142)	(0.0379)	(0.0152)	(0.0404)
Private Credit*FDI	0.0427	-0.430			0.0222	-0.414		
	(0.118)	(0.422)			(0.122)	(0.620)		
ICRG Index*FDI			-0.00681	-0.395			-0.0590	-0.791
			(0.246)	(0.633)			(0.207)	(0.957)
Constant	2.148	-3.074	2.195	2.148	41.50***	5.222	41.26***	6.016
	(2.261)	(4.345)	(2.272)	(2.261)	(10.43)	(6.515)	(10.35)	(9.318)
Observations	1,137	1,137	1,137	1,137	389	389	389	389
Countries	51	51	51	51	51	51	51	51
AR(2) Correlation		0.335		0.370		0.367		0.493
Hansen Test		0.121		0.199		0.209		0.409
No. of Instruments		51		51		35		35

Note: The variables in each regressions and their instruments are similar to those in table 5 and 8.

Table A2. Portfolio Equity Regressions with Interaction terms

	Annual Data				Three Year Averages of Data			
	FE	**GMM**	**FE**	**GMM**	**FE**	**GMM**	**FE**	**GMM**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Lagged Dependent Variable	0.0838	0.140	0.0859	0.145	-5.483***	-0.449	-5.388***	-0.417
	(0.0580)	(0.110)	(0.0575)	(0.0975)	(1.512)	(0.873)	(1.483)	(1.093)
Port Equity (% GDP)	1.063***	2.448	1.190	0.211	1.417***	1.023	1.755	-0.472
	(0.308)	(2.408)	(0.958)	(3.714)	(0.422)	(1.496)	(1.083)	(2.241)
Domestic Investment (% GDP)	0.191***	0.113	0.193***	0.132**	0.0821**	0.0839	0.0869**	0.102*
	(0.0397)	(0.0756)	(0.0395)	(0.0588)	(0.0381)	(0.0512)	(0.0386)	(0.0604)
Years of Schooling	0.167	0.597	0.189	0.284	-0.0088	0.515	0.0119	0.524
	(0.290)	(0.809)	(0.289)	(0.745)	(0.307)	(0.369)	(0.301)	(0.423)
Government Exp.(% GDP)	-0.0552	-0.0370	-0.0551	-0.127	-0.0490	-0.104	-0.0554	-0.135
	(0.0519)	(0.280)	(0.0515)	(0.244)	(0.0558)	(0.135)	(0.0595)	(0.121)
Trade (% GDP)	0.0148	0.0056	0.0149	0.0018	0.0134	-0.0002	0.0120	0.0003
	(0.0141)	(0.0303)	(0.0139)	(0.0364)	(0.0103)	(0.0291)	(0.0101)	(0.0240)
Private Credit (% GDP)	-0.0694***	-0.0283	-0.0721***	-0.0171	-0.0196*	0.0108	-0.0260**	0.0039
	(0.0149)	(0.0222)	(0.0143)	(0.0209)	(0.0116)	(0.0233)	(0.0111)	(0.0164)
ICRG Index	-0.0310	-0.0333	-0.0209	0.0410	0.0066	-0.0325	0.0221	-0.0271
	(0.0212)	(0.173)	(0.0247)	(0.141)	(0.0182)	(0.0693)	(0.0201)	(0.0438)
Private Credit* Port Equity	-0.714***	-1.718			-1.207***	-1.135		
	(0.264)	(2.450)			(0.418)	(1.653)		
ICRG Index* Port Equity			-1.302	0.631			-2.214	-0.371
			(1.522)	(6.158)			(1.767)	(3.854)
Constant	0.416	-1.478	-0.144	-2.054	41.60***	2.289	40.45***	2.275
	(2.756)	(8.486)	(2.771)	(7.753)	(11.30)	(6.514)	(11.08)	(6.896)
Observations	796	796	796	796	287	287	287	287
Countries	48	48	48	48	48	48	48	48
AR(2) Correlation		0.227		0.480		0.791		0.959
Hansen Test		0.379		0.511		0.720		0.511
No. of Instruments		51		51		28		28

Note: The variables in each regressions and their instruments are similar to those in table 6 and 9.

Table A3. Portfolio Debt Regressions with Interaction terms

	Annual Data				Three Year Averages of Data			
	FE	**GMM**	**FE**	**GMM**	**FE**	**GMM**	**FE**	**GMM**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Lagged Dependent Variable	0.146***	0.239***	0.145***	0.235**	-4.565***	-0.781	-4.597***	-0.724
	(0.0479)	(0.0776)	(0.0469)	(0.105)	(1.365)	(1.152)	(1.393)	(1.216)
Port Debt (% GDP)	0.0354	0.396	-0.281	-1.370	0.104	-0.416	-0.565*	-0.254
	(0.105)	(0.608)	(0.171)	(3.231)	(0.0993)	(0.339)	(0.326)	(0.803)
Domestic Investment (% GDP)	0.165***	0.149**	0.167***	0.115	0.0879***	0.123**	0.0933***	0.132***
	(0.0353)	(0.0684)	(0.0356)	(0.129)	(0.0280)	(0.0511)	(0.0280)	(0.0463)
Years of Schooling	0.219	0.388	0.224	0.323	0.323	0.790*	0.256	0.683*
	(0.261)	(0.843)	(0.259)	(1.040)	(0.276)	(0.450)	(0.280)	(0.401)
Government Exp.(% GDP)	-0.101	-0.163	-0.104	-0.0181	-0.0817	-0.104	-0.0846	-0.139
	(0.0710)	(0.196)	(0.0726)	(0.213)	(0.0611)	(0.107)	(0.0623)	(0.104)
Trade (% GDP)	0.00552	-0.0480	0.0073	0.0051	0.0004	0.0102	0.0040	0.0156
	(0.0108)	(0.0400)	(0.0111)	(0.0778)	(0.0082)	(0.0251)	(0.0086)	(0.0171)
Private Credit (% GDP)	-0.0673***	-0.0021	-0.0684***	-0.0255	-0.0227**	-0.0031	-0.0267***	-0.0128
	(0.0149)	(0.0338)	(0.0149)	(0.0423)	(0.0105)	(0.0220)	(0.00975)	(0.0155)
ICRG Index	-0.0005	0.0820	-0.0057	0.107	0.0023	-0.0202	-0.0074	-0.0033
	(0.0227)	(0.0989)	(0.0225)	(0.0942)	(0.0152)	(0.0331)	(0.0178)	(0.0415)
Private Credit* Port Debt	-0.0719	-3.082**			-0.418**	-0.441		
	(0.177)	(1.241)			(0.203)	(0.736)		
ICRG Index* Port Debt			0.591	1.094			1.070	-0.763
			(0.386)	(4.779)			(0.707)	(1.430)
Constant	0.626	-1.541	0.766	-6.250	34.79***	2.642	35.69***	2.522
	(2.492)	(7.543)	(2.443)	(12.40)	(10.59)	(7.099)	(10.90)	(7.349)
Observations	868	868	868	868	316	316	316	316
Countries	51	51	51	51	51	51	51	51
AR(2) Correlation		0.849		0.729		0.758		0.809
Hansen Test		0.584		0.394		0.454		0.491
No. of Instruments		51		51		28		28

Note: The variables in each regressions and their instruments are similar to those in table 7 and 10.

Table A4. Sensitivity Analysis: FDI Regressions

	Excluding Outliers				Excluding Eastern European Countries			
	FE	**GMM**	**FE**	**GMM**	**FE**	**GMM**	**FE**	**GMM**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Lagged dependent Variable	-5.062***	-0.339	-4.914***	-0.731	-5.229***	-0.417	-4.976***	-2.052
	(1.093)	(0.875)	(1.350)	(1.082)	(1.385)	(0.991)	(1.653)	(1.386)
FDI (% GDP)	0.0668	0.216*	0.0518	0.177	0.0009	0.167	0.00202	-0.0374
	(0.0550)	(0.124)	(0.0517)	(0.116)	(0.0375)	(0.113)	(0.0368)	(0.101)
Domestic Investment (% GDP)	0.0837***	0.0939*	0.0817***	0.0985*	0.0682**	-0.00772	0.0729**	0.0806
	(0.0261)	(0.0538)	(0.0272)	(0.0554)	(0.0292)	(0.0869)	(0.0309)	(0.0894)
Years of Schooling	-0.0138	0.383	0.0011	0.990**	-0.114	0.146	-0.0656	0.655
	(0.253)	(0.496)	(0.279)	(0.462)	(0.247)	(0.509)	(0.307)	(0.500)
Government Exp. (% GDP)	-0.0551	-0.149	-0.0376	-0.184	-0.0822	-0.340*	-0.0675	0.0591
	(0.0508)	(0.273)	(0.0533)	(0.143)	(0.0515)	(0.199)	(0.0534)	(0.136)
Trade (% GDP)	0.0066	-0.0070	0.0097	-0.0260	0.00984	0.0268	0.00710	-0.00248
	(0.0094)	(0.0192)	(0.0091)	(0.0192)	(0.0112)	(0.0236)	(0.0108)	(0.0245)
Private Credit (% GDP)			-0.0291***	-0.0239**			-0.0267**	-0.00401
			(0.0089)	(0.0108)			(0.0109)	(0.0206)
ICRG Index			0.0021	-0.0323			-0.00265	0.0549
			(0.0144)	(0.0329)			(0.0157)	(0.0525)
Constant	38.15***	1.567	37.53***	5.102	39.60***	6.623	38.41***	8.956
	(8.216)	(7.040)	(9.743)	(6.855)	(9.995)	(6.171)	(11.54)	(8.739)
Observations	402	402	376	376	348	348	325	325
Countries	54	54	51	51	45	45	42	42
AR (2) Correlation		0.181		0.128		0.789		0.893
Hansen Test		0.949		0.838		0.181		0.044
No. of Instruments		26		32		26		32

Note: The variables in each regressions and their instruments are similar to those in table 5 and 8.

Table A5. Sensitivity Analysis: FDI Regressions

	Non-Oil Exporting Countries				Including Regional Dummies			
	FE	**GMM**	**FE**	**GMM**	**FE**	**GMM**	**FE**	**GMM**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Lagged dependent Variable	-6.791***	-0.0660	-6.503***	-1.181	-0.271	1.262	-0.660***	-1.430
	(1.138)	(0.877)	(1.273)	(1.231)	(0.279)	(1.843)	(0.213)	(1.267)
FDI (% GDP)	0.0599	0.122	0.0181	0.179	0.0611	0.288*	0.0193	0.102
	(0.0555)	(0.107)	(0.0340)	(0.110)	(0.0461)	(0.158)	(0.0348)	(0.124)
Domestic Investment (% GDP)	0.0530	0.117	0.0616*	0.0602	0.0805***	0.0894*	0.099***	0.0647
	(0.0318)	(0.0772)	(0.0311)	(0.0738)	(0.0166)	(0.0505)	(0.0160)	(0.056)
Years of Schooling	-0.654	-0.0844	-0.128	0.780***	0.108	-0.109	0.215***	0.556
	(0.548)	(0.215)	(0.394)	(0.285)	(0.0879)	(0.556)	(0.0694)	(0.397)
Government Exp. (% GDP)	-0.112	-0.0534	-0.00314	-0.0221	-0.0551	-0.222	-0.0241	-0.0795
	(0.0933)	(0.149)	(0.0511)	(0.114)	(0.0339)	(0.155)	(0.0293)	(0.155)
Trade (% GDP)	-0.00168	-0.0206	0.0121	-0.0377	-0.0069*	-0.0115	-0.0081**	-0.0177
	(0.0172)	(0.0319)	(0.0104)	(0.0310)	(0.0037)	(0.0217)	(0.0034)	(0.0170)
Private Credit (% GDP)			-0.0363***	-0.0155			-0.0009	-0.0133
			(0.0105)	(0.0142)			(0.0038)	(0.0112)
ICRG Index			-0.00758	-0.0192			0.0092	0.0288
			(0.0168)	(0.0463)			(0.0103)	(0.0327)
Constant	54.91***	0.613	49.50***	7.397	1.889	-6.909	3.954***	9.335
	(8.891)	(4.860)	(9.269)	(7.226)	(1.940)	(13.40)	(1.514)	(8.958)
Observations	315	315	289	289	417	417	389	389
Countries	41	41	38	38	54	54	51	51
AR (2) Correlation		0.279		0.390		0.738		0.670
Hansen Test		0.176		0.282		0.343		0.308
No. of Instruments		26		32		31		37

Note: The variables in each regressions and their instruments are similar to those in table 5 and 8.

Table A6. Sensitivity Analysis: Portfolio Equity Regressions

	Excluding Outliers				Excluding Eastern European Countries			
	FE	**GMM**	**FE**	**GMM**	**FE**	**GMM**	**FE**	**GMM**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Lagged dependent Variable	-4.471***	-0.334	-4.248***	-0.0440	-5.481***	-0.141	-5.148**	-0.937
	(1.043)	(1.168)	(1.244)	(0.758)	(1.700)	(0.713)	(1.952)	(2.228)
Port Equity (% GDP)	0.598***	0.124	0.694***	-0.311	0.468	-1.272	0.546*	-1.652
	(0.215)	(1.234)	(0.219)	(0.927)	(0.321)	(0.928)	(0.317)	(2.530)
Domestic Investment (% GDP)	0.0881***	0.127	0.0858**	0.113	0.0525	0.189**	0.0568	0.134*
	(0.0320)	(0.0853)	(0.0343)	(0.0786)	(0.0385)	(0.0873)	(0.0415)	(0.0692)
Years of Schooling	-0.0264	0.287	-0.0267	0.258	0.0132	0.201	-0.0436	0.0789
	(0.235)	(0.450)	(0.304)	(0.266)	(0.254)	(0.350)	(0.329)	(0.669
Government Exp. (% GDP)	-0.0463	-0.245*	-0.0454	-0.342*	-0.0892	0.0810	-0.0745	0.0179
	(0.0525)	(0.144)	(0.0570)	(0.181)	(0.0606)	(0.161)	(0.0638)	(0.166)
Trade (% GDP)	0.00949	0.0242	0.0150	0.0172	0.00919	0.0382*	0.00846	0.0294
	(0.0101)	(0.0282)	(0.0107)	(0.0352)	(0.0147)	(0.0215)	(0.0149)	(0.0291)
Private Credit (% GDP)			-0.0241**	-0.0107			-0.0260*	0.0221
			(0.0106)	(0.0262)			(0.0139)	(0.0564)
ICRG Index			0.00976	0.0271			0.00854	-0.0283
			(0.0180)	(0.0407)			(0.0205)	(0.174)
Constant	34.07***	1.686	32.35***	0.481	41.69***	-5.842	39.66***	4.076
	(8.105)	(7.734)	(9.308)	(4.452)	(12.64)	(5.435)	(13.88)	(23.29)
Observations	294	294	278	278	247	247	232	232
Countries	50	50	48	48	41	41	39	39
AR (2) Correlation		0.519		0.539		0.868		0.777
Hansen Test		0.335		0.397		0.788		0.962
No. of Instruments		21		26		21		26

Note: The variables in each regressions and their instruments are similar to those in table 6 and 9.

Table A7. Sensitivity Analysis: Portfolio Equity Regressions

	Non-Oil Exporting Countries				Including Regional Dummies			
	FE	**GMM**	**FE**	**GMM**	**FE**	**GMM**	**FE**	**GMM**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Lagged dependent Variable	-5.142***	1.331	-5.199***	1.943	-0.460*	0.358	-0.727***	-0.487
	(1.144)	(1.006)	(1.354)	(1.704)	(0.240)	(1.417)	(0.240)	(1.216)
Port Equity (% GDP)	0.215	0.682	0.282	-0.0303	0.351	0.0075	0.375	-0.346
	(0.186)	(0.949)	(0.197)	(1.145)	(0.233)	(1.047)	(0.230)	(1.288)
Domestic Investment (% GDP)	0.0819**	0.0444	0.0811**	0.0301	0.106***	0.0912	0.113***	0.0965
	(0.0352)	(0.0474)	(0.0384)	(0.0598)	(0.0169)	(0.0630)	(0.0163)	(0.0663)
Years of Schooling	-0.0511	-0.0672	-0.0216	0.101	0.164**	0.0119	0.195**	0.426
	(0.302)	(0.295)	(0.426)	(0.319)	(0.0796)	(0.357)	(0.0798)	(0.338)
Government Exp. (% GDP)	0.00364	-0.225	0.0198	-0.0669	-0.0082	-0.146	0.0168	-0.0984
	(0.0495)	(0.197)	(0.0477)	(0.192)	(0.0333)	(0.189)	(0.0274)	(0.159)
Trade (% GDP)	0.00368	-0.0197	0.00909	-0.0516	-0.0037	-0.0207	-0.0062*	-0.0147
	(0.0120)	(0.0317)	(0.0150)	(0.0376)	(0.0032)	(0.0220)	(0.0035)	(0.0263)
Private Credit (% GDP)			-0.0280*	-0.0346			-0.0031	-0.0010
			(0.0155)	(0.0374)			(0.0042)	(0.0193)
ICRG Index			-0.000793	-0.0151			0.0156	-0.0065
			(0.0231)	(0.0556)			(0.0109)	(0.0513)
Constant	37.91***	-5.872	38.41***	-9.983	2.536	0.353	3.536*	3.352
	(8.665)	(6.188)	(10.38)	(10.48)	(1.687)	(10.50)	(1.822)	(9.160)
Observations	220	220	204	204	304	304	287	287
Countries	37	37	35	35	50	50	48	48
AR (2) Correlation			0.876	0.979			0.949	0.984
Hansen Test			0.829	0.980			0.696	0.394
No. of Instruments			21	26			26	31

Note: The variables in each regressions and their instruments are similar to those in table 6 and 9.

Table A8. Sensitivity Analysis: Portfolio Debt Regressions

	Excluding Outliers				Excluding Eastern European Countries			
	FE	**GMM**	**FE**	**GMM**	**FE**	**GMM**	**FE**	**GMM**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Lagged dependent Variable	-4.204***	-0.654	-4.004***	0.266	-4.664***	-0.465	-4.243**	-0.0111
	(1.024)	(1.231)	(1.290)	(1.423)	(1.608)	(1.143)	(1.685)	(1.264)
Port Debt (% GDP)	-0.0378	-0.524	-0.0099	-0.189	-0.0696	-0.371	-0.0508	-0.193
	(0.109)	(0.586)	(0.119)	(0.436)	(0.0748)	(0.576)	(0.0822)	(0.609)
Domestic Investment (% GDP)	0.102***	0.122	0.0963***	0.0897	0.0605*	0.0666	0.0624*	0.0572
	(0.0248)	(0.0818)	(0.0244)	(0.0635)	(0.0304)	(0.0757)	(0.0309)	(0.107)
Years of Schooling	0.396	0.856	0.356	0.458	0.0043	0.454	0.0859	0.298
	(0.300)	(0.609)	(0.256)	(0.643)	(0.300)	(0.467)	(0.304)	(0.388)
Government Exp. (% GDP)	-0.0639	-0.0827	-0.0484	-0.252	-0.114*	-0.198	-0.103	-0.217*
	(0.0557)	(0.303)	(0.0593)	(0.271)	(0.0635)	(0.149)	(0.0647)	(0.127)
Trade (% GDP)	-0.00782	-0.00186	-0.00163	0.0192	-0.0046	0.0207	-0.0033	0.0311
	(0.00842)	(0.0337)	(0.00805)	(0.0265)	(0.0116)	(0.0340)	(0.0103)	(0.0362)
Private Credit (% GDP)			-0.0262**	-0.0359*			-0.0256**	-0.0126
			(0.00984)	(0.0198)			(0.0121)	(0.0163)
ICRG Index			-0.00394	0.0121			-0.0029	0.0087
			(0.0161)	(0.0544)			(0.0174)	(0.0484)
Constant	31.11***	0.591	30.31***	-2.204	37.29***	2.656	34.42**	-0.410
	(8.356)	(5.785)	(10.07)	(9.798)	(12.41)	(6.449)	(12.85)	(8.197)
Observations	315	315	306	306	266	266	259	259
Countries	52	52	51	51	43	43	42	42
AR (2) Correlation			0.567	0.592			0.885	0.865
Hansen Test			0.094	0.604			0.134	0.080
No. of Instruments			21	21			21	26

Note: The variables in each regressions and their instruments are similar to those in table 7 and 10.

