WHAT AFFECTS INCOME IN SUB-SAHARAN AFRICA?

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ABSTRACT

This paper closely examines how selected macroeconomic variables affect income in Sub-Saharan Africa (SSA). The study employs a more recent dataset and uses fixed and random effects models to characterise the nature and direction of impact evidenced from the data. The analysis further incorporates a monetary policy element by introducing money market interest rate and examining its effects. In general, the paper reveals that income in SSA is significantly affected by trade. Additionally, money market interest rate is found to have no major impact on income as may be perceived, suggesting that this aspect of monetary policy has not played a major role in affecting income levels in SSA. The findings of this study can serve as a guide for policy makers within the region when considering policy actions in relation to income.

KEY WORDS

income, international trade, sub-Saharan Africa, money market interest rate

JEL CODES

B27, E01, E43, F14, F35

1 INTRODUCTION

Economic literature is replete with studies supporting and some opposing the various elements that characterize income generation and its determinants, but few (Ravallion, 2004; Afonso et al., 2010; Mehregan et al., 2012; Ata et al., 2019) examine the issues associated with it in the context of Sub-Saharan Africa (SSA). Admittedly, there is no one variable that can be identified as single-handedly being the only factor that affects income in any given economy. Historically, there are always a number of these factors with few country-specific variations. It is no wonder that the frequently cited paper of Roberto Perotti (1996) even considers demographic factors and includes democracy in his study of income distribution and growth. It

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is fair to say that he paved the way for a more insightful and a deeper approach towards the investigation of income and its distribution and effects in recent history.

When considering the macroeconomic factors that affect income in SSA, it is vital to observe that in some of the countries, international trade constitutes an important share of the gross domestic product (GDP) as it proves valuable in the prospects of profit growth and reduced dependence on already known local markets (Surugiu and Surugiu, 2015). Thus, it is essential to mention that the importance of international trade is at a higher level in the region now more than ever. The participation of SSA countries in international trade allows for the availability of many trade-related opportunities as they emerge into more globalized markets. In this regard, the significance of international trade and its links to income generation cannot be underestimated. Equally vital is the prominence of foreign aid, FDI, and inflation in the same vein.

Consequently, this paper aims to investigate the relationship between selected macroeconomic variables (which include trade, foreign aid, FDI, and inflation) and income in the context of SSA during the period of 2005 to 2018. Additionally, the study attempts to provide a better overview of direct monetary policy effects on income within the region by examining the effect of money market interest rate on income. This is something that is missing in available economic literature within the scope of SSA.

The study's contribution to current economic literature is characterised in two aspects. First and foremost, the paper uses a more recent dataset and a broader selection of countries to investigate the relationship between income and the selected determinants, thereby providing a more current and comprehensive contribution to the current state of knowledge in the subject area. Secondly, by including a broader range of macroeconomic variables such as foreign direct investment (FDI), foreign aid, inflation, and international trade, the paper is able to offer more ample recommendations for policy makers in SSA. Furthermore, the paper introduces an extended model to investigate the effects of monetary policy by incorporating money market interest rate, thereby offering meaningful insights for both academics and policy makers about the monetary policy effect on income within a region that often lacks such targeted research.

The remaining sections of the paper are organized in the following manner: First, a review of literature on factors affecting income is given in Section 2. Materials and Methods used in the study are presented in Section 3. The empirical result of the analysis and discussion then follows in Sections 4 and 5 respectively. Finally, the conclusion is presented.

2 REVIEW OF LITERATURE

2.1 Trade, FDI, and Income

International trade is estimated to have both direct and indirect effects on development by enhancing growth and promoting employment in various sectors of an economy. Nevertheless, the direct effects that trade exhibits on income has always been difficult to measure. In a recent study, Feyrer (2019) estimated that about 17 percent of the variations in income growth across countries between 1960 and 1995 can be accounted for by the differences in predicted growth of trade. Amjad (2015) also aimed at investigating the impact of trade on income distribution localised to Pakistan and found trade as having a negative impact on income distribution and likewise that income inequality was affected by remittances and GDP.

Erpek (2014) similarly investigated the effects of international trade on income in the context of Western Asia and found a positive relationship between international trade and income. Additionally, the study of Lee (2014) also revealed a statistically significant relationship between international trade, income inequality and poverty.

Meanwhile, Meschi and Vivarelli (2009) found that in developing countries, especially through importation and exportation, trade with high-income countries tend to worsen income distribution. By extension, differences in technology and the nature of those technologies themselves between developed and developing countries may be a significant factor influencing how trade affects income distribution. On the other hand, the studies of Irwin and Terviö (2002), Noguer and Siscart (2005), and Aradhyula et al. (2007) suggest that more trade increases income. However, Irwin and Terviö (2002) also highlighted that the estimates on the effects of trade on income using OLS were biased in almost all the years they sampled, akin to the findings of Frankel and Romer (1999) who successfully introduced country-specific geographic attributes in their study and subsequently concluded that trade has a positive and significant effect on income.

FDI inflows are often seen as a significant contributor to the overall gains of the host economy. Such inflows can help increase GDP and assure a multiplier effect which when positive, can result in an increase in national income. The question to consider is if this is always the case and if the response to income differs in the context of SSA. Studying the relationship between FDI and economic growth, Mahembe and Odhiambo (2014) revealed that FDI is a major contributor to economic growth. They argue that FDI affects economic growth by stimulating the transfer of knowledge both in skill acquisition and labour training. This seems to be a widely held position among academics. However, Herzer et al. (2008) challenged this position by arguing that FDI does not have a short- or long-term effect on growth for majority of the countries in their sample. They further argued that the correlation between FDI growth and its impact on income per capita in developing countries is rather not clear.

