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Capital flows and productivity in Africa: The angel is in the details[1#]

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Abstract

Existing literature suggests the jury is still out there, regarding the effect of capital flows on productivity and income growth. We seek to extend existing knowledge by investigating the effects of heterogeneous types of private capital flows on income growth and productivity across heterogeneous recipient sectors, using a unique hand-collected database of 18 African countries for 1996-2016. We find that the angel is in the details: The effects of private capital flows on productivity and economic growth depend both on the recipient sectors (agriculture, trade, infrastructure, services, extractives, construction, manufacturing and tourism) and on the type of flows and their reversibility. Specifically, our results suggest that foreign direct investment (FDI) flows to the construction sector enhance total factor productivity. However, FDI flows to the agriculture and infrastructure sectors are associated with reduction in productivity. Moreover, we uncover an inverse relationship between capital flows and income growth in some sectors: total capital flows induce income contraction in infrastructure and trade; while FDI flows are associated with income contraction in infrastructure, trade and extractives. Our findings are robust to alternative empirical testing and use of competing proxies.

Keywords: capital flows, productivity, economic growth, Africa
JEL Classification No: E22, F21, F32, O47

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I. Introduction

The analytical framework for this paper builds on, and combines, two important traditions of economic thinking, providing a novel approach, which will be used for empirical analysis based on a unique and new data set. The first tradition focuses on structural transformation, and the role increases in productivity, within sectors, and across sectors (through higher growth in sectors with higher productivity) play in economic growth (for a recent excellent synthesis, with particular reference to Africa, see Rodrik et al, 2017). The second tradition examines capital flows and their development impact, looking at positive effects, but also on potential risks, which their volatility and reversibility cause for financial and macro-economic instability, and developmentally costly crises (for early analyses, see Corden, 1990; and Griffith-Jones et al., 1992) .

The key research question is whether capital flows contribute more to growth, - because they are channelled to the sectors which have higher productivity, than the rest of the economy or to sectors where productivity is increasing more, in the Rodrik tradition - or whether they risk undermining growth, because they do not contribute sufficiently to productivity increases, and potentially reversible or subject to "sudden stops", (Calvo, 1998) so they may cause crises, which undermine growth. Therefore, both the sectorial destination of these capital flows (whether go to sectors with higher productivity and/or with increasing productivity), and the nature of these flows, whether more stable, long-term and difficult to reverse are important factors.

An important distinction between good and bad booms is made by Gorton and Ordonez (2016). It is shown credit booms are not rare; the average country spends over half its time

in a boom, which is on average ten years long. The seeds of a crisis are sown a decade before the boom ends in financial crash. But, not all credit booms end in crisis; some do (bad booms) while other do not (good booms). Good booms are those where productivity and economic growth increases are sufficiently high, to lead to a stable higher level of output to avoid reversals of capital flows and crises. Bad booms are those where productivity increases are not sufficient, and capital flows lead to a sequence of booms and busts.

Rodrik, et al. (2017) show how increased productivity in the modern sectors in Sub-Saharan Africa is essential for overall growth. The argument builds on the tradition of Arthur Lewis that labour released (from agriculture) is absorbed in modern activities (manufacturing and services). And if productivity is not growing in these modern sectors, economy wide growth ultimately will stall. The contribution the structural-change component can make is necessarily self-limiting if the modern sector does not experience rapid productivity growth.

The concern of Rodrik, et al. (2017) is that while structural change is strong and led to rapid productivity growth in African countries, it was accompanied by weak to negative performance in productivity growth in non-agricultural sectors. If this continues, the gap in labour productivity between high productivity non-agricultural sectors and the agricultural sector would shrink prematurely, while these countries remain relatively poor. This would lead to a decline in growth potential, which also increases risk of bad booms. It is therefore essential that capital flows are channelled to high productivity sectors, and activities within those sectors that increase growth of productivity.

To summarize, firstly, it is crucial to determine whether capital flows are channelled to investment, and how much such investment increases productivity and/or goes more to high productivity sectors, to contribute to long-term growth. This is the rosy scenario, as in Griffith-Jones et al. (1992). However, there is also a darker scenario. If increased investment proves insufficient and/or not leading to sufficient increases in productivity, the initial output growth it generates can be followed by a debt problem, leading possibly to reductions in total absorption, below levels that can be sustained in absence of the earlier boom. Thus, the total effect of such flows on the country's income can be negative. .

Secondly, the rosy scenario is more likely to materialise if the modality of flows is better suited for financing long-term growth. This implies preferably long-term, low cost modalities, and mechanisms where outflows linked to results, as with foreign direct investment (FDI).

Notwithstanding the extensive literature on the link between capital flows and economic growth (reviewed below), it is impossible to conclude on the net positive gain of capital inflows on recipient developing economies. The empirical findings depend on the sample period of study and capital flows indicators used. Most studies use either net aggregate inflows of capital or disaggregated flows such as foreign direct investment, portfolio investments and debt flows. Moreover, to our knowledge, practically none of the existing papers examined sectorial composition of capital flows and their incidence on economic and productivity growth. Overall, these mixed and inconclusive empirical results justify the need to conduct an empirical investigation of the relationship between private capital

flows and economic growth by analysing effects of these different categories of flows by economic sectors.

Hence, this paper aims to extend previous research by using a new database on sectorial composition of capital flows in African countries. The objective is to analyse effects of sectorial private capital flows on economic productivity and growth in different sectors. Two dimensions are important. Firstly, while some capital flows are more long-term, and not reversible, others are more short-term, subject to reversals, with negative effect on growth. Secondly, economic sectors have differential productivity and growth potential; the extent to which capital flows to sectors where productivity growth is higher, and can be assumed to contribute to this productivity increase, determines positive impact of capital flows on growth.

The research reported in this paper undertakes rigorous hand - collection of a unique database, which presents heterogeneity of categories of capital flows as well as of economic sectors, which receive the capital flows. This database has never been assembled before and no previous research has explored the high level of heterogeneity among categories of capital flows and destination economic sectors. The unique database exploited in this paper can provide valuable evidence to policy-makers about the likely impact of the flows.

Hence, it is theoretically relevant to test the research hypothesis that the effects of private capital flows on economic productivity and growth depend both on the economic sectors where funds are channelled and on the type of flows and their reversibility, contributing to and extending existing literature.

Section II undertakes a literature review on capital flows, productivity and economic growth. After presenting the theoretical framework, we specify the theoretical model in Section III, including the hypothesized relationship between capital flows, productivity and economic growth. Section IV presents and discusses the univariate results for the main variables as well as empirical evidence, plus the main findings. Section V concludes.

II. Literature review on capital flows, productivity and economic growth

We review the literature on the link between capital flows and growth, which looks at macro-economic effects, and does not examine sectorial impacts. This shows our paper helps fill an important gap in the literature.

Following waves of financial liberalization of 1980s and 1990s, international capital flows towards developing countries grew rapidly. There was the belief that capital market liberalisation and resulting capital flows promote economic growth in developing countries; see, Ocampo, Spiegel and Stiglitz (2000) for this argument and its critique; see also Griffith-Jones and Ocampo, forthcoming).

The literature on the relationship between capital flows and economic development found mixed results. Foreign capital inflows can influence positively productivity and economic growth (Klein and Olivei, 2008; Kose et al., 2009), but also cause financial and economic crises (Calvo, 1998; Reinhart and Reinhart, 2008; Forbes and Warnock, 2012), especially, if short-term and reversible.

A relevant study is contained in Prasad et al. (2007), who examined the relationship between foreign capital flows and economic growth. Their empirical analysis showed a

negative relationship between net capital inflows and economic growth in non-industrialised countries. Countries with less net foreign capital inflows grow more rapidly than economies with more net inflows of external capital, implying negative effect of capital flows on economic growth.

Gourinchas and Jeanne (2013) examined the link between net foreign capital inflows and productivity growth for developing countries. They find evidence of a negative relationship between net capital flows and productivity growth. In contrast, Alfaro et al. (2014) found a positive relationship.