Table A9. Sensitivity Analysis: Portfolio Debt Regressions

	Non-Oil Exporting Countries				Including Regional Dummies			
	FE	**GMM**	**FE**	**GMM**	**FE**	**GMM**	**FE**	**GMM**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Lagged dependent Variable	-5.142***	0.531	-5.039***	1.190	-0.441*	0.0875	-0.720***	-1.155
	(1.017)	(1.026)	(1.158)	(0.963)	(0.250)	(2.080)	(0.242)	(1.184)
Port Debt (% GDP)	-0.164**	-0.568*	-0.152*	-0.428***	-0.120*	0.322	-0.138**	-0.228
	(0.0759)	(0.281)	(0.0796)	(0.142)	(0.0673)	(1.093)	(0.0663)	(0.544)
Domestic Investment (% GDP)	0.0808***	0.117*	0.0764**	0.122***	0.109***	0.0929	0.110***	0.115
	(0.0286)	(0.0583)	(0.0287)	(0.0411)	(0.0152)	(0.0776)	(0.0145)	(0.0727)
Years of Schooling	0.0535	0.278	0.308	0.300	0.188**	0.511	0.185**	0.777
	(0.351)	(0.456)	(0.358)	(0.358)	(0.0840)	(0.930)	(0.0811)	(0.496)
Government Exp. (% GDP)	-0.0398	-0.169	-0.0158	-0.0791	-0.0233	-0.396**	-0.0125	-0.150
	(0.0537)	(0.105)	(0.0505)	(0.0860)	(0.0335)	(0.197)	(0.0269)	(0.144)
Trade (% GDP)	-0.00515	-0.00436	-0.00161	0.00510	-0.0069**	-0.0224	-0.0076**	0.0026
	(0.00795)	(0.0213)	(0.00824)	(0.0250)	(0.0033)	(0.0284)	(0.0032)	(0.0295)
Private Credit (% GDP)			-0.0316**	-0.0343**			0.0033	-0.0122
			(0.0130)	(0.0145)			(0.0036)	(0.0140)
ICRG Index			-0.00499	-0.0207			0.0167	0.0005
			(0.0180)	(0.0351)			(0.0111)	(0.0456)
Constant	39.12***	-4.876	37.58***	-10.08	2.970	2.598	4.529**	5.987
	(7.989)	(6.157)	(9.303)	(6.369)	(1.820)	(12.97)	(1.866)	(9.681)
Observations	239	239	231	231	326	326	316	316
Countries	39	39	38	38	52	52	51	51
AR (2) Correlation			0.804	0.494			0.420	0.905
Hansen Test			0.564	0.912			0.058	0.078
No. of Instruments			21	26			26	31

Note: The variables in each regressions and their instruments are similar to those in table 7 and 10.

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3. Foreign Direct Investment and Channels of Intra-industry Spillovers [1]

Abstract

This study examines the different channels of intra-industry spillover from foreign direct investment. It focuses on the demonstration, competition and linkage channels of horizontal spillovers. Using a panel of Sub-Saharan African firms, this study finds that each channel of spillover has different effects on the productivity of domestic firms. In most cases, the results indicate an insignificant demonstration spillover effect, positive linkage effect and a negative competition effect. However, the magnitude of this effect depends on the structure of foreign ownership as well as the country and domestic firms' characteristics.

JEL Codes: F23, F21, O1.

Keywords: Foreign Direct Investment, Productivity, Spillover effects, Linkages, Sub-Saharan Africa.

[1] This paper has been presented at 14th CIREQ PhD Conference, the 5th Annual MMF PhD Conference, 7th International PhD Meeting, Thessaloniki under the name 'Oluwaseun Ologun'

3.1 Introduction

It has been argued that foreign direct investment (FDI) is beneficial to developing countries since it can generate technological spillovers and augment domestic savings to finance development. In a bid to attract FDI, developing countries have been offering tax incentives to foreign firms. Are there really benefits from foreign presence? The existing research has not reached a consensus on this matter. This paper contributes to this literature by analysing competition, demonstration and linkage effect from foreign firms affect the productivity of domestic firms in intra industry setting.

The literature often distinguishes between horizontal and vertical spillovers respectively. Horizontal (or intra-industry) spillovers refers to spillovers from foreign firms to domestic firms in the same sector while vertical spillovers (or inter-industry) are spillovers from foreign firms to domestic suppliers or customers in different sectors. The literature further distinguishes among five possible channels through which FDI affects productivity: demonstration or imitation, competition, exports, labour turnover and linkage (Görg and Greenaway, 2004; Colen et al., 2009; Alfaro et al., 2009). While the demonstration and competition channel occur mainly in the intra industry setting, export, labour turnover and linkage can occur in both intra or inter industry setting.

The demonstration effect involves domestic firms learning from the production and organisation techniques of foreign firms. The competition channel occurs through competition for market share. Aitken and Harrison (1999) identified that domestic firms might benefit from demonstration effect which might increase their productivity but the competition effect on their market share would lead to a decline in productivity. It is even possible for multinational firms to prevent technological spillovers from flowing to domestic competitors in order to reduce competition (Alfaro et al., 2009). Although foreign firms can reduce the productivity of domestic firms in the same sector (horizontal), they can enhance the productivity of domestic firms in the vertical sector. Javorcik (2004) finds that foreign firms facilitate the productivity of their domestic suppliers (vertical spillovers). Foreign firms might help domestic suppliers to become more productive in order to improve their input quality, cost of input and delivery times. It is possible for domestic firms in the foreign firms' sector to benefit from the use of good quality input at lower prices (Alfaro et al., 2009). While the literature has found evidence for vertical linkages in inter-industry settings, evi-

dence of linkage effect in intra-industry setting is limited to Kee (2015) which focuses on Bangladesh. One objective of this paper, therefore, is to investigate the horizontal externality linkage effect in intra-industry settings[2].

An argument for the inconclusive evidence on horizontal spillovers is the inability of empirical research to disentangle the different effects of foreign presence (Javorcik, 2004). It is important to distinguish between demonstration and competition effect in examining productivity spillovers. Based on a survey of domestic firms in Latvia and Czech Republic, Javorcik and Spatareanu (2005) showed that demonstration and competition channels have different effects. There have been few studies which attempt to disentangle the competition effect from the demonstration effect: (e.g.,Kokko (1996), Narula and Marin (2003), Li et al. (2001), Haskel et al. (2007), Demena and Murshed (2018)). These studies measure competition based on domestic firm market share or price mark-ups. These measures are industry wide measures for competition and could be affected by the presence of both foreign and domestic firms. It is difficult to distinguish if the activities of foreign firms contributed to changes in these industry measures. Theoretical explanation for a negative competition effect relates to the scale effect (Aitken and Harrison, 1999). Hence, measures that relates to market share competition effect of foreign firms only would be informative. In this study, a measure which relates to the domestic sales of foreign firms is used to examine the competition channel.

This paper focuses on the sample of manufacturing firms in Sub-Sahara Africa between the periods 2003-2016. It examines the demonstration, competition and the horizontal externality linkage effect of foreign presence on the productivity of domestic firms. It measures productivity as total factor productivity and labour productivity. It contributes to the literature on productivity spillovers in threefold. First, it investigates the channels of intra-industry productivity spillovers by distinguishing between the different channels. Second, it focuses on Sub-Sahara Africa comprising mostly of low income countries on which there has been less research. Lastly, it considers absorptive capacity factors in intra-industry spillovers.

Studies in the literature mostly capture horizontal spillover using foreign presence

[2]The horizontal externality linkage effect works indirectly. Foreign firm enhance the domestic firms in the vertical sector, this spills over to domestic firms in the sector of the foreign firm (horizontal sector) through their contact with the vertical sector firms. In the rest of the paper, it would be referred to as linkage effect.

in the industry (Javorcik, 2004; Bwalya, 2006; Waldkrich and Ofosu, 2010). A limitation of this measure is its inability to distinguish between the channels of productivity spillovers. First, this analysis investigates the competition, demonstration and linkage effect of foreign presence using different measures to capture each channel of horizontal spillover.

Second, this study provides evidence on productivity spillovers from foreign firms (FDI) in developing countries particularly low-income countries where there has been less research due to lack of data. Sub-Sahara Africa comprises mostly of low-income countries. It is one of the poorest regions where foreign finance is needed to facilitate growth, diversification into manufacturing and reduce poverty. There is a need to analyse if domestic firms benefit from foreign presence through productivity spillovers and to understand what type of FDI (foreign firms) is most suitable for sub-Sahara Africa [3].

Lastly, this study relates to the literature which examines how absorptive capacity affects productivity spillovers. The literature on productivity spillovers claim that absorptive capacity factors are important for domestic firms to absorb spillovers from foreign presence. These factors could be domestic firms' factors, foreign firm factors or country factors. A foreign firm factor mostly considered in the literature is the structure of foreign ownership. The structure of foreign ownership affects the level of spillover a domestic firm can absorb from foreign firms in its sector (Rojec and Knell, 2017). Based on this, the measures of spillover channels are re-classified to examine how ownership structure affects productivity spillovers. This study also considers domestic firms' and country factors to investigate what firms or countries are likely to benefit or lose from the various channels of foreign presence.

To the best of found knowledge, there is no research that tries to disentangle the linkage, market share competition and the demonstration effect. The closest to this paper is Demena and Murshed (2018) which examines the demonstration, labour mobility and competition channel. Their competition channel relates to industry wide competition measures which differs from foreign competition for market share.

The rest of the paper is divided into 5 sections. Section 2 describes the channels and type of productivity spillovers. In addition, it reveals how foreign firm presence

[3]Types of foreign firm depends on the input strategy, structure of foreign ownership and market orientation (local sales) of the foreign firm.

affects domestic firm productivity. It also reviews empirical evidence on productivity spillovers. Section 3 gives a description of the data, measurement of spillover channels and productivity. It also reveals the estimation strategy. Section 4 contains the empirical results of the channels of spillovers, how absorptive capacity factors might affect spillovers and some sensitivity analysis while section 5 gives the conclusions.

3.2 Foreign Presence and Productivity Spillovers

This section describes the literature on productivity spillovers. It outlines the channels through which foreign presence contributes to the productivity of domestic firms. In addition, it provides empirical evidence from studies on productivity spillovers.

3.2.1 Theory and Evidence on Productivity Spillovers

There are several ways through which the presence of foreign firms can affect the productivity of domestic firms: through the demonstration effect, the competition effect, linkage effect, the export link and the labour turnover (Blomström and Kokko, 1998; Görg and Greenaway, 2004; Alfaro et al., 2009; Rojec and Knell, 2017). The literature on productivity spillover claims that foreign firms are more productive than domestic firms as they possess non-tangible productive assets such as better technology, organisational skills, exporting knowledge which makes them more productive than domestic firms (Aitken and Harrison, 1999). Therefore, domestic firms can improve their productivity by learning better production techniques, use of superior technology and better organisational practices from foreign firms (Görg and Greenaway, 2004). This is regarded as the demonstration effect. The effect of this channel might depend on the size of the foreign firms in the sector (Wang and Blomström, 1992). The larger the presence of foreign firms, the higher the opportunity for domestic firms to observe, learn and imitate. This means the more available the foreign firm's products, the more the opportunity for domestic firms to imitate them.

Foreign firms invest in training and skill acquisition programmes for their workers. Domestic firms can benefit from training programmes of foreign firms through labour turnover by employing previous workers of foreign firms. These workers would bring with them the knowledge and skills acquired from the foreign firm. They might also

train other workers in the domestic firms. Hence, making the domestic firm more productive. This is known as the labour turnover channel. Domestic firms might also gain knowledge about the products and processes of foreign firms through the labour turnover channel.

The competition channel occurs when foreign and domestic firms compete for market share. The effect of competition could be two ways. It could lead the domestic firm to invest in advanced technology, train workers, improve their productivity and compete with foreign firms. On the other hand, it could also lead to the crowding out of some domestic firms due to loss of scale economies which means higher cost of production since output reduces as a result of competition (Aitken and Harrison, 1999). This competition effect is regarded as the market stealing effect. It also relates to the market orientation of foreign firms. Foreign firms could be market-oriented or export-oriented. Market-oriented foreign firm sells more in the domestic market hence, they would compete more with domestic firms (Girma et al., 2008). The export link channel occurs when domestic firms obtain knowledge about export markets and links through exporting activities of foreign firms (Görg and Greenaway, 2004; Colen et al., 2009).

Foreign firms may prevent horizontal spillover to domestic firms in the same industry to reduce competition. However, they could aid domestic suppliers or customers to be more productive. Therefore, the spillover effect might be vertical rather than horizontal (Javorcik, 2004; Alfaro et al., 2009). Vertical spillover could be backward or forward. Forward linkages relate to foreign firms assisting domestic customers (upstream sector) to become more productive while backward linkages involve foreign firms assisting domestic suppliers in the downstream sector to become more productive. This study relates to backward linkages which is the channel for externalities to domestic firms in the foreign firm's sector.

The linkage channel might work through foreign firms introducing domestic suppliers to better technology and practices to improve input quality, delivery times and reduce cost of inputs (Alfaro and Rodriguez-Clare, 2004). In order to become a supplier of a foreign firm, domestic suppliers might also adopt technologies to improve input quality and delivery times (Javorcik and Spatareanu, 2005). In addition, the presence of foreign firms could increase the demand for inputs which would allow input suppliers to produce on a large scale. Hence, customers would benefit from scale

economies.

Domestic firms in the sector of the foreign firm can benefit from linkage externality through quality and prices of inputs. While linkages improve the quality of inputs, its effect on input prices might be ambiguous. On one hand, a model by Markusen and Venables (1999) argues that increase in demand for inputs might lead to entry of more firms in the downstream sector which would induce competition and reduce prices of inputs. On the other hand, a model by Lin and Saggi (2007) shows that foreign firms who use superior inputs might have exclusive agreements with domestic suppliers. They assist their suppliers to become productive and restrict them from supplying their domestic competitors. This reduces the number of firms supplying domestic competitors' local inputs. Less competition for other input suppliers would increase the cost of inputs of the domestic firms (competitors of foreign firms).

Linkage effect depends on the input sourcing strategy (use of local inputs) of the foreign firms. Rodriguez-Clare (1996) identified that the origin of the investor is an important factor in determining productivity spillovers. He argued that the geographical distance (transport costs) together with the cultural, social and legal differences could affect the use of inputs of foreign firms. Multinationals from farther regions are more likely to generate more linkage effect as communication costs and transportation costs are greater. These means that developing host countries are more likely to benefit from countries from farther regions.

Empirical evidence on horizontal spillovers has produced mixed results. While the picture is clearer for advanced countries, it is less clear for transition and developing countries. Görg and Greenaway (2004) highlight a number of studies which found positive horizontal spillovers. These studies relate to countries like the UK, US, Ireland and Italy. Studies on horizontal productivity spillovers in developing countries have mostly found evidence of negative effect on either firm productivity (TFP- Total Factor Productivity) or labour productivity (Rojec and Knell, 2017).

Aitken and Harrison (1999) found evidence of negative horizontal spillovers from foreign participation in Venezuela. They find that the firm productivity of domestic plants decline as foreign participation in the same sector increases. In the same vein, Konings (2001) finds evidence of negative spillover from foreign firms to domestic firms in Bulgaria and Romania while for Poland, he finds no evidence of horizon-

tal productivity spillovers. In the case of Czech enterprises, Djankov and Hoekman (2000) showed that foreign participation in an industry leads to a negative effect on the TFP of domestic firms in that industry. In the context of Africa, Haddad and Harrison (1993) find no evidence of foreign presence on firm productivity of domestic firms in Morocco's manufacturing sector. In contrast to Haddad and Harrison (1993), Waldkirch and Ofosu (2010) find that the presence of foreign firms in Ghana had a negative effect on the firm and labour productivity of domestic firms.

The above studies on horizontal spillover mostly find an insignificant effect or negative effect. Aitken and Harrison (1999) argue that a negative effect from foreign presence could mean that the competition channel outweighs the demonstration channel. Since these studies use one measure to capture horizontal spillover, it is difficult to distinguish the competition from the demonstration channel. A study by Demena and Murshed (2018) examined the effect of different channels of horizontal spillover in 8 sub-Saharan African countries. They find that domestic firms benefit from demonstration and labour mobility channel while the competition (price mark-ups) channel hurts the productivity of these firms. However, the competition channel is based on industry wide measures (not exclusively on foreign firms) and they do not consider the linkage channel of horizontal spillover which this study considers.

Javorcik (2004) argue that spillovers might be vertical and not horizontal. For a sample of firms in Lithuania, Javorcik (2004) found no evidence of horizontal spillovers on firm productivity. However, she found that domestic firms became more productive by supplying foreign firms' inputs. This is an evidence of vertical spillovers which lead to a wave of studies on spillovers in inter-industry setting. For sub-Sahara Africa countries, Bwalya (2006) finds evidence for vertical spillovers on the firm productivity of Zambian manufacturing firms. Managi and Bwalya (2010) find evidence of both horizontal and vertical spillovers on firm productivity in Kenya and Zimbabwe but not for Tanzania. For other developing countries, Kugler (2006) finds evidence of positive vertical spillovers on the TFP of Colombian manufacturing plants. Like other studies, they find no evidence of horizontal spillovers. Blalock and Gertler (2009) also find evidence of vertical spillovers on the TFP of Indonesian firms supplying foreign firms. For transition economies, Gorodnichenko et al. (2014) find evidence of positive backward vertical spillovers and no evidence of forward vertical and horizontal spillovers on firm

productivity of 17 transition economies. These studies provide evidence that the presence of foreign firms can make domestic firms in the downstream sector become more productive. These vertical spillovers might be passed on as linkage externalities to domestic firms in the sector of the foeign firm.

Barrios et al. (2011) suggest that the measures of vertical spillovers might be restrictive since these measures use input-output tables and assume that multinationals use local inputs in the same proportions as domestic firms. These measures also assume that the share of multinationals' output in each sector is a measure of their demand for inputs which might not be the case. The measure from the input-output table also includes imported inputs. Therefore, these studies assume that local inputs are used in the same proportion as imported inputs. This study improves on the measures of backward linkages by using the proportion of input reported as purchased locally by foreign firms. This could be a better measure which might provide insight on linkages as well as backward vertical spillovers.

There are other studies on productivity spillovers not reviewed in this paper. This section reviews the most relevant and important studies in the literature. Hanousek et al. (2011) and Rojec and Knell (2017) give a survey of studies on productivity spillovers. A review of the literature shows that the evidence of productivity spillovers in developing countries is inconclusive. How linkage and competition affect domestic firm productivity have not explicitly been studied. There also exist few studies which have examined productivity spillovers for sub-Sahara African countries. This study aims to fill this gap in the literature and unravel the channels of productivity spillovers.

The literature on productivity spillovers argue that developing countries might not have the right capacities to benefit from productivity spillovers. There are absorptive capacity factors which determine the ability of domestic firms to benefit from the presence of foreign firms. In the next section, absorptive capacity variables and why they matter is discussed.

3.2.2 Absorptive Capacity

Görg and Greenaway (2004) argued that the ability of domestic firms to benefit from a foreign firm depends on its absorptive capacity. Absorptive capacity is defined as the ability of the domestic firms to apply the knowledge and processes of foreign

firms in its own firm (Narula and Marin, 2003). A study by Farole and Winkler (2012) argues that research on productivity spillovers should focus on examining factors that could explain the mixed results in the literature. They argued that there is a need to identify mediating or absorptive capacity factors that could enhance or undermine the ability of domestic firms to benefit from foreign firms. These factors have been classified into domestic firm, foreign firm and host country characteristics.