Wu and Hsu (2012) also concluded based on their study that FDI has a minimal effect on income inequality whereas international trade has a positive impact on income distribution. Meanwhile, Gao (2004) used a similar approach as Frankel and Romer (1999) and established that FDI inflows have a positive correlation with income. Considering that various authors report different findings about the impact of FDI on income and subsequently on economic growth, it seems likely that the more a host country is systematically and infrastructurally developed, the more it tends to gain from FDI inflows. Thus, when an economy has a well-developed and properly structured financial market, it stands to gain considerably more from the inflows of FDI (Alfaro et al., 2004).

2.2 Inflation, Interest Rate, Foreign Aid, and Income

While contemporary economic literature is awash with studies about the effect of inflation on income inequality, the direct effects of inflation on income levels itself is often not mentioned. An example is the study of Monnin (2014) which concludes that low inflation rates are associated with higher income inequality and as inflation increases, income inequality decreases. Relatedly, Li and Zou (2002) report that inflation decreases the rate of economic growth and has a negative impact on income distribution. Thus, a direct report on the actual impact of inflation on income levels seem to be missing especially in the SSA context.

Similarly, various authors have examined interest rate in an approach to characterise its effect on economic growth but again, a detailed examination of its direct effect on income levels seem to be missing. For instance, there are empirical studies that examine the relationship between interest rates and inflation towards economic growth resulting in the conclusion that interest rate has a significant impact on economic growth (Jelilov, 2016; Ramlan and Bin Suhaimi, 2017).

While examining the effects of foreign aid on income, it is common to come across evidence-based views that are yet divergent. Some authors report that development aid has a robust direct effect on donor exports and consequently, recipient countries experience an indirect effect on their income levels although these effects are heterogenous and differ from region to region (Martínez-Zarzoso, 2019). Additionally,

aid is seen to promote economic growth while it positively affects income (Gomanee et al., 2005; Karras, 2006) and some even provide evidence that foreign aid reduces poverty (Addison et al., 2005). Conversely, others conclude that foreign aid negatively impacts per capita income (Nowak-Lehmann et al., 2012). Evidently, there is no consensus about the effects of foreign aid on income. However, as the goal of most SSA countries is to boost economic growth, these findings are certainly useful.

2.3 Research Gaps

The main research gaps identified and addressed by this study is the lack of a wider cross-country examination of the observed variables that affect income within SSA. Most of the concluded research currently available deals with either (1) a single variable observed over a few countries, (2) multiple variables observed in a single country or (3) multiple variables observed in a few countries. At the same time, majority of the available studies do not focus on the countries of SSA. This study addresses that gap by offering a comprehensive examination of the variables affecting income on a regional level and with a focus on SSA. Furthermore, most of the available studies of recent times only focus on income inequality and distribution while ignoring income levels and how it is affected. More so, the studies that directly consider the dynamics of income in SSA predate the late 2000s, necessitating the importance of newer research. This study addresses such gaps by offering a holistic approach that employs more recent data about macroeconomic variables affecting income in a broader regional context.

3 MATERIALS AND METHODOLOGY

To achieve the objective of the study, two different initial models are developed in this paper. We selected a sample of twenty-five (25) countries over a period of 14 years (2005–2018) for the main model. For the second model, only ten (10) countries are selected for the same period due to constraints of data availability. The first model uses income, trade, foreign direct investment, foreign aid, and inflation data for the 25 selected SSA countries while the second model is extended to include money market interest rate.

The first model is an unbalanced panel with a total of 350 observations while the second constitutes a panel with a total of 140 observations. The countries are sampled purely based on the availability and consistency of data. The summary statistics and correlation analyses are provided in Tab. 4 and 5 in the Annex.

3.1 Data

GNI per capita measured on purchasing power parity (PPP) is used as a proxy for income, being the main dependent variable. We used this indicator primarily because it is a metric that takes into consideration all income inflows into the economy of a nation, regardless of whether it is earned within the country or not (World Bank, 2020a).

Balance of Trade as a percentage of GDP, referenced simply as Trade is used as a proxy for international trade. This variable is a major macroeconomic indicator of the comparative importance of international trade in and for the economy of a country and it is obtained primarily from UNCTAD (2021). We expect trade to have a positive sign based on the theoretical foundation presented by Frankel and Romer (1999) who estimated that trade raises income. Similar results were achieved by Erpek (2014) as well as Feyrer (2019) who predicted a significant effect on income with about one-half elasticity.

The remaining variables employed include inflation as measured by the consumer price index in annual %. This data is obtained from the World Bank (World Bank, 2020b). When inflation increases and there is a resultant adjustment based on the cost of living, then income is also expected to rise. The reverse is

also true when there is an increase in inflation with no adjustments. However, inflation can also have a negative effect for credit demand (Maiti et al., 2020) which then translates into a negative effect on income. We, therefore, expect inflation to have a negative sign.

Foreign direct investment (FDI) inflows is also used in this study and to ensure that the relationship to be observed between the other variables is non-spurious. This data is also derived from the World Bank's data bank (World Bank, 2020c) grounded on the sixth edition of the IMF's Balance of Payments Manual (BPM6). As far as FDI is concerned, its contribution to employment and subsequently the salary structure should necessarily improve income. Theoretically, this makes economic sense as also proven by the study of Cassette et al. (2012). Our initial assumption, therefore, proposes a positive sign.

Net official development assistance and official aid received is then used as a proxy for foreign aid (World Bank, 2020d). We refer to this variable simply as F_Aid. We expect foreign aid to have either a positive or a negative sign. The relationship is unclear until empirically proven, given that different kinds of foreign aid yield different results, especially considering the heterogeneity of the SSA region (Addison et al., 2005; Martínez-Zarzoso, 2019).

The last variable employed is money market interest rate (International Monetary Fund, 2021), referenced simply in this paper as interest rate (IR). A higher rate of interest often discourages credit demand while a lower rate of interest often translates into cheaper credit, thus boosting credit demand which can lead to an increase in income. Consequently, we expect money market interest rate to also exhibit a negative sign.

