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THE NEXUS BETWEEN FINANCIAL DEVELOPMENT AND MERCHANDISE EXPORTS. FRESH EVIDENCE FROM SUB-SAHARAN AFRICA (SSA) USING DYNAMIC SIMULTANEOUS-EQUATION S MODELS

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Abstract

This study investigated the causal link between financial development and merchandise exports using simultaneous-equations models for SSA countries over the period 1986-2016.

The analysis is conducted using an instrumental Generalized Method of Moments (IV-GMM) to examine the two-way linkages between financial development and exports for the panel of 25 SSA countries. The results show that the level of financial development does not affect exports in SSA, rather it is exports that influences the level of finance.

With regards to individual countries in the panel, while the level of financial development dampens merchandise exports in Burkina Faso and Rwanda, exports on the other hand matters for the development of the financial sector in Benin, Mauritius, and Togo.

There is evidence that positive bi-causal relationship in finance – exports nexus exists in Gambia, Namibia, Nigeria, South Africa, Tanzania, and Uganda while the bi-causal impact of financial development on exports is negative in Cape Verde, Central Africa Rep., Cote' d'Ivoire, Ethiopia, Ghana, Kenya, and Zambia, implying that the eve of financial development is detrimental to trade in those countries.

As a policy measure, the policymakers in SSA would need to deepen existing trade policy reforms to increase the volume of trade in the region as well as evolving country-specific policies to address structural constraints that have hampered the prospects of the intermediation function that could help mobilize resources in support of more trade volume which can in turn promote the development of the financial sector.

Keywords: Financial Development, Merchandise exports, Generalized Method of Moments, SSA

1. Introduction

Financial development in recent time has been recognized as an important factor that affects trade. Beginning with the seminal work of Kletzer and Bardhan (1987) and Baldwin (1989), a number of researchers (Beck, 2002; Ju and Wei 2005; Becker and Greenberg 2007; Antras and Caballero, 2009; Berthou, 2011; Manova, 2013) have argued that, the deeper the financial sector of a country, the greater the ease with which entrepreneurs are able to fulfill the need for external finance, which in turn increases the level of liquidity needed for exports to undertake large exports entry that is typically hard to finance internally (Leibovici, 2015)[1]. Hence, efficient financial intermediations are capable of reducing the barriers to effective international trade and positively affecting a country's trade performance and patterns of specialization. Similarly, trade has also been argued to be a significant factor that could also promote the development of the financial sector of a nation (Do and Levchenko, 2007). Hence, the argument for possible nexus between financial development and trade performance.

Although the broad generalization in the literature[2] is that Africa's trade performance has proven to grow in the least, yet Sub-Saharan Africa (SSA) has recorded a considerable increase in the value of its merchandise trade when viewed in absolute term. The level of SSA merchandise trade (exports and imports) with the world rose from US$92 billion in 1985 to US$622 billion in 2017. However, SSA exports and imports trade remain low compared to other regions for the period 1985-2017. For instance, its exports are almost 22 and 46 times lower than that of developing Asia and developed Europe in 1985. On the import sides, developing Asia and developed Europe outweigh SSA's imports by about 15 times and 19 times in 2015 and 2017 respectively[3].

[1]. Export participation allows firms to lessen the severity of their financial constraint (Greenway et al., 2007).
[2]. Africa exhibited a poor trade performance from the mid-1950s to early 1990s (Yeats, 1996)
[3]. The fact is discussed in section 2.1 under exports performance of SSA

One of the reasons advanced for the weak trade performance in Africa is that the continent, in particular, SSA, has so far focused more on the elimination of trade barriers and less on the development of the productive capacities necessary for trade (UNCTAD, 2013). While the elimination of trade barriers is certainly important, it can only have the desired effect if it is complemented with policy measures that can boost supply capacities, particularly, measures that can facilitate financial intermediation between savers and investors, because international trade flourishes when essential trade-related financial services are available (Fingerand and Ludger, 1999).

The contributions of this paper to the existing body of knowledge in the area of finance and trade relationship are articulated in the following. First, despite the vast body of literature on finance – trade nexus, a dearth of studies on the relationship between finance and trade exists in Africa. The very few studies that have specifically undertaken what appears in the literature an exclusive African study on the finance-trade related debate include Babatunde and Fowowe, 2010; Jaud and Kukenova 2011; Mangani 2013, Wamboye and Mookerjee, 2014 and Yakubu, Aboagye, Mensah and Bokpin, 2018). However, none of these studies address the issue of possible reverse causality between financial development and trade, an important gap this study intends to fill. Third, studies that have examined financial development and trade relationship in SSA have failed to recognize the heterogeneity of economies that make up the region, thereby pooling them together in a single study. In this study, we considered SSA as a whole and further show the nexus between financial development and trade in individual countries that make up the sample in this study, thereby reducing the aggregation bias of the earlier studies. Lastly, although, the Heckscher–Ohlin (H-O) model predicts the reasons why there are differences in international trade patterns across countries, it is, however, limited in its capacity to provide a comprehensive analysis of the relationship between trade and financial development. This study thus addressed the need for better

understanding of the links between financial development and trade by using an extension of the Hecksher-Ohlin-Vanek (HOV) model to incorporate financial development measure in the model in a way to serve as factor endowments, capable of creating a comparative advantage in trade. Thus, explicit and policy-oriented economic research should derive from solid economic theory (Beaudreau, 2010).

With these aims in mind, this paper unfolds as follows. The next section presents the stylized facts about merchandise exports and financial development in SSA. Section 3 reviews the different literature on financial development and trade (exports). Section 4 dwells on the theoretical framework and methodology used while section 5 discusses the empirical analysis while section 6 summarizes and conclude the paper with policy recommendation

2. Stylized Trends of Merchandise Exports and Financial Sector Development in SSA

2.1 Exports Performance of Sub-Saharan Africa

A cursory look at Table 1 indicates that the values of exports in SSA increased markedly in 1985, 2000, 2005 and 2010. However, SSA exports remain low compared to other regions for the period 1985-2017. For instance, its exports are almost 22 and 46 times lower than that of developing Asia and developed Europe in 1985. The gap however reduced to about 18 and 19 times in 2015 and 2017 when compared to the two regions. Despite the increase in the value of merchandise exports, SSA remains a marginal player in world trade when compared to other regions. The share of exports in global trade has increased substantially in all the developing and developed regions. However, SSA lags behind all other regions of the world in terms of its share of global trade. The share of its exports in the world trade is around 3 times less than that of

developing Asia and about 21 times less than that of developed Europe in 2015 and 2017 (Table 2).