Technology gap is considered as an important domestic firm absorptive capacity factor. Blalock and Gertler (2009) argued that domestic firms might not benefit if the technology gap between them and the foreign firm is small. In this case, technological gap is measured as the difference between the productivity of a domestic and foreign firm. This means technological gap relates to the productivity level of the domestic firms. Therefore, the productivity level of domestic firms is an important absorptive capacity factor. Gorodnichenko et al. (2014) find evidence that spillovers could differ by firm size as larger firms are more likely to benefit than smaller firms. Larger firms are more likely to be organised and capable of absorbing knowledge flows from foreign firms. The level of skilled labour in the domestic firm could also affect how they benefit from foreign firms. Skilled workers would be better at applying knowledge from foreign firms and imitating the production process of foreign firms. Domestic exporters are faced with foreign competition in the export markets. Therefore, they would find it easier to absorb the technological processes of the foreign firms in their environment.

Absorptive capacities could be a reason for positive spillover effects in developed countries. These countries have the right environment and conditions for local firms to thrive. Therefore, country factors could also influence productivity spillovers. Crespo and Fontoura (2007) argued that foreign firms are more likely to introduce low-level technology in countries with weak property rights. The level of financial development in a country could also enhance the absorption of spillovers as it improves firms' access to finance for technological goods (Alfaro et al., 2009). To compete and imitate the production processes of foreign firms, domestic firms require finance. The level of wages in developing countries could make labour mobility from foreign firms to domestic firms difficult as domestic firms might find it challenging to pay higher wages relative to foreign firms. This might make it difficult for domestic firms to benefit from

labour turnover. The size of a country could also affect the level of inputs sourced locally by foreign firms (Sánchez-Martín et al., 2015). Other country factors which might affect the absorption of spillovers are: the level of human capital development, labour market regulations, investment and business climate, innovation and infrastructure (Farole and Winkler, 2012; Rojec and Knell, 2017).

Foreign firm characteristics could also serve as absorptive capacity factor. The literature argues that the structure of foreign ownership is important in productivity spillovers. Foreign firms with domestic participation i.e partially foreign firms would generate more spillovers than fully owned foreign firms as the former will network more with the domestic environment and suppliers hence, providing more linkage effect (Sánchez-Martín et al., 2015). Partially foreign firms are more likely to arise from mergers and acquisition. Therefore, the starting point technology of the firm is comparable with other domestic firms (Crespo and Fontoura, 2007). As the firm advances, other domestic firms learn gradually through demonstration and imitation. This means the structure of foreign ownership is important for productivity spillovers.

In the emprical analysis, important absorptive capacity factors such as productivity level, firm size, exporting status, the level of economic development, institutional development and structure of foreign ownership are considered as absorptive capacity factors.

3.3 Data and Empirical Strategy

This section focuses on the data as well as the empirical framework used in this study.

3.3.1 Data

Data is obtained from the World Bank Enterprise Survey. This survey contains information on manufacturing and service firms. World Bank enterprise surveys are surveys of firms in developing countries. The survey provides information on output and input of the firm, the origin of owners, employees, export, the location of the firm as well as country factors which affect the firm. The survey uses a standardized questionnaire therefore, questions are comparable in countries across different survey

waves.

The number of firms surveyed is based on the size of the economy. The survey uses stratified sampling techniques and firms are selected based on country size, sector, firm size and geographical location. Two waves of survey for each country is considered for this study. Different countries are surveyed in different years and the interval between the first and second wave ranges from 4 to 7 years. A summary of countries and their survey years can be found in appendix table B1. Only manufacturing firms are considered as service firms do not have enough information to calculate productivity. This study considers 14 sub-Sahara African countries. Selection of countries is based on the availability of panel data.

All domestic currency values have been deflated by the country's GDP deflator and converted to 2010 US dollars using the official exchange rate obtained from the World Bank. Most countries in Sub-Sahara Africa do not have data on producers or input price index. Hence the use of GDP deflator. This index is preferred to the consumer price index as it makes use of domestic goods only and it is based on the whole economy. Foreign firms are defined as firms with foreign equity participation greater than 10 percent as described by the official definition of FDI from the World Bank and IMF.

The survey includes 23 sectors. These sectors are further aggregated into 10 sectors due to the small number of firms in some sectors. After excluding firms with no information on sales, employees and sectors, the sample size consists of a total of 6,681 firms. The panel data is unbalanced as some firms exit the survey while some firms enter the survey. The full sample of all firms is referred to as the pooled cross-sectional sample while the sample of all panel firms (all firms that appear in both time periods) is referred to as the panel sample. To ensure foreign presence spillover measures are close to the overall sector foreign share, all foreign presence measures are based on the full sample. Table 3.1 below gives a breakdown of firms in each survey waves for the pooled cross-sectional and panel sample.

Table 3.2 contains a summary of firms by sector. The table reveals that some sectors have more foreign presence relative to others. chemical products, rubber and plastics, and machinery, transport and other equipment sectors have over 20% of the firms as foreign firms. This shows that foreign firms are more concentrated in medium to high

Table 3.1. Manufacturing Firms by Period of Survey

	Period 0 (wave 1)	Period 1 (wave2)	Total Observations
Panel firms	546	546	1092
Cross section 1 only	4399	-	4399
Cross section 2 only	-	1736	1736
N	4945	2282	7227

Source: Author's calculations based on WBES

Table 3.2. Manufacturing Firms by Sector

Code	Sector	Foreign firms (% of all firms)	All firms	Panel firms
15	Food and beverages	13.27	1666	181
18	Textile and Garments	9.00	1011	63
22	Publishing and printing	8.90	382	32
24	Chemical Products	22.56	359	33
25	Rubber and Plastics	25.27	182	20
26	Non-metallic Products	9.32	515	29
28	Basic and fabricated metals	11.34	794	70
32	Machinery, transport and other equipment	23.91	276	32
36	Wood and Furniture	6.52	1181	56
37	Other manufacturing	20.63	315	30
	N	12.36	6681	546

Note: Other manufacturing includes tobacco products, leather products, paper products, coke and petrol products.

Source: Author's calculations based on WBES

Table 3.3. Manufacturing Firms by Country

Country	Foreign firms (% of all firms)	All firms	Panel firms
Angola	14.55	213	35
Botswana	47.66	128	35
Burkina Faso	30.61	49	12
Cameroon	29.17	96	12
Cote d'ivoire	29.17	168	11
Dem. Rep. Congo	31.55	187	29
Ethiopia	15.13	304	30
Kenya	15.11	589	47
Nigeria	2.49	2729	97
Senegal	11.46	192	28
South Africa	16.29	933	99
Tanzania	12.93	294	43
Uganda	17.58	364	26
Zambia	22.30	435	42
N	12.26	6681	546

Source: Author's calculations based on WBES

technologically intensive sectors while domestic firms are concentrated in low technological sectors. All countries have a combination of foreign and domestic firms in most sectors as shown in table 3.3. The number of firms in a country mostly depends on the size of the country due to the stratified sampling method used. Therefore, larger countries have more sampled firms.

3.3.2 Empirical Framework

To examine the effect of foreign presence on the productivity of domestic manufacturing firms in the pooled sample, the following equation is estimated using the OLS (Ordinary Least Squares) estimator.

$$\begin{aligned} \ln prod_{isct} = \beta_0 + \beta_1 demonstration_{sct} + \beta_2 competition_{sct} \\ +\beta_3 linkage_{sct} + \alpha_i X_{isct} + \delta_{country} + \delta_{sector} + \delta_{period} + \delta_{surveyyear} + \epsilon_{isct} \end{aligned} \tag{3.1}$$

$lnprod_{isct}$ is the log of productivity. Demonstration, competition and linkages are foreign presence spillover variables. *i*,*s*,*c*,*t* represent firm,country, sector and time respectively. X_{isct} is a vector of firm controls such as firm age, firm size and exporting dummy. $\delta_{country}$ and δ_{sector} represents country and sector fixed effects. The period dummy is a time dummy which controls for differences between period 0 and 1. Period 0 is the first survey wave while period 1 is the second survey wave. To control for any effect due to different timing of the surveys in different countries, survey year dummies which represent the years of survey is included.

The specification above is the baseline specification. Productivity is measured as total factor productivity and labour productivity. In the specification where labour productivity is the dependent variable, capital intensity (capital per worker) is included in the regression to control for capital used in the production process. Several variations of equation 3.1 are estimated for the panel and pooled cross-sectional sample. Foreign presence variables are included one after the other to see how demonstration channel changes when other channels of spillovers are included. The control variables include firm age, firm size and a dummy variable for exporting. Firms are categorised into sizes based on the number of employees. Small firms are firms with 1-19 employees, medium firms are firms with 20-99 employees while large firms are firms with over 100 employees.

For the panel sample, the first difference estimator is used. Taking first difference helps us eliminate firm fixed effects which might lead to bias in the estimates. The first difference regressions for the panel data sample uses the same specifications as equation 3.1 above except that all variables are in first differences. The baseline specification therefore becomes:

$$\begin{aligned}\Delta \ln prod_{isct} = \beta_1 \Delta demonstration_{sct} + \beta_2 \Delta competition_{sct} \\ +\beta_3 \Delta linkage_{sct} + \alpha_i \Delta X_{isct} + \delta_{country} + \delta_{sector} + \epsilon_{isct}\end{aligned} \tag{3.2}$$

All standard errors are clustered at country and sector level to control for within -cluster errors which might introduce bias to the standard errors.

3.3.3 Foreign Spillover measures

The measures for foreign presence spillover measures includes demonstration, linkage and competition effect.

Demonstration: It refers to knowledge spillovers domestic firms acquire from the presence of foreign firms. It is defined as the average foreign share of a sector in a country weighted by each firm's share in the total sectoral output (sales) in the country:

$$\frac{\sum_{i=1}^{n_s} foreignshare * Y_{it}}{\sum_{i,i\in j} Y_{it}}$$

where n_s is the number of firms in the sector and Y_{it} is firm sales. This measure reveals the size (presence) of foreign firms' output in relation to the whole sector. Output is the mechanism for observation and imitation. The more available a product is, the more opportunity for the domestic firm to imitate the product. The demonstration variable increases as the output of the firm and foreign equity in the firm increases.

Foreign share follows the definition of FDI and it is regarded as 10 percent or more of foreign ownership in the firm. Demonstration channel can further be categorised by the level of foreign participation into partial and fully foreign. Partial foreign refers to foreign firms with foreign ownership of between 10 - 99 percent while fully foreign are foreign firms with 100 percent foreign ownership.

Linkage effect: refers to domestic firms benefiting from the downstream vertical link-

age effect of the foreign firm. If foreign firms make domestic firms in the downstream sector (suppliers) productive, the spillover effect of such benefit to domestic competitors is regarded as the horizontal externality or linkage effect (Alfaro, Kalemli-Ozcan and Sayek, 2009). The linkage effect is defined by the percentage of local input in the total input of the foreign firm. This variable is measured as the average percentage of local input used by foreign firms in each sector in a country:

$$\frac{\sum_{i=1}^{n_f} \frac{localinput_{ft}}{totalinput_{ft}}}{nf_s}$$

where f represents foreign firms and nf_s is the number of foreign firms in the sector. A high value indicates the use of more local input by the foreign firms in the sector.

Competition: Foreign firms compete with domestic firms for market share and this could reduce the productivity of domestic firms (Aitken and Harrison, 1999). The competition effect is defined as the percentage of local sales in the total sales of the foreign firm. It is measured as the average percentage of the local sales of foreign firms in each sector in a country:

$$\frac{\sum_{i=1}^{n_f} \frac{localsales_{ft}}{totalsales_{ft}}}{nf_s}$$

where f represents foreign firms and nf_s is the number of foreign firms in the sector. A high value indicates that the foreign firm sells more in the local market rather than exporting.

Competition and linkage variables are further categorised into partial and full to examine if there are differences in the competition and linkage effect of partial and fully foreign firms. All foreign presence spillover measure are constructed based on the full sample. There might be reasons to assume that the channels of foreign presence might be correlated. Table3.4 below shows the correlation matrix of foreign presence variables for the sample of domestic firms since they are the basis for the research question. The correlation matrix shows that foreign presence variables are not very correlated.

Table 3.4. Foreign presence correlation matrix- Domestic firms only

	Pooled Sample		**Panel Sample**	
	Demonstration	Competition	Demonstration	Competition
Demonstration effect	1		1	
Competition effect	-0.16	1	0.05	1
Linkage effect	-0.23	0.20	-0.17	0.06

Source: Author's calculations

3.3.4 Productivity Measures

There are two measures of productivity used in this study: The labour productivity measure and the total factor productivity (TFP) measure. Labour productivity is measured as the logarithm of value added per worker. Value added is measured as sales less materials cost. The TFP measure would be derived using OLS approach and the Levinsohn and Petrin (2003) approach. The OLS approach might produce biased estimates as it does not control for the endogenous nature of inputs. Firms may observe some part of their productivity which is contained in the error term and this would influence their choice of input thus making input and the error term correlated. The Levinsohn and Petrin (2003) approach accounts for the endogenous nature of inputs in the production function by using intermediate inputs as a proxy for the unobservable component of firm productivity. Electricity cost is used as proxy for the unobservable component of productivity. This is based on the assumption that a productivity shock which increases output would lead to more intermediate input use. This approach requires the use of a panel sample therefore, it relates to panel firms only.

Levinsohn and Petrin (2003) uses a semi-parametric method which consists of two stages. In the first stage, coefficients of inputs are estimated using a semi parametric method while in the second stage, coefficients of capital are obtained, and the productivity measure is derived. As described by Levinsohn and Petrin (2003); Petrin et al. (2004), the method assumes that the production function is in the form below:

$$y_{it} = \beta_1 l_{it} + \beta_2 k_{it} + \beta_3 m_{it} + \omega_{it} + \eta_{it} \tag{3.3}$$

where *y* is firm sales. *k, l* and *m* are capital, labour and materials respectively. All variables are assumed to be in logs. ω_{it} is productivity (state variable) and $\eta_i t$ is an i.i.d component. The state productivity variable affects the input decisions of the firm while the i.i.d component does not. Intermediate input (proxy) demand can then be

given as:

$$m_{it} = m_{it}(\omega_{it}, k_{it})$$

where k_{it} is capital. The unobserved productivity term can be expressed as a function of capital and intermediate input.

$$\omega_{it} = \omega_{it}(k_{it}, m_{it})$$

Levinsohn and Petrin (2003) assumes that ω_{it} follows a first order Markov process therefore it can be written as

$$\omega_{it} = E[\omega_{it} \mid \omega_{it-1}] + \xi it$$

where ξ_{it} is the innovation to productivity at time *t* which is uncorrelated with k_{it}. Equation 3.2 can therefore be rewritten as

$$y_{it} = \beta_1 l_{it} + \phi(k_{it}, m_{it}) + \eta_{it} \tag{3.4}$$

Since $\phi(k_{it}, m_{it})$ is a function of *k* and *m*.

$$\phi(k_{it}, m_{it}) = \beta_0 + \beta_k k_{it} + \beta_m m_{it} + \omega_{it}(k_{it}, m_{it}) \tag{3.5}$$

Estimating equation 3.4 gives the first stage of the estimation. ω_{it} can be estimated using any values of *k* and *m*. The residual from the second stage as expressed by equation 3.5 below gives the total factor productivity measure.

$$(\eta_{it} + \xi_{it}) = y_{it} - \beta_1 l_{it} - \beta_2 k_{it} - \beta_3 m_{it} - E[\omega_{it} \mid \omega_{it-1}] \tag{3.6}$$

Levinsohn and Petrin (2003) uses the moment conditions that $E[\eta_{it} + \xi_{it} \mid k_{it}] = 0$, i.e the capital stock is not correlated to the present period residual since it is determined by previous period decisions and does not respond to current period innovation shocks. The second moment condition $E[\eta_{it} + \xi_{it} \mid m_{it}] = 0$ separately identifies *k* and *m*. It assumes that previous period input is uncorrelated with this period residual. Production function based on Levinsohn and Petrin (2003) method are estimated for each sector separately to account for varying returns to inputs across sectors.

Levinsohn and Petrin (2003) requires period *t-1*, therefore panel data is needed for its estimation. For the pooled cross-sectional sample, the OLS approach is used to derive the TFP measure. OLS TFP estimates are also derived for each sector separately. Table B2 in the appendix presents the correlation between the productivity measures. The production function estimated by OLS takes the following form:

$$\ln sales_{isct} = \alpha_1 \ln capital_{isct} + \alpha_2 \ln labour_{isct} + \alpha_3 \ln materials_{isct} + \omega_{isct} \quad (3.7)$$

ω_{isct} is productivity which is the residual. All variables are in logs.

Table B3 in the appendix presents the estimation results of the production functions. The differences in the magnitude of the labour and materials coefficients reveal that the Levinsohn and Petrin (2003) method corrects for the bias due to the simultaneity of inputs. OLS production function estimates give higher coefficients to labour and materials thereby introducing a downwards bias to capital (Javorcik, 2004). Although the estimates of capital in the Levinsohn and Petrin (2003) method is insignificant in some sectors, the coefficients of labour and material reduces.

TFP relates to firm productivity. It represents anything that makes a firm more productive other than capital, labour and materials. Hence, it can be composed of technical change, improvements in efficiency, innovation or organisational change (Griliches and Mairesse, 1995). It is likely that all channels of foreign presence might affect TFP. Demonstration and linkage channel might affect labour productivity (workers' productivity). However, competition might have no effect as this channel relates to market share only. Hence, foreign presence could affect both productivity measures differently.

3.4 Empirical Results

Table 3.5 presents summary statistics of variables used in this study. Foreign presence variables range between 0 – 100 percent. The variables are measured in percentages for easy interpretation since the dependent variables are also in logs. Table 3.2 and 3.3 shows that in the pooled sample, 13 percent of the firms are foreign firms. Demonstration effect which is the average foreign share in each sector weighted by each firm's sales represent 27 percent as given by the mean in table 3.5. The linkage

Table 3.5. Summary Statistics

Variables	Observations	Mean	Standard Deviation	Minimum	Maximum
TFP- LevPet (Panel only)	1063	6.54	2.41	-0.31	19.32
TFP-OLS	7111	0.00	1.12	-10.9	13
Labour productivity	7052	9.5	2.29	0.53	20.27
Demonstration effect	7227	26.92	25.18	0	100
Linkage effect	7227	66.55	21.56	0	100
Competition effect	7227	87.91	15.03	0	100
Firm age	7227	16.49	14.41	0	157
Small firms	7227	0.54	0.5	0	1
Medium firms	7227	0.3	0.46	0	1
Large firms	7227	0.15	0.36	0	1
Exporter	7227	0.19	0.39	0	1
Firm foreign ownership	7227	9.95	27.97	0	100
Full time workers	7227	83.09	392.16	1	18753
Foreign firm dummy	7227	0.13	0.34	0	1

effect shows that on average, 67 percent of total input of foreign firms are sourced locally.

As reflected in the measure of competition effect, on average, foreign firms in each sector sell 88 percent of their output in the local market. The measures of productivity (TFP Levinsohn and Petrin (LevPet), TFP OLS, Labour productivity) reveal that there is a variation in the level of productivity of the firms. Summarizing productivity by foreign ownership, foreign firms are more productive than domestic firms. Majority of the firms in the sample are small firms and are non-exporters. A large proportion of non-exporters and smaller firms are domestic firms. This reveals that there are differences between foreign and domestic firms.

3.4.1 Pooled Cross-sectional Sample

This section examines the effect of foreign presence on domestic firms in the pooled cross-sectional sample. This sample includes all manufacturing domestic firms and it enables us to examine the effect of foreign presence on a wider and more representative sample of domestic firms. Table 3.6 reports the regression results for demonstration effect on firm productivity. Firm foreign ownership share has a positive effect on productivity. This shows that foreign ownership in a firm is associated with better

productivity. However, domestic firms do not benefit from demonstration effect associated with foreign presence in their sector. This can be explained by the insignificant effect of demonstration on the firm productivity of domestic firms as shown in column 2 in the TFP OLS regressions.