3.2 Unit Root Test

Because of the nature of the dataset, it was necessary to conduct a unit root test to establish the stationarity of the variables. We used the Im-Pesaran-Shin (IPS) unit root test to determine the order of integration. Based on the results of IPS unit root test of model 1 (Tab. 1), the null hypothesis is rejected for foreign aid, foreign direct investment, inflation, and trade. We then transformed income by differencing it once to achieve stationarity.

For model 2, FDI and inflation are stationary at their original values. Trade, foreign aid, and interest rate achieve stationary at the first differencing while income is stationary at the second differencing (Tab. 1).

Tab. 1: Unit Root Test

Variables	(1) Statistics	(2) Statistics
F_Aid	4.1774*** (0.000)	−1.1491 (0.125)
FDI	−2.8662*** (0.002)	−2.0845** (0.019)
Inflation	−4.4995*** (0.000)	−3.7984*** (0.000)
Trade	−2.1098** (0.017)	−1.6028 (0.054)
Income	6.6441 (1.000)	6.2069 (1.000)
D.Income	−3.2032*** (0.001)	−0.6209 (0.267)
Interest rate		−1.0725 (0.142)
D.F_Aid		−4.2953*** (0.000)
D.Trade		4.0598*** (0.000)
D.Interest rate		−2.8486*** (0.002)
D2.Income		−2.8308*** (0.002)

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

3.3 The Model

The conventional approach used in this study to investigate the effect of the selected variables on income is to regress the variables (trade, foreign aid, foreign direct investment, inflation, and interest rate) on income using panel data regression. We use fixed effects (FE) and random effects (RE) models to achieve our goal.

We fittingly group income strategically to the observed factors and model it with the selected variables accordingly. The presence of a statistically significant correlation between

the variables are also tested using the FE model. The panel regression equations for the FE models are given as:

$$Y_{it} = \alpha_0 + \alpha_1 \, \mathrm{F}_{\mathrm{aid}_{it}} + \alpha_2 \, \mathrm{FDI}_{it} + \\ + \alpha_3 \, \mathrm{Inf}_{it} + \alpha_4 \, \mathrm{Trade}_{it} + u_{it}, \tag{1}$$

$$Y_{it} = \alpha_0 + \alpha_1 \, \mathrm{d.F}_{\mathrm{aid}_{it}} + \alpha_2 \, \mathrm{FDI}_{it} + \\ + \alpha_3 \, \mathrm{Inf}_{it} + \alpha_4 \, \mathrm{d.Trade}_{it} + \\ + \alpha_5 \, \mathrm{d.IR}_{it} + u_{it}, \tag{2}$$

where Y_{it} for equation 1 is income after first differencing and Y_{it} for equation 2 is income after second differencing, all for country i in period t; α_0 is the constant and u_{it} is error term. Also, $\alpha_1, \ldots, \alpha_5$ are coefficients to be estimated, $F_{\mathrm{aid}_{it}}$, FDI_{it}, Inf_{it}, Trade_{it}, and IR_{it} are vectors of the independent variables.

We also use the variance components model, otherwise known as the random effects model, to aid in controlling for any unobserved time-constant heterogeneity (Maddala, 2001; Greene, 2003; Baltagi, 2008). The equations for the RE models are given as:

$$\alpha_i \sim \mathrm{iid}(0, \sigma_\alpha^2),$$

$$\mathrm{D.income}_{it} = \alpha + \Delta x_{it}^1 \beta + \alpha_i + u_{it}, \\ u_{it} \sim \mathrm{iid}(0, \sigma_u^2), \tag{3}$$

$$\mathrm{D2.income}_{it} = \alpha + \Delta x_{it}^1 \beta + \alpha_i + u_{it}, \\ u_{it} \sim \mathrm{iid}(0, \sigma_u^2), \tag{4}$$

where α_i is time-invariant and homoscedastic across individuals and it contributes to the correlation between the country, year and the variables. Also, βs are the coefficient values of the independent variables (trade, foreign aid, foreign direct investment, inflation and interest rate); iid indicates the independent and identically distributed variables, α is overall mean being captured in the variables and u_{it} is the error term or the random error.

3.3.1 Hausman Test

The Hausman test is used here as the robustness check between the FE models and the RE models. This test is a statistical hypothesis check to evaluate the consistency of the estimators employed in this paper to determine if our statistical model corresponds to the dataset used. Hausman test tests the null hypothesis H_0 such that x_{it} and u_{it} are uncorrelated. At different levels, the FE model and RE model would be considered.

H_0 is the random effects model:

$$\mathrm{D.income}_{it} = \alpha + \Delta x_{it}^1 \beta + \alpha_i + u_{it}, \tag{5}$$

$$\mathrm{D2.income}_{it} = \alpha + \Delta x_{it}^1 \beta + \alpha_i + u_{it}. \tag{6}$$

H_1 is the fixed effects model:

$$\mathrm{D.income}_{it} = \alpha + \Delta x_{it}^1 \beta + u_{it}, \tag{7}$$

$$\mathrm{D2.income}_{it} = \alpha + \Delta x_{it}^1 \beta + u_{it}. \tag{8}$$

$\hat{\beta}_{\mathrm{RE}}$ is consistent under the null hypothesis and $\hat{\beta}_{\mathrm{FE}}$ is consistent and appropriate under the alternative.

4 EMPIRICAL RESULTS

The results of the FE model from Tab. 2 point towards trade in its level having a statistical significance and a positive relationship with change in income whereas foreign aid, FDI, and inflation appear as not statistically significant. At the same time, the results from the RE model also show trade as being statistically significant and having a positive relationship with change in income. The model further shows a weak positive correlation with rho of 0.020. The other variables do not appear to prove any significant contribution to income (Tab. 2). The positive statistically significant relationship between trade and income evident in both models is similar to the findings of Feyrer (2019), with the simple economic implication being that trade increases income. The implication is that much like other economies of the world, trade has proven to have a significant effect on income also in SSA.