Interesting insights are provided by disaggregating capital flows by category of flows, for example by Aizenman et al. (2013) and MacDonald (2015). Aizenman et al. (2013) decomposed international capital flows into FDI, equity portfolio investment, other non-equity portfolio investment flows, and short-term debt. The authors found FDI flows positively influence economic growth. The relationship between foreign portfolio investments flows and economic growth is negative, while that between short-term debt and economic growth is non-significant and negative post-crisis. Thus the relationship between capital flows and economic growth depends on the type of capital flows. MacDonald (2015) confirmed the negative relationship between net capital flows and productivity growth, with a positive relationship between FDI and economic growth, but foreign portfolio investments flows impacting negatively productivity growth.

The second strand of the literature studies effects of capital account liberalisation on growth and development. Since the “Washington Consensus” , many developing countries opened their economies to capital flows. Developing countries often have lower levels of

accumulated capital relative to developed economies; additional sources of capital should increase stock of capital. . Unfortunately, volatility and reversibility of some capital flows, have very negative macroeconomic consequences. (Gallagher et al., 2012:1).

Klein and Olivei (2008) found empirical evidence of positive relationship among capital account openness, deepening of financial sector and economic growth. Kose et al. (2009) found a positive link between financial market liberalisation and economic growth, due to positive effects of FDI and foreign equity portfolio flows on total factor productivity growth. External debt flows negatively impact economic growth, but less for countries with better institutional quality and more developed financial systems. Similar conclusions were reached by Choong et al. (2010) and by Debbiche and Rahmouni (2015). The latter highlighted benefits from international capital flows depend on level of development of the country's financial system and quality of institutions.

Reinhart and Reinhart (2008) studied the capital flow "bonanzas". They noticed capital flow bonanzas become more frequent following relaxation of capital controls. For advanced and middle-income countries, capital inflows bonanzas are associated to high probability of bank crises. Sovereign defaults tend to be systematically preceded by capital flows bonanzas. This is consistent with Gorton and Ordenez (2016), where good periods of bank credit and productivity growth can be followed by economic downturns (see also Ffrench-Davis and Griffith-Jones, 1995).

The nature of capital flows changed over time, with increasing inflows of foreign portfolio investment flows and cross-border bank loans compared to previous decades, including for low income countries (Hou et al., 2013; Araujo et al., 2017).

Massa (2014) literature review on private capital inflows effects for low-income countries stressed that although foreign capital flows can have positive benefits , there are risks (such as macroeconomic instability and financial crises,) , which negatively impact growth. Hence, net capital receiving countries should adequately regulate capital flows.

Other empirical analyses, such as Alley (2015) for Sub-Saharan Africa and Combes et al. (2017) for developing countries, showed foreign capital inflows contribute positively to economic growth. However, Combes et al. (2017) and other studies highlighted these capital flows contribute to appreciation of the exchange rate with negative indirect effect on growth.

From the above discussions, we could conclude financial liberalisation in developing countries can be beneficial only if capital openness policies are oriented towards attracting FDI. However, empirical evidence is not unanimous on positive impact of FDI on economic growth (Carkovic and Levine, 2004; Azman-Saini et al., 2010; Alfaro et al., 2004; Alfaro et al., 2010). Net gains in terms of productivity are ambiguous (Aitken et Harrison, 1999; Alfaro and Rodriguez-Clare, 2004). The effects of FDI on productivity and economic growth may depend on specific characteristics of the host country, i.e. level of development of financial institutions (Alfaro et al., 2004; 2010), human capital (Borensztein et al., 1998), trade openness (Balasubramanyam et al., 1996), development of infrastructure (Wu and Hsu, 2012), and quality of governance (Jude and Levieuge, 2017).

Overall, the literature on the impact of capital flows on economic growth and productivity shows mixed and inconclusive empirical results. This may be attributed to the assumption

that different economic sectors receiving capital flows are homogenous. Therefore, if we consider heterogeneity of capital flows and different destination economic sectors, this may shed light on the impact of capital flows on economic growth through changes in productivity of recipient sectors.

III. Model

3.1. Theoretical foundations

Our main objective is to analyze the impact of foreign capital flows on economic productivity in selected African countries. Since Solow (1956), the economic growth literature decomposes variations in country's production into variations linked to input factors (capital and labor) and variations of total factor productivity. Financial liberalization and resulting capital flows can affect economic growth positively by increasing the country's capital stock or its total factor productivity.

Suppose the production function of a given economy can be represented by a coherent function with Solow model (e.g., Mankiw, Romer and Weil (1992), Hall and Jones (1999) and Bonfiglioli (2008)):

$$Y_j = K_j^{\alpha}\left(A_j H_j L_j\right)^{\beta}, \qquad (1)$$

where, Y_j represents total production in country j, K_j is the capital factor, H_j is the average level of human capital of labor, L_j is the labor factor and A_j is the productivity associated with the labor factor. In equation (1), the product $H_j L_j$ denotes the human capital generated by labor. For simplicity, we follow Hall and Jones (1999) and Bonfiglioli (2008) and

assume a Cobb-Douglas type production function (α + β = 1), which excludes endogenous growth models. Equation (1) becomes:

$$Y_j = K_j^{\alpha}\left(A_j H_j L_j\right)^{1-\alpha}. \quad (2)$$

Dividing Y_j by the human capital, $H_j L_j$, we obtain:

$$\frac{Y_j}{H_j L_j} = \left(\frac{K_j}{H_j L_j}\right)^{\alpha}\left(A_j\right)^{1-\alpha}. \quad (3)$$

By assuming $y_j \equiv Y_j/(H_j L_j)$ and $k_j \equiv K_j/(H_j L_j)$, equation (3) yields:

$$A_j = y_j^{1/1-\alpha} k_j^{-\alpha/1-\alpha} \quad (4)$$

Under this specification, productivity is a function of two factors: the production per unit of working human capital (y_j) and the capital stock per unit of working human capital (k_j). From the above equation (4), openness to foreign capital flows can influence positively productivity A_j through three channels. The first channel is that financial liberalization can cause exogenous shocks with positive impact on productivity. For the second channel, the inflow of foreign capital can increase worker productivity for a given level of constant human capital (y_j=$\frac{Y_j}{H_j L_j}$). In the third channel, foreign capital flows can impact positively productivity by diminishing the capital stock needed per unit of working human capital (k_j=$\frac{K_j}{H_j L_j}$). We can therefore argue that capital flows will influence productivity growth in countries following capital market liberalization through these three channels if and only if it increases production per unit of working capital and/or decreases the level of physical

capital needed per unit of labor. Based on the above theoretical foundations we model empirically the effect of capital flows on productivity and economic growth.

3.2. Econometric model

Our aim is to study empirically the potential effects of foreign capital flows on productivity. We define by y_{it} the productivity measure of country i at time t. We estimate the following regression equation:

$$y_{it} = u_i + \alpha_j F_{ijt} + \sum_{k=1}^{m} \beta_j X_{kit} + \varepsilon_{it}, \quad (5)$$

where, F_{ijt} represents the capital flows variable (total capital flows or FDI flows) in country *i* at date *t* and in sector *j*. X_{kit} represents the control variable k and m is the number of control variables. The set of control variables comprises: the level of financial development proxy by the ratio of credit to private sector to GDP, life expectancy at birth, openness to trade indicator, government consumption spending, exchange rate, and quality of institutions. For the neoclassical viewpoint, countries with rapid productivity growth are expected to attract more foreign capital flows, since foreign investors are searching for higher return investment opportunities. This leads to an endogenous relationship between per capita revenue growth and capital flows. To deal with the potential endogeneity issues, we use the dynamic panel system GMM estimation technique of Arellano and Bover (1995) and Blundell and Bond (1998). This estimation approach is appropriate to deal with possible estimation biases generated by omitted variables, endogeneity issues, used of lagged variables and country specific effects. We use the one step GMM method of Arellano and Bover (1995) and Blundell and Bond (1998) given its performance over the first difference estimation approach of Arellano and Bond (1991) (in the first difference

estimation, the residuals remain correlated with the first difference of the lagged dependent variable). As in Arrelano and Bover (1995) and Blundell and Bond (1998), the lagged of the difference of the variables are used as instruments for the level equation and the lagged of the variables in level are used as instruments for the difference equation. We also go further in the analysis of capital flows by taking advantage of the three-dimensional structure of our unique database. Therefore, we investigate the effects of foreign private capital on productivity growth by implementing a hierarchic panel model analysis, which takes account the fact that our database has three dimensions such as country, sector and time.