Table 1: SSA's Total Merchandise Trade Compared to other Region: 1985-2017

	Exports (US$ Billions)					
	1985	2005	2010	2015	2016	2017
Sub-Saharan Africa	50	194	344	281	252	299
Developing America	109	586	892	923	889	996
Developing Asia	311	2904	5016	6075	5781	6435
Developed America	310	1262	1666	1913	1842	1968
Developed Asia	183	638	828	688	705	759
Developed Europe	840	4313	5516	5789	5778	6320

Source: Computed from UNCTADstat database, 2018

Table 2: SSA's Total Merchandise Trade Compared to other Region: 1985-2017

	Exports (US$ Billions)					
	1985	2005	2010	2015	2016	2017
Sub-Saharan Africa	2.6	1.9	2.2	1.7	1.6	1.7
Developing America	5.6	5.6	5.8	5.6	5.5	5.6
Developing Asia	15.8	27.6	32.8	36.7	36.1	36.3
Developed America	15.8	12.0	10.9	11.6	11.5	11.1
Developed Asia	9.3	6.1	5.4	4.2	4.4	4.3
Developed Europe	42.8	41.1	36.0	35.0	36.0	35.6

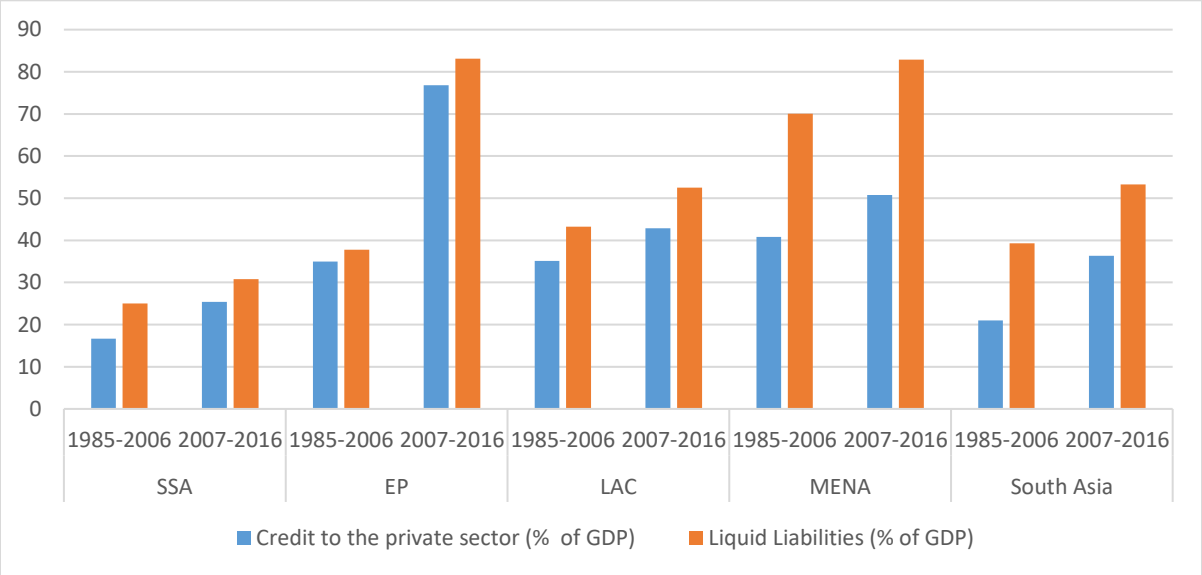
Source: Computed from UNCTADstat database, 2018

2.2 Banking Sector development in SSA and other Regions

On average, financial development in SSA is still shallow when compared to other developing regions of the world (Figure 1). For instance, the average ratio of private credits of 16.7% and 25.4% in 1985-2006 and 2007-2016 in SSA was clearly below that of EAP, LAC, MENA, and South Asia respectively for the same period. Similarly, the liquid liabilities as a percentage of GDP is about 25.0% in SSA while MENA posted about 70.0%%, followed by 43.3%, 39.3%, and 37.8% respectively in LAC, South Asia and EAP in that other respectively in 1986-2006. The same pattern is also observed for 2007-2016. The low level of private credit and liquid liabilities demonstrate the

underdevelopment of the financial sector of SSA when compared to other regions.

Figure 1: Banking Sector development indicators: SSA and other Regions: 1985-2016



Source: graphed by the author from the data obtained from Global Financial Development Database (2018)

Given the heterogeneity of economies in SSA, indicators of the financial sector development, when viewed in aggregate, may obscure the disparities across countries. Using 1985-2006 as a benchmark, the depth of the financial system, as measured on average by liquid liabilities (M3) and the private sector credit as a percentage of GDP is higher in all of the SSA countries in 2007-2016, compared to 1985-2006 level (Table 3). Compared to the 1996-2006 figure, the average values of liquid liabilities (M3) and private sector credit has equally improved in several countries across all the countries.

Table 3: Individual Countries Banking Sector development indicators:1985-2016

	Credit to the private sector (% of GDP)		Liquid Liabilities (% of GDP)	
	1985-2006	2007-2016	1985-2006	2007-2016
Angola	3.1	18.6	14	31.7
Botswana	14.9	27.2	26.3	43.6
Burkina Faso	11.8	20.6	20.9	27.8
Cameroon	8.1	12.4	14.8	20.6
Congo, Rep.	5.3	8.5	13.4	28.2
Côte d'Ivoire	14.4	17.1	22.8	32.5
Gabon	8.6	10.9	14.9	20.7
Gambia, The	8.2	14.2	24.6	49
Ghana	6.4	14.6	15.2	27.3
Guinea	2.8	5.5	9.1	20.5
Guinea-Bissau	2.5	7.9	17.7	31.9
Kenya	21.6	27.2	32.1	37.4
Madagascar	8.6	11.1	22.3	22.3
Malawi	2.8	10	9.4	19.5
Mali	13.4	17.3	20.9	24.9
Mozambique	9.9	22.4	19.5	37.7
Namibia	43.4	47.3	38.2	51
Niger	5.1	12.1	10.9	20.5
Nigeria	7.7	14.3	11.6	19.5
Senegal	17.4	27.4	25.5	39.2
Sierra Leone	2	5.3	11.2	18.9
South Africa	61.4	68.5	45.2	41.4
Tanzania	4.8	11.7	17.2	21.9
Togo	16.4	26	25.5	42.8
Uganda	6	11.4	14.7	15.9
Zambia	6.6	11.1	17.3	18.1

Source: Computed from Global Financial Development Database (2018)