Although both the fixed and random effects variants of model 1 exhibit similar behaviour

and produced similar results, the output of the robustness Hausman test 1 (Tab. 6 in the Annex) indicates the FE model as more consistent and appropriate. Consequently, the output of the FE model is considered in the discussion.

Tab. 2: Model 1

Variable	FE	RE
Constant	647.378***	423.180***
	(120.964)	(84.691)
F_Aid	0.000	−0.000
	(0.000)	(0.000)
FDI	0.000	0.000
	(0.000)	(0.000)
Inflation	0.539	−5.786
	(10.188)	(7.422)
Trade	45.173***	12.428***
	(6.496)	(2.949)
σ_u	659.131	101.854
σ_e	708.376	708.376
ρ	0.464	0.020
Adj_R-squared	0.063	0.139

Notes: Dependent var. = D.Income; *** $p < 0.01$.

Tab. 3 presents the results of the extended model in which we included money market interest rate to identify its effect on income, if any. The output from the FE model 2 imply that FDI in its level has a statistically significant negative effect on change in income at the second difference. Although the opposite results would be generally expected, our findings seem to be in line with Herzer et al. (2008) who found that in majority of their sampled countries, there was no effect of FDI on growth and concluded that the relationship between FDI's growth impact and income is rather unclear in developing countries. At the same time, money market interest rate, inflation, and foreign aid do not exhibit any statistical significance in this extended model.

On the other hand, the RE model (Tab. 3) indicates that all the observed variables have no significant relationship with income. Nevertheless, money market interest rate has a negative coefficient in both the FE and RE models, which is in line with our initial expectations. The results of the robustness Hausman test 2 (Tab. 7 in the Annex) indicates the RE model 2 to be consistent and appropriate between the two models. The RE model is therefore considered as the basis for discussion.

Tab. 3: Model 2

Variable	FE	RE
Constant	27.041	14.964
	(38.898)	(25.988)
D.F_Aid	0.000	0.000
	(0.000)	(0.000)
FDI	−0.000**	−0.000
	(0.000)	(0.000)
Inflation	−1.262	−1.075
	(5.733)	(3.195)
D.Trade	−7.679*	−5.417
	(4.391)	(4.059)
D.Interest rate	−4.930	−7.579
	(8.970)	(8.386)
σ_u	49.069	0
σ_e	202.049	202.049
ρ	0.056	0
Adj_R-squared	0.060	0.096

Notes: Dependent variable = D2.Income;
** $p < 0.05$, * $p < 0.1$.

4.1 Robustness Check

As a measure of robustness, we performed a lag distribution test on both FE and RE models 1 and 2 using lag 1 and lag 2. Considering the fixed effects model 1, the results in Tab. 8 in the Annex indicate that trade in its level has a positive effect on change in income and remain significant at no lag, lag 1 and lag 2. Foreign aid, FDI, and inflation are not significant in this model. Therefore, a consistent result is shown for the factors affecting income in SSA countries in both model 1 and its lag equivalents. This further proves the Hausman test to be right in identifying the fixed effects model 1 as the appropriate first model.

There is, however, no consistency in the results of FE model 2 when compared with its lag equivalent. At no lag, trade and FDI are found to be significant. At lag 1, trade is not significant while FDI remains significant. Meanwhile at lag 2, none of the variables are significant. Nevertheless, this is no cause for alarm given that this model was not chosen and therefore, not considered in the discussion.

When comparing the variability of the dataset for the fixed effects model 1, there is an improvement of the variables from no lag to lag 2. At no lag, there is a variability of 14.60%. At lag 1, the variability is 15% and at lag 2, the variability is 16.30%. Similarly, an improvement is shown for fixed effects model 2. The result shows that 6.03% variability is explained by the explanatory variables for model 2 at no lag, 6.57% is explained by the explanatory variables at lag 1 and 7.63% is explained by the explanatory variables at lag 2 as shown in Tab. 8 in the Annex.

Tab. 9 in the Annex shows the results for lag distribution of the RE models. For model 1, trade shows a positive significant effect at no lag, lag 1, and lag 2. Foreign aid, FDI and inflation are found non-significant. For model 2, none of the variables show a significant effect with income at no lag, lag 1, and lag 2. This model proves a consistency in the results for both RE models.

5 DISCUSSION OF RESULTS

The study aimed to ascertain the effect of international trade, foreign aid, foreign direct investment, inflation, and interest rate on income, using panel data from the period 2005–2018 for selected SSA countries. Fixed effects and random effects models were used to establish the relationship between the variables at various significance levels.

We applied the Hausman test as a robustness measure to select the best of the two models. Consequently, the fixed effects model 1 is proven as appropriate for model 1 whereas the random effects model 2 is consistent and appropriate for model 2. We further applied the models at lags 1 and 2 for comparison and found that apart from model 2 of the fixed effects, the other models have consistent results with their lag equivalents, thereby further proving the robustness of the models.

5.1 Income and Trade

International trade has a substantial effect on the distribution of income across SSA countries. It is of the observation that trade has an impact on employment and wages in the occupational or sectoral level (UNCTAD, 2013b). Trade plays a crucial role in the job creation process and subsequently in the poverty alleviation process. It is also observed that international trade increases government revenue which helps the poor in financing their social expenditures. In evaluating the effect of international trade on income, several issues arise on the structure of trade policy and the general structure of trade itself in protecting the citizens of SSA to ensure maximum economic gains. Programs such as Aid for Trade and the multilateral agencies programs, among others, were launched by the World Trade Organisation to assist Least Developed Countries (LDC), some of which are in SSA. The programs aimed at overcoming some limitations and alleviating poverty and also to help achieve sustained growth of income in various African countries (DiCaprio and Trommer, 2010). In that regard, some studies (Nicita et al., 2014; Noguer and Siscart, 2005; Spilimbergo et al., 1999) have found trade to be significant with a positive impact on income. In line with those studies, our findings also showed that international trade has a positive significant impact on income. Bensidoun et al. (2011) also concluded in their study that a change in the factor content of trade has a significant impact on trade depending on the level of national income.