IV. Empirical analysis and results

4.1. Data and variables

Our country sample contains eighteen (18) sub-Saharan African countries with data available over the period 2006-2015. These countries are: Benin, Botswana, Cameroon, Ethiopia, Ghana, Kenya, Liberia, Madagascar, Malawi, Namibia, Nigeria, Rwanda, Senegal, Sierra Leone, Tanzania, Uganda, Zambia and Zimbabwe. Initially, we considered the full population of 55 countries in Africa, but after taking into account data availability, we narrowed the sample to the 18 countries above.

The sample excludes fragile states since data for these countries are less reliable, financial offshore centers, and countries with no detailed sectorial data on capital flows. Countries are included primarily if they have sectorial data on capital flows. FDI and debt related flows are collected across the following ten (10) economy sectors: (1) agriculture, (2) extractive, (3) manufacture, (4) commerce, (5) construction, (6) infrastructures, (7)

services, (8) tourism, (9) financial services and uncategorized elements qualified as (10) « others » composed of flows not captured in the previous nine sectors. For our analysis, we concentrate on the first eight (8) sectors and exclude financial services and the others sectors. The capital flows data are collected from several sources comprising statistics from central banks, national bureau of statistics, and the World Bank.

- *Capital flows variables*

The main challenge in the analysis of the differential effects of sectorial capital flows on productivity or economic growth is to obtain measures or indicators of capital flows by economic sectors. Data published by most international or governmental organizations dedicated to foreign capital flows data collection are aggregate indicators on capital flows across countries. It is very difficult to obtain longer series of data on disaggregated indicators in order to investigate the effects of capital flows on productivity. Our research tries to deal with that challenge by using disaggregated capital flows data across sectors for a sample of African countries. Foreign capital inflows are decomposed into foreign direct investments (FDI) flows, foreign portfolio equity flows, foreign portfolio bonds and short-term debt flows. Our sample covers mostly African countries with no exchange market. Our main measures of capital flows are: total capital flows (sum of FDI flows, foreign portfolio equity flows, foreign portfolio bonds flows and international bank loans) and FDI flows. FDI constitute the major part of foreign capital flows in our sample countries.

- *Productivity measures*

In a perfect world, productivity would be measured by the growth rate of total factor productivity in each country, each sector and over the years. Unfortunately, this indicator

is not available for all countries of our sample. We therefore use several proxies for productivity. The first follows Alfaro et al. (2014) and approximates total factor productivity by growth rate of real per capita GDP. The advantage is that the data are readily available for all the countries and the entire period. The drawback is that it is a very imperfect measure of productivity.

For the second proxy, we use the Pen World Table (PWT 9.0) database to obtain the measure of total factor productivity available for only eleven (11) countries of our sample over the study period. In that database, total factor productivity is calculated relative to the United States (which is set at 1) considered as the benchmark country. Thus, this indicator of total factor productivity is an indication of the productivity "catching-up" of a country with respect to USA.

Finally, our third proxy for productivity is labor productivity defined as value added per worker, e.g. Rodrik et al. (2017). The value added for each sector is obtained from the United Nations Statistics database (UNStats), which gives the value added for the following five (05) sectors: (i) agriculture, fishing, hunting and forestry, (ii) manufacturing, (iii) mining and quarrying, (iv) construction, and (v) "others". The sectorial classification is based on the "International Standard Industrial Classification of All Economic Activities Rev.3" (ISIC Rev3). Data on workers' sectorial distribution are obtained from the International Labor Organization (ILO) database (ILOStats). Workers's categorization is done according to three sectors: agriculture, industry and services based on the ISIC Rev3 classification. We compute the value added for each of the three sectors by mapping ILOStats and UNStats classifications. Labor productivity defined as the value added per unit of labor is calculated by dividing the value added per sector by the number of workers

in the sector. We also extract the capital flows per sector following the same sectorial classification procedure.

- *Control variables*

Human capital: We follow Barro (2001, 2003) and control for the level of human capital. Human capital is commonly proxied by health and education. Howewer, we have only data on education for less than half of our panel. Therefore, we use only life expectancy at birth to proxy human capital in our regressions. This is obtained from the World Bank World Development Indicators database. Overall, human capital is expected to influence positively productivity growth.

Government consumption (*Govconsum*) are assumed to be expenses in non-productive sectors, and thus not expected to impact positively on growth and productivity. We divide the nominal amount of government spending by GDP to account for size of the country.

Openness to trade (*Trade*): Openness-to-trade indicator measured by the sum of exports plus imports divided by GDP, is used to control for the importance of international trade openness in the productivity growth process. Openness to trade is expected to influence positively productivity growth.

Macroeconomic instability: we proxy macroeconomic instability by exchange rate movements. Exchange rate (*Exchangerate*) is measured by the average number of units of domestic currency per unit of US dollars. Macroeconomic instability is expected to slow down the movements of capital flows, and hence have a negative impact on productivity and growth.

Financial development (*Bankcredit*): We use bank credit to the private sector over GDP as proxy for financial sector development. This indicator is usually used to capture the level of development of the financial sector, especially in developing countries, where the financial sector is mainly bank based. In our hierarchic model regressions, we will proxy financial development by the sectorial bank lending in each country (Sbankcredit).

Quality of institutions: The quality of institutions is usually seen as a fundamental prerequisite for development of countries. We use the six (06) governance indicators of Kauffmann et al. (2010) available at World Governance Indicators project of the World Bank. We use the average of these six indicators (*Kaufindex*) as our measure for institutional quality.

Table 1 provides a summary of the variables used in our study and their data sources. It includes an overview on literature using these variables in regressions related to productivity, growth and capital flows.

"Insert Table 1 here"

4.2. Univariate analysis

The graphics of Figure 1 show evolution of total capital flows (1a) and FDI flows (1b) over the years and for different sectors. All flows are divided by GDP to account for size of the economy. Overall, total capital flows and FDI flows have similar upward trends. As mentioned above, foreign direct investment is the primary source of foreign capital flows in the sample countries, which explains the observed similarities between the two trends. Foreign capital in the sample countries is primarily directed toward the natural resources extractive sector. The second and third most attractive sectors are, respectively, agricultural

and the infrastructure sector. These sectors are followed by commerce, construction and tourism sector, and finally the "others" sector. The services sector, supposed to bring more positive externalities, is one of sectors that attracted less foreign investments over the period.

"Insert Figure 1 here"

Table 2 presents descriptive statistics of the variables. There are high variability in capital flows across countries and sectors, even after dividing the nominal amount by the country GDP to downplay the size effect. Nonetheless, the general trend is increasing over the years. Depending on their level of development or economic structure, countries can benefit more from capital flows in some specific sectors. Big economies like have a market size advantage compared to small economies.

"Insert Table 2 here"

Figures 2 and 3 present the dynamics of the relationship between real per capita GDP growth and total capital flows and FDI flows in different sectors from 2006 to 2015. We observe a linear negative relationship between average income growth and total capital flows in agriculture, extractive, construction, services and tourism sectors. In commerce, infrastructure and manufacturing, the relationship is not clear cut. As for the relationship between sectorial FDI flows and income growth (Figure 3), out of the eight (8) sectors analyzed, only FDI inflows in the manufacturing sector seem to influence positively economic growth. FDI flows in the agriculture, extractive, construction, services and tourism sectors exhibit the same negative linear relationship with growth. This is consistent

with earlier findings that an increase in capital flows may not necessarily lead to higher productivity and higher economic growth.

"Insert Figure 2 & Figure 3 here"

The extractive and agriculture sectors, the two most important targets for capital inflows, seem to be negatively impacting economic growth, while manufacturing seems to show different type of behavior. Hence, analyzing the impact of capital flows on productivity and/or economic growth using aggregated capital or FDI flows measure will be incomplete and misleading. We deepen our analysis by way of further multivariate econometric analysis.