3. Literature Review

Indeed, several studies have investigated the relationship between financial development and trade (see Beck, 2002; Hur, Raj, and Riyanto, 2006; Kim, 2011; Kim, Lin, and Suen, 2010 a,b; Svaleryd and Vlachos, 2005). However, two main strands of arguments have evolved from the trade-finance empirics. One strand of the literature emphasizes the importance of financial development in promoting international trade, while the other focuses on the reverse causality from financial development to trade. So far, existing studies on each area of the

study point to mixed conclusions. Building on a theoretical model of the seminar paper of Kletzer and Bardhan (1987) and Baldwin (1989), Beck (2002) pioneered the empirical research in this line of thought. He uses a 30-year panel for 65 countries from 1966 to 1995 and focuses on the role of finance in mobilizing savings and allocating such in the form of loanable funds to facilitate large scale production. Beck (2002) uses the credit to the banks and other financial institutions as a percentage of GDP to proxy financial development. After controlling for unobserved country heterogeneity and possible reverse causality, he finds that countries with better-developed financial sectors have higher shares of manufactured exports and trade balance in manufactured goods. To verify the hypothesis that countries with a higher level of financial development have higher export shares and trade balances in industries that rely more on external finance, Beck (2003) applies the technique of Rajan and Zingales (1998) to industry – level data for 36 industries and 56 countries. The result robustly confirms the positive impact of a better developed financial sector on the export volumes, particularly in industries that report a larger level of external financial dependence. More recently, a number of studies (e.g Svaleryd and Vlachos, 2005; Ju and Wei, 2005; Wynne 2005; Hur *et al*., 2006; Becker and Greenberg, 2013, Susanto and Rosson, 2011; Lin, and Suen, 2012, Leibovici, 2015; Gachter and Gkrintzalis, 2017) have all confirmed the trade-enhancing effect of finance.

The second strand of argument maintained that the level of financial development in itself is influenced by international trade, hence the argument for possible reverse causality. Some of the studies opined that policies which encourage openness to external trade tend to boost financial systems that are linked to finance-dependent sectors of the economy and therefore, financial development is treated as endogenous, rather than being an exogenous factor that determines a country's pattern of trade. Do and Levchenko (2007) for instance, in a cross -country regression of 96 countries between 1970 to 1999,

uses private credit as a share of GDP to proxy financial development as the dependent variable. The result shows that countries with a comparative advantage in financially intensive goods experience a higher demand for external finance than those that export goods that require lower external finance. Recent studies that have documented similar results include Huang and Temple, 2005; Klein and Olivei, 2008; Kim *et al,* 2010; Baltagi *et al.,* 2009; Matadeen and Seetanah, 2013. In a sample of 63 countries over the period 1960–2007, Kim *et al.* (2012) found a positive effect of financial development on trade, whereas the effect of trade on domestic financial development was unclear.

Some other studies such as Samba and Yan (2009), Gries *et al.* (2009), Kiendrebeogo, (2012), Wamboye and Mookerjee (2014), have internalized the above two lines of thought to consider both financial development and trade as endogenous variables, using various econometric techniques, ranging from VECM to panel causality and panel ARDL. The studies point to varying results of causality running from either financial development to trade or from trade to financial development or both. Also, Kim et al. (2010) used panel data for 87 OECD and non-OECD countries over 1960–2005 to investigate the long and short-run relationships between financial development and international trade. The authors found a positive long-run nexus between trade and finance, while such relationship is negative in the short run, suggesting that, in the long run, finance and trade are complements. However, when the sample was separated into OECD and non-OECD countries, the findings only held for the non-OECD countries where the majority of the African countries fell. For OECD countries, financial development has insignificant effects on trade. Thus, the overall effect of finance on international trade could be more to country-specific than it is to a group of countries.

Studies such as Hur *et al.* (2006) and Manova (2008) have examined the finance-trade nexus at Industry/sectoral levels. Hur *et al* (2006) investigated the impact of a country's financial development and a firm's asset structure on the trade flow of different industries. Using data for 27 industries in 42 countries they found that economies with higher levels of financial development had higher export shares and trade balance in industries with more intangible assets. Manova (2008) developed a model with credit-constrained heterogeneous firms, countries at different levels of financial development, and sectors of varying financial vulnerability. She showed that financially developed countries are more likely to export bilaterally and ship greater volumes when they become exporters. She empirically found robust, systematic variations in export participation, volumes, product variety, product turnover, and trade partners across countries at different levels of financial development and across sectors at different levels of financial vulnerability.

4. Theoretical Framework and Methodology

4.1 Theoretical Framework

The theoretical foundation on which the relationship between financial development and international trade is based, evolved from a version of the augmented Heckscher–Ohlin model known as the Hecksher-Ohlin-Vanek (H-O-V) model. The model states that trade is linearly related to factor endowments-made up of factor input*s* θ and vector of other factors V^c. In general, then, Eq. 1 formalizes this idea.

$$T^c = \theta V^c \qquad 1$$

In functional form, the basic function becomes:

$$T_c = f(K_c, L_c, \emptyset_c) \qquad 2$$

Where for country c, physical capital (k), labour (L) are factor inputs and $\emptyset$ is a collection of vectors of other possible sources $\emptyset$ of comparative advantage in trade. As noted in the literature review section, financial sector development (*FD*) importantly determines international trade patterns and constitutes other

sources of comparative advantage in trade. According to beck (2000), countries with a high level of financial development tend to have a high share of exports and trade balance. Hence, ∅ affects a country's trade level and can be expressed as a function of *FD* thus:

$$\emptyset_c = \emptyset(FD_c) \quad 3$$

Incorporating eq.3 into eq. 2, we have an expanded trade function, consequently:

$$T_j = f(K_c, L_c, FD_c) \quad 4$$

Eq. 4 sets out trade as a linear function of capital, labour, and financial development in a way consistence with H-O-V model.

4.2 Methodology

4.2.1. Model specification and estimation technique

Arising from the foregoing theoretical framework, and in fulfillment of the objectives of this study, a country's trade (measured by exports), as determined by financial development is specified in logarithmic form, using the following baseline regression specification:

$$T_{it} = \alpha + \beta_1 * FD_{it} + \beta_2 * K_{it} + \beta_3 * L_{it} + \beta_4 * W_{it} + \mu_i + \gamma_t + \varepsilon_{it} \quad 5$$

Where: *T* is total exports as a measure of trade, FD represents financial development, K is physical capital, L is labour and w is a set of control variables (such as GDP per capital, inflation rate, real effective exchange rate) to capture other factors associated with trade. α, β_1, β_2, β_3 and β_4 are unknown parameters to be estimated. μ, γ and ε are country fixed effects, time effects, and idiosyncratic error term, respectively. Country fixed effects control for any fixed effects common across countries while time dummies allow us to capture the provincial features of economic performance. In equation 5, β_1 is the coefficient of interest and it is expected to be positive.