Our results ascertain a positive impact of trade on income in SSA, confirming the findings of Spilimbergo et al. (1999) and mainly also Noguer and Siscart (2005) who concluded based on their findings that the more a country trades, the higher the level of income they achieve. In the late 90s, Frankel and Romer (1999) asserted that trade has a significant and a positive effect on income and the effect is robust. Additionally, Feyrer (2019) also concluded on a similar result, finding trade to have a significant effect on income. Our result confirms that the trend is

no different for the countries of SSA and that trade is beneficial in boosting the income levels of SSA.

5.2 Income and Foreign Direct Investment

FDI is estimated to be a major driver of income growth in SSA. Africa has experienced a significant surge in domestic investment over the past two decades. That notwithstanding, most countries in the region of SSA still experience a wide gap between the requirements for investment and the availability of domestic resources. Naturally, FDI is expected to play a significant role in bridging this gap but that does not seem to be the case as the region accounts for a very low share of global FDI flows (UNCTAD, 2013a). Our general findings and that of UNCTAD (2013a) report no evidence suggesting that FDI has a major impact on the income level of SSA countries. This finding proves no relationship between FDI and income given that the result was not significant. This is possibly because FDI inflows are directed at only a few countries on the continent and even those are often focused on the extractive sector. As a result, whereas FDI might benefit a particular sector in a particular country, it does not necessarily translate to the entire SSA region. We further argue that in order for FDI to have a considerable impact on income, the economies of SSA should first and foremost have a well-developed financial market (Alfaro et al., 2004). This seems to be a necessary condition towards achieving real gains from FDI inflows. While the research of Tian et al. (2008), Jaumotte et al. (2008) and Cassette et al. (2012) seem to point toward FDI having some positive effect on income, our findings do not prove that when taken in the context of SSA. Like Herzer et al. (2008), we maintain that the effect that FDI has on income in SSA is rather unclear.

5.3 Income and Inflation

Through its effects on economic growth, inflation tends to have an effect on the distribution of income. In exploring this subject, it is necessary to note that the Tobin-Sidrauski model links inflation to the increase of capital accumulation while at the same time, a linking of inflation to a reduction in the accumulation of capital is put forth by other authors (Fischer, 1981). While there is no real consensus on the matter, the findings in three of our models reveal a negative sign, but the result is insignificant. Similarly, Li and Zou (2002) found that inflation has a negative but insignificant effect on the share of income for the poor and middle-class economic agents. In most SSA countries, income distribution faces many challenges arising from conflicts of inflation especially among policy objectives (Kasa, 2001; Gemayel et al., 2011). The findings of this study does not conclusively point to inflation having any real effect on income in SSA as no statistical significance is proven. However, given that inflation and its effects are often reviewed indirectly through growth, we point to the findings of Khan and Senhadji (2001) who estimated that at the threshold of 11–12%, inflation significantly slows growth in developing countries.

5.4 Income and Foreign Aid

In exploring the nature of the relationship between foreign aid and income in SSA, our findings reveal no significant impact. Nowak-Lehmann et al. (2012) likewise reveal on a general note that aid has insignificant impact on income per capita. They also argue that where there is a significant impact, it is rather negative and comparatively minute. Addison et al. (2005) maintain that different kinds of aid have different impacts, and this is rightly so. The scope of foreign aid itself and the channels through which they are distributed can largely influence how they impact income in SSA and subsequently growth. However, it is now rather unclear if foreign aid does significant good and if so, whether or not the benefits outweigh the potential disadvantages within the context of SSA.

5.5 Income and Interest Rate

In our extended model, we sought to determine if monetary policy has any significant impact on income levels in SSA through money market interest rate. As the main regulator overseeing banks and banking in the economy (Boldeanu and Tache, 2016; Cipovová and Dlasková, 2016), the central bank controls total money supply in the economy with the aid of monetary policy instruments. The results of our study does not find money market interest rate as having a statistically significant impact on income in SSA. Although the focus of this paper is not on economic growth, it is important to note that while we do not prove any impact of interest rate on income, studies have revealed a significant impact of interest rate on economic growth (Jelilov, 2016; Ramlan and Bin Suhaimi, 2007). We mention this in acknowledgment that growth is ultimately the desired goal for the economies of SSA. Additionally, monetary policy itself is seen to have a distributional effect through different mechanisms of transmission (Davtyan, 2017). Nevertheless, our results suggest that whilst monetary policy might be significant for economic growth as a whole, it may not necessarily be as significant of a factor in determining the direct income levels within the countries of SSA.

6 CONCLUSION

This paper sought to determine if international trade, foreign direct investment, foreign aid, inflation, and monetary policy through money market interest rate have any influence on income in SSA by analysing available panel data for 25 SSA countries and 10 SSA countries over a period of 14 years. Two sets of models were developed. The first model set used a dataset from 25 SSA countries and the second model used a dataset from 10 SSA countries, all for the period 2005–2018. The empirical analysis of the panel data comprised of fixed effects and random effects models to investigate the relationship between the observed variables and income.

The result of the fixed effects model showed trade to be significant and with a positive effect on income for model 1. Additionally, foreign aid, FDI, and inflation were not significant. The results of the random effects model 2 did not prove any of the variables as statistically significant even with the introduction of money market interest rate. Consequently, the only variable with a proven effect on income in this study is trade. Supporting the theories of Noguer and Siscart (2005), and Spilimbergo et al. (1999), our main empirical finding points to trade having a significant impact on income in SSA.