4.3. Econometric results

This section performs the econometric analysis of the relationship between capital flows and productivity for different sectors. We use the GMM estimation technique of Arellano and Bover (1995) and Blundell and Bond (1998). Productivity is measured, alternatively, by real per capita GDP growth, total factor productivity and labor productivity. Below, we analyze the regressions with each of these indicators separately.

4.3.1. Capital flows and productivity proxied with economic growth

The regression results of the effect of total capital flows and FDI flows on per capita income growth are given in Table 3 (total capital flows) and Table 4 (FDI flows). Overall, we observe a negative relationship between capital flows and income growth, with significant coefficients for infrastructure and trade sectors on the total capital flows side and significant effects for infrastructure, trade and extractive sectors on the FDI flows side.

Indeed, a one standard deviation increase of FDI flows in the infrastructure sector yields a 0.363% decrease in the growth rate of per capita GDP. Similarly, a one standard deviation increase in FDI flows in the trade sector impacts per capita income growth by -0.954%. For the eight (8) sectors analyzed, none of them seems to have a positive relationship between capital flows and per capita income growth. This is consistent with some of the findings in the literature where authors found no significant or inconclusive relationship between capital flows and economic growth. Our univariate analyses and the regression results suggest that total capital flows influence significant and negatively economic growth in two specific sectors, the infrastructure and the trade sectors. Capital flows in the agriculture sector have no significant impact (at least at 5%) on economic growth. This result combined the others non-significant sectors may explain the non-significant relationship between aggregated FDI inflows and economic growth found in earlier works such as Alfaro et al. (2004, 2010), Borensztein et al. (1998), Carkovic and Levine (2004), among many others.

"Insert Table 3 & Table 4 here"

We further explore this relationship by putting special emphasis on the level of development of the financial sector in recipient countries. Indeed, according to Alfaro et al. (2004, 2010), the influence of FDI flows on economic growth will depend on quality of the country's institutions including financial institutions. Countries with better quality institutions will benefit more from capital flows. To account for level of financial sector development, we introduce in our regressions the cross product of capital flows variable and the financial sector development indicator (measured by the bank credit to the private sector over GDP). In these further robustness analyses, the level of development of the

financial sector does not seem to play a critical role in the relationship between capital flows and economic growth[2]. The negative relationship between capital flows and income growth is still valid for sectors mentioned above.

4.3.2. Capital flows and total factor productivity

Here we analyse effects of capital flows on total factor productivity. We obtain the total factor productivity data from Pen World Table (PWT 9.0) database, which gives total factor productivity with respect to the United States (fixed at 1), the so-called productivity "*catching-up*" and multiply by 100. The regression results are presented in Table 5 (for total capital flows) and Table 6 (for FDI flows). In Table 5, total capital flows in construction sector influences positively the productivity. Total capital flows in agriculture and infrastructure sectors influence negatively productivity catching-up. Similar results are obtained with sectorial FDI flows as shown in Table 6. FDI flows in the construction sectors have positive effects on total factor productivity, whereas FDI inflows in the agriculture and infrastructure sectors have negative impact on productivity. The construction sector is constituted of real estate, construction and mortgages related industries, requires high level of technology, and contributes positively to technological progress and productivity "catching-up" with US economy.

"Insert Table 5 & Table 6 here"

Compare to the results obtained with economic growth used as productivity indicator, the surprising result is the significant positive coefficient of the construction sector. Notwithstanding the fact that private capital flows in the construction sector do not

[2] For brevity, these results are not reported here but are available from the authors upon request.

contribute positively to per capita income growth, they contribute positively to productivity catching-up. This can be explained by the fact this sector plays an important role in lifting the level of technology of the recipient countries, whereas in terms of population well-being, capital flows into this sector do not increase their wealth. The extractive sector has no significant impact on productivity catching-up even though it is the most important destination sector of capital flows (see figure 1). This implies the spillover effects of extractives sector capital flows on domestic economy are very weak. Then, the positive spillovers of extractives sector (long-term structure of those investments and technology involved) do not outweigh their negative impact (negative macroeconomic implication - Dutch disease-, environmental concerns).

4.3.3. Capital flows and labor productivity

Studying the relationship between capital flows and labor productivity, one has to pay attention to two fundamental aspects. First, at the bottom of labor productivity, developing countries can start the accumulation of capital, to allow these economies to increase their capital intensity and labor productivity. Second, a continuous increase in labor productivity can lead to net outflows of capital outside developing countries towards developed countries (e.g., Jin, 2012). From the international capital flows allocation perspective, the relationship between capital movement and productivity is reciprocal. We are interested in international movements of capital and their potential impact on labor productivity. Given the low level of development of countries in our sample, we expect to have positive effect of capital flows on labor productivity growth. Table 7 presents the regression results. As mentioned, because of data availability, the sectors are merged into three categories based on the “International Standard Industrial Classification of All Economic Activities Rev.3”

(ISIC Rev 3). Agriculture sector contains agriculture, fisheries, livestock, and agri-processing. Industry sector includes extractives, manufacturing and construction sectors. Services sector includes trade, infrastructure, services, tourism, and financial services sectors. Here, service sector (defined in reference to ISIC Rev.3) is more general than in our precedent regressions. Our labor productivity indicators have been taken in logarithm to account for their scale. We pursue regressions based on one step system GMM following Blundell and Bond (1998) as in the above regressions. We find negative significant impact of services sector total capital flows and FDI flows on labor productivity. Comparing these results to our precedent regressions with growth of income per capita, we can observe that trade and infrastructure sectors capital flows which impacted negatively growth of income per capita are included in the definition of services sector (ISIC Rev.3). Then, while our regressions with labor productivity indicate negative effects of foreign capital on this productivity measure in the services sector, our regressions with growth of income per capita suggest this negative effect comes from foreign capital flows in trade and infrastructure sectors. These results are in line with findings of de Vries et al. (2015) who study patterns of structural change in growth in developing countries. They find productivity levels in market services have been falling behind the technology frontier, implying the sector lacks technological dynamism in Africa and most Asian and Latin American countries. Given foreign capital flows contributed negatively to labor productivity growth in the services sector, we can infer these capital flows, contributed to this lack of technological dynamism.

"Insert Table 7 here"

We deepen our analysis by implementing a hierarchic panel model. Here, our data on capital flows as on labor productivity have three-dimensional characteristic: country, sector, and year. In this way, we can implement a three-dimensional panel data analysis commonly called "hierarchic model" analysis. We estimate the regression equation:

$$y_{ijt} = u_0 + \theta F_{ijt} + \sum_{k=1}^{m} \beta_k X_{ijtk} + \alpha_i + \delta_j + \varepsilon_{ijt} \quad (6)$$

In this formulation y_{ijt} represents labor productivity in country i, in sector j and at date t. F_{ijt} represents the capital flows variable (total capital flows or FDI flows) in country i at date t and in sector j. X_{kijt} represents the control variable k and m is the number of control variables. α_i is the country's specific effects, δ_j the sector's specific effects, u_0 the fixed effects, and ε_{ijt} the error term. We assume fixed slope parameters on the effects of capital flows and control variables on labor productivity and random effects at country and sector specific effects. Then, our model now has two random-effects equations. The first one is a random intercept at the country level (α_i, only a constant), and the second one is a random intercept at the sector level (δ_j, only constant). In our analysis sector is nested within country. We perform a Hierarchic Linear Model (HLM) using iterative maximum likelihood technique (see Griffin et al. (2017), Peterson et al. (2012) for similar use of this approach and Matyas (2017) for multiples examples, recent literature review and econometrics). One advantage of HLM regressions is the fact that they model simultaneously the effects of capital flows on labor productivity at both the country-level and the sector-level.

The results of regressions are displayed in Table 8. The results show that foreign private total capital flows have negative impact on labor productivity. We obtained similar results

with sectorial FDI flows. Overall, based on our hierarchic model analysis, we may conclude that foreign private capital flows tend to have a negative impact on labor productivity growth in our selected African countries.