For the labour productivity regressions, Column 5 shows that demonstration has a negative effect on the labour productivity of domestic firms. It shows that a 10-percentage point increase in the foreign output share of the sector is associated with a fall in productivity of each domestic firm by 3 percent. This negative demonstration effect mostly comes from fully foreign firms. This would mean that there are no productivity spillovers from partially foreign firms while the presence of fully foreign firms has a negative effect on labour productivity. The measure of demonstration effect reflects the size of foreign firms in relation to the whole sector. It is possible for this channel to capture other channels through which the presence of foreign firms might affect the productivity of the domestic firms. A negative effect on labour productivity might work through the skilled labour channel. A theoretical model by Glass and Saggi (2002) shows that fully foreign firms might be paying a wage premium thereby attracting highly productive workers from domestic firms. Their model predicts that new workers employed by domestic firms are likely to be less productive and less informed given the pool of workers in the economy.

As regards the controls, exporters are more productive than non-exporters. Firm size behaves differently in both OLS and labour productivity regressions. In the OLS regressions, firm age does not matter for productivity. It also reveals that larger firms are less productive than smaller firms (the base group for firm size is small firms). On the contrary, the labour productivity regressions reveal that larger firms are more productive. Since this research is mainly on the productivity of domestic firms, the rest of the analysis would be based on the sample of domestic firms.

Table 3.6. Demonstration effect and Firm Productivity-Pooled Cross-sectional Sample

	TFP OLS			Labour Productivity		
	All Firms	Domestic	Domestic	All Firms	Domestic	Domestic
	(1)	(2)	(3)	(4)	(5)	(6)
Firm Foreign Share	0.0014***			0.0044***		
	(0.0005)			(0.0006)		
Demonstration	0.0001	-0.0004		-0.0014	-0.003***	
	(0.001)	(0.00111)		(0.0011)	(0.0011)	
Demonstration (Partial)			-0.0018			-0.0030
			(0.0017)			(0.0026)
Demonstration (Full)			0.0000			-0.003***
			(0.0012)			(0.0010)
Firm age	-0.0011	-0.0013	-0.0013	0.0042***	0.0017	0.0017
	(0.0010)	(0.0012)	(0.0012)	(0.0015)	(0.0017)	(0.0017)
Medium firms	-0.151***	-0.171***	-0.169***	0.180***	0.153***	0.153***
	(0.0287)	(0.0319)	(0.0315)	(0.0443)	(0.0425)	(0.0421)
Large firms	-0.305***	-0.256***	-0.256***	0.387***	0.423***	0.423***
	(0.0605)	(0.0676)	(0.0677)	(0.0696)	(0.0672)	(0.0671)
Exporter	0.122**	0.120***	0.122***	0.276***	0.279***	0.279***
	(0.0471)	(0.0459)	(0.0460)	(0.0559)	(0.0600)	(0.0598)
Capital Intensity				0.262***	0.270***	0.270***
				(0.0189)	(0.0181)	(0.0181)
Period dummy	1.462***	1.338***	1.313***	1.520***	1.267***	1.268***
	(0.325)	(0.330)	(0.314)	(0.264)	(0.326)	(0.329)
Constant	1.411***	1.493***	1.517***	7.677***	7.884***	7.883***
	(0.170)	(0.187)	(0.176)	(0.228)	(0.217)	(0.213)
Sector dummies	yes	yes	yes	yes	yes	yes
Country dummies	yes	yes	yes	yes	yes	yes
Survey year dummies	yes	yes	yes	yes	yes	yes
Observations	7,111	6,194	6,194	7,052	6,146	6,146
R-Squared	0.269	0.281	0.282	0.758	0.755	0.755

The table reports the effect of demonstration effect on firm productivity. Demonstration effect is disaggregated into full and partial demonstration channels. Standard errors are clustered at country and sector level. *, **, *** denotes 10%, 5% and 1% level of significance.

To examine if including the competition effect would change the result of demonstration effect, competition and linkage effect are included in the regression model as in table 3.7. The literature argues that competition effect might be a reason for negative horizontal spillover might be the competition effect. Including the competition effect in the TFP OLS regression does not affect the significance of the coefficient of demonstration effect. However, there is a negative competition effect. An increase in the domestic sales of foreign firms is associated with a negative effect on the firm productivity of domestic firms. If foreign competition reduces the output of firms, average cost rises as it is difficult to adjust capital, therefore, productivity would fall (Aitken

and Harrison, 1999). In the labour productivity regressions, competition has no negative effect on domestic firms. It is likely that there is no link between competition for market share and worker's productivity. As regards the linkage effect, it is insignificant when included in the regression.

Including all channels in the same regression does not change the results. In the labour productivity regressions, demonstration remains negative and significant when both linkage and competition effect are included. As discussed in the literature that productivity spillover effect could depend on the structure of foreign ownership (Javorcik, 2004; Javorcik and Spatareanu, 2011). Therefore, demonstration, competition and linkage effect are categorised as full or partial variables.

Table 3.7. Competition/Linkage effect on Domestic Firm Productivity-Pooled Sample

	TFP OLS			Labour Productivity		
	All Firms	Domestic	Domestic	All Firms	Domestic	Domestic
	(1)	(2)	(3)	(4)	(5)	(6)
Demonstration	-0.0008	-0.0003	-0.0006	-0.0032***	-0.0028**	-0.003***
	(0.0012)	(0.0011)	(0.0011)	(0.0011)	(0.0011)	(0.001)
Linkage Effect		0.0010	0.0009		0.0014	0.0014
		(0.0010)	(0.0010)		(0.0012)	(0.0013)
Competition	-0.0028*		-0.0027*	-0.0010		-0.0009
	(0.00144)		(0.0014)	(0.0025)		(0.0025)
Capital Intensity				0.270***	0.270***	0.270***
				(0.0181)	(0.0182)	(0.0182)
Controls	yes	yes	yes	yes	yes	yes
Sector dummies	yes	yes	yes	yes	yes	yes
Country dummies	yes	yes	yes	yes	yes	yes
Survey year dummies	yes	yes	yes	yes	yes	yes
Observations	6194	6194	6194	6146	6146	6146
R-Squared	0.282	0.282	0.282	0.755	0.755	0.755

This table examines the channels of foreign presence on productivity spillovers. Separate regressions are estimated for competition and linkage effect. Standard errors are clustered at country and sector level. *, **, *** denotes 10%, 5% and 1% level of significance.

Table 3.8 presents foreign presence spillover measures by the structure of foreign ownership. There is no demonstration effect from both fully and partially foreign firm on firm productivity. There is also no linkage effect on firm productivity. Columns 3 reveals that partial competition has a negative effect on the firm productivity of domestic firms. This means that domestic firms lose out from the competition effect of partially foreign firms. Wang and Blomström (1992) suggests that competition effect depends on the substitutability between domestic firm and foreign firm's goods. Foreign firms with higher technological sophistication prefer direct entry as fully foreign

firms rather than joint venture as partially foreign firms (Javorcik and Saggi, 2010). Therefore, fully foreign firms are more likely to produce more technologically intensive goods relative to other firms. Hence, the substitutability between the goods of fully foreign firms and domestic firms would be low. Partial foreign firms have some local participation in them and are more likely to arise from mergers and acquisition (Javorcik and Saggi, 2010). Therefore, they are more likely to link more with the domestic community hence, they might produce goods which corresponds to local taste and fashion. Their products are more likely to be similar to the domestic firms' goods thereby bringing about more competition.

Table 3.8. Partial/Full Foreign Ownership on Firm Productivity-Pooled Sample

	TFP OLS			Labour Productivity		
	(1)	(2)	(3)	(4)	(5)	(6)
Demonstration (Partial)	-0.0018	-0.0018	-0.0017	-0.0032	-0.0033	-0.0033
	(0.0017)	(0.0018)	(0.0018)	(0.0027)	(0.0028)	(0.0028)
Demonstration (Full)	0.0001	0.00002	0.0002	-0.0031***	-0.003***	-0.003***
	(0.0012)	(0.0011)	(0.0011)	(0.0010)	(0.0010)	(0.0010)
Linkage (Partial)	0.0003		0.0010	0.0002		0.0003
	(0.0008)		(0.0007)	(0.0010)		(0.0011)
Linkage (Full)	0.0002		0.0004	-0.0004		0.0002
	(0.0007)		(0.0009)	(0.0011)		(0.0013)
Competition (Partial)		-0.0011	-0.0015**		-0.0002	-0.0003
		(0.0007)	(0.0008)		(0.0010)	(0.0012)
Competition (Full)		-0.0007	-0.0008		-0.0008	-0.0009
		(0.0005)	(0.0007)		(0.0007)	(0.0008)
Capital intensity				0.270***	0.269***	0.269***
				(0.0179)	(0.0180)	(0.0179)
Controls	yes	yes	yes	yes	yes	yes
Sector dummies	yes	yes	yes	yes	yes	yes
Country dummies	yes	yes	yes	yes	yes	yes
Survey year dummies	yes	yes	yes	yes	yes	yes
Observations	6194	6194	6194	6146	6146	6146
R-Squared	0.282	0.282	0.283	0.755	0.755	0.755

This table examines the channels of foreign presence on productivity spillovers. Partial variables relates to foreign firms with foreign ownership of between 10-99% while full variables relates to fully foreign firms with foreign ownership of 100%. Construction of these variables are defined in section 3.2.2. Standard errors are clustered at country and sector level. *, **, *** denotes 10%, 5% and 1% level of significance.

In the labour productivity regressions, column 6 shows that the demonstration effect from fully foreign firms remain negative and significant. Linkage and competition effect also remain insignificant. The next section focuses on the panel sample and examine if these results hold after controlling for firm specific fixed effects.

3.4.2 Panel sample

To account for unobservables, the panel data structure was exploited. The sample is narrowed down to include only panel firms which appear in both time periods of the survey. The Levinsohn and Petrin (2003) productivity measure which controls for endogeneity of inputs is included in the panel analysis. In the panel sample, the regressions are estimated in first differences. It is possible for foreign investors to select firms based on some unobservable characteristics which can be based on firm, country and sector characteristics. The first difference estimator controls for this firm unobservables by taking first difference which helps to eliminate firm fixed effects which might bias the estimates. Sector and country fixed effects are also included in the regressions.

Table 3.9. Demonstration effect on Domestic Firm Productivity-Panel Sample

	Levinsohn and Petrin		TFP OLS		Labour Productivity	
	(1)	(2)	(3)	(4)	(5)	(6)
Δ Demonstration	-0.0056		-0.0005		0.0032	
	(0.0056)		(0.0031)		(0.0038)	
Δ Demonstration (Partial)		-0.0074		-0.0015		0.0073
		(0.0083)		(0.0046)		(0.0050)
Δ Demonstration (Full)		-0.0044		0.0018		0.0005
		(0.0052)		(0.0032)		(0.0045)
Δ Capital Intensity					0.241***	0.241***
					(0.0351)	(0.0347)
Controls	yes	yes	yes	yes	yes	yes
Sector dummies	yes	yes	yes	yes	yes	yes
Country dummies	yes	yes	yes	yes	yes	yes
Observations	360	360	360	360	340	340
R-Squared	0.251	0.251	0.306	0.307	0.318	0.320

The table reports the effect of on firm productivity. Demonstration effect is disaggregated into full and partial demonstration channels. Standard errors are clustered at country and sector level. *, **, *** denotes 10%, 5% and 1% level of significance.

Table 3.9 shows that foreign presence is not associated with improvement in both firm and labour productivity of domestic firms. Distinguishing demonstration effect based on structure of foreign ownership does not change our conclusions. Table 3.10 presents the effect of foreign presence spillover variables on the productivity of domestic firms. Linkage effect is positive and significant in the TFP levpet regressions. It shows that a 10-percentage point increase in the use of local input by foreign firms is associated with about 3 percent increase in the productivity of domestic firms in the

same sector. This might be an evidence that the horizontal spillover measure used in the literature might not capture the positive linkage effect of foreign presence. The linkage effect can be viewed as an externality transmitted indirectly through backward vertical spillovers. This means there is likely to be a backward vertical spillover effect from foreign firms to domestic suppliers through the use of local inputs which gets transmitted to domestic competitors. In the TFP OLS and labour productivity regressions, the linkage effect is insignificant. Competition effect is also insignificant in the regressions. This means competition has no significant effect on productivity.

Foreign spillover variables are re-examined based on the structure of foreign ownership. These variables are redefined as full or partial as described in section 3.3 and the results are presented on table 3.11. Similar to table 3.9, the results from both full and partial demonstration effect remains insignificant. Columns 1 and 3 shows that the positive linkage effect occurs through the presence of partially foreign firms. Partially foreign firm might use similar input with domestic firms hence, their linkage effect is positive. The partial linkage effect could be transmitted through input prices or quality. If partial foreign firms' use of inputs generates an increase in demand for inputs, competition would increase in the downstream (inputs) sector which would reduce prices of inputs (Markusen and Venables, 1999). A positive linkage effect might also work through improvements in quality of inputs which improves the efficiency of inputs. This supports the argument that partially owned firms are more likely to link with domestic suppliers thereby improving their inputs quality and introducing them to better production techniques which reduce costs of inputs (Javorcik, 2004). The result gives some evidence that externalities from linkage effect is passed onto domestic competitors (intra-industry sector).

Column 2 and 3 reveals that there is a negative competition effect from both full and partially foreign firms. However, the negative competition effect from partially foreign firms is higher than that of fully foreign firms. This shows that foreign firms compete with domestic firms for market share, but partial foreign firms are more likely to compete with domestic firms since they link more with the domestic community, they might produce goods which are similar to those produced by domestic firms thereby bringing about more competition. The negative competition effect on columns 6 and 9 also supports the evidence on partially foreign firms.

Table 3.10. Competition/Linkage effect on Domestic Firm Productivity-Panel Sample

	Levinsohn and Petrin			TFP OLS			Labour Productivity		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Δ Demonstration	-0.0052	-0.0004	-0.0001	0.0006	0.0018	0.0018	0.0032	0.0040	0.0040
	(0.0057)	(0.0051)	(0.0053)	(0.0031)	(0.0031)	(0.0031)	(0.0038)	(0.0037)	(0.0037)
Δ Linkage Effect		0.0272***	0.0268***		0.0067	0.0066		0.0043	0.0044
		(0.0088)	(0.0085)		(0.0053)	(0.0052)		(0.0072)	(0.0072)
Δ Competition	-0.0094		-0.0079	-0.0023		-0.0020	0.0005		0.0006
	(0.0083)		(0.0073)	(0.0045)		(0.0043)	(0.0058)		(0.0059)
Δ Capital Intensity							0.241***	0.241***	0.242***
							(0.0348)	(0.0351)	(0.0349)
Controls	yes	yes	yes	yes	yes	yes	yes	yes	yes
Sector dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes
Country dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes
Observations	360	360	360	360	360	360	340	340	340
R-Squared	0.255	0.286	0.288	0.306	0.309	0.309	0.318	0.319	0.319

This table examines the channels of foreign presence on productivity spillovers. Standard errors are clustered at country and sector level. *, **,*** denotes 10%, 5% and 1% level of significance respectively.

Table 3.11. Partial/Full Foreign Ownership on Domestic Firm Productivity-Panel Sample

	Levinsohn and Petrin			TFP OLS			Labour Productivity		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Δ Demonstration (Partial)	-0.0053	-0.0071	-0.0017	-0.0016	-0.0012	-0.0003	0.0062	0.0073	0.0078
	(0.0086)	(0.0084)	(0.0089)	(0.0048)	(0.0047)	(0.0050)	(0.0049)	(0.0052)	(0.0054)
Δ Demonstration (Full)	-0.0023	-0.0071	-0.0037	0.0016	0.0003	0.0006	-0.0003	-0.0009	-0.0012
	(0.0060)	(0.0058)	(0.0064)	(0.0035)	(0.0035)	(0.0037)	(0.0045)	(0.0043)	(0.0044)
Δ Linkage (Partial)	0.0048		0.0133**	-0.0005		0.0024	-0.0017		0.0019
	(0.0047)		(0.0052)	(0.0029)		(0.0031)	(0.0033)		(0.0037)
Δ Linkage (Full)	0.0033		0.0057	-0.00003		-0.00004	-0.0024		-0.0016
	(0.0036)		(0.0045)	(0.0019)		(0.0024)	(0.0025)		(0.0028)
Δ Competition (Partial)		-0.0107**	-0.0178***		-0.0044	-0.0060*		-0.0057	-0.0073*
		(0.0052)	(0.0059)		(0.0033)	(0.0035)		(0.0036)	(0.0039)
Δ Competition (Full)		-0.0049*	-0.0071*		-0.0011	-0.0010		-0.0030	-0.0020
		(0.0028)	(0.0041)		(0.0019)	(0.0026)		(0.0027)	(0.0034)
Δ Capital Intensity							0.240***	0.243**	0.242***
							(0.0352)	(0.0343)	(0.0349)
Controls	yes	yes	yes	yes	yes	yes	yes	yes	yes
Sector dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes
Country dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes
Observations	360	360	360	360	360	360	340	340	340
R-Squared	0.255	0.265	0.283	0.307	0.309	0.310	0.322	0.325	0.326

This table examines the channels of foreign presence on productivity spillovers in panel firms. Partial variables relate to foreign ownership of between 10-99% while full variables relates to fully foreign firms with foreign ownership of 100%. Construction of these variables are defined in section 3.2.2. Standard errors are clustered at country and sector level. *, **, *** denotes 10%, 5% and 1% level of significance respectively.

The results from the pooled and panel sample shows that there is an insignificant demonstration effect, negative competition effect and positive linkage effect. The magnitude of this effect depends on the structure of foreign ownership of the foreign firm. It is possible for the negative competition effect to outweigh the positive linkage effect. This might also point to the negative effect found in the literature when one measure is used to capture horizontal productivity spillovers.

3.4.3 Absorptive capacity

The literature argues that there are conditions which allow domestic firms to benefit from foreign presence. These conditions are important in absorbing and applying foreign firms' practices and processes. They might also help domestic firms to mitigate the negative competition effect and boost the positive linkage effect from foreign presence. These conditions are regarded as absorptive capacity. As discussed in section 3.2, absorptive capacity factors are divided into foreign firm, domestic firm and country factors. In this analysis, foreign firm factor (structure of foreign ownership) has been examined. We find that domestic firms are more likely to benefit from foreign firms with partial foreign ownership, who use local inputs (linkage effect) and sells less in the domestic market (competition effect).

To examine how domestic firm's absorptive capacity affects their ability to benefit from productivity spillovers, firm productivity level, firm size and exporting status are considered as absorptive capacity factors. Firm productivity is important, and it determines the technological gap of a firm. Exporters are more likely to compete with domestic firms and benefit from productivity spillovers as a result of exposure to foreign competition in the export markets. A major reason for considering firm size is the composition of firms in developing countries. Most of the firms in developing countries particularly sub-Sahara Africa are small. An analysis on firm size is important to examine if small firms benefit from productivity spillovers.

Country characteristics are also important absorptive capacity factors. To examine if country factors matter for spillovers, two country factors are considered: the economic freedom and the level of economic development proxy by the GDP per capita. Economic freedom indicator is an aggregate indicator for institutions. It shows the level of economic freedom for business and investment in a country. It is an aggregate

of property rights, government regulations, business freedom, labour market freedom, trade, investment and financial freedom. Table 3.12 presents the results for the absorptive capacity factors. The table uses the TFP levpet and the panel sample of domestic firms only. TFP levpet is the preferred measure of firm productivity as it controls for the endogenous nature of input which might bias the TFP estimates. In addition, the panel sample allows us to control for unobservables which might affect our results.