Since the level of financial development in itself is influenced by international trade (Do and Levchenko, 2004; 2007), and to account for the possible reverse causality, the two-way linkages between trade and financial

development is examined empirically, using the following simultaneous equations models:

$$T_{it} = \alpha + \beta_1 * FD_{it} + \beta_2 * K_{it} + \beta_3 * L_{it} + \beta_4 * W_{it} + \mu_i + \gamma_t + \varepsilon_{it} \quad 6$$

$$FD_{it} = \alpha + \beta_1 * T_{it} + \beta_2 * K_{it} + \beta_3 * L_{it} + \beta_3 * W_{it} + \mu_i + \gamma_t + \varepsilon_{it} \quad 7$$

Equation 5-7 can be estimated by OLS. However, OLS could lead to a statistical bias in the estimated coefficient on trade and financial development, as it neither eliminates the unobservable country-specific effects nor does it deal with possible endogeneity in the regressors (possible reverse causality). To solve the problem, an instrumental variables estimator using the Generalized Method of Moments (GMM) is used. This methodology gives us coefficient estimates that are corrected for endogeneity. A short introduction to this approach is provided in what follows.

4.2.2 The IV–GMM estimator

GMM formalization is typically attributed to Hansen (1982) who proved that every instrumental variable estimator, in linear or nonlinear models, with cross-section, time series or panel data, could be cast as a GMM estimator. Therefore GMM is sometimes viewed as a unifying framework for inference in econometrics. Considering the model:

$$y_i = X_i\theta + \mu \quad 8$$

Where $E(\mu\mu') = \Omega$, X is a matrix of regressors, which is a combination of X_1 endogenous regressors and X_2 exogenous. In other words, In the Generalized Method of Moments IV (IV-GMM) estimator framework, $X(N \times K)$ define a matrix $Z(N \times \ell)$ where $\ell \geq K$. Existence of endogenous regressors $(E(X_i\mu_i) \neq 0)$ causes estimators to be biased, and this necessitates that instruments be introduced so that the problems can be solved. Z is a matrix of regressors which are all exogenous $(E(X_i\mu_i) = 0)$. Z can be constructed in the way that it consists of two

subdivisions, Z_1 which is not included in the original equation (excluded instruments) and Z_2. Condition that $E(Z_i\mu_i = 0)$ can be expressed as:

$$E(g_i, \theta = 0), \quad 9$$

$$\bar{g}(\hat{\theta}) = \frac{1}{n}\sum_{i=1}^{n} g_i(\hat{\theta}) = \frac{1}{n}\sum_{i=1}^{n} Z_i'(y_i - X_i\hat{\theta}) = \frac{1}{n} Z'\hat{\mu}, \quad 10$$

Where $g_i\hat{\theta} = Z'\mu_i$, g is a vector with ℓ -columns, where ℓ equals the number of instruments, so there are ℓ conditions that need to be fulfilled. So, the aim of the GMM is to set θ that will meet the condition $\bar{g}(\hat{\theta}) = 0$, in this case $\ell = K$ and the equation to be estimated is said to be exactly identified by the order condition for identification: that is, there are as many excluded instruments as included right-hand endogenous variables. The method of moment's problem is then k equations in k unknowns, and a unique solution exists, equivalent to the standard IV estimator.

$$\hat{\theta}_{IV} = (X'Z)^{-1}Z'y) \quad 11$$

However, in the case of overidentification, where ℓ > *K*, there will be more equations than unknowns and finding $\hat{\theta}$ that solves all equations is impossible. Thus, there is a need for use of a weighing matrix W (with L columns and L rows), hence the objective function is:

$$\min_{\hat{\theta}} J(\hat{\theta}) = n\bar{g}(\hat{\theta}')W\bar{g}(\hat{\theta}) \quad 12$$

Differentiating with respect to $\hat{\theta}$

$$\frac{\partial J(\hat{\theta})}{\partial \hat{\theta}} = 0 \quad 13$$

and solving the order conditions leads to IV-GMM estimator of an overidentified equation

$$\theta_{G\hat{M}M} = (X'ZWZ'X)^{-1}X'ZWZ'y) \quad 14$$

Furthermore, the choice of a weighing matrix is a decisive factor in improving the efficiency of the GMM estimator. It can be observed from the equation (14)

that every W which is a non-zero scalar would not change $\hat{\theta}$. However, choosing W to be a scalar would place an equal-weighted metric on the moment vector, what is very likely to be a source of bias. For example, if there are two instruments with means equaling zero, but with dramatically different variations. Moments based on the instruments with bigger variation will dominate the others. This means that choosing a W to be a scalar is not efficient, this lack of efficiency is signaled by for example high variance. Hence to ensure efficiency W must be constructed in a way that weight moments according to their variance (and covariance between moments).

4.2.3. Data and variable description

Empirical analysis in this study covers the period 1985-2016 due to data availability constraint. The data were obtained from four different sources: United Nation's UNCTAD database, World Bank, World Development Indicators Database, Global Financial Development Database and Bruegel Database. The variables used for estimations are described in Table 4. Annual data for the variables were obtained for the 25 Sub-Saharan African countries, which are Benin, Botswana, Burkina Faso, Burundi, Cape Verde, Cote d'Ivoire, Central Africa Rep, Ethiopia, Gambia, Ghana, Guinea, Kenya, Lesotho, Madagascar, Mauritania, Mauritius, Namibia, Nigeria, Rwanda, Senegal, South Africa, Tanzania, Togo, Uganda, Zambia, for which all data sets required for estimation are available.

Table 4: Source and Definition of the Variables

Variable	Variable Definition	Data Sources
TME	Total Merchandise Exports	United Nation's UNCTAD database (2018)
FD	Domestic private credit (% of GDP)	Global Financial Development Database (GFDD, 2018)
GFCF	Gross fixed Capital formation (% of GDP)	World Development Indicator (WDI, 2018)
LAB	Working population ages 15-64 (% of total)	World Development Indicator (WDI, 2018)
GDPPC	per capita Income	World Development Indicator (WDI, 2018)
INF	Inflation (consumer price index)	World Development Indicator (WDI, 2018)

REER	Real effective exchange rate (CPI base)	Bruegel, 'Real effective index for 178 countries: a new database (updated version)

Source: Author's compilation

5. Empirical Results and Discussion

5.1 Preliminary analysis

5.1.1 Descriptive Statistics

To describe the characteristics of the variables used for the regression analysis, the summary statistics of the mean value, the standard deviation and the coefficient of variation associated with the actual values of the different variables used in this study, both for the individual country as well as for the global is reported in Table 5. On average, the highest levels of merchandise exports as a percentage of GDP (44.548), financial development, proxied by private credit as a percentage of GDP (33.410), gross fixed capital formation (27.092) and labour as a percentage of total population are found in Botswana, Zambia, Togo and South Africa respectively, while the lowest mean for the merchandise exports and gross fixed capital formation is found in Cape-Verde, with Benin and Burkina Faso accounting for the lowest mean of financial development (11.568) and labour value (38.284) respectively.