"Insert Table 8 here"

Our paper finds that foreign capital flows in African countries have negative labour productivity growth impact and might be harmful to these countries' development. . According to Rodrik (2017), increased productivity in modern sectors in Sub-Saharan Africa is essential for growth, and if productivity not growing in modern sectors, economy wide growth will stall. He also showed African countries experience with recent growth booms is particularly intriguing, as growth-enhancing structural change appears to have come typically at expense of declining labor productivity growth in more modern sectors. Our results argue that capital account liberalization and resulting foreign capital flows contribute to this declining trend of labour productivity growth in those modern sectors. Capital flows have hampered labour productivity growth and thus economic growth of African countries given that, according to Rodrik et al. (2017), a comparison between growth in GDP per capita and growth in value added per worker or labor productivity growth using the Groningen Growth and Development Centre (GGDC) data reveals labor productivity growth rates are comparable to GDP growth rates even though the former is slightly lower than the latter.

On the productivity catching-up side, our regressions with total factor productivity as indicator of productivity show that only foreign capital flows in the construction sector contribute positively. Foreign private capital flows in the agriculture and infrastructure

sectors have negative impact on productivity catching-up. These results suggest capital flows in the construction sector should be welcome in African countries from productivity catching-up perspective.

Last and not least, our regressions with growth of GDP per capita as indicator of productivity indicate foreign capital flows have negative and significant impact on income per capita growth in infrastructure and trade sectors on total capital flows side and in trade, infrastructures and extractives sectors on FDI flows side. The impact is not significant in other sectors. These results suggest that concerning income per capita growth, foreign capital flows in the trade, infrastructure and extractives sectors should at least be controlled to limit their negative impact on income per capita growth.

V. Concluding remarks

This paper has pushed forward the frontiers of existing knowledge by investigating the effects of heterogeneous private capital flows on sectorial economic productivity and growth, thus recognizing the heterogeneity of different categories of capital flows as well as of recipient sectors of economic activity – the main ones being agriculture, trade, infrastructure, services, extractives, construction, manufacturing and tourism. We undertake rigorous hand - collection of a unique database, which presents heterogeneity of categories of capital flows as well as of economic sectors receiving them. We test the research hypothesis, that effects of private capital flows on economic productivity and growth depend both on the economic sectors where funds are channeled and on type of flows and their reversibility, for sample of 18 African countries, during 1996-2016.

We uncover a negative relationship between capital flows and income growth, with significant coefficients for infrastructure and trade sectors on total capital flows side and significant effects for infrastructure, trade and extractive sectors on FDI flows. However, FDI flows in the construction sectors have positive effects on total factor productivity, whereas FDI inflows in agriculture and infrastructure sectors have a negative impact on productivity. The construction sector requires high level of technology, and therefore contributes positively to technological progress and productivity "catching-up" with industrial economies.

Overall, our evidence suggests that, regarding the impact of capital flows on productivity and economic growth, the angel is in the details: We find effects of private capital flows on economic productivity and growth depend both on the economic sectors where funds are channeled and on type of flows and their reversibility. Two main results stand out. First, we uncover an inverse relationship between capital flows and income growth, with significant coefficients for the infrastructure and trade sectors on total capital flows side and significant effects for infrastructure, trade and extractive sectors on FDI flows. Second, we find FDI flows in the construction sectors have positive effects on total factor productivity, whereas FDI inflows in the agriculture and infrastructures sector have a negative impact on productivity. Our findings are robust to alternative empirical testing and use of competing proxies.

Our findings seem to imply that African governments should be cautious about encouraging capital flows and may want to discourage excessive ones, as these may have net negative effects on their economies. However, further research is needed, for example on more long- term effects of capital flows, as well as sectorial effects of different capital

flows. Furthermore, there may be a case for conditions to be attached to capital flows, especially FDI, such as for example export performance and local content, so as to increase their positive impact on growth and increased productivity.

Figure 1: Evolution of total capital flows and FDI flows by sector

These graphics exhibit the evolution of total capital and FDI flows for different sectors from 2006 to 2015. For each sector, we compute the average annual flows for the sample countries. The flows are divided by GDP to account for the size of the economies.