The implications of our findings rest toward international trade as having a major role to play in the income levels of SSA countries. An improvement in the strategic trade partnerships within the region can therefore go a long way to boost the sector, resulting in the improvement of income level. Money market interest rate, being insignificant in this study suggests that this aspect of monetary policy may not necessarily be influencing income generation as expected. This is an eye-opener for policy makers when considering what aspects of monetary policy has had real effects on income within the SSA region. FDI, foreign aid, and inflation also proved to have no significant effect on income when taken in the context of SSA. However, there is a possibility that when these variables are studied for each country independently, different results may be reached. This would be in recognition of the heterogeneous nature of the countries in SSA, thereby taking into account possible unique factors that may otherwise be omitted in a study for the entire region combined.

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8 REFERENCES

Addison, T., Mavrotas, G. and McGillivray, M. 2005. Aid to Africa: An Unfinished Agenda. *Journal of International Development*, 17 (8), 989–1001. DOI: 10.1002/jid.1255.

Afonso, A., Schuknecht, L. and Tanzi, V. 2010. Income Distribution Determinants and Public Spending Efficiency. *The Journal of Economic Inequality*, 8 (3), 367–389. DOI: 10.1007/s10888-010-9138-z.

Alfaro, L., Chanda, A., Kalemli-Ozcan, S. and Sayek, S. 2004. FDI and Economic Growth: The Role of Local Financial Markets. *Journal of International Economics*, 64 (1), 89–112. DOI: 10.1016/S0022-1996(03)00081-3.

Amjad, Z. 2015. Trade and Income Distribution in Pakistan. *Global Journal of Management and Business Research*, 15 (8), 18–25.

Aradhyula, S. V., Rahman, T. and Seenivasan, K. 2007. Impact of International Trade on Income and Income Inequality. In *2007 Annual Meeting*. American Agricultural Economics Association. DOI: 10.22004/ag.econ.9999.

Ata, F. N., Alam, S. and Saeed, N. 2019. The Determinants of Income Distribution, an Empirical Analysis of Developing Countries. *Public Finance Quarterly*, 64 (4), 494–510. DOI: 10.35551/pfq_2019_4_3.

Baltagi, B. H. 2008. *Econometric Analysis of Panel Data*. 4th ed. Chichester: John Wiley & Sons.

Bensidoun, I., Jean, S. and Sztulman, A. 2011. International Trade and Income Distribution: Reconsidering the Evidence. *Review of World Economics*, 147 (4), 593. DOI: 10.1007/s10290-011-0107-9.

Boldeanu, F. T. and Tache, I. 2016. The Financial System of the EU and the Capital Markets Union. *European Research Studies Journal*, 19 (1), 59–70. DOI: 10.35808/ersj/506.

Cassette, A., Fleury, N. and Petit, S. 2012. Income Inequalities and International Trade in Goods and Services: Short- and Long-Run Evidence. *The International Trade Journal*, 26 (3), 223–254. DOI: 10.1080/08853908.2012.682023.

Cipovová, E. and Dlasková, G. 2016. Comparison of Different Methods of Credit Risk Management of the Commercial Bank to Accelerate Lending Activities for SME Segment. *European Research Studies Journal*, 19 (4), 17–26. DOI: 10.35808/ersj/577.

Davtyan, K. 2017. The Distributive Effect of Monetary Policy: The Top One Percent Makes the Difference. *Economic Modelling*, 65 (C), 106–118. DOI: 10.1016/j.econmod.2017.05.011.

DiCaprio, A. and Trommer, S. 2010. Bilateral Graduation: The Impact of EPAs on LDC Trade Space. *Journal of Development Studies*, 46 (9), 1607–1627. DOI: 10.1080/00220381003706502.

Erpek, H. 2014. *The Effect of International Trade on Income* [online]. Clemson University. Available at: `https://tigerprints.clemson.edu/all_theses`.

Fischer, S. 1981. Towards an Understanding of the Costs of Inflation: II. *Carnegie-Rochester Conference Series on Public Policy*, 15, 5–41. DOI: 10.1016/0167-2231(81)90016-6.

Frankel, J. A. and Romer, D. H. 1999. Does Trade Cause Growth? *American Economic Review*, 89 (3), 379–399. DOI: 10.1257/aer.89.3.379.

Feyrer, J. 2019. Trade and Income–Exploiting Time Series in Geography. *American Economic Journal: Applied Economics*, 11 (4), 1–35. DOI: 10.1257/app.20170616.

Gao, T. 2004. FDI, Openness and Income. *The Journal of International Trade & Economic Development*, 13 (3), 305–323. DOI: 10.1080/0963819042000240048.

Gemayel, E. R., Jahan, S. and Peter, A. 2011. *What Can Low-Income Countries Expect from Adopting Inflation Targeting?* IMF Working Paper No. 11/276. International Monetary Fund.

Gomanee, K., Girma, S. and Morrissey, O. 2005. Aid and Growth in Sub-Saharan Africa: Accounting for Transmission Mechanisms. *Journal of International Development*, 17 (8), 1055–1075. DOI: 10.1002/jid.1259.

Greene, W. H. 2003. *Econometric Analysis*. 5th ed. Pearson Education.

Herzer, D., Klasen, S. and Nowak-Lehmann Danzinger, F. 2008. In Search of FDI-Led Growth in Developing Countries: The Way Forward. *Economic Modelling*, 25 (5), 793–810. DOI: 10.1016/j.econmod.2007.11.005.

International Monetary Fund. 2021. *International Monetary Fund Statistics* [online]. Available at: `https://data.imf.org/regular.aspx?key=61545867`. [Accessed 2021, January 12].

Irwin, D. A., Terviö, M. 2002. Does Trade Raise Income? Evidence from Twentieth Century. *Journal of International Economics*, 58 (1), 1–18.

Jaumotte, F., Lall, S. and Papageorgiou, C. 2008. *Rising Income Inequality: Technology, or Trade and Financial Globalization*. IMF Working Paper No. 08/185. International Monetary Fund.