Considering the volatility of the individual series using the standard deviation-to-mean ratio, Senegal's merchandise exports is the most volatile compared with other countries as it has the highest coefficient of variation (11.826). In terms of financial development, gross fixed capital formation, labour and real effective exchange rate, Cote 'd'Ivoire, South Africa, Burundi and Cape Verde are the most volatile as they recorded the highest coefficient of variations of 1.787, 3.830, 11.797 and 26.996 respectively. The highest standard deviation-to-mean ratio in Botswana confirms it as the most volatile country in term of variations in inflation (3.593) compared to other countries.

5.2.2 Stationarity / unit root test

In order to identify the stationary properties of the relevant variables, the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests were conducted for each of the individual country used in the study in order to have a more robust analysis. Some variables appear to be stationary at level, while some achieve stationarity after first difference. Thereafter, the individual variables are used in the model estimation according to their respective level of stationarity as shown in Table 6A. For the panel data analysis, the first generation panel unit root tests (Levin, Lin and Chu (2002),- LLC; Im, Pesaran, and Shin (2003),- IPS; Fisher tests using Augmented Dickey and Fuller (ADF) (1979), and Phillips and Perron (1988)[4] were employed in order to decide which variables should enter the proposed modeling in their level form or after differencing, so as to avoid mis-specification of the model. These tests are divided in two groups. The first group of tests which includes LLC's test assumes a common unit root process across the cross-section. The other tests-IPS, Fisher-ADF and Fisher-PP assume individual unit root process across the cross-section. For all these tests, the null hypothesis is that there is a unit root and the alternative hypothesis is that there is no unit root. We assume that the test regressions contain an intercept and no deterministic trend. The numbers of lags selected are selected automatically using Schwarz Information Criterion (SIC). The panel unit roots in table 5B revealed that the null hypothesis of panel unit root is rejected for financial development, gross fixed capital formation, labour force, real GDP per capital, and inflation rate, This implies that these variables are stationary and they can enter the proposed modeling in their level forms, while for the other two variables (namely, total merchandise exports, and real effective exchange rate), the null hypothesis of the panel unit root is not rejected, implying that these variables are non-stationary and can enter into the modeling in their first difference form as shown in Table 6B.

[4] The stata 15 software package have incorporated all of the first generation panel unit root tests

Table 5: Summary statistics of the data used for regression analysis

Individual Country	Descriptive Statistics	TME	FD	GFCF	LAB	GDPPC	INF	REER
Benin	Mean	17.160	11.568	19.074	39.372	1496.422	3.108	96.046
	Std. dev.	3.468	7.182	9.330	5.570	2535.853	2.196	7.547
	CV	4.948	1.611	2.044	7.069	0.590	1.415	12.726
Botswana	Mean	44.548	18.578	18.398	40.357	1531.240	7.841	104.244
	Std. dev.	5.924	25.972	8.581	5.581	1725.356	2.182	6.739
	CV	7.520	0.715	2.144	7.231	0.887	3.593	15.469
Burkina Faso	Mean	12.251	20.245	17.461	38.284	1826.360	2.792	97.151
	Std. dev.	5.203	24.945	7.028	6.581	2831.006	2.705	5.298
	CV	2.354	0.812	2.485	5.818	0.645	1.032	18.336
Burundi	Mean	4.990	11.883	20.175	41.200	1551.827	11.939	125.218
	Std. dev.	1.340	7.477	10.055	3.493	2639.638	8.509	23.090
	CV	3.722	1.589	2.006	11.797	0.588	1.403	5.423
Cape Verde	Mean	2.429	19.866	17.276	39.785	1424.963	3.151	102.215
	Std. dev.	0.939	25.761	5.870	7.087	1814.972	2.329	3.786
	CV	2.588	0.771	2.943	5.613	0.785	1.353	26.996
Central Africa Republic (CAR)	Mean	10.978	18.381	18.449	40.877	1758.742	6.000	101.638
	Std. dev.	3.969	27.737	9.700	4.785	2487.921	9.074	11.837
	CV	2.766	0.663	1.902	8.543	0.707	0.661	8.586
Cote'd'Ivoire	Mean	40.928	13.127	19.743	39.971	1505.774	2.691	95.476
	Std. dev.	4.578	7.346	8.998	5.589	2290.362	1.597	7.149
	CV	8.940	1.787	2.194	7.152	0.657	1.686	13.355
Ethiopia	Mean	6.822	21.760	18.624	41.094	1688.112	11.819	104.594
	Std. dev.	1.341	30.827	8.563	5.474	1911.422	11.038	19.430
	CV	5.089	0.706	2.175	7.507	0.883	1.071	5.383
Gambia	Mean	4.839	12.401	20.065	41.876	1516.677	5.391	117.106
	Std. dev.	4.486	8.078	8.939	3.582	2262.995	4.028	39.396
	CV	1.079	1.535	2.245	11.691	0.670	1.338	2.973
Ghana	Mean	26.502	21.923	18.215	40.307	1561.747	17.954	92.382
	Std. dev.	5.263	27.244	4.944	7.302	2021.888	9.527	19.007
	CV	5.036	0.805	3.684	5.520	0.772	1.885	4.860
Guinea	Mean	25.120	16.898	21.924	39.489	1752.055	18.376	113.189
	Std. dev.	5.587	17.560	9.922	5.673	2392.887	9.013	21.487

	CV	4.496	0.962	2.210	6.961	0.732	2.039	5.268
Kenya	Mean	13.869	18.800	20.690	41.416	1882.775	9.417	98.785
	Std. dev.	2.389	26.595	8.383	5.468	2509.945	5.067	16.505
	CV	5.806	0.707	2.468	7.574	0.750	1.859	5.985
Lesotho	Mean	35.004	23.333	21.476	39.494	1499.231	7.915	91.419
	Std. dev.	9.505	32.047	10.187	6.898	1941.536	6.557	13.318
	CV	3.683	0.728	2.108	5.726	0.772	1.207	6.864
Madagascar	Mean	16.535	14.114	22.094	40.754	1579.362	9.616	106.041
	Std. dev.	3.322	9.212	7.690	5.582	2193.290	4.617	12.899
	CV	4.978	1.532	2.873	7.301	0.720	2.083	8.221
Mauritania	Mean	35.183	15.597	23.026	42.257	1646.331	5.450	102.882
	Std. dev.	10.051	10.644	7.514	4.122	2211.189	2.670	8.710
	CV	3.500	1.465	3.064	10.252	0.745	2.041	11.812
Mauritius	Mean	30.255	27.893	24.813	40.983	1880.813	5.404	112.141
	Std. dev.	6.788	31.388	7.575	7.124	2442.415	2.284	7.594
	CV	4.457	0.889	3.276	5.753	0.770	2.366	14.768
Namibia	Mean	33.267	24.988	23.795	41.684	2028.633	5.893	98.186
	Std. dev.	3.043	31.154	8.136	6.026	2504.413	2.136	8.745
	CV	10.932	0.802	2.925	6.917	0.810	2.759	11.227
Nigeria	Mean	33.865	18.666	24.244	41.750	1702.607	11.953	129.016
	Std. dev.	10.468	12.517	8.873	5.936	2277.662	5.448	63.380
	CV	3.235	1.491	2.732	7.033	0.748	2.194	2.036
Rwanda	Mean	5.321	31.572	25.156	41.927	2277.056	6.629	112.558
	Std. dev.	1.959	32.366	6.730	5.771	2605.240	3.935	15.427
	CV	2.716	0.975	3.738	7.265	0.874	1.685	7.296
Senegal	Mean	18.233	29.380	24.771	39.445	2249.809	1.937	95.848
	Std. dev.	1.542	34.037	9.888	6.672	2917.852	1.617	3.769
	CV	11.826	0.863	2.505	5.912	0.771	1.198	25.432
South Africa	Mean	22.957	20.656	25.454	43.229	1819.551	6.029	101.263
	Std. dev.	2.844	12.068	6.646	4.530	2415.177	2.174	11.151
	CV	8.071	1.712	3.830	9.544	0.753	2.773	9.081
Tanzania	Mean	10.124	32.414	26.727	41.259	2138.070	9.020	125.834
	Std. dev.	2.148	34.716	9.556	7.014	2809.303	4.616	20.369
	CV	4.712	0.934	2.797	5.882	0.761	1.954	6.178
Togo	Mean	29.882	25.890	27.092	41.308	2156.966	2.899	98.173
	Std. dev.	3.187	21.805	12.024	6.237	2802.345	2.516	6.191
	CV	9.375	1.187	2.253	6.623	0.770	1.152	15.858
Uganda	Mean	8.839	28.742	26.459	42.254	2225.598	6.889	103.940