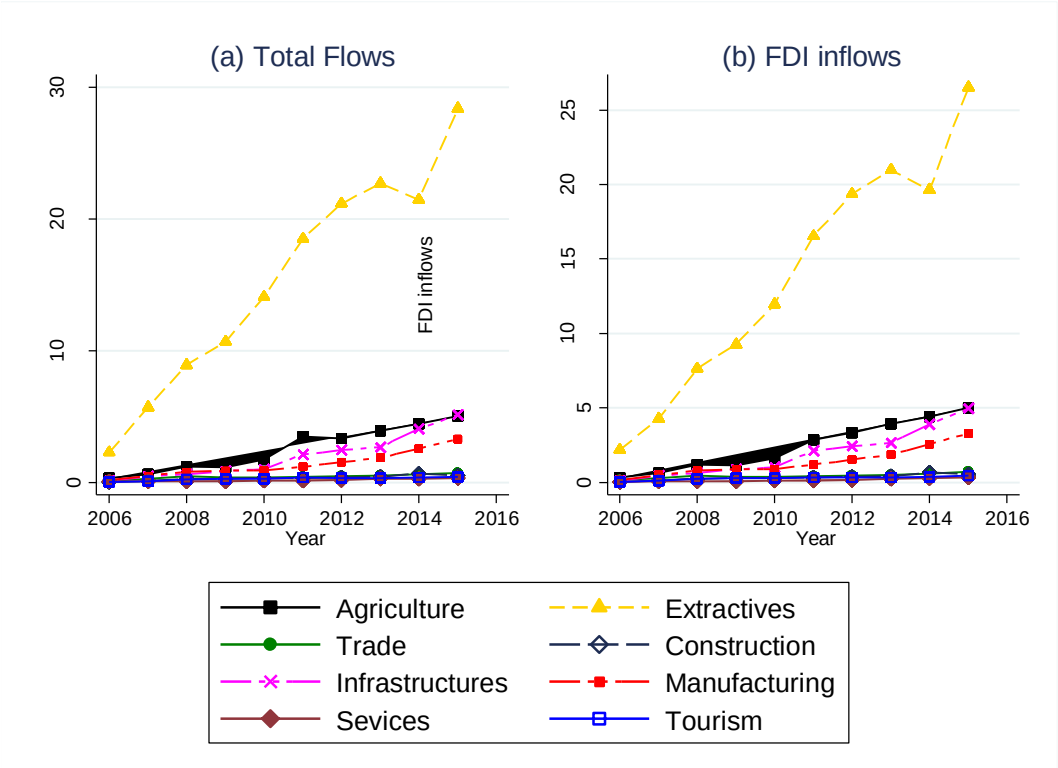

Figure 2: Relation between economic growth and total capital flows by sector

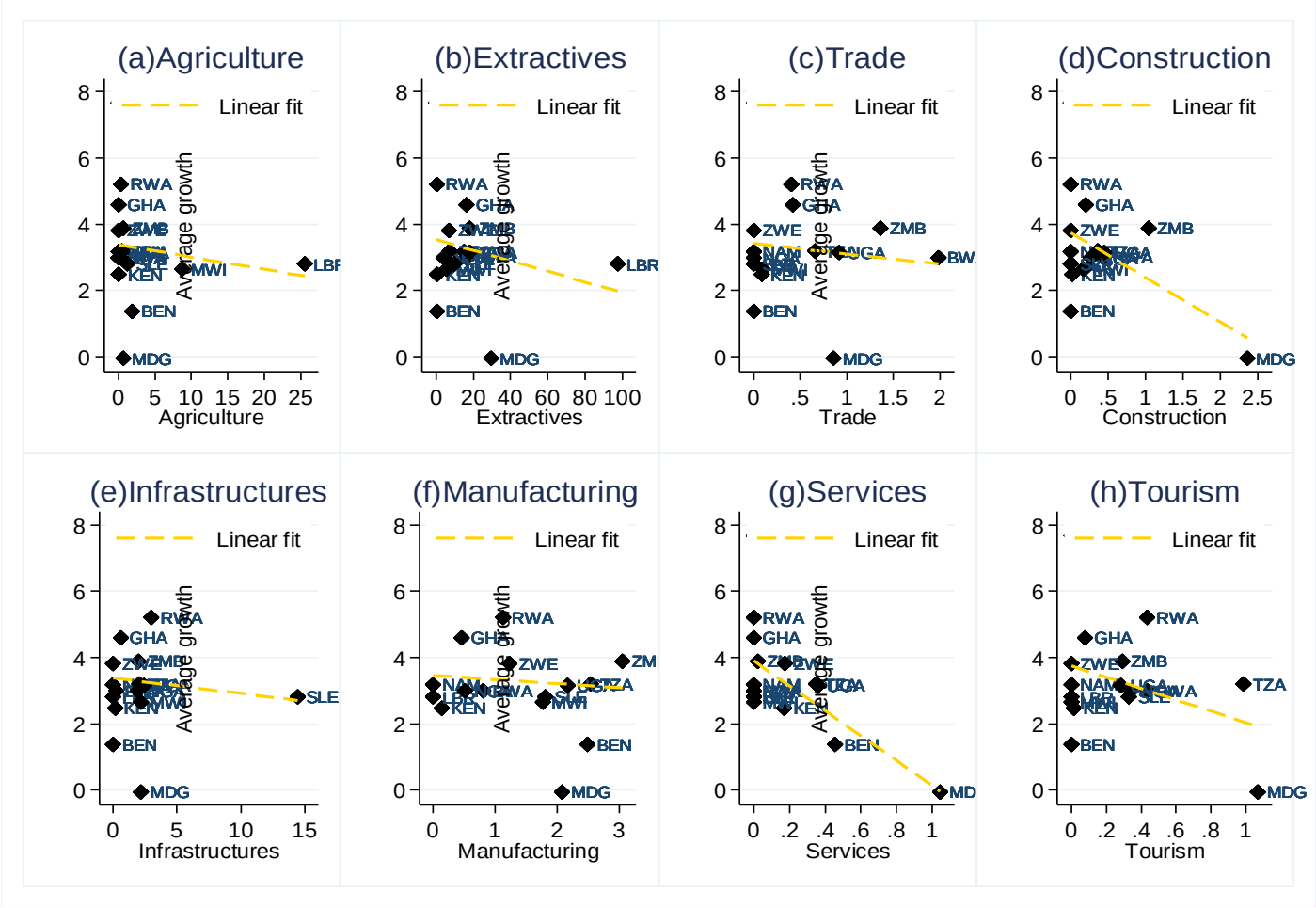

Figure 3: Relation between economic growth and FDI inflows by sector

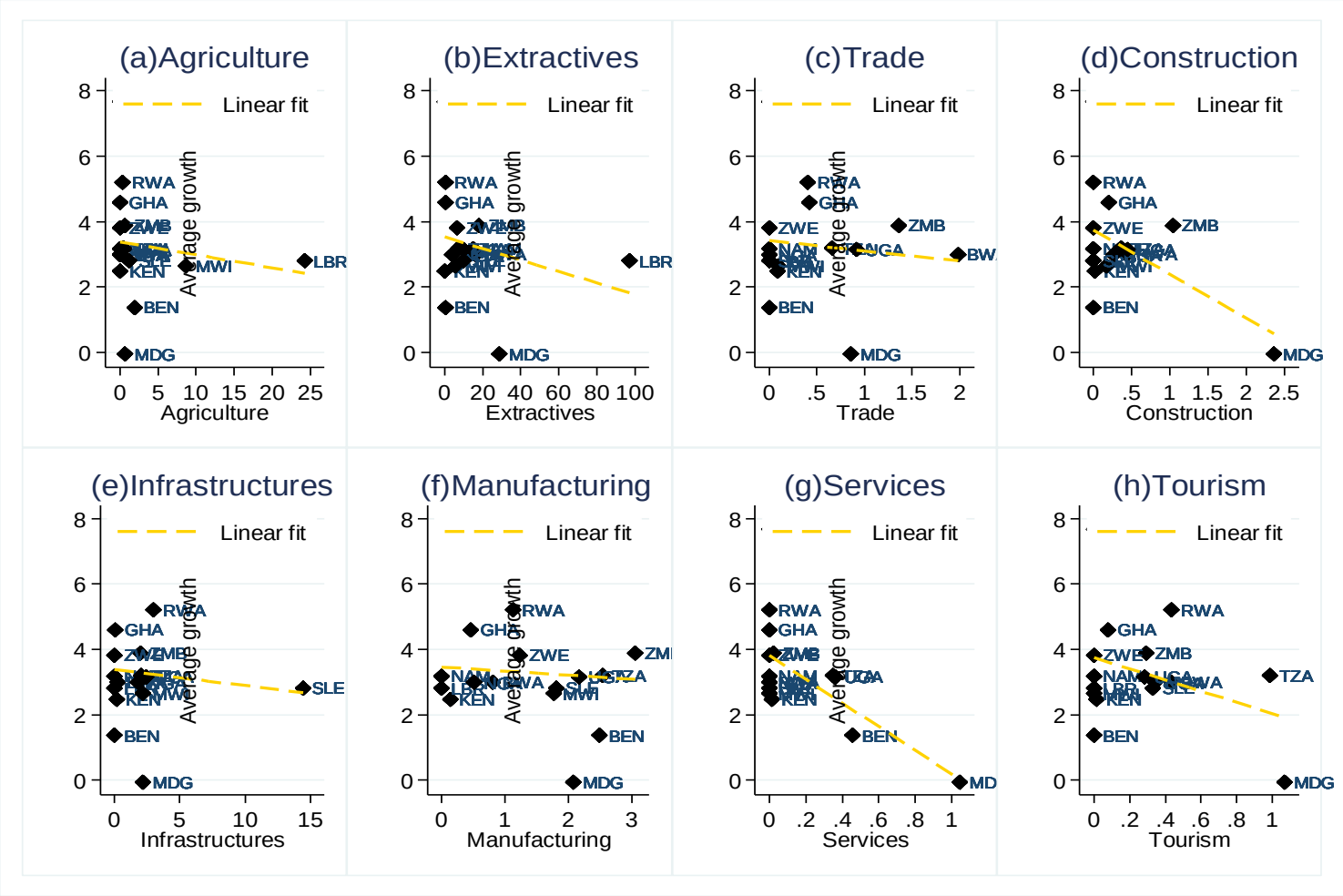

Table 1: Variables and data sources

Variable	Description	Related literature review	Source of data
Capital flows measures			
FDI	FDI inflows by sector	Alfaro et al. (2003), Aykut et Sayek(207)	
TC flows	Total capital flows by sector		
Productivity measures			
GDP per capita growth	Real per capita GDP growth rate (base 2010)	Alfaro et al. (2014), Aizenman et al. (2013), Choon et al. (2010), Beck et al. (2000)	WDI
Total factor productivity	Total factor productivity	Gourinchas & Jeanne (2013), Alfaro et al. (2014), Kose et al. (2009), Bonfiglioli (2008), Beck et al. (2000)	Pen World Table 9.0
Control variables			
Initial GDP	GDP per capita of period t-1	Bekaert et al. (2011), Beck et al. (2000), Barro (2001, 2001), Chong et al.(2010), Prasad et al.(2007)	WDI
Life expectancy	Life expectancy at birth	Bekaert et al. (2011), Beck et al. (2000), Barro (2003), Prasad et al. (2007)	WDI
Education	Gross school enrollment at secondary level	Aizenman et al. (2013), Klein & Olivei (2010), Bekaert et al. (2011), Barro (2001, 2003)	Unesco Statistics
Government consumption	Government consumption expenditure as % of GDP	Barro (2001, 2003), Aizenman (2013), Beck et al. (2000),	WDI
Trade openness	(Imports + Exports) / GDP	Bonfiglioli (2008), Barro (2001), Kose et al. (2009), Klein & Olivei (2010), Bekaert et al. (2011), Aizenman et al. (2013), Beck et al. (2000)	WDI
Inflation	Annual growth of GDP deflator	Froot & Stein (1991), Bonfiglioli (2008), Beck et al. (2000), Barro (2001)	WDI
Exchange rate	Average yearly exchange rate (units of national currency for 1 USD)	Froot & Stein (1991), Beck et al. (2000), Chong et al. (2010)	IMF
Institutional quality	Average of Kaufmann et al. Institutional quality index	Bonfiglioli (2008), Bekaert et al. (2011), Kose et al. (2009), Barro (2001), Prasad et al.(2007)	WGI