The results on absorptive capacity in table 3.12 shows that large firms are more likely to benefit from linkage effect and lose from the competition effect of foreign firms compared to smaller firms. Larger firms are more organised, use more skilled workers and advanced technology (Gorodnichenko et al., 2014). Therefore, they are likely to produce more technologically advanced goods relative to smaller firms. This could mean that they produce goods which are slightly similar to foreign firms hence, the degree of substitution between their goods and foreign firm's goods is likely to be higher. Since foreign firms and large domestic firms produce similar goods, large firms would benefit from linkage effect by using similar inputs or same supplier with foreign firms. In the case of smaller firms, there are no productivity spillovers effects from foreign presence in their sector.

Columns 3 and 4 of table 3.12 shows the difference in the effects of foreign presence spillover variables on high and low productive firms. High productivity firms are firms whose level of productivity is greater than the median productivity level of all firms. The result shows that both high and low productivity firms benefit from linkage effect. For low productive firms, there is a negative competition effect which means these firms do not possess the productive capacity to compete with foreign firms in the domestic market. Hence, they lose out more from the competition effect compared to highly productive firms. A lot of sub-Sahara African firms are small and have low productivity compared to firms in other regions of the world (Dinh and Clarke, 2012). This might explain the insignificant or negative productivity spillover effect found by previous studies on sub-Sahara African countries as is the case of Ghana (Waldrikirch and Ofosu, 2008), Zambia (Bwalya, 2006) and Tanzania (Managi and Bwalya, 2010).

Both exporters and non-exporters benefit from linkage effect with exporters benefiting more than non-exporters. Exporters also benefit from demonstration effect. This follows the argument that exporters which have been exposed to foreign competition

Table 3.12. Absorptive capacity factors- Panel Sample (Levinsohn and Petrin Productivity Measure)

	Firm Size		Productivity Level		Exporting		Income Level		Economic Freedom	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Large	Small	High	Low	Exporter	Non-Exporter	Middle	Low	High	Low
Δ Demonstration	0.0043	-0.0083	-0.0009	-0.0064	0.0266**	-0.0035	0.00008	-0.0065	-0.0025	0.0719**
	(0.0098)	(0.0069)	(0.0075)	(0.0089)	(0.0100)	(0.0049)	(0.0067)	(0.0070)	(0.0053)	(0.0255)
Δ Linkage Effect	0.0364***	0.0135	0.0213*	0.0253**	0.0255*	0.0247**	0.0159	0.0439***	0.0213**	0.0530***
	(0.0095)	(0.0110)	(0.0124)	(0.0102)	(0.0140)	(0.0096)	(0.0107)	(0.0099)	(0.0092)	(0.0120)
Δ Competition	-0.0182*	-0.0019	-0.0010	-0.0154*	-0.0033	-0.0102	-0.0035	-0.0075	-0.0018	-0.0297**
	(0.0094)	(0.0105)	(0.0140)	(0.0085)	(0.0166)	(0.0073)	(0.0089)	(0.0105)	(0.0088)	(0.0101)
Controls	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Sector dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Country dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Observations	177	183	168	192	91	269	236	124	333	27
R-Squared	0.341	0.362	0.593	0.203	0.343	0.311	0.303	0.364	0.289	0.748

Standard errors are clustered at country and sector level. *, **, *** denotes 10%, 5% and 1% level of significance respectively. Large firms are firms with more than 25 fulltime workers which is the median. High productivity firms are firms with Levinsohn and Petrin TFP (productivity) greater than the median (7.33). Income level and economic freedom classification are contained in appendix table A1.

would possess the capability to utilize and absorb the technological, organisational and managerial techniques observed from foreign firms.

On country characteristics, firms in middle income sub-Sahara African countries do not benefit from foreign presence. This contrasts with what one would expect. Middle-income countries are more economically developed than low-income countries. Hence, they are more likely to have better infrastructure and local environment for domestic firms to imitate foreign firms. Firms in low income sub-Sahara African countries benefit from linkage effect. Low wage is a reason for multinationals citing plants in underdeveloped countries. If low wages in these countries attract multinationals (foreign firms) and the transportation, communication costs with their home country is high, they are likely to use local inputs (Rodriguez-Clare, 1996). It is also likely that the input sector in low income countries to be underdeveloped or inexistent. Therefore, the presence of foreign firms would develop the input sector. Local input suppliers in low income countries could also improve their input quality to become a supplier of a foreign firm (Javorcik and Spatareanu, 2005). Hence, domestic firms in low income countries would benefit more as the possibility of sharing an input supplier with a foreign firm might be greater due to the level of underdevelopment in the input sector. This might also reduce their reliance on imported and low-quality inputs.

Economic freedom is a combination of different institutional and economic variables. Therefore, one would expect that countries with better government regulations, property rights, labour market and financial freedom would benefit more from linkage effect. Columns 9 and 10 of table 3.12 shows that both countries with high and low economic freedom benefit from linkage effect with countries with low economic freedom benefiting more. Amendolagine et al. (2013) finds that foreign firms in sub-Sahara African countries with better institutions use more local inputs. However, the use of more local inputs might not translate into linkage effect if foreign firms have exclusive agreements with domestic suppliers which prevents them from supplying other domestic firms (Lin and Saggi, 2007).

Firms in countries with low economic freedom benefit from demonstration and linkage effect but they lose from competition effect. The low level of economic freedom might make difficult for them to compete with foreign firm while making it easier for them to imitate and copy foreign firms without restrictions.

Channels of spillovers are important in examining how foreign presence affects domestic firms in host countries. However, domestic firms and country firm characteristics are also important in analysing if domestic firms can utilize the positive spillovers and mitigate the negative effect from foreign presence.

3.4.4 Sensitivity Checks

To examine if the composition of data affects the results, sensitivity checks are carried out. Firms from Nigeria make up a proportion of total firms. Botswana also has the largest proportion of foreign firms. The next table shows the results from regression where firms from Nigeria and Botswana are excluded. Only results from the panel sample using the TFP levpet are reported. The significance and signs of the foreign presence variables remain the same. These shows that the results are not driven by the firms from Nigeria and Botswana.

Studies that focus on competition effect mostly measure competition by price markups. However, this measure focuses on industry wide competition and not competition from foreign firms only. As an alternative measure of competition, price markup is used. Markup is measured by firm sales less cost of sales divided by firm sales. A low markup indicates an increase in competition while a high markup indicates a decrease in competition. A negative coefficient of markup therefore shows that competition leads to increase in productivity (Narula and Marin, 2003). The result on table 3.13 shows that competition reduces the productivity of domestic firms. This is consistent with the conclusion on market share competition. Markup relates to competition in both product and factor markets. This evidence also collaborates the possibility of foreign firms competing with domestic firms in the factor market for skilled labour.

To eliminate outliers, firms with productivity level below the 1st percentile and above the 99th percentile were excluded. Eliminating this firms does not change the results. These results are similar to other studies in the literature. Kee (2015) finds that sharing the same input supplier with a foreign firm improve the productivity of domestic firms in Bangladesh. The conclusions on competition is also similar to studies that use price markup to measure industry wide competition (Narula and Marin, 2003; Demena and Murshed, 2018).

Table 3.13. Sensitivity Analysis-Panel Sample (Levinsohn and Petrin TFP Measure)

	Excluding Nigeria and Botswana (1)	Regression for 1-99 percentile (2)	Using price cost margin for competition (3)
Δ Demonstration	0.0017	0.0007	-0.0002
	(0.0051)	(0.0055)	(0.0050)
Δ Linkage Effect	0.0301***	0.0297***	0.0252***
	(0.0109)	(0.0076)	(0.0087)
Δ Competition (Local Sales)	-0.0112	-0.0087	
	(0.0081)	(0.0075)	
Δ Competition(Price Cost Margins)			0.169***
			(0.0273)
Controls	yes	yes	yes
Sector dummies	yes	yes	yes
Country dummies	yes	yes	yess
Observations	260	268	360
R-Squared	0.389	0.260	0.323

Standard errors are clustered at country and sector level. *, **,*** denotes 10%, 5% and 1% level of significance respectively.

3.5 Conclusion

This study relates to the literature on intra-industry spillovers for manufacturing firms. It focuses on sub-Sahara Africa and examines the various channels of productivity spillovers. In addition, it considers the absorptive capacity factors for productivity spillovers. The analysis reveals that demonstration, competition and linkage are important channels when considering intra-industry spillovers. As argued by Alfaro et al., (2009), use of inputs by foreign firms should translate into horizontal externality effect for domestic competitors. This study finds evidence for this effect. A 10-percentage point increase in foreign firms use of local input is associated with a 3 percent increase in productivity of firms in the same sector. There is a positive linkage effect which indicates a positive intra-industry productivity spillover channel not considered in the literature.

A negative competition effect is obtained from foreign presence. This is an evidence that foreign firms compete with domestic firms for sales hence reducing the market share and productivity of domestic firms. The implication of this is that foreign presence is likely to lead to the exit of less productive domestic firms through the competition effect. Although this might lead to efficient resource allocation, it might be unhealthy for local industries and private sector development in developing regions like sub-Saharan Africa.

In the case of demonstration effect, this study finds no significant effect. The demonstration channel measure captures the size of the foreign firms in the sector hence, it could capture other ways through which foreign firms affect domestic firms not captured in the other two channels like competition for inputs and skilled workers. The competition measure is based on market sales and thus, it might not capture other channels for competition. There is a need for broader measure that capture all channels of competition from foreign firms such as competition for factor inputs, labour and market share.

The effect of each channel depend on the foreign ownership structure in the sector. This study finds that partial foreign firms are more important than fully foreign firms. Partial foreign firms provide a source of linkage externality. However, they compete with the domestic firms for market share. It is more likely for the positive linkage effect to outweigh the negative competition effect. This would mean that the total effect from partial foreign firms would be positive. There is no evidence that fully foreign firms provide linkage effects. Fully foreign firms are more likely to introduce advanced technologies which might be difficult for domestic firms to imitate. In addition, they are also less likely to use local inputs as they might prefer imported inputs due to connections with their foreign suppliers (Javorcik, 2004).

This study also relates to the literature on absorptive capacity for productivity spillovers. It considers foreign firms, domestic firms and country characteristics. Foreign firm characteristics considered include: linkages which relates to use of inputs of foreign firms, competition which relates to the motives of foreign investment (export or market-oriented) and the structure of foreign ownership (fully and partially foreign). We find that domestic firms would benefit more from foreign firms who use local inputs and are more export-oriented. Export-oriented firms produce for export therefore, they have less competition pressure on domestic firms. Domestic firms are more likely to benefit from foreign firm with local investors as is the case of partial foreign firms. Partial foreign firms also contribute more to productivity spillovers through input linkages.

Domestic firm and host country characteristics are also important in productivity spillovers. These characteristics determine how channels of productivity spillovers affect sub-Sahara African firms differently. Sub-Saharan African countries need to

improve their business environment, institutions and access of firms to finance. Access to finance, better electricity and good institutions would facilitate an increase in size and technological adoption of domestic firms. This would increase the absorptive capacity of domestic firms in absorbing productivity spillovers. Improving country factors would assist domestic firms to overcome obstacles which prevent them from competing favourably with foreign firms.

This study finds that the linkage channel is associated with an increase in the productivity of domestic firms. Foreign firm's use of input is a channel for countries to improve their productivity and benefit from FDI. Institutions and economic development are important factors for use of local inputs (Sánchez-Martín, de Piniés, and Antoine, 2015). Economic and institutional development might determine the quality of inputs and the confidence of foreign firms in local suppliers and goods. There is a need for host countries to put in place measures to facilitate the production of good quality local inputs as the use of domestic inputs by foreign firms would produce spillovers to other domestic firms. Encouraging foreign firms' use of input would improve the productivity of the input sector and the quality of inputs produced. This might promote foreign investment into the manufacturing sector with foreign firms taking advantage of availability of resources and labour.

3.A Appendix B

Table B1. Countries and Survey years

Country	Years of Survey	Income Level	Economic Freedom
Angola	2006 and 2010	Middle	Low
Benin	2009 and 2016	Low	High
Botswana	2006 and 2010	Middle	High
Burkina Faso	2005 and 2009	Low	High
Cameroon	2009 and 2016	Middle	High
Cape Verde	2005 and 2009	Middle	High
Cote D'Ivoire	2009 and 2016	Middle	High
Dem. Congo	2006 and 2010	Low	Low
Ethiopia	2011 and 2015	Low	High
Ghana	2007 and 2014	Middle	High
Kenya	2007 and 2013	Low	High
Mali	2010 and 2016	Low	High
Nigeria	2009 and 2014	Middle	High
Senegal	2007 and 2014	Middle	High
South Africa	2003 and 2007	Middle	High
Tanzania	2006 and 2013	Low	High
Uganda	2006 and 2013	Low	High
Zambia	2007 and 2013	Middle	High

High economic freedom countries are countries whose total score is about 50. Maximum score is 100. Data source: World Development Indicators and Heritage freedom index.

Table B2. Correlation Matrix of Productivity Measures

	Pooled Sample	Panel Sample	
	TFP-OLS	TFP-OLS	TFP-LEVPET
TFP-LevPet	-	0.63	1
Labour productivity	0.54	0.61	0.52

Table B3. Production function Estimates: Pooled Sample-OLS

Sector code	(15)	(18)	(22)	(24)	(25)	(26)	(28)	(32)	(36)	(37)
lnCapital	0.239***	0.168***	0.272***	0.231***	0.313***	0.152***	0.291***	0.176***	0.165***	0.280***
	(0.0358)	(0.0295)	(0.0703)	(0.0392)	(0.0728)	(0.0428)	(0.0466)	(0.0486)	(0.0304)	(0.0375)
lnLabour	0.322***	0.254***	0.382***	0.255***	0.447***	0.396***	0.462***	0.474***	0.492***	0.460***
	(0.0425)	(0.0507)	(0.0881)	(0.0580)	(0.0940)	(0.0895)	(0.0549)	(0.0718)	(0.0584)	(0.0733)
lnMaterials	0.526***	0.666***	0.504***	0.590***	0.475***	0.675***	0.501***	0.633***	0.531***	0.459***
	(0.0431)	(0.0376)	(0.0955)	(0.0449)	(0.0818)	(0.0819)	(0.0551)	(0.0454)	(0.0456)	(0.0463)
Observations	1,821	1,062	401	381	196	542	859	291	1,229	329

Table B4. Production function Estimates Panel Sample- Levinsohn and Petrin (2003)

Sector code	(15)	(18)	(22)	(24)	(25)	(26)	(28)	(32)	(36)	(37)
lnCapital	0.123	0.182	0.269	0.158	-0.0269	0.285*	-0.0561	0.0745	0.168	-0.0361
	(0.0921)	(0.120)	(0.179)	(0.112)	(0.145)	(0.165)	(0.257)	(0.133)	(0.144)	(0.132)
lnLabour	0.252***	0.0602	0.0152	0.280	0.139	0.263	0.372**	0.281	0.160	0.732***
	(0.0692)	(0.0667)	(0.114)	(0.194)	(0.207)	(0.277)	(0.146)	(0.194)	(0.133)	(0.247)
lnMaterials	0.262**	0.417***	0.444***	0.504***	0.746***	0.263	0.796***	0.416***	0.297*	0.459**
	(0.106)	(0.113)	(0.152)	(0.134)	(0.268)	(0.298)	(0.230)	(0.145)	(0.165)	(0.179)
Observations	357	122	59	63	37	57	140	62	111	55

Table B5. Production function Estimates: Panel Sample-OLS

Sector code	(15)	(18)	(22)	(24)	(25)	(26)	(28)	(32)	(36)	(37)
lnCapital	0.171***	0.279***	0.234**	0.136**	0.0571	0.241***	0.529***	0.187**	0.192***	0.111
	(0.0598)	(0.0831)	(0.0897)	(0.0621)	(0.0978)	(0.0802)	(0.125)	(0.0857)	(0.0664)	(0.0960)
lnLabour	0.434***	0.0913	0.0532	0.410***	0.229	0.798***	0.352***	0.372**	0.468**	0.766***
	(0.0893)	(0.0656)	(0.139)	(0.142)	(0.175)	(0.285)	(0.123)	(0.144)	(0.183)	(0.192)
lnMaterials	0.432***	0.571***	0.599***	0.579***	0.682***	0.475***	0.237*	0.494***	0.456***	0.317***
	(0.0671)	(0.0964)	(0.113)	(0.0904)	(0.0908)	(0.170)	(0.120)	(0.0851)	(0.112)	(0.113)
Observations	357	122	59	63	37	57	140	62	111	55

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4. Foreign Firms and Markups in Sub-Sahara Africa

Abstract

This paper examines if foreign firms in host countries derive market power from their technological assets. Using markups as a measure of market power, this paper investigates if foreign firms have higher markups than their domestic counterparts. In addition, this study examines how the competitive pressures from foreign firms affects the markups of domestic firms in the host country. We consider sub-Sahara African countries where there has been no research on the competitive effect of foreign presence. This analysis focuses on firms in the manufacturing sector. It finds that foreign firms only had higher markup than their domestic counterparts in highly concentrated sectors. In addition, this study finds that foreign presence reduces the markups of domestic firms in highly concentrated sectors, low technology sectors and low-income countries.

JEL Codes: D22, F23, L60.

Keywords: Foreign Direct Investment, Markups, Productivity Spillovers, Competition, Foreign firms, Sub-Saharan Africa.

4.1 Introduction

Productivity gains from foreign direct investment has been a major debate in economic research. The literature argues that the presence of foreign firms in host countries can improve aggregate productivity in host countries through spillovers and competition (Aitken and Harrison, 1999). Foreign firms possess some advantageous assets and technology which make them more productive. Domestic firms can increase their productivity by learning from and imitating the technology and productive techniques of foreign firms (Alfaro et al., 2009; Colen et al., 2009). However, the presence of foreign firms could increase competition in the local market of the host country. With their productive assets, foreign firms can produce at lower marginal cost which makes it possible for them to charge higher markup (excess of marginal cost over price). Greater competition from foreign firms can reduce the market power of domestic firms forcing them to reduce their prices and markups. Using markup as a proxy for market power, this study examines if foreign firms have higher markups relative to their domestic counterparts. In addition, it examines if the presence of foreign firms reduces the markup of domestic firms in the host country.

Firm level empirical literature on foreign direct investment (FDI) has focused on productivity spillovers, little is known about how foreign presence affects competition in the host country. Studies that focus on the competition effect of foreign firms on domestic firms is limited to Sembenelli and Siotis (2008) and Clementi (2017). Examining the competition effect of foreign direct investment will enhance our knowledge of how firms and sectors in host countries respond to the competitive pressures from FDI. Understanding the competition effect of foreign firms on markup is also important for resource allocation and consumer's welfare (Feenstra and Weinstein, 2017). If firms charge higher markup, they can lower consumer's welfare, produce less output and worsen resource allocation (De Loecker and Eeckhout, 2017). On the other hand, greater competition could also increase aggregate productivity through exit of less productive domestic firms and reallocation of resources from low productive firms to high productive firms (Alfaro and Chen, 2018).

This study contributes to the literature by focusing on the competitive effect of FDI in sub-Sahara African countries. Studies on the effect of FDI in sub-Sahara African countries has been limited to productivity spillovers. This study provides evidence

on the relationship between markup and the level of foreign presence in sub-Sahara Africa. In the last two decades, FDI flows to Sub-Sahara Africa has increased (World Development Indicators, 2018). In addition, FDI flows particularly green field investment to the manufacturing sector has increased (UNCTAD World Investment Report, 2012; 2016; 2018). Manufacturing sector contributes about 10% of the average GDP of sub-Sahara African countries (World Development Indicators, 2018). This means the manufacturing sector produces less output. On average, foreign firms in our sample sell over 80% of their output in the local market [1]. Therefore, they engage in the local market of the host country. Hence, they could drive competition in the manufacturing sector and affect the markup of domestic firms in their sector.