	Std. dev.	1.368	31.107	7.841	5.937	2736.500	4.709	11.629
	CV	6.462	0.924	3.375	7.117	0.813	1.463	8.938
Zambia	Mean	29.266	33.410	26.088	41.142	1978.213	16.900	85.912
	Std. dev.	5.780	33.888	11.386	6.717	2591.997	9.457	22.888
	CV	5.063	0.986	2.291	6.125	0.763	1.787	3.754
Global Panel	Mean	20.767	21.283	22.052	40.861	1787.157	7.880	104.450
	Std. dev.	13.270	24.875	9.079	5.847	2372.315	7.182	22.281
	CV	1.565	0.856	2.429	6.988	0.753	1.097	4.688

Notes: CV indicates the coefficients of variation (standard deviation-to-mean ratio)

*Critical value at the 1% and 5% significance level are denoted by * and ***

Source: Authors computation from Stata 15

Table 6A: Unit root tests results based on Individual country in SSA

Individual Country	Test Statistics		TME	FD	GFCF	LAB	GDPPC	INF	REER
Benin	ADF	Level	-1.993	-2.951*	-6.111*	-1.561	-6.149	-4.473*	-1.611
		1st Difference	-2.962*	-3.831*	-7.445*	-4.235*	-8.364*	-7.368*	-4.091*
	PP	Level	-2.084	-2.813**	-7.005*	-1.617	-6.510*	-4.481*	-4.481*
		1st Difference	-2.694**	-3.793*	-11.028*	-4.291*	-12.273*	-9.490*	-9.490*
	Decision		I(1)	I(0)	I(0)	I(1)	I(0)	I(0)	I(1)
Botswana	ADF	Level	-2.654**	-5.769*	-5.258*	-3.906*	-7.323*	-1.561	-2.258
		1st Difference	-4.624*	-9.194*	-7.055*	-5.753*	-9.042*	-6.241*	-2.578**
	PP	Level	-2.627**	-5.843*	-5.382*	-3.886*	-8.494*	-1.402	-1.362
		1st Difference	-4.637*	-10.580*	-9.893*	-6.451*	-12.406*	-6.584*	-2.386**
	Decision		I(0)	I(0)	I(0)	I(0)	I(0)	I(1)	I(1)
Burkina Faso	ADF	Level	-0.607	-3.364*	-4.876*	-3.640*	-6.907*	-5.078*	-1.707
		1st Difference	-3.600*	-6.223*	-6.898*	-4.802*	-10.650*	-6.622*	-3.994*
	PP	Level	-0.702	-3.363*	-4.964*	-3.582*	-7.060*	-5.475*	-1.715
		1st Difference	-3.577*	-6.218*	-8.422*	-5.202*	-11.949*	-11.097*	-3.970*
	Decision		I(1)	I(0)	I(0)	I(0)	I(0)	I(0)	I(1)
Burundi	ADF	Level	-2.291	-4.676	-6.277*	-4.661*	-6.462*	-4.189*	-1.195
		1st Difference	-6.156*	-7.115**	-7.636*	-5.829*	-8.291*	-5.834*	-3.220*
	PP	Level	-2.429*	-7.470*	-7.314*	-4.877*	-7.247*	-4.392*	-1.275
		1st Difference	-6.162*	-7.314*	-11.734*	-7.508*	-13.659*	-7.484*	-3.288*
	Decision		I(0)	I(0)	I(0)	I(0)	I(0)	I(0)	I(1)
Cape Verde	ADF	Level	-0.568	-5.299*	-2.520	-3.429*	-5.685*	-2.241	-1.785
		1st Difference	-4.337*	-9.335*	-4.146*	-4.662*	-8.509*	-6.168*	-4.067*
	PP	Level	-0.570	-5.253*	-2.513	-3.397*	-5.969*	-2.167	-1.950
		1st Difference	-4.335*	-9.953*	-4.151*	-5.206*	-9.697*	-6.268*	-4.069*
	Decision		I(1)	I(0)	I(1)	I(0)	I(0)	I(1)	I(1)
CAR	ADF	Level	-0.399	-4.394*	-5.512*	-6.269*	-6.217*	-2.410	0.507
		1st Difference	-3.791*	-6.657*	-6.753*	-8.389*	-7.337*	-7.021*	-3.188*
	PP	Level	-0.373	-4.403*	-5.970*	-6.453*	-7.289*	-2.425	0.301
		1st Difference	-3.787*	-7.475*	-8.459*	-10.717*	-10.710*	-7.292*	-3.148*
			I(1)	I(0)	I(0)	I(0)	I(0)	I(1)	I(1)
Cote'd'Ivoire	ADF	Level	-1.708	-4.088*	-6.499*	-1.669	-6.069*	-4.848*	-1.579
		1st Difference	-4.798*	-5.838*	-7.693*	-4.548*	-8.095*	-7.621*	-4.014*
	PP	Level	-1.729	-4.066*	-8.477*	-1.720	-6.534*	-4.903*	-1.560
		1st Difference	-4.798*	-6.295*	-11.613*	-4.657*	-12.139*	-11.071*	-3.992*
	Decision		I(1)	I(0)	I(0)	I(1)	I(0)	I(0)	I(1)
Ethiopia	ADF	Level	-2.912**	-4.403*	-5.106*	-3.806*	-7.065*	-3.452*	-0.011
		1st Difference	-4.890*	-8.088*	-6.462*	-6.162*	-8.575*	-9.171*	-3.644*
	PP	Level	-2.927**	-4.403*	-5.341*	-3.790*	-8.256*	-3.532**	0.156