Table 2 : Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Total Capital Flows					
Agriculture	180	2.221299	7.32102	-.0840734	45.60531
Trade	180	.375176	.6722989	0	3.749259
Construction	180	.2935951	.7044697	0	4.956616
Extractives	180	13.69734	26.96061	0	182.4212
Infrastructures	180	1.728797	5.135048	0	50.54057
Manufacturing	180	1.204719	1.56418	-.0960839	8.138334
Services	180	.1445247	.3420358	0	1.986182
Tourism	180	.237203	.3890982	0	1.765485
Financial Services	180	1.08673	1.229853	0	5.120552
FDI Flows					
Agriculture	180	2.150219	6.992242	-.0840734	45.60531
Trade	180	.375176	.6722989	0	3.749259
Construction	180	.2935951	.7044697	0	4.956616
Extractives	180	12.18827	26.87449	0	182.4212
Infrastructures	180	1.696493	5.137062	0	50.54057
Manufacturing	180	1.204369	1.564418	-.0960839	8.138334
Services	180	.1247686	.3433592	0	1.986182
Tourism	180	.237203	.3890982	0	1.765485
Financial Services	180	.8108632	1.158153	0	5.120552
Productivity					
Per capita GDP growth	180	2.947053	4.282043	-22.2252	17.99567
Total factor productivity	98	40.56485	19.14756	15.89597	85.23228
Labor Productivty					
Agriculture	180	938.6771	1083.819	93.61887	5146.112
Industrie	180	6896.948	8533.847	349.4099	39868.65
Services	180	4312.082	4409.302	290.02	20325.7
Control Variables					
Trade	175	71.03541	34.76912	21.12435	311.3553
Exchangerate	172	783.9337	1283.52	.9164518	9686.771
Bankcredit	164	18.85772	10.82337	3.38	53.79
Govconsum	170	14.11182	4.63716	3.208175	27.04121
Lifexpectancy	179	58.63916	4.974393	44.54507	66.66144
Kaufindex	179	2.119262	.4831191	.708804	3.431258

Table 3: Per capita GDP growth and sectoral capital flows

Dependent variable: Growth of Real GDP Per Capita (Pgrowth)								
	Agriculture	Trade	Construction	Extactives	Infrastructures	Manufacturing	Services	Tourism
Pgrowth (-1)	0.389**	0.343**	0.359**	0.348**	0.494**	0.457**	0.476**	0.342*
	[0.173]	[0.153]	[0.158]	[0.154]	[0.182]	[0.168]	[0.222]	[0.162]
TC Flows	-0.0521	-0.954***	-0.677	-0.0146*	-0.357**	-0.432	0.616	-1.794
	[0.0352]	[0.312]	[0.462]	[0.00728]	[0.130]	[0.308]	[1.852]	[1.551]
bankcredit	-0.0628	-0.00618	-0.0326	-0.0654	0.00740	-0.0840	-0.0579	0.00332
	[0.0754]	[0.0864]	[0.0740]	[0.0774]	[0.0633]	[0.0954]	[0.0979]	[0.0703]
trade	0.0148*	0.0266**	0.0226**	0.0155*	0.0308	0.0140	0.0159	0.0220*
	[0.00841]	[0.0109]	[0.0105]	[0.00811]	[0.0235]	[0.00939]	[0.00954]	[0.0115]
exchangerate	-0.000439**	-0.000264	-0.000232	-0.000392**	0.000744	-0.000191	-0.000453	-1.62e-05
	[0.000193]	[0.000256]	[0.000240]	[0.000184]	[0.000815]	[0.000221]	[0.000379]	[0.000244]
govconsum	-0.0268	-0.216	-0.148	-0.0283	-0.223	-0.00969	-0.0563	-0.211
	[0.115]	[0.138]	[0.126]	[0.111]	[0.190]	[0.134]	[0.160]	[0.194]
kaufindex	1.436*	2.609**	1.928**	1.624**	1.850	1.682*	1.752**	2.113*
	[0.707]	[0.942]	[0.794]	[0.682]	[1.096]	[0.809]	[0.780]	[1.000]
Constant	-0.710	-2.265	-1.195	-0.926	-1.977	-1.031	-1.658	-1.204
	[1.462]	[1.370]	[1.491]	[1.424]	[2.822]	[1.469]	[1.938]	[1.510]
Observations	141	141	141	141	141	141	141	141
Nb Countries	16	16	16	16	16	16	16	16
Specification Tests								
Hansen Test	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
AR2	0.155	0.148	0.229	0.124	0.230	0.167	0.171	0.059
AR3	0.550	0.476	0.596	0.579	0.544	0.488	0.402	0.583
AR4	0.465	0.669	0.630	0.491	0.451	0.430	0.490	0.611
Nb Instruments	52	52	52	52	68	52	52	52

Robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

Specification tests (p value reported)

Table 4: Par capita GDP growth and sectorial FDI flows

Dependent variable: Growth of Real GDP Per Capita (Pgrowth)								
	Agriculture	Trade	Construction	Extractives	Infrastructures	Manufacture	Services	Tourism
Pgrowth(-1)	0.388**	0.343**	0.359**	0.363*	0.498**	0.457**	0.492**	0.342*
	[0.175]	[0.153]	[0.158]	[0.178]	[0.180]	[0.168]	[0.223]	[0.162]
FDI Flows	-0.0597	-0.954***	-0.677	-0.0133**	-0.363**	-0.433	0.772	-1.794
	[0.0357]	[0.312]	[0.462]	[0.00596]	[0.130]	[0.308]	[1.811]	[1.551]
bankcredit	-0.0674	-0.00618	-0.0326	-0.0513	0.00937	-0.0840	-0.0740	0.00332
	[0.0750]	[0.0864]	[0.0740]	[0.0696]	[0.0633]	[0.0954]	[0.102]	[0.0703]
trade	0.0150*	0.0266**	0.0226**	0.0160	0.0312	0.0140	0.0138	0.0220*
	[0.00829]	[0.0109]	[0.0105]	[0.00973]	[0.0237]	[0.00939]	[0.00992]	[0.0115]
exchangerate	-0.000443**	-0.000264	-0.000232	-0.000374**	0.000773	-0.000190	-0.000494	-1.62e-05
	[0.000194]	[0.000256]	[0.000240]	[0.000171]	[0.000820]	[0.000221]	[0.000381]	[0.000244]
govconsum	-0.0173	-0.216	-0.148	-0.0505	-0.230	-0.00983	-0.0210	-0.211
	[0.114]	[0.138]	[0.126]	[0.111]	[0.193]	[0.134]	[0.170]	[0.194]
kaufindex	1.408*	2.609**	1.928**	1.574**	1.868	1.683*	1.740**	2.113*
	[0.699]	[0.942]	[0.794]	[0.661]	[1.105]	[0.810]	[0.769]	[1.000]
Constant	-0.692	-2.265	-1.195	-0.911	-2.034	-1.031	-1.707	-1.204
	[1.478]	[1.370]	[1.491]	[1.386]	[2.830]	[1.469]	[1.932]	[1.510]
Observations	141	141	141	141	141	141	141	141
Nb Countries	16	16	16	16	16	16	16	16
Specification Tests								
Hansen Test	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
AR2	0.150	0.148	0.229	0.133	0.244	0.167	0.165	0.192
AR3	0.538	0.476	0.596	0.554	0.552	0.488	0.396	0.583
AR4	0.455	0.669	0.630	0.474	0.447	0.430	0.472	0.611
Nb Instruments	52	52	52	52	68	52	52	52

Robust standard errors in brackets
Specification tests (p value reported)
*** p<0.01, ** p<0.05, * p<0.1