This analysis is based on a two-time period panel of manufacturing firms in Sub-Sahara Africa. The methodology introduced by De Loecker and Warzynski (2012) was used to estimate markup for the sample of firms. This study finds that foreign firms do not have higher markups relative to domestic firms except in highly concentrated sector. This could be evidence that the presence of foreign firms leads to exit of less productive firms. Therefore, foreign firms compete with the most productive domestic firms and can only charge higher markup in sectors where competition is low (highly concentrated sectors). In addition, this study finds that foreign presence in a sector reduces the markup of domestic firms in that sector. This effect is larger in highly concentrated sector, low technology sectors and low-income countries. In low technology sectors, foreign firms derive advantages from their productive assets and can charge higher markups. In highly concentrated sectors and low-income countries, they benefit from low competition coupled with their technological advantages. Therefore, foreign presence drives competition in host countries and can improve aggregate productivity.

The rest of the paper is divided into 5 sections. Section 2 describes firm characteristics that influences markup and how foreign presence affects markup. Section 3 gives a description of the data, markup estimation and the empirical strategy. Section 4 contains the empirical results and Section 5 gives the conclusions.

[1] Based on Author's calculation from the pooled sample of firms used in this study.

4.2 Foreign Presence and Markup

Foreign firms possess non-tangible productive assets such as better technology, organisational skills, exporting knowledge which makes them more productive than domestic firms (Aitken and Harrison, 1999). Domestic firms can improve their productivity and competitiveness by learning better production techniques, use of superior technology and better organisational practices from foreign firms (Görg and Greenaway, 2004). Although the presence of foreign firms can improve the productivity of domestic firms, it could also increase the level of competition in the product and the factor markets of the host country (Alfaro and Chen, 2018). The results from chapter 3 supports this argument. The study found that foreign presence in the manufacturing sector of some sub-Saharan Africa countries improved firm productivity through linkage effect and reduced firm productivity through the competition effect.

FDI can reduce the markup of domestic firm if foreign presence leads domestic firms to lower their prices or increase their marginal cost, markup of domestic firms will fall since markup is the excess of price over marginal cost. Therefore, foreign presence would be associated with a decrease in markup of domestic firms. On the other hand, foreign presence can increase markup if foreign entry leads to a fall in marginal cost only or exit of less productive and inefficient firms. The reallocation of inputs to most productive firms could increase the level of concentration in the industry which could reduce competition (Lundin et al., 2007).

According to Aitken and Harrison (1999), the productive assets of foreign firms make them more productive and this could lead to a reduction in their marginal costs given the fixed cost of production in an imperfectly competitive market. This means foreign firms can produce more and sell at a lower price relative to the domestic firm. In addition, the productive assests of foreign firms would make them produce higher quality products and charge higher prices given their marginal costs and this would imply higher markups (Békés et al., 2016; Clementi, 2017). Studies examining markup premium of foreign firms find that foreign firms had higher markups than their domestic counterparts (Muraközy and Russ, 2015; Békés et al., 2016). This could be evidence that foreign firms use their technological assets to produce on a lower marginal cost given the prices in the competitive market. However, these studies are limited to European countries which are high- or upper middle-income countries and receive more

FDI flows than sub-Saharan African countries. Firms in these countries also operate in good economic environment with good institutions and laws which can promote competition. Firms in Sub-Sahara Africa are less exposed to foreign competition (low FDI) and they operate in environment with less economic freedom and institutions. Therefore, examining if foreign firms in sub-Sahara Africa have higher markup than their domestic counterparts is important. This study will also provide evidence on the competition effect of FDI in low and lower-middle income countries.

Arguments on competition effect from foreign presence mostly relates to reducing the market share of domestic firms in the output market which forces them to reduce their prices. The competition effect of foreign presence could also work through the factor market for inputs and labour. Foreign firms are more productive and could pay a wage premium to their workers. Therefore, they employ the most productive workers given the pool of workers in the economy (Glass and Saggi, 2002). This in addition to increase in demand for workers could raise wages. Increased competition and demand for inputs can also drive up input prices. On the other hand, foreign presence can reduce marginal cost if foreign firms introduce domestic suppliers to better technology and practices to improve input quality and reduce cost of inputs.

Empirical evidence on the competitive effect of foreign firms on markups have been limited to the case of Spain and Romania. Sembenelli and Siotis (2008) using a Spanish dataset find that the presence of foreign firms reduces markups of domestic firms in the short run only. This negative effect applies to non-research-intensive sectors and disappears in the long run. However, this study makes use of accounting price cost margins as measure for markups. Clementi (2017) argues that this measure is based on accounting practices of the firm and does not reflect economic margins as it does not consider differences in productivity. For a sample of Romania firms, Clementi (2017) find that foreign firms charge higher markup than their domestic counterparts and that foreign presence reduces the markup of domestic firms in the same sector. This effect depends on the level of concentration and technology in the sector. The negative effect on markup is stronger in highly concentrated sectors and low technologically intensive sectors. The findings from the above studies suggest that competition from foreign presence is likely to reduce the markup of domestic firms. This study is based on findings from European countries. As described above, there are differences be-

tween European countries and sub-Sahara African countries. Hence, it is important to examine how foreign presence affects the markup of domestic firms in sub-Saharan Africa.

A reduction in the markup of domestic firms could be through fall in prices or increase in marginal cost. Previous studies by Sembenelli and Siotis (2008) and Clementi (2017) do not have information on prices. Therefore, these studies do not observe if fall in markup due to foreign presence is associated with increase in marginal cost or decrease in prices. A study by De Loecker et al. (2016) uses information on prices and markup to examine how trade liberalisation (reduction in tariffs) affects the markup of firms in India. The study derived marginal cost from information on prices and markup. They find that reducing input and output tariffs led to an increase in the markup of firms. While decline in output tariffs increased competition and led to a fall in price, decline in input tariffs led to a fall in marginal cost of firms. The fall in price from trade liberalisation was lower than the reduction in marginal cost. Therefore, markup increased due to incomplete pass-through of reduction in marginal cost to prices. This study does not observe prices or marginal cost for firms in sub-Sahara Africa. Hence, the channel though which foreign presence reduces markup is not observed.

The effect of foreign presence might differ based on sector characteristics. Competition in a sector depends on the level of concentration in that sector. In low concentrated sectors (high competition), prices would be close to the marginal cost (Konings et al., 2005). In highly concentrated sectors, competition is low. Hence firms in these sectors would have higher markups as they are able to charge higher prices. Therefore, foreign presence would have a higher negative effect on the markup of firms in highly concentrated sector. The level of technology used in a sector is also important for the effect of foreign presence on markup. Clementi (2017) argues that in high technology sectors there is a higher level of vertical integration and market segmentation which can lead firms to charge higher markup. This segmentation can also reduce the competition effect of foreign presence on the markup of domestic firms. Foreign firms in low technology sectors in the host country are more likely to have higher technological know-how and knowledge of modern production techniques which reduces their cost of production and increases their competitive advantage [2].

[2]Classification of sectors based on their level of technology can be found in the appendix table A2. Highly concentrated sectors relate to sectors with Herfindahl Index which is above the 75th percentile

The level of economic development in a country is also an important factor in estimating the effect of foreign firms on the markup of domestic firms. Middle-income countries have higher income and a more enabling environment for firms to compete with foreign firms [3]. In these countries, manufacturing sector contributes more to GDP relative to low-income countries. Hence, the intensity of competition in middle-income countries will be larger than that of low-income countries. Therefore, the effect of foreign presence on markups will be lower in these countries.

In examining the effect of foreign presence on markup, the empirical analysis distinguishes between firms based on their level of concentration and technology in their sector and the level of income in the country.

4.3 Data and Empirical Strategy

4.3.1 Data

Data is obtained from the World Bank Enterprise Survey which focuses on firms in developing countries. This survey contains information on manufacturing and service firms. It provides information on output and input of the firm, the origin of owners, employees, export, the location of the firm as well as country factors which affect the firm. The survey uses a standardized questionnaire therefore, questions are comparable in countries across different survey waves.

The survey uses stratified sampling techniques where the number of firms surveyed is based on the size of the economy. Firms are selected based on country size, sector, firm size and geographical location. This study focuses on 14 sub-Sahara African countries with two survey waves. Selection of countries is based on the availability of panel data. Different countries are surveyed in different years and the interval between the first and second wave ranges from 4 to 7 years. A summary of countries and their survey years can be found in appendix table C1. Only manufacturing firms are considered as service firms do not have enough information to calculate markup. After excluding non-manufacturing firms, firms with no information on sales, employees and sectors, the sample consist of 6681 firms of which 546 firms are panel. Only panel

of the distribution.

[3] Classification of countries based on their level of income is on appendix table A1.

firms are used in this analysis as the procedure of using De Loecker and Warzynski (2012) approach requires panel data for estimation.

The survey includes 23 sectors based on two-digit ISIC code. These sectors are further aggregated into 10 sectors due to the small number of firms in some sectors. Table 3.1 below gives a description of sectors and firms used in this analysis. All domestic currency values have been deflated by the country's GDP deflator and converted to 2010 US dollars using the official exchange rate obtained from the World Bank. Foreign firms are defined as firms with foreign equity participation greater than 10% as described by the official definition of FDI from the World Bank and IMF. To measure competitive presence for foreign presence, we use the horizontal measure commonly used in the literature. This study only focuses on how foreign presence affects markup. It does not explore the channels through which it affects markup. Hence, the use of horizontal measure to capture foreign presence. Foreign presence is defined as the average foreign share of a sector in a country weighted by each firm's share in the total sectoral output (sales) in the country:

$$\frac{\sum_{i=1}^{n_s} foreignshare * Y_{it}}{\sum_{i,i\in j} Y_{it}}$$

where n_s is the number of firms in the sector. This measure reveals the size (presence) of foreign firms' output in relation to the whole sector. This measure is at sector level. Therefore, it is the same across all firms in the same sector and country. The pooled sample of firms is used in calculating sector variables such as foreign presence, market share and concentration ratios. Using the pooled sample of all firms allows us to capture foreign presence and sector measures on a larger sample and to obtain measures which will be closer to the overall sector measure.

4.3.2 Markup Measure

To estimate markup, the procedure of De Loecker and Warzynski (2012) is implemented. Their procedure is based on the idea of Hall et al. (1986) which relies on the fact that when price equals marginal cost of production, output elasticity of a variable factor of production will be equal to the variable factor's expenditure share in total revenue. This means under perfect competition, markup is equal to unity. Under imperfect

Table 4.1. Manufacturing Firms by Sector

Code	Sector	Sector FDI	Foreign firms (% of all firms)	All firms	Panel firms
15	Food and beverages	36.35	13.27	1666	181
18	Textile and Garments	33.79	9.00	1011	63
22	Publishing and printing	16.22	8.90	382	32
24	Chemical Products	36.56	22.56	359	33
25	Rubber and Plastics	25.08	25.27	182	20
26	Non-metallic Products	29.88	9.32	515	29
28	Basic and fabricated metals	31.14	11.34	794	70
32	Machinery, transport and other equipment	46.31	23.91	276	32
36	Wood and Furniture	12.65	6.52	1181	56
37	Other manufacturing	43.41	20.63	315	30
	N		12.26	6681	546

Note: Other manufacturing includes tobacco products, leather products, paper products, coke and petrol products.
Source: Author's calculations based on WBES

competition, markup represent the difference between the output elasticity of the input and the input's share in total revenue. De Loecker and Warzynski (2012) claims that their approach is suitable in relating markup to firm level activity which can be correlated to firm productivity. Hence, we can use this approach to derive markup and relate it to firm level characteristics. This approach can generate firm-year-specific measures of markups and control for unobserved productivity which might bias markup estimation.

The De Loecker and Warzynski (2012) method relies on the standard cost minimization condition for a variable input free of adjustment costs to generate markup from variable input-output elasticity and the input share in total sales. It considers the following production function for firm *i* at time *t*:

$$Q_{it} = Q_{it}(L_{it}, M_{it}, K_{it}, \omega_{it}) \tag{4.1}$$

Where Q_{it} represents gross output, which relies on L_{it},M_{it},K_{it}, ω_{it} which represents labour, materials, capital stock and hicks neutral production efficiency respectively. It is assumed that this production function is continuous and twice differentiatable with respect to its arguments. If producers are assumed to be cost minimising, we have a

Lagrangian function specified below:

$$\mathbf{L}(L_{it}, M_{it}, K_{it}, \lambda_{it}) = P_{it}^{L} * L_{it} + P_{it}^{M} * M_{it} + r_{it} * K_{it} + \lambda_{it}[Q_{it} - Q_{it}(L_{it}, M_{it}, K_{it})] \tag{4.2}$$

The first order condition for each variable input (labour or materials) is

$$\frac{\partial \mathbf{L}_{it}}{\partial X_{it}^{v}} = P_{it}^{v} - \lambda_{it}\frac{\partial Q_{it}}{\partial X_{it}^{v}} = 0 \tag{4.3}$$

The above equation generates:

$$\frac{\partial Q_{it}}{\partial X_{it}^{v}} = P_{it}^{v}\frac{1}{\lambda_{it}} \tag{4.4}$$

Multiplying both sides by $\frac{\partial X_{it}^{v}}{\partial Q_{it}}$, gives:

$$\frac{\partial Q_{it}}{\partial X_{it}^{v}}\frac{X_{it}^{v}}{Q_{it}} = \frac{1}{\lambda_{it}}\frac{P_{it}^{v}X_{it}^{v}}{Q_{it}} \tag{4.5}$$

where λ_{it} is the marginal cost of production. Markup is denoted as μ_{it}. $\mu_{it} \equiv \frac{P_{it}}{\lambda_{it}}$. Hence, $\frac{1}{\lambda_{it}} \equiv \frac{\mu_{it}}{P_{it}}$. Let $\frac{\partial Q_{it}}{\partial X_{it}^{v}}\frac{X_{it}^{v}}{Q_{it}}$=$\theta_{it}^{v}$,where θ_{it}^{v} is the elasticity of output with respect to the variable input. Then equation 4.5 then becomes:

$$\theta_{it}^{v} = \mu_{it}\frac{P_{it}^{v}X_{it}^{v}}{P_{it}Q_{it}} \tag{4.6}$$

From equation 4.6, we derive the following expression for markup.

$$\mu_{it} = \theta_{it}^{v}(\alpha_{it}^{v})^{-1} \tag{4.7}$$

where $\alpha_{it} = \frac{P_{it}^{v}X_{it}^{v}}{P_{it}Q_{it}}$ which is the share of expenditures on variable input *v* in total sales ($P_{it}Q_{it}$). In a Cobb-Douglas production function, θ_{it}= θ_{s} since input output elasticity is the same for all firms in a sector. To obtain input output elasticity which varies per firm, a translog production function is used in this study. A translog production function is the second order approximation to the Constant Elasticity of Substitution (CES) production function. It assumes that the production function exhibit constant returns to scale and Hicks neutral technical change (Boisvert, 1982). The specification used in this analysis includes inputs, the square of inputs and the interaction between inputs. Eliminating the square of inputs and the interaction between inputs gives the

Cobb-Douglas production function. In the translog case, the efficiency of an input depends on the input and its combination with other inputs. Therefore, we can obtain input output elasticity that varies by year in each firm.

4.3.3 Input Output Elasticity

This study makes use of materials as a variable input free of adjustable cost following De Loecker and Warzynski (2012). To estimates markups, input elasticity is derived from production functions estimated based on the approach of Ackerberg et al. (2015). This approach can generate input output elasticity of materials and control for unobserved productivity which might bias markup estimation. To proxy for unobserved productivity, intermediate input was used as a proxy based on the approach of Levinsohn and Petrin (2003). To get input output elasticity for each firm at time *t*, the translog production function estimated is specified below:

$$y_{it} = \beta_l l_{it} + \beta_k k_{it} + \beta_m m_{it} + \beta_{ll} l_{it}^2 + \beta_{kk} k_{it}^2 + \beta_{mm} m_{it}^2 + \beta_{lk} l_{it} k_{it} + \beta_{lm} l_{it} m_{it} + \beta_{km} k_{it} m_{it} + \omega_{it} + \epsilon_{it} \tag{4.8}$$

where *y* is firm sales. *l, k* and *m* are labour, capital and materials respectively. All variables are assumed to be in logs. ω_{it} is productivity shock observed by the firm but not by the econometrician and ϵ_{it} is an idiosyncratic component. The Ackerberg et al. (2015) approach relies on two step procedure. This procedure relies on Levinsohn and Petrin (2003) which uses material demand function to proxy for unobserved productivity. The material demand function is invertible; therefore, unobserved productivity becomes a function of capital, intermediate input and other factors affecting input choices.

$$\omega_{it} = \omega_{it}(l_{it}, k_{it}, m_{it}, z_{it}) \tag{4.9}$$

z_{it} is included in the Markov process to control for other factors affecting input demand choices. De Loecker and Warzynski (2012) argues that in estimating markups, factors that affect firms' input demand choices need to be included as additional controls. Once these variables are controlled for, the model of competition does not matter in estimating markup. These variables depend on the context in which markup is estimated. In this case, foreign ownership and sector FDI is included as additional control

variables [4].

Levinsohn and Petrin (2003) assumes that ω_{it} follows a first order Markov process therefore the law of motion for productivity can be written as:

$$\omega_{it} = E[\omega_{it} \mid \omega_{it-1}] + \xi_{it} \tag{4.10}$$

where ξ_{it} is the innovation to productivity at time t which is uncorrelated with k_{it}. The first stage of the regression estimates the equation below and it is estimated non-parametrically:

$$y_{it} = \phi(k_{it}, l_{it}, m_{it}, z_{it}) + \epsilon_{it} \tag{4.11}$$

Expected output (ϕ) is given by:

$$\begin{aligned}\phi = \beta_l l_{it} + \beta_k k_{it} + \beta_m m_{it} + \beta_{ll} l_{it}^2 + \beta_{kk} k_{it}^2 + \beta_{mm} m_{it}^2 + \beta_{lk} l_{it} k_{it} + \beta_{lm} l_{it} m_{it} \\ + \beta_{km} k_{it} m_{it} + h(k_{it}, l_{it}, m_{it}, z_{it})\end{aligned} \tag{4.12}$$

After the first stage, we can compute productivity for any value of β. Productivity is derived as:

$$\hat{\omega_{it}} = \phi - (\beta_l l_{it} + \beta_k k_{it} + \beta_m m_{it} + \beta_{ll} l_{it}^2 + \beta_{kk} k_{it}^2 + \beta_{mm} m_{it}^2 + \beta_{lk} l_{it} k_{it} + \beta_{lm} l_{it} m_{it} + \beta_{km} k_{it} m_{it})$$

Regressing productivity on its lag, we can obtain the innovation to productivity $\xi_{it}(\beta)$ which is not correlated with capital but correlated with labour:

$$\omega_{it}(\beta) = \omega_{it-1}(\beta) + \xi_{it}(\beta) \tag{4.13}$$

The production function coefficients are estimated in the second stage through GMM by relying on the law of motion and using the lagged value of labour as instrument. To estimate the production function, we rely on the following moments:

$$E[\xi_{it}(\beta) I_{it}] = 0 \tag{4.14}$$

[4]Foreign firms are more likely to use imported inputs by sourcing for their inputs from their foreign connections with suppliers (Javorcik, 2004). Sector FDI might also affect input demand sourcing through competition in the input market. Controlling for sector FDI should eliminate concerns about productivity spillovers from foreign presence affecting the empirical results.

where $I_{it} = l_{it-1}, k_{it}, m_{it-1}, l^2_{it-1}, k^2_{it}, m^2_{it-1}, l_{it-1}k_{it}, l_{it-1}m_{it-1}, k_{it}m_{it}$.
Production functions are estimated for each sector separately to account for varying returns to inputs across sectors.