		1st Difference	-5.485*	-8.721*	-8.827*	-6.830*	-11.951*	-11.448*	-3.582**
		Decision	I(0)	I(0)	I(0)	I(0)	I(0)	I(0)	I(1)
Gambia	ADF	Level	-0.644	-3.827*	-6.187*	-4.585*	-6.316*	-2.737**	-1.265
		1st Difference	-5.675*	-5.974*	-7.795*	-6.865*	-7.907*	-5.431*	-2.503***
	PP	Level	-0.534	-3.817*	-6.776*	-4.677*	-7.274*	-2.744**	-1.319
		1st Difference	-5.546*	-6.261*	-12.233*	-8.643*	-13.118*	-5.416*	-2.506***
		Decision	I(1)	I(0)	I(0)	I(0)	I(0)	I(0)	I(1)
Ghana	ADF	Level	-1.830	-4.535*	-2.848***	-3.476**	-5.423*	-3.502**	-1.080
		1st Difference	-3.805*	-8.052*	-4.684*	-4.879*	-8.334*	-4.944*	-4.504*
	PP	Level	-1.998	-4.542*	-2.804***	-3.442**	-5.622*	-3.516**	-1.006
		1st Difference	-3.818*	-8.238*	-4.702*	-5.430*	-9.246*	-5.218*	-4.556*
		Decision	I(1)	I(0)	I(0)	I(0)	I(0)	I(0)	I(1)
Guinea	ADF	Level	-2.345	-5.046*	-4.831*	-3.200***	-6.967*	-2.917***	-1.255
		1st Difference	-4.809*	-8.838*	-6.586*	-4.027*	-9.730*	-4.859*	-3.045**
	PP	Level	-2.317	-4.987*	-4.825*	-3.078**	-7.051*	-2.829***	-1.425
		1st Difference	-4.836*	-9.264*	-7.703*	-4.118*	-13.788*	-5.062*	-3.010**
		Decision	I(1)	I(0)	I(0)	I(0)	I(0)	I(0)	I(1)
Kenya	ADF	Level	-0.628	-3.571*	4.848*	-5.894*	-6.238*	-3.719*	-0.434
		1st Difference	-4.072*	-5.731*	-7.441*	-8.535*	-7.109*	-5.871*	-4.408*
	PP	Level	-0.609	-3.549**	-4.906*	-5.968*	-7.426*	-3.687**	-0.268
		1st Difference	-4.078*	-6.158*	-8.269*	-10.414*	-10.562*	-7.250*	-4.525*
		Decision	I(1)	I(0)	I(0)	I(0)	I(0)	I(0)	I(1)
Lesotho	ADF	Level	-1.843	-4.606*	-4.068*	-3.807*	-5.819*	-3.269**	-1.595
		1st Difference	-3.597**	-8.512*	-5.774*	-4.956*	-9.315*	-5.640*	-2.838***
	PP	Level	-1.850	-4.602*	-4.063*	-3.767*	-5.796*	-3.250**	-1.889
		1st Difference	-3.598**	-8.815*	-7.284*	-5.591*	-11.176*	-6.053*	-2.825***
		Decision	I(1)	I(0)	I(0)	I(0)	I(0)	I(0)	I(1)
Madagascar	ADF	Level	-2.984***	-3.619**	-4.774*	-1.877	-6.098*	-5.759*	-1.919
		1st Difference	-4.650*	-5.892*	-7.454*	-5.247*	-8.003*	-7.839*	-3.880*
	PP	Level	-2.894***	-3.593**	-4.786*	-1.907	-6.647*	-5.817*	-2.117
		1st Difference	-5.018*	-6.277*	-8.462*	-5.392*	-12.000*	-10.387*	-3.875*
		Decision	I(0)	I(0)	I(0)	I(1)	I(0)	I(0)	I(1)
Mauritania	ADF	Level	-1.269	-4.340*	-4.308*	-4.322*	-6.298*	-1.703	-1.872
		1st Difference	-2.964***	-6.523*	-6.876*	-7.646*	-7.833*	-4.597*	-2.487
	PP	Level	-1.535	-4.344*	-4.308*	-4.327*	-7.294*	-1.657	-1.971
		1st Difference	-3.007**	-7.604*	-7.388*	-9.180*	-13.046*	-4.602*	-2.526
		Decision	I(1)	I(0)	I(0)	I(0)	I(0)	I(1)	I(1)
Mauritius	ADF	Level	-0.989	-4.611*	-5.614*	-3.734*	-5.420*	-1.887	-1.135
		1st Difference	-3.415**	-7.704*	-6.983*	-5.311*	-8.412*	-4.705*	-4.169*
	PP	Level	-0.994	-4.641*	-6.010*	-3.707**	-5.593*	-1.786	-1.281
		1st Difference	-3.364**	-8.626*	-10.299*	-6.083*	-9.425*	-4.855*	-4.176*