Table 5: Total factor productivity and sectorial total capital flows

Dependent variable: Total Factor Productivity (TFP)								
	Agriculture	Trade	Construction	Extractives	Infrastructures	Manufacturing	Services	Tourism
TFP (-1)	0.800***	0.846***	0.796***	0.834***	0.839***	0.836***	0.815***	0.808***
	[0.0293]	[0.0407]	[0.0589]	[0.0480]	[0.0377]	[0.0424]	[0.0473]	[0.0624]
TC Flows	-1.122***	1.200*	6.966**	0.0835	-0.153**	-0.101	6.772	2.977
	[0.341]	[0.619]	[3.242]	[0.100]	[0.0673]	[0.307]	[4.706]	[2.190]
bankcredit	0.326***	0.271***	0.330***	0.283***	0.224**	0.286***	0.385***	0.355***
	[0.0765]	[0.0829]	[0.114]	[0.0740]	[0.104]	[0.0994]	[0.103]	[0.125]
lifexpectancy	-0.421***	-0.315**	-0.391**	-0.298*	-0.353***	-0.334**	-0.506***	-0.418**
	[0.139]	[0.133]	[0.160]	[0.153]	[0.129]	[0.152]	[0.168]	[0.200]
kaufindex	-1.014	-2.051	-1.746	-1.743	-0.320	-1.008	-0.759	-1.485
	[1.344]	[1.364]	[1.184]	[1.373]	[1.144]	[1.079]	[1.265]	[1.244]
Constant	28.20***	22.76**	26.97**	21.26**	23.16***	22.11**	29.65***	26.89**
	[9.346]	[9.430]	[11.13]	[9.964]	[8.681]	[10.02]	[10.89]	[12.93]
Observations	80	80	80	80	80	80	80	80
Nb Countries	11	11	11	11	11	11	11	11
Specification Tests								
Hansen Test	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
AR2	0.420	0.459	0.345	0.421	0.614	0.486	0.343	0.375
AR3	0.799	0.739	0.747	0.736	0.851	0.811	0.804	0.797
AR4	0.360	0.320	0.315	0.736	0.352	0.348	0.318	0.338
Nb Instruments	34	34	34	34	34	34	34	34

Robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

Specification tests (p value reported)

Table 6: Total factor productivity and sectorial FDI flows

Dependent variable: Total Factor Productivity (TFP)								
	Agriculture	Trade	Construction	Extractives	Infastructures	Manufacturing	Services	Tourism
TFP (-1)	0.800***	0.846***	0.796***	0.835***	0.838***	0.836***	0.817***	0.808***
	[0.0293]	[0.0407]	[0.0589]	[0.0475]	[0.0376]	[0.0424]	[0.0502]	[0.0624]
FDI Flows	-1.122***	1.200*	6.966**	0.0833	-0.155**	-0.100	6.852	2.977
	[0.341]	[0.619]	[3.242]	[0.100]	[0.0676]	[0.307]	[4.861]	[2.190]
bankcredit	0.326***	0.271***	0.330***	0.282***	0.224**	0.286***	0.380***	0.355***
	[0.0765]	[0.0829]	[0.114]	[0.0739]	[0.104]	[0.0994]	[0.104]	[0.125]
lifexpectancy	-0.421***	-0.315**	-0.391**	-0.296*	-0.354***	-0.334**	-0.481***	-0.418**
	[0.139]	[0.133]	[0.160]	[0.153]	[0.130]	[0.152]	[0.159]	[0.200]
kaufindex	-1.014	-2.051	-1.746	-1.751	-0.311	-1.008	-0.869	-1.485
	[1.344]	[1.364]	[1.184]	[1.387]	[1.145]	[1.079]	[1.213]	[1.244]
Constant	28.20***	22.76**	26.97**	21.12**	23.20***	22.11**	28.54***	26.89**
	[9.346]	[9.430]	[11.13]	[9.897]	[8.708]	[10.02]	[10.52]	[12.93]
Observations	80	80	80	80	80	80	80	80
Nb Countries	11	11	11	11	11	11	11	11
Hansen Test	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
AR2	0.420	0.459	0.345	0.423	0.616	0.486	0.352	0.375
AR3	0.799	0.739	0.747	0.736	0.851	0.811	0.352	0.797
AR4	0.360	0.320	0.315	0.305	0.350	0.348	0.352	0.338
Nb Instruments	34	34	34	34	34	34	34	34

Robust standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

Specification tests (p value reported)

Table 7: Capital flows and labor productivity

Dependent variable: Log of Labor Productivity (LP) in the sector							
Panel A: Total Capital Flows				Panel B: FDI Flows			
	Agriculture	Industry	Services		Agriculture	Industry	Services
LPA (-1)	0.968***			LPA(-1)	0.969***		
	[0.0480]				[0.0473]		
LPI (-1)		0.977***		LPI (-1)		0.990***	
		[0.0192]				[0.0168]	
LPS (-1)			0.992***	LPS(-1)			0.991***
			[0.0109]				[0.00983]
TC Flows	-0.000690	-0.000253*	-0.00193***	FDI Flows	-0.000768	-0.000304	-0.00219***
	[0.000917]	[0.000147]	[0.000301]		[0.000958]	[0.000282]	[0.000310]
trade	0.000622*	0.000427	0.0000933	trade	0.000622*	0.000452	-8.63e-05
	[0.000324]	[0.000305]	[0.000178]		[0.000319]	[0.000312]	[0.000176]
bankcredit	-0.00320*	-0.00175	0.000157	bankcredit	-0.00320*	-0.00211	0.000322
	[0.00170]	[0.00215]	[0.000997]		[0.00170]	[0.00213]	[0.000900]
lifexpectancy	-0.00240	-0.00370	-0.00132	lifexpectancy	-0.00233	-0.00281	-0.00126
	[0.00317]	[0.00416]	[0.000918]		[0.00313]	[0.00433]	[0.000924]
kaufindex	0.0209	0.0685	0.0180	kaufindex	0.0204	0.0544	0.0185
	[0.0331]	[0.0432]	[0.0127]		[0.0328]	[0.0373]	[0.0128]
Constant	0.333	0.274	0.137	Constant	0.323	0.148	0.135
	[0.310]	[0.289]	[0.0989]		[0.305]	[0.285]	[0.0905]

Table 7 (continued)

Observations	144	144	144	Observations	144	144	144	
Nb Countries	18	18	18	Nb Countries	18	18	18	
Specification Tests				Specification Tests				
Hansen Test	0.914	1.000	1.000	Hansen Test	0.916	1.000	1.000	
AR2	0.748	0.926	0.479	AR2	0.749	0.936	0.449	
AR3	0.965	0.955	0.444	AR3	0.965	0.958	0.431	
AR4	0.534	0.460	0.216	AR4	0.531	0.411	0.219	
Nb Instruments	25	65	65	Nb Instruments	25	65	65	

Robust standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1 Specification tests(p value)

LPA: Labor productivity in the agriculture sector; LPI: Labor productivity in the industry sector; LPS: Labor productivity in the services sector.

Table 8: Hierarchic model analysis

Dependent variable: Log of Labor Productivity (LP) in the sector			
Panel A: Total Capital Flows		Panel B: FDI Flows	
TC Flows	-0.00280***	FDI Flows	-0.00263***
	[0.000726]		[0.000742]
Trade	-0.000415	trade	-0.000381
	[0.000358]		[0.000358]
Sbcredit	0.0110***	sbcredit	0.0109***
	[0.00420]		[0.00421]
lifexpectancy	0.0207***	lifexpectancy	0.0203***
	[0.00290]		[0.00291]
Kaufindex	0.0478*	kaufindex	0.0477*
	[0.0252]		[0.0253]
Constant	6.266***	Constant	6.281***
	[0.246]		[0.246]
Observations	525	Observations	525
Number of Countries	18	Number of Countries	18
Specification Test		Specification Test	
Wald Test	90.98	Wald Test	88.33
P-value	0.0000	P-value	0.0000
LR Test	1643.37	LR Test	1642.67
P-value	0.0000	P-value	0.0000

Standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1 Specification tests (p value reported)

Annexe 1: List of countries and their codes

Country	Code
Benin	BEN
Bostwana	BWA
Cameroun	CMR
Ethiopia	ETH
Ghana	GHA
Kenya	KEN
Liberia	LBR
Madagasgar	MDG
Malawi	MWI
Namibia	NAM
Nigeria	NGA
Rwanda	RWA
Senegal	SEN
Sierra leone	SLE
Tanzania	TZA
Uganda	UGA
Zambia	ZMB
Zimbabwe	ZWE

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