De Loecker and Warzynski (2012) relies on the use of a variable input free of adjustment cost to calculate markup. Clementi (2017) argues that labour might not be perfectly variable due to hiring and firing cost. In this study, material cost is used as a variable input free of adjustment cost. Therefore, in the translog case, θ^m_{it} the input output elasticity of labour is calculated as:

$$\theta^m_{it} = \beta_m + 2\beta_m mm_{it} + \beta_{lm} l_{it} + \beta_{km} k_{it} \tag{4.15}$$

After estimating the production function, firms with negative coefficient of output elasticity are excluded as they would give negative estimates of markup.

Following De Loecker and Warzynski (2012), the expenditure share of materials is corrected. They argue that the correct expenditure share cannot be observed directly. We observe $\tilde{Q}_{it}$ which is given by $Q_{it}exp(\epsilon_{it})$ which includes a measurement error. This correction removes measurement error by eliminating variations in expenditure shares not explained by variables affecting input (material) demand. To remove the measurement error, the residual ϵ_{it} from the first stage regression of the production function as in equation 4.11 is used. Thus, expenditure share is computed as:

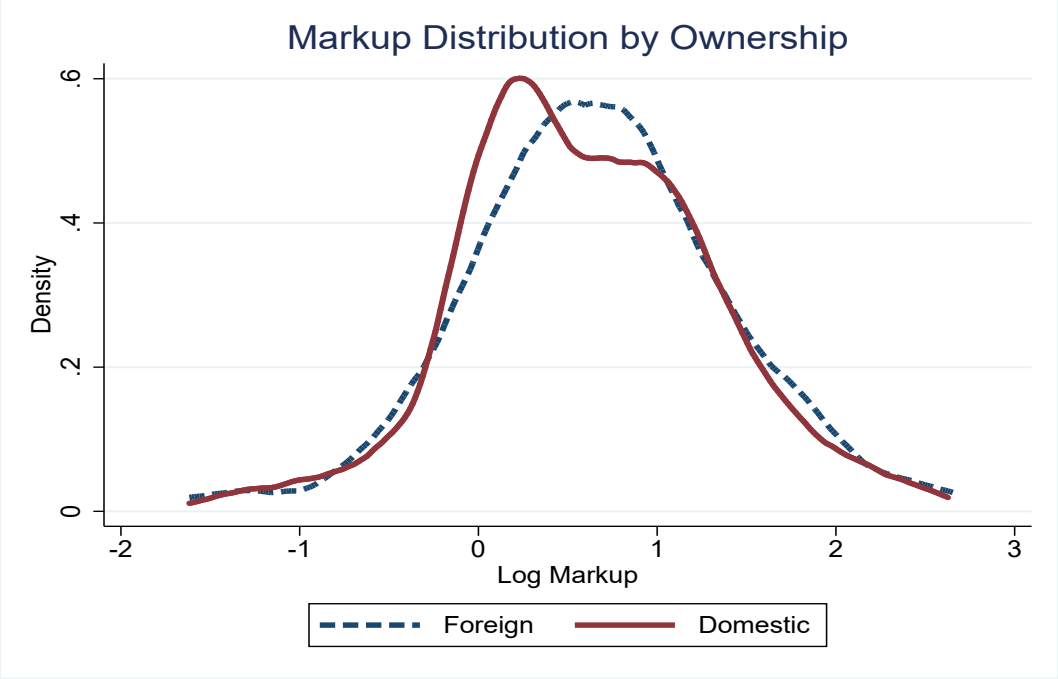
$$\hat{\alpha}^m_{it} = \frac{P^m_{it} X_{it}}{P_{it} \frac{\tilde{Q}_{it}}{exp(\hat{\epsilon}_{it})}} \tag{4.16}$$

Markup can therefore be computed as: $\mu_{it} = \theta^m_{it}(\alpha^m_{it})^{-1}$

4.3.4 Markup Distribution

This section describes markup distribution by year, sector and country. Table 4.2 shows that on average, firms charge a markup which is over 140 percent of their marginal cost. The markup of foreign firms is greater than that of domestic firms which should imply that foreign firms have higher markups. However, a density distribution of markup of foreign and domestic firms in figure 4.1 reveals that there are no differences in the distribution of markup at the tails of the distribution. At the peak

Figure 4.1. Log markup Distribution by Ownership



Note: Outliers below and above the 2nd and 98th percentiles are excluded.

of the distribution, there are slight differences between the markup of domestic and foreign firms.

Examining the markup distribution by sector, table 4.2 shows that the highest markup is charged by firms in Plastics and Rubber sector. Excluding Wood and Furniture sector, sectors with markup greater than or equal to three are high technology sectors. This shows that on average, firms in high technology sectors charge higher markup than firms in low technology sector. Classification of sectors based on their level of technology can be found in the appendix table C2. As described in sector 4.2 above, firms in high technology sectors are more likely to charge higher markup due to the high level of vertical integration and market segmentation in these sectors. The distribution of markup by ownership type shows that in some sectors, the average markup of domestic firms is greater than that of foreign firms. These sectors asides from Machinery and other equipment, have a lower proportion of foreign firms compared to other sectors.

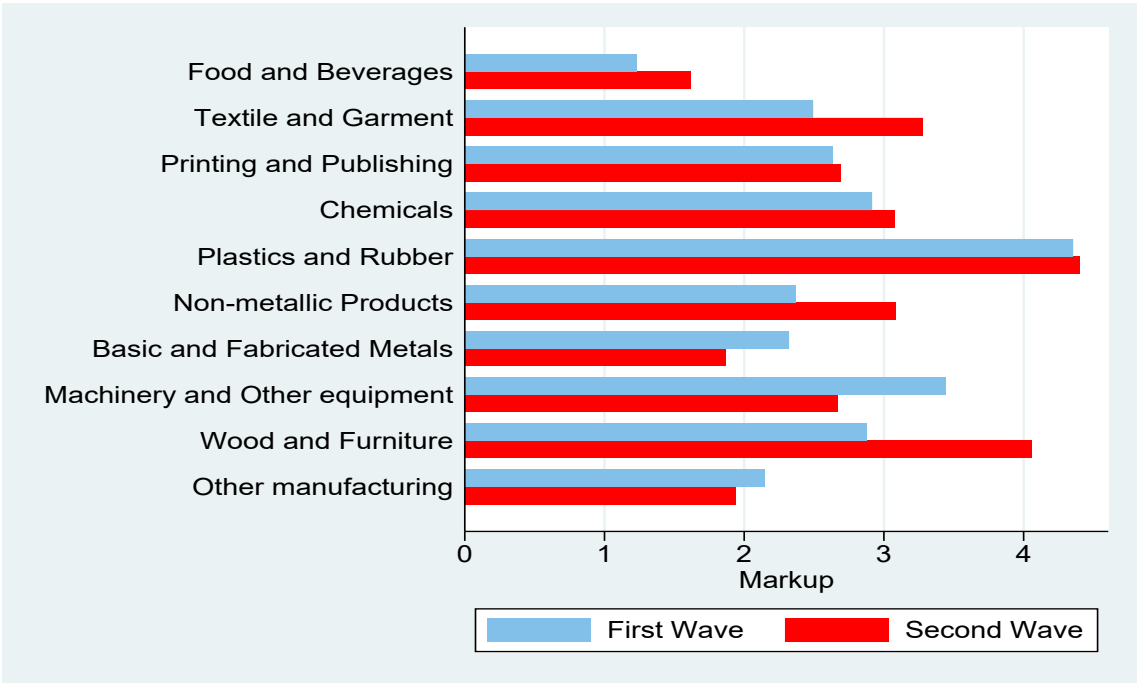
Figure 4.2 shows the distribution of markup in each sector by year. In most sectors, the average markup increased between the first wave and the second wave. Markup fell in basic and fabricated metals, machinery and other equipment and other manufacturing sectors while it increased in other sectors. The results in the latter part of table

Table 4.2. Markup Distribution by Sector

		All Firms		Foreign Firms		Domestic Firms	
Code	**Sector**	**Mean**	**Median**	**Mean**	**Median**	**Mean**	**Median**
15	Food	1.40	1.15	1.71	1.24	1.34	1.14
18	Textile & Garment	2.89	2.61	2.46	2.45	2.96	2.67
22	Printing & Publishing	2.65	2.38	3.05	2.18	2.58	2.39
24	Chemicals	3.00	2.58	2.76	2.57	3.15	2.60
25	Plastics & Rubber	4.37	3.65	4.75	3.27	4.18	3.96
26	Non-metallic Products	2.72	2.24	3.23	2.89	2.47	2.07
28	Basic & Fabricated metals	2.08	1.34	1.82	1.34	2.18	1.33
32	Machinery & Equipments	3.03	2.51	2.50	1.81	3.23	2.83
36	Wood & Furniture	3.41	2.58	3.35	2.10	3.42	2.59
37	Other Manufacturing	2.07	1.51	2.71	1.96	1.66	1.45
	High Concentrated sector	2.79	2.07	2.94	2.03	2.74	2.07
	Low Concentrated sector	2.15	1.70	2.19	1.80	2.15	1.66
	High Technology sector	3.07	2.57	3.04	2.34	3.09	2.70
	Low Technology sector	2.23	1.65	2.29	1.74	2.21	1.62
	Middle-income countries	2.50	1.90	2.70	2.10	2.44	1.85
	Low-income countries	2.22	1.52	2.20	1.60	2.22	1.51
	All Firms	2.40	1.81	2.53	1.93	2.37	1.77

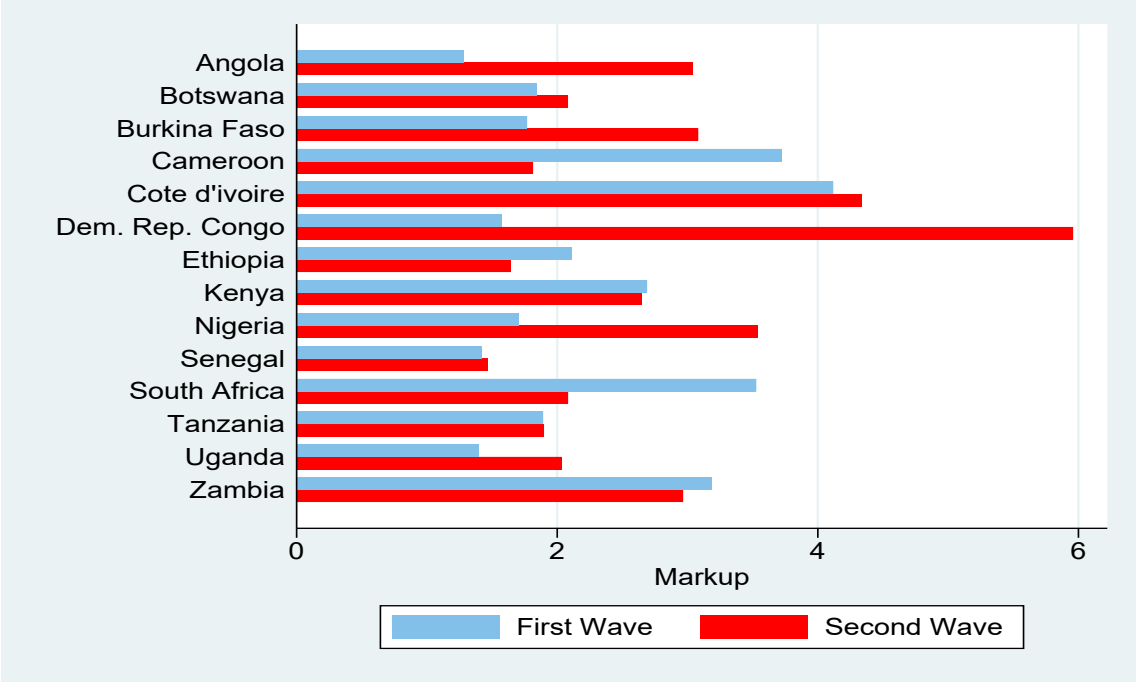
Note: Other manufacturing includes tobacco, leather products, paper products,coke and petrol products. Values represents mean of variables.Outliers above and below the 2nd and 98th percentiles are excluded.
Source: Author's calculations based on WBES.

Figure 4.2. Average markup distribution by Sector



Note: Outliers below and above the 2nd and 98th percentiles are excluded.

Figure 4.3. Average markup distribution by Country



Note: Outliers below and above the 2nd and 98th percentiles are excluded.

4.2 supports the literature as described in section 4.2 that firms in highly concentrated industries and high technology industries will have higher markup due to less competition and higher market segmentation.

Table 4.3 presents markup distribution of firms by country income grouping. The table shows that firms in middle-income countries have higher markups relative to firms in low-income countries. As shown in table 4.3, in most countries, foreign firms have higher markup relative to domestic firms. The markup of domestic firms in Cote d'Ivoire suggest the presence of outliers in the country. Democratic Republic of Congo also stands out in the distribution of markup in figure 4.3. It experienced a significant increase in markup between the first and the second survey wave. In most countries, markup increased between the first and second survey wave except for Cameroon, Ethiopia, Kenya, South Africa and Zambia which experienced a fall in markup.

The descriptive statistics above supports the hypothesis that markup of firms differ by the level of technology, concentration and country income level. Therefore, the effect of foreign presence on the markup of firms could also differ based on these characteristics. In the next section, we examine if foreign firms have higher markup and how the presence of foreign firms affects markup of domestic firms in their sector and country. The markup distribution of firms differ by sector and country. In the

Table 4.3. Markup Distribution by Sector

	All Firms		Foreign Firms		Domestic Firms	
Country	**Mean**	**Median**	**Mean**	**Median**	**Mean**	**Median**
Angola	1.94	1.34	3.56	1.49	1.68	1.20
Botswana	1.96	1.81	1.68	1.74	2.18	1.87
Burkina Faso	2.33	1.60	3.07	1.18	1.88	1.72
Cameroon	3.18	1.81	4.33	2.46	1.64	1.64
Cote d'Ivoire	4.25	2.69	1.65	1.70	6.34	5.39
Dem. Rep. Congo	2.84	1.50	2.79	1.71	2.86	1.50
Ethiopia	1.88	1.26	2.06	1.62	1.85	1.24
Kenya	2.67	2.09	2.28	1.90	2.76	2.09
Nigeria	2.46	1.86	4.00	3.12	2.36	1.83
Senegal	1.44	1.20	1.68	1.61	1.41	1.19
South Africa	2.72	2.19	2.72	2.71	2.72	2.19
Tanzania	1.90	1.51	2.15	1.95	1.85	1.43
Uganda	1.66	1.34	1.49	1.40	1.79	1.31
Zambia	3.07	2.65	3.33	3.27	3.00	2.58

Notes: Values represents mean of variables. Outliers above and below the 2nd and 98th percentiles are excluded. Source: Author's calculations based on WBES.

empirical analysis, we include country and sector dummies to account for country and sector fixed effects. In addition, separate regressions are estimated for firms based on their level of concentration, technology and country income.

4.3.5 Estimation Strategy

Do foreign firms have higher markup?

First, this analysis examines how firm characteristics affect firm level markup by estimating the equation below using pooled OLS:

$$ln\mu_{isct} = \beta_0 + \beta_1 foreign_{isct} + \beta_2 age_{isct} + \beta_3 labour_{isct} + \beta_4 capitalintensity_{isct} + \delta_{country} + \delta_{sector*time} + \delta_{surveyyear} + \epsilon_{isct} \tag{4.17}$$

$ln\mu_{isct}$ is the log of markup and foreign represents a dummy variable for foreign firm. X_{isct} are firm characteristics which would serve as control variables. This include firm age, firm size and capital intensity. The subscripts *i, s, c, t* represents firm, sector, country and time respectively. $\delta_{country}$ represent country fixed effects and $\delta_{sectortime}$ is an interaction between sector and time dummy. To control for any effect due to different timing of surveys in different countries, survey year dummies which represent

the years of survey is included. All standard errors are clustered at country sector level. This regression does not take account of firm unbservables as the main variable of interest (foreign) is a dummy variable. This regression examines if there are differences between domestic and foreign firm markup after controlling for other factors.

De Loecker and Warzynski (2012) claim that markup estimated using their approach is suitable for examining firm characteristics on markup. Therefore, the firm control variables are included to capture differences in firm size, age and factor intensity. Firm size is measured as log of the number of employees; capital intensity is measured as log of capital divided by the number of workers. In some regression specification, market share is included as a control variable to account for how market share can influence markup. This equation examines if foreign firms have higher markup than their domestic counterparts.

Does the foreign presence reduce markup of domestic firms?

Second, this study examines how foreign presence affects the markup of domestic firms in their sector. The regression specified below is estimated for the sample of domestic firms in first difference:

$$\Delta ln\mu_{isct} = \beta_1 \Delta sectorFDI_{sct} + \beta_2 \Delta age_{isct} + \beta_3 \Delta labour_{isct} + \beta_4 \Delta capitalintensity_{isct} + \beta_5 \Delta marketshare_{isct} + \delta_{country} + \delta_{sector} + \epsilon_{isct} \tag{4.18}$$

Sector FDI is the measure for foreign presence in a sector of a country. X_{isct} are firm characteristics which includes firm age, number of employees, capital intensity and market share. Market share is measured as firm sales divided by total sector sales. Country and sector dummies are included to control for country and sector fixed effects.

Following Clementi (2017), this analysis distinguishes between high technology and low technology sectors, high and low concentrated sectors. In addition, it distinguishes between middle and low-income countries.

4.4 Empirical Results

This section presents the results from the empirical analysis. First, it presents result from equation 4.17 which examines if foreign firms have higher markup. Second, this section presents results on the effect of foreign presence on the markup of domestic firms.

4.4.1 Do foreign firms have higher markup?

The results in column 1 of table 4.4 shows that foreign firms do not have higher markup relative to domestic firms. The result on this table does not represent a causal relationship between foreign ownership and markup. This analysis only examines if there are significant differences in the markup of foreign and domestic firms after controlling for other firm characteristics that affect markup, sector, time and country fixed effects. To examine a causal relationship, econometric concerns like reverse causality and the presence of unobservables needs to be considered.

Firm, country and sector factors not observable to the econometrician may lead to a correlation between being a foreign firm and having a higher markup. These unobservable factors may make firms with higher markups attractive to investors. This regression can eliminate sector and country unobservables through including sector and country fixed effects in the regression. However, self-selection effects which are based on firm unobservables cannot be isolated due to the nature of the data (two-time period). A possible way to control for firm unobservables is using first differences or fixed effects estimators. In this analysis, foreign firm is represented by a dummy variable. Only a few firms in the sample change ownership status between the two survey waves therefore, it is not possible to exploit change in ownership dynamics using fixed effects estimator. Hence, we interpret the results on the table as differences in markup charged by foreign firms.

The coefficients of the firm characteristics show that larger firms charge higher markup. The table also shows that there are no significant differences in firm markup based on firm age and capital intensity. Columns 2 and 3 shows the results from disaggregating sectors into high and low concentrated sectors. It shows that in low concentrated sectors, foreign firms have lower markups than domestic firms. It is difficult

to distinguish if lower markup are as a result of lower prices or higher marginal cost. A possible explanation for this result is that foreign firms in low concentrated sectors might reduce their prices to compete with many domestic competitors in a less segregated market. As described in section 4.2, foreign presence might reduce the revenue of domestic firms and increase the price of factor inputs which will facilitate exit of less efficient firms. The exit of the least efficient firms would mean that foreign firms compete with surviving efficient firms. Therefore, they might reduce their prices to compete aggressively to gain market share.