Jelilov, G. 2016. The Impact of Interest Rate on Economic Growth Example of Nigeria. *African Journal of Social Sciences*, 6 (2), 51–64.

Karras, G. 2006. Foreign Aid and Long-Run Economic Growth: Empirical Evidence for a Panel of Developing Countries. *Journal of International Development*, 18 (1), 15–28. DOI: 10.1002/jid.1187.

Kasa, K. 2001. *Will Inflation Targeting Work in Developing Countries?* FRBSF Economic Letter. Federal Reserve Bank of San Francisco.

Khan, M. S. and Senhadji, A. S. 2001. *Threshold Effects in the Relationship Between Inflation and Growth*. IMF Working Paper. International Monetary Fund.

Lee, K.-K. 2014. Globalization, Income Inequality and Poverty: Theory and Empirics. *Social System Studies*, 28, 109–134.

Li, H. and Zou, H.-F. 2002. Inflation, Growth, and Income Distribution: A Cross-Country Study. *Annals of Economics and Finance*, 3 (1), 85–101.

Maddala, G. S. 2001. *Introduction to Econometrics*. 3rd ed. New York: John Wiley & Sons.

Mahembe, E. and Odhiambo, N. M. 2014. Foreign Direct Investment and Economic Growth: A Theoretical Framework. *Journal of Governance and Regulation*, 3 (2), 63–70. DOI: 10.22495/jgr_v3_i2_p6.

Maiti, M., Esson, I. A. and Vuković, D. 2020. The Impact of Interest Rate on the Demand for Credit in Ghana. *Journal of Public Affairs*, 20 (3), e2098. DOI: 10.1002/pa.2098.

Martínez-Zarzoso, I. 2019. Effects of Foreign Aid on Income through International Trade. *Politics and Governance*, 7 (2), 29–52. DOI: 10.17645/pag.v7i2.1830.

Mehregan, N., Imandoust, S. and Mohseni, E. 2012. Estimating of Inflation and Income Distribution Threshold Level in Iran. *International Journal of Science and Advanced Technology*, 2 (1), 102–107.

Meschi, E. and Vivarelli, M. 2009. Trade and Income Inequality in Developing Countries. *World Development*, 37 (2), 287–302. DOI: 10.1016/j.worlddev.2008.06.002.

Monnin, P. 2014. *Inflation and Income Inequality in Developed Economies*. CEP Working Paper No. 2014/1. Council on Economic Policies.

Nicita, A., Olarreaga, M. and Porto, G. 2014. Pro-Poor Trade Policy in Sub-Saharan Africa. *Journal of International Economics*, 92 (2), 252–265. DOI: 10.1016/j.jinteco.2014.01.001.

Noguer, M. and Siscart, M. 2005. Trade Raises Income: A Precise and Robust Result. *Journal of International Economics*, 65 (2), 447–460. DOI: 10.1016/j.jinteco.2003.11.006.

Nowak-Lehmann, F., Dreher, A., Herzer, D., Klasen, S. and Martínez-Zarzoso, I. 2012. Does Foreign Aid Really Raise Per Capita Income? A Time Series Perspective. *Canadian Journal of Economics*, 45 (1), 288–313. DOI: 10.1111/j.1540-5982.2011.01696.x.

Perotti, R. 1996. Growth, Income Distribution, and Democracy: What the Data Say. *Journal of Economic Growth*, 1 (2), 149–187.

Ramlan, H. and Bin Suhaimi, M. S. I. 2017. The Relationship between Interest Rates and Inflation Toward the Economic Growth in Malaysia. *Journal of Humanities, Language, Culture and Business*, 1 (1), 55–63.

Ravallion, M. 2004. *Looking Beyond Averages in the Trade and Poverty Debate*. Policy Research Working Paper Series 3461, The World Bank. DOI: 10.1596/1813-9450-3461.

Spilimbergo, A., Londoño, J. L. and Székely, M. 1999. Income Distribution, Factor Endowments, and Trade Openness. *Journal of Development Economics*, 59 (1), 77–101. DOI: 10.1016/S0304-3878(99)00006-1.

Surugiu, M.-R. and Surugiu, C. 2015. International Trade, Globalization and Economic Interdependence between European Countries: Implications for Businesses and Marketing Framework. *Procedia Economics and Finance*, 32, 131–138. DOI: 10.1016/S2212-5671(15)01374-X.

Tian, X., Wang, B. and Dayanandan, A. 2008. The Impact of Economic Globalization on Income Distribution: Empirical Evidence in China. *Economics Bulletin*, 4 (35), 1–8.

UNCTAD. 2013a. *Strengthening Linkages Between Domestic and Foreign Direct Investment in Africa.* Trade and development board. United Nations Publication. TD/B/EX(57)/3.

UNCTAD. 2013b. *The Impact of Trade on Employment and Poverty Reduction.* United Nations Publication. TD/B/C.I/29.

UNCTAD. 2021. *UNCTAD Statistics* [online]. Available at: `https://unctadstat.unctad.org/wds/ReportFolders/reportFolders.aspx?sCS_referer=&sCS_ChosenLang=en`. [Accessed 2021, January 13].

World Bank. 2020a. *World Development Indicators. GNI Per Capita, PPP (Current International Dollars)* [online]. Available at: `https://databank.worldbank.org/reports.aspx?source=2&series=NY.GNP.PCAP.PP.CD&country=SSF#`. [Accessed 2021, January 13].

World Bank. 2020b. *Inflation, Consumer Prices (Annual %)* [online]. Available at: `https://databank.worldbank.org/reports.aspx?source=2&series=FP.CPI.TOTL.ZG&country=SSF`. [Accessed 2021, January 13].

World Bank. 2020c. *Foreign Direct Investment, Net Inflows (BoP, Current USD)* [online]. Available at: `https://databank.worldbank.org/reports.aspx?source=2&series=BX.KLT.DINV.CD.WD&country=SSF#`. [Accessed 2021, January 13].

World Bank. 2020d. *Net Official Development Assistance and Official Aid Received* [online]. Available at: `https://databank.worldbank.org/reports.aspx?source=2&series=DT.ODA.ALLD.CD&country=SSF#`. [Accessed 2021, January 13].

Wu, J.-Y. and Hsu, C.-C. 2012. Foreign Direct Investment and Income Inequality: Does the Relationship Vary with Absorptive Capacity? *Economic Modelling*, 29 (6), 2183–2189. DOI: 10.1016/j.econmod.2012.06.013.

9 ANNEX

Tab. 4: Summary Statistics and Correlation Analysis of Model 1

	Income	F_Aid	FDI	Inflation	Trade
Mean	5,040.8860	817,000,000	780,000,000	6.4031	−9.9408
Std.Dev	5,755.7010	906,000,000	1,840,000,000	6.1889	16.1516
Min	610	520,000	−7,400,000,000	−2.8147	−66.3460
Max	28,750	11,000,000,000	10,000,000,000	34.6953	57.1514
Obs	350	350	350	344	346
			Correlation analysis		
F_Aid	−0.2621				
FDI	0.1331	0.3378			
Inflation	−0.0864	0.1121	0.0472		
Trade	0.4372	0.0812	0.1448	0.0844	

Note: F_Aid is foreign aid.

Tab. 5: Summary Statistics and Correlation Analysis of Model 2

	Income	F_Aid	FDI	Inflation	Trade	Interest rate
Mean	5,088.3570	822,000,000	896,000,000	5.2722	−6.8436	6.8235
Std.Dev	5,512.4650	487,000,000	2,290,000,000	6.0271	10.8408	5.1220
Min	680	11,700,000	−7,400,000,000	−2.2480	−28.5173	0.9448
Max	26,080	2,910,000,000	10,000,000,000	32.3777	30.0079	25.4350
Obs	140	140	140	139	140	134
Correlation analysis						
F_Aid	−0.3881					
FDI	0.2122	0.3107				
Inflation	0.1037	−0.1194	−0.0501			
Trade	0.1222	−0.1578	−0.0826	0.4219		
Interest rate	−0.0937	0.1765	0.1005	0.7812	0.3034	

Note: F_Aid is foreign aid.

Tab. 6: Hausman Test 1

D.Income	(b) **Fixed**	(B) **Random**	$(b-B)$ **Difference**	$\sqrt{\text{diag}\,(V_b - V_B)}$ **S.E.**
F_Aid	0.0000	−0.0000	0.0000	0.0000
FDI	0.0000	−0.0000	0.0000	0.0000
Inflation	0.5388	−5.7861	6.3249	6.9802
Trade	45.1729	12.4282	32.7446	5.7885
$\chi^2(2)$	32.0300		Prob $> \chi^2$	0.0000

Tab. 7: Hausman Test 2

D2.Income	(b) **Fixed**	(B) **Random**	$(b-B)$ **Difference**	$\sqrt{\text{diag}\,(V_b - V_B)}$ **S.E.**
D.F_Aid	0.0000	0.0000	0.0000	0.0000
FDI	−0.0000	−0.0000	−0.00002	0.0000
Inflation	−1.2618	−1.0752	−0.1866	4.7602
D.Trade	−7.6793	−5.4172	−2.2622	1.6751
D.Interest rate	−4.9303	−7.5794	2.6491	3.1818
$\chi^2(2)$	2.07		Prob $> \chi^2$	0.5571

Tab. 8: Fixed Effect Lag Distribution Test of Models 1 and 2

Model 1				**Model 2**			
Variable	**No lag**	**Lag 1**	**Lag 2**	**Variable**	**No lag**	**Lag 1**	**Lag 2**
Constant	647.3775***	667.4863***	711.9948***	Constant	27.0414	−59.5153	17.6835
Trade	45.1729***	46.4627***	50.2924***	D.Trade	−7.6793*	2.5544	−5.5312
F_Aid	0.0000	0.0000	0.0000	D.F_Aid	0.0000	0.0000	0.0000
FDI	0.0000	−0.0000	0.0000	FDI	−0.0000**	−0.0000*	−0.0000
Inflation	0.5387555	0.4416	−0.4430	Inflation	−1.2618	5.4628	−3.0762
				D.Interest rate	−4.9303	−6.2561	−8.5136
R-squared	0.1460	0.1501	0.1630	R-squared	0.0603	0.0657	0.0763
P-value	0.0000	0.0000	0.0000	P-value	0.1609	0.2558	0.2313

Notes: Dependent variable = D.Income; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Tab. 9: Random Effects Lag Distribution Test of Models 1 and 2

Model 1				Model 2			
Variable	**No lag**	**Lag 1**	**Lag 2**	**Variable**	**No lag**	**Lag 1**	**Lag 2**
Constant	423.1803***	408.0997***	400.8819***	Constant	14.9644	−59.5153	17.6835
Trade	12.4282***	11.7589***	11.80431***	D.Trade	−5.4171	2.5544	−5.5312
F_Aid	−0.0000	−0.0000	−0.0000	D.F_Aid	0.0000	0.0000	0.0000
FDI	−0.0000	−0.0000	−0.0000	FDI	−0.0000	−0.0000	−0.0000
Inflation	−5.7861	−4.2251	−2.9269	Inflation	−1.0752	5.4628	−3.0762
				D.Interest rate	−7.5794	−6.2561	−8.5136
R-squared	0.1387	0.1124	0.1253	*R*-squared	0.0961	0.0787	0.0761
P-value	0.0006	0.0010	0.0021	*P*-value	0.2423	0.2558	0.2313

Notes: Dependent variable = D2.Income; *** $p < 0.01$.

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