Table 4.4. Firm Characteristics and Markup- All firms

	All firms	**HC**	**LC**	**All firms**	**HC**	**LC**
Foreign	-0.0113	0.136	-0.101*	-0.003	0.141	-0.083
	(0.0563)	(0.0949)	(0.0579)	(0.0552)	(0.0947)	(0.0553)
Firm age	0.0018	0.0010	0.0014	0.0019	0.0010	0.0014
	(0.0016)	(0.0023)	(0.0016)	(0.0016)	(0.0023)	(0.0017)
Log labour	0.0542**	0.0009	0.0930**	0.0611**	0.0051	0.114***
	(0.0265)	(0.0377)	(0.0353)	(0.0285)	(0.0409)	(0.0395)
Capital Intensity	-0.00896	-0.0105	0.0246	-0.0065	-0.0089	0.0301
	(0.0194)	(0.0203)	(0.0255)	(0.0202)	(0.0218)	(0.0260)
Market Share				-0.169	-0.0723	-0.714*
				(0.162)	(0.181)	(0.403)
Constant	0.632**	0.853	0.0668	0.606**	0.857	-0.0490
	(0.256)	(0.703)	(0.377)	(0.266)	(0.710)	(0.398)
R-squared	0.386	0.448	0.462	0.387	0.448	0.467
Observations	935	363	572	935	363	572

This table reports the effect of firm characteristics on firm markup. Standard errors are clustered at country and sector level. * , ** , *** denotes 10%, 5% and 1% level of significance. Each regression includes country, time, survey year and sector dummies. HC represents highly concentrated sector, LC- low concentrated sector. HC relates to sectors with over 75 percentile of HHI index distribution. Outliers above and below the 2nd and 98th percentiles are excluded.

To examine if market share affects the differences in markup charged by firms, market share is included in the regressions as shown in columns 4 to 6 of table 4.4. Once market share of firms is controlled for, the result shows that foreign firms do not have higher markup relative to domestic firms. The coefficient of market share is negative which reveals that firms with larger market shares have lower markup. This supports the claim that the negative coefficient in column 3 captures the efforts of foreign firms to gain market share.

The result on table 4.4 reveal that there are no significant differences in the markup

of domestic and foreign firms. This evidence differs from other studies which examined foreign premium on markup. Studies on France, Germany, Italy, Spain and Hungary find that foreign firms had higher markups relative to domestic firms (Muraközy and Russ, 2015; Békés et al., 2016; Clementi, 2017). The countries above are European countries which operate in a different environment from sub-Sahara African countries. As argued by Paus and Gallagher (2008), county factors play an important role in the characteristics of foreign firms. Country factors such as property rights determine what sectors investors invest in and the level of technology of such investment. This in turn determine the motive of foreign firms and how they affect domestic firms. Therefore, there would be differences in the motives of foreign firms in Europe and sub-Sahara Africa. The technological advantages of foreign firms in sub-Sahara African countries will be less than that of European countries as foreign investors are more likely to introduce low level of technology to sub-Sahara African countries due to weak property rights (Crespo and Fontoura, 2007).

4.4.2 Does the foreign presence reduce markups of domestic firms?

This section examines how foreign presence in a sector affects the markup of domestic firms. The results in table 4.5 focuses on the sample of domestic firms and isolates selection effects from firm unobservables by estimating the regression model in first difference. In addition, country and sector dummies are included to control for sector and country fixed effects. Therefore, in table 4.5, there is less concern about bias from selection or reverse causality. Column 1 shows that foreign presence does not have any significant effect on the markup of domestic firms. Disaggregating domestic firms based on the level of concentration in the sector, we find that foreign presence reduces the markup of domestic firms in highly concentrated sectors and have no effect on firms in low concentrated sector (as shown on columns 2 and 3). In highly concentrated sectors, the level of competition is low and market segmentation is high. The descriptive statistics on table 4.2 supports this evidence. It showed that firms in highly concentrated sectors had higher average markups relative to firms in low concentrated sector. The presence of foreign firms might increase competition in these highly concentrated sectors and force domestic firms to reduce their prices.

Disaggregating firms based on the level of technology used in their sector shows

Table 4.5. Sectoral Foreign Presence on Markup- Domestic firms only

	Dom. firms	**HC**	**LC**	**HT**	**LT**	**MI**	**LI**
ΔSectorFDI	-0.0022	-0.0065**	-0.0068	-0.0105	-0.005*	-0.0008	-0.010***
	(0.002)	(0.003)	(0.006)	(0.0134)	(0.002)	(0.004)	(0.004)
ΔFirm age	0.0007	0.0006	0.0022	0.0149	-0.0020	-0.0008	0.0060
	(0.004)	(0.006)	(0.005)	(0.009)	(0.005)	(0.005)	(0.006)
ΔLog labour	0.0905	-0.0458	0.227*	-0.247*	0.134*	0.111	0.0686
	(0.0676)	(0.0610)	(0.120)	(0.126)	(0.0749)	(0.0824)	(0.128)
ΔCapital Intensity	0.0013	0.0006	-0.0198	0.113*	-0.0014	0.0051	-0.0274
	(0.0245)	(0.0269)	(0.0594)	(0.0580)	(0.0288)	(0.0249)	(0.0727)
ΔMarket share	0.113	0.134	-0.279	-1.650***	0.165	0.101	0.516
	(0.493)	(0.610)	(0.696)	(0.544)	(0.560)	(0.708)	(0.719)
Constant	0.859***	0.792***	0.222	1.005	0.789***	0.926***	-0.336
	(0.122)	(0.153)	(0.463)	(0.643)	(0.130)	(0.131)	(0.199)
R-squared	0.304	0.355	0.263	0.615	0.318	0.365	0.316
Observations	270	147	123	43	227	183	87

This table reports the effect of foreign presence on firm markup. Standard errors are clustered at country and sector level. * , ** , *** denotes 10%, 5% and 1% level of significance. Each regression includes country, survey year, time and sector dummies. HC represents highly concentrated sector, LC- low concentrated sector. HT- high technology, LT- low technology, MI- middle-income countries and LI- low-income countries. HC relates to sectors with over 75 percentile of HHI index distribution. Outliers above and below the 2nd and 98th percentiles are excluded.

that foreign presence have a negative effect on the markup of firms in low technology sectors. Technology level is defined as in Blomström et al. (1990) based on the use of labour and capital [5]. Majority of firms in this sample produce in low technology industries. Low technology production requires the use of less capital and less complex machinery. Foreign firms in low technology sectors are more likely to have higher technological know-how and knowledge of modern production techniques which can make them produce more efficiently at a lower marginal cost. This means they can sell at lower prices, compete more with domestic firms for market share and force domestic firms to reduce their prices and markups.

Columns 6 and 7 shows the effect of foreign presence on markup in low- and middle-income countries. Foreign presence has a negative effect on the markup of domestic firms in low-income countries relative to those in middle-income countries. Low-income countries engage in less manufacturing activities [6]. Therefore, the level of competition in the manufacturing sectors of these countries might be low. The presence of foreign firms would increase the level of competition and force firms with higher markups to reduce their price in order to compete for market share.

[5]Technology classification is in table C2 in Appendix

[6]The contribution of manufacturing to GDP is less than 10%

On the control variables, firm age has no significant effect on the markup of domestic firms. Large firms have higher markups in low concentrated and high technology sectors as indicated by the coefficient of log of labour (full time workers). Smaller firms have higher markup in high technology sectors and markets share is only important in this sector.

The results from the table above supports the propositions of the literature that the presence of foreign firms would lead to competition in the host country which might force domestic firms to reduce their markup in order to compete for market share.

4.4.3 Sensitivity Checks

Table 4.6. Firm Characteristics and Markup- Excluding Outliers

	All firms	**HC**	**LC**
Foreign	0.0353	0.166*	-0.084
	(0.058)	(0.098)	(0.059)
Firm age	0.0020	0.0010	0.0015
	(0.0010)	(0.002)	(0.002)
Log labour	0.0729**	0.0201	0.121***
	(0.029)	(0.0417)	(0.041)
Capital Intensity	-0.005	-0.002	0.0275
	(0.021)	(0.021)	(0.027)
Market Share	-0.234	-0.136	-0.706
	(0.166)	(0.195)	(0.424)
R-squared	0.377	0.421	0.461
Observations	879	338	541

This table reports the effect of foreign characteristics on firm markup. Standard errors are clustered at country and sector level. * , ** , *** denotes10%, 5% and 1% level of significance. Each regression includes country, survey year, time and sector dummies. HC represents highly concentrated sector, LC- low concentrated sector.

As a form sensitivity check, we exclude firms from Cote d'Ivoire and Democratic Republic of Congo. The markup distribution in section 4.3 suggests that some firms in these countries behave like outliers. Table 4.6 presents the results from excluding firms from these countries from the analysis on table 4.4. Excluding firms from these two countries, we find that foreign firms do not have higher markup relative to domestic firms. The table also reveals that in highly concentrated sectors, foreign firms had higher markups compared to their domestic counterparts. This follows the proposition

of the literature that foreign firms are more likely to have higher markup due to their technological advantages. This difference in markup is significant in highly concentrated sectors where foreign firms can charge higher markup due to less competition.

Table 4.7. Sectoral Foreign Presence on Markup- Domestic firms only

	Dom. firms	**HC**	**LC**	**HT**	**LT**	**MI**	**LI**
				Excluding Outliers			
ΔSectorFDI	-0.001	-0.006*	-0.007	-0.010	-0.004	0.0005	-0.009**
	(0.003)	(0.003)	(0.006)	(0.014)	(0.003)	(0.004)	(0.004)
ΔFirm age	0.0007	0.0008	0.0022	0.0151	-0.0025	-0.0007	0.0052
	(0.0038)	(0.0062)	(0.0050)	(0.0089)	(0.0046)	(0.0049)	(0.0066)
ΔLog labour	0.111	-0.0141	0.227*	-0.252*	0.159**	0.109	0.122
	(0.0678)	(0.0589)	(0.120)	(0.126)	(0.0766)	(0.0839)	(0.140)
ΔCapital Intensity	0.0091	0.0099	-0.0198	0.117*	0.0065	0.0080	-0.0076
	(0.0241)	(0.0242)	(0.0592)	(0.0599)	(0.0278)	(0.0254)	(0.0782)
ΔMarket share	-0.281	-0.117	-0.279	-1.662***	-0.186	-0.112	-0.569
	(0.536)	(0.650)	(0.694)	(0.539)	(0.607)	(0.746)	(0.386)
Observations	260	138	122	40	220	180	80
R-squared	0.294	0.313	0.263	0.567	0.303	0.355	0.287

This table reports the effect of foreign presence on firm markup. Standard errors are clustered at country and sector level. * , ** , *** denotes 10%, 5% and 1% level of significance. All regression includes controls, country, time, survey year and sector dummies. HC represents highly concentrated sector, LC- low concentrated sector. HT- high technology, LT- low technology, MI- middle-income countries and LI- low-income countries. HC relates to sectors with over 75 percentile of HHI distribution. Outliers above and below the 2nd and 98th percentiles are excluded.

Table 4.7, presents the results from re-estimating the regressions on table 4.5 after excluding firms from Cote d'Ivoire and Democratic Republic of Congo. We examine if the conclusions on the effect of foreign presence on markup remains the same after excluding these outlier firms. The results are less significant. Although the conclusions on the effect of foreign presence in highly concentrated and low-income countries remains the same, the coefficient of foreign presence in low technology sector becomes insignificant.

4.5 Conclusions

This paper examines if foreign firms in the manufacturing sector of sub-Sahara African countries have higher markups relative to their domestic counterparts. In addition, it examines how the presence of foreign firms in a sector affects the markup of domestic firms in that sector. The analysis reveals that on average, foreign firms do not have higher markup than domestic firms. Taking into account the level of concentra-

tion in the sector, we find that foreign firms have higher markups in highly concentrated sectors. This evidence supports the argument that foreign firms can produce efficiently which can lower their marginal cost and reduce their prices. It is also possible that the difference in markup arises from prices since the level of competition in highly concentrated sector is low. Foreign firms might use their technological advantages to produce higher quality goods and charge higher prices. The data for this study does not include information on prices therefore, we can not differentiate between change in markup that arises from prices or marginal cost.

This paper also finds that the presence of foreign firms in the manufacturing sector of sub-Sahara African countries has an effect on markup of domestic firms. This effect is strongest in highly concentrated sectors and low-income countries. This suggest that foreign presence increase the competition intensity in these sectors and countries. The possible channel is that competition for market share forces domestic firms to reduce their prices and markup to increase sales.

This study contributes to the literature by providing evidence on the competitive effect of FDI where there has been less studies particularly on low-income countries. FDI in the host country can lead to productivity spillovers and competition. Therefore, examining the effect of foreign presence on markup is important to understand the competition effect from FDI. Markup has an important implication for resource allocation and consumer's welfare (Feenstra and Weinstein, 2017; De Loecker and Eeckhout, 2017). Opening to foreign competition can reduce the markup of domestic firms and increase the welfare of consumers since firms charge prices which are closer to their marginal cost. Markup is also important for resource allocation as firms with higher markup can produce less output and decrease labour demand. If the presence of foreign firms forces domestic firms to reduce their markup, less efficient domestic firms might exit the market leading to reallocation to the most efficient producers which might increase aggregate productivity.

An interesting area for future research is to examine the dynamics in firm ownership and its effect on markup. If firm ownership changes over time, we can compare the markup of firms before and after change in ownership. It will be interesting to observe if a change in ownership leads to change in markup of firms particularly after foreign acquisition or investment. The limited time period of data used in this study

does not provide enough information to pursue this line of research. The use of census data with information on the universe of firms would also improve the analysis of the effect of FDI on markup as firms can be observed over a long period of time.

4.A Appendix C

Table C1. Description of Firms by country

Country	Survey Year	Foreign firms(%)	All Firms	Panel Firms	Income Level
Angola	2006 and 2010	14.55	213	35	Middle
Botswana	2006 and 2010	47.66	128	35	Middle
Burkina Faso	2005 and 2009	30.61	49	12	Low
Cameroon	2009 and 2016	29.17	96	12	Middle
Cote D'Ivoire	2009 and 2016	29.17	168	11	Middle
Dem. Rep. Congo	2006 and 2010	31.55	187	29	Low
Ethiopia	2011 and 2015	15.13	304	30	Low
Kenya	2007 and 2013	15.11	589	47	Low
Nigeria	2009 and 2014	2.49	2729	97	Middle
Senegal	2007 and 2014	11.46	192	28	Middle
South Africa	2003 and 2007	16.29	933	99	Middle
Tanzania	2006 and 2013	12.93	294	43	Low
Uganda	2006 and 2013	17.58	364	26	Low
Zambia	2007 and 2013	22.30	435	42	Middle
Total		12.26	6681	546	

Table C2. Description of Sector by Level of Technology

Level of Technology	Sector
High Technology	Chemicals, Rubber and Plastics, Machinery and other Equipment, Other manufacturing.
Low Technology	Food and Beverages, Textile and Garments, Publishing and Printing, Non-metallic Products, Basic and Fabricated Metals, Wood and Furniture.

Note: Technological Classification based on Blomström et al. (1990). High technology consists of medium and high technology sectors. Other manufacturing is included as high technology as it consists of more medium technology sectors.

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5. Conclusion

The literature on financial integration argue that foreign capital inflows would augment domestic savings in host countries thereby improving investment, productivity and growth (Kose et al., 2011). Despite many studies on the effect of foreign capital inflows, the literature is yet to reach a consensus on the benefits of financial integration in developing countries. This thesis contributes to the literature by providing new and recent evidence on foreign capital flows and their effect on host country economies. It investigates the effect of foreign direct investment (FDI), portfolio equity and portfolio debt flows on the economic growth of developing countries which receive them. In addition, it examines how foreign direct investment affects productivity and competition.

The second chapter contributes to the literature by providing recent evidence on the effect of capital flows on the economic growth of developing countries which became integrated into the financial markets in the 1980s. It focuses on the three main forms of capital flows; FDI, portfolio equity and portfolio debt. It distinguishes between portfolio equity and portfolio debt flows which are mostly aggregated in the literature. In addition, it focuses on the period 1990-2014 which coincides with periods when developing countries experienced economic growth and became well integrated into the financial markets.

The analysis reveals that FDI enhances growth, Portfolio equity has an insignificant effect while Portfolio debt dwindles growth. However, this effect differs by regional grouping of countries and oil exporting status. The insignificant effect of portfolio equity and negative effect of portfolio debt flows found for non-oil exporting countries supports the argument that portfolio debt and equity flows have different effect on growth and therefore, pulling them together in empirical analysis will give ambiguous and misleading results. The insignificant effect of capital flows for subsample of other developing countries (after excluding transition economies) could refer to capital flows working through different channels to influence growth. It could work through improvement in financial and institutional development, as well as through trade and human capital development. Therefore, controlling for these other channels in the regressions could bring about an insignificant effect of capital flows on growth (Kose et al., 2009a).

The third chapter examines how FDI affects firms and industrial sectors in host countries which receive them. The study contributes to the literature by using different measures to examine the different channels through which foreign presence in a sector contributes to the productivity of domestic firms in that sector. Most studies on productivity spillover from foreign direct investment use a single measure to capture all channels of horizontal spillover effect from foreign presence. Hence, it is difficult to point out the beneficial and less beneficial channels of productivity spillover. This study focuses on the demonstration, competition and the linkage externality channel of productivity spillover. The paper also provides evidence on the effect of FDI on productivity in low-income countries by focusing on sub-Sahara Africa which comprises mostly of low-income countries. The analysis focuses on a sample of manufacturing firms in 14 Sub-Sahara African countries surveyed between the periods 2003-2016.

The study finds that each channel of spillover has different effects on the productivity of domestic firms. In most cases, the results indicate an insignificant demonstration spillover effect, positive linkage effect and a negative competition effect. However, the magnitude of this effect depends on the structure of foreign ownership as well as the country and domestic firms' characteristics. It finds that large firms, exporters, high productivity firms and firms in low-income countries benefit most from foreign presence. In addition, it finds that domestic firms would benefit more from foreign firms who use local inputs and are more export oriented. Domestic firms are also more likely to benefit from foreign firm with local investors as is the case of partial foreign firms. This shows that country, domestic firms' factors and foreign firms' characteristics are important determinant of productivity spillovers.

The fourth chapter focuses on the effect of foreign presence on the level of competition (market power) in the manufacturing sector of sub-Sahara African countries. Using markup as a proxy for market power, this study examines if foreign firms have higher markups relative to their domestic counterparts. In addition, it examines if the presence of foreign firms reduces the markup of domestic firms in the host country. This study contributes to the literature by providing evidence on how foreign presence affects competition in sub-Saharan African host countries. The paper finds that on average, foreign firms do not have higher markups relative to domestic firms. However, distinguishing firms based on the level of concentration in their industry, the analysis

find that foreign firms in highly concentrated sectors had higher markups. In addition, this study finds that foreign presence in a sector reduces the markup of domestic firms in that sector. The effect is larger in highly concentrated sectors, low technology sectors and low-income countries. This result shows that foreign presence exerts competition effect on domestic firms which can improve resource allocation and consumer's welfare.

This thesis shows that the different forms of capital inflows have different effect on the economic growth of developing host countries. In addition, the results shows that FDI might be the most beneficial form of capital flow. This thesis also provides evidence on the effect of FDI on manufacturing firms in sub-Sahara Africa. FDI can contribute to growth by improving firm productivity through demonstration and linkages channels. Linkage channel is associated with an increase in the productivity of domestic firms. Therefore, foreign firm's use of input is a channel for countries to improve their productivity and benefit from FDI. For the competition effect, it can reduce the productivity of domestic firms on one hand. On the other hand, it can improve aggregate productivity and consumer's welfare through its effect on markup and reallocation of resources to the most productive and efficient firms.

Country, domestic firm and foreign firms' factors are also important for effect of FDI. Sub-Saharan African countries need to improve their business environment, institutions and access of firms to finance. This would facilitate an increase in size, technological adoption of domestic firms and increase their absorptive capacity to absorb productivity spillovers. Improving country factors would assist domestic firms to overcome obstacles which prevent them from competing favourably with foreign firms. Economic and institutional development might determine the quality of inputs and the confidence of foreign firms in local suppliers and goods. Sub-Saharan African countries mostly engage in the production of agricultural goods and primary commodities. Encouraging foreign firms' use of input would improve the productivity of the input sector and the quality of inputs produced. This might promote foreign investment into the manufacturing sector with foreign firms taking advantage of availability of resources and labour. It could also improve the value and quality of primary and agricultural goods exported.

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