		Decision	I(1)	I(0)	I(0)	I(0)	I(0)	I(1)	I(1)
Namibia	ADF	Level	-1.858	-4.212*	-4.311*	-5.575*	-6.216*	-2.382	-1.904
		1st Difference	-4.450*	-6.401*	-5.977*	-9.144*	-6.952*	-3.407**	-3.431*
	PP	Level	-2.045	-4.213*	-4.328*	-5.505*	-7.487*	-2.570	-2.026
		1st Difference	-4.438*	-7.363*	-6.737*	-10.825*	-10.608*	-3.381**	3.394**
		Decision	I(1)	I(0)	I(0)	I(0)	I(0)	I(1)	I(1)
Nigeria	ADF	Level	0.597	-3.942*	-3.832*	-2.647***	-6.140*	-4.571*	-2.315
		1st Difference	-3.465**	-6.046*	-6.013*	-5.879*	-8.112*	-6.035*	-4.426*
	PP	Level	1.276	-3.921*	-3.804*	-2.624***	-6.643	-4.508*	-2.239
		1st Difference	-3.365**	-7.201*	-6.624*	-6.247*	-12.263*	-6.697*	-4.443*
		Decision	I(1)	I(0)	I(0)	I(0)	I(1)	I(0)	I(1)
Rwanda	ADF	Level	-1.094	-4.718*	-5.110*	-3.462**	-7.421*	-2.276	-1.310
		1st Difference	-5.427*	-7.507*	-7.614*	-5.971*	-8.792*	-4.606*	-3.144*
	PP	Level	-0.899	-4.782*	-5.141*	-3.450**	-9.042*	-2.213	-1.581
		1st Difference	-5.605*	-8.403*	-9.955*	-6.945*	-13.465*	-4.750*	-3.151**
		Decision	I(1)	I(0)	I(0)	I(0)	I(0)	I(1)	I(1)
Senegal	ADF	Level	-1.431	-2.339	-5.226*	-4.510*	-6.392*	-2.380	-1.935
		1st Difference	-4.165*	-5.532*	-7.341*	-6.336*	-10.826*	-4.124*	-3.655**
	PP	Level	-1.498	-2.392	-5.219*	-4.580*	-6.288*	-2.384	-2.038
		1st Difference	-4.181*	-5.531*	-9.191*	-7.641*	-11.938*	-4.169*	-3.614**
		Decision	I(1)	I(1)	I(0)	I(0)	I(0)	I(1)	I(1)
South Africa	ADF	Level	-2.281	-5.068*	-4.202*	-4.488*	-6.391*	-2.828***	-2.150
		1st Difference	-5.377*	-8.197*	-7.333*	-7.160*	-7.942*	-4.005*	-3.529**
	PP	Level	-2.207	-5.045*	-4.206*	-4.497*	-7.385*	-2.792***	-2.237
		1st Difference	-5.657*	-10.007*	-7.837*	-8.810*	-13.211*	-4.010*	-3.504**
		Decision	I(1)	I(0)	I(0)	I(0)	I(0)	I(0)	I(1)
Tanzania	ADF	Level	-1.740	-4.197*	-4.488*	-3.759*	-5.367*	-2.575	-1.090
		1st Difference	-2.919***	-7.281*	-8.498*	-5.627*	-8.372*	-4.154*	-2.842***
	PP	Level	-2.022	-4.196*	-4.571*	-3.738*	-5.535*	-2.563	-1.351
		1st Difference	-2.805*	-7.321*	-9.190*	-6.632*	-9.312*	-4.177*	-2.818*
		Decision	I(1)	I(0)	I(0)	I(0)	I(0)	I(0)	I(1)
Togo	ADF	Level	-2.261	-3.809*	-4.426*	-3.910*	-6.548*	-4.010*	-1.437
		1st Difference	-5.050*	-6.518*	-7.585*	-5.529*	-9.488*	-5.282*	-3.964*
	PP	Level	-2.315	-3.855*	-4.428*	-3.855*	-6.495*	-4.065*	-1.398
		1st Difference	-5.117*	-6.552*	-9.208*	-6.416*	-12.200*	-5.971*	-3.937*
		Decision	I(1)	I(0)	I(0)	I(0)	I(0)	I(0)	I(1)
Uganda	ADF	Level	-2.938***	-4.550*	-6.410*	-5.653*	-6.160*	-3.664*	-1.849
		1st Difference	-5.292*	-7.445*	-8.514*	-9.842*	-6.874*	-7.200*	-3.591**
	PP	Level	-2.950***	-4.552*	-6.656*	-5.509*	-7.276*	-3.691**	-1.826
		1st Difference	-5.586*	-8.849*	-12.366*	-11.731*	-10.628*	-8.738*	-3.587**
		Decision	I(0)	I(0)	I(0)	I(0)	I(0)	I(0)	I(1)
Zambia	ADF	Level	-1.852	-3.960*	-4.245*	-3.907*	-5.673*	-2.027	-1.502
		1st Difference	-6.067*	-7.434*	-6.643*	-5.522*	-9.282*	-4.618*	-4.327*
	PP	Level	-1.749	-3.974*	-4.236*	-3.894*	-5.615*	-2.032	-1.500

		1st Difference	-6.181*	-7.389*	-8.731*	-6.433*	-11.045*	-4.681*	-4.329*
		Decision	I(1)	I(0)	I(0)	I(0)	I(0)	I(1)	I(1)

*Note: Critical value at the 1% and 5% significance level are denoted by * and ***

Source: Authors computation from Stata 15

Table 6B: Panel Unit Root Tests Results

	Levin, Lin & Chu t*		Im, Pesaran and Shin W-stat		ADF-Fisher chi-square		PP-Fisher chi-square		Decision
	Level	1st Diff	Level	1st Diff	Level	1st Diff	Level	1st Diff	
TME	-1.633** (0.051)	-10.146* (0.000)	-0.554 (0.290)	-10.805* (0.000)	0.701 (0.242)	39.654* (0.000)	0.701 (0.242)	39.654* (0.000)	I(1)
FD	-6.461* (0.000)	-9.463* (0.000)	-10.464* (0.000)	-14.116* (0.000)	33.527* (0.000)	102.498* (0.000)	33.527* (0.000)	102.498* (0.000)	I(0)
GFCF	-10.674* (0.000)	-19.9944* (0.000)	-11.806* (0.000)	-14.203* (0.000)	49.580* (0.000)	102.584* (0.000)	49.580* (0.000)	102.584* (0.000)	I(0)
LAB	-8.899* (0.000)	-17.257* (0.000)	-9.251* (0.000)	-13.086* (0.000)	29.474* (0.000)	78.110* (0.000)	29.474* (0.000)	78.110* (0.000)	I(0)
GDPPC	-14.508* (0.000)	-21.404* (0.000)	-13.917* (0.000)	-15.230* (0.000)	80.491* (0.000)	140.354* (0.000)	80.491* (0.000)	140.354* (0.000)	I(0)
INF	-5.340* (0.0000)	-16.397* (0.000)	-7.221* (0.000)	-12.440* (0.000)	18.062* (0.000)	68.198* (0.000)	18.062* (0.000)	68.198* (0.000)	I(0)
REER	-4.170 * (0.000)	-8.5488* (0.000)	0.499 (0.691)	-8.663* (0.000)	-1.561 (0.941)	21.349* (0.000)	-1.561 (0.941)	21.349* (0.000)	I(1)

Note: P-value listed in parentheses. Critical value at the 1% and 5% significance level denoted by * and **

Source: Authors computations from Stata 15

5 Empirical Results

5.1 GMM Estimation: An instrumental variable approach

To prepare the ground for establishing the impact of financial development on trade of SSA, the simultaneous equation models showing the nexus between financial development and trade are estimated by using three stage least squares (3SLS) and generalized method of moments – GMM (also known as GMM-IV specifications). In what follows, only the results of GMM estimations are presented because the parameter estimates of both methods were similar both in magnitude

and sign, while at the same time finding the GMM estimates to be statistically more robust than the 3SLS approach. The GMM estimator has several advantages. Beck *et al.* (2000) for instance argue that the GMM panel estimator is good in exploiting the time-series variation in the data, accounting for unobserved individual specific effects, and therefore providing better control for endogeneity of all the explanatory variables. Again, to provide a causal interpretation to the financial development-trade nexus, a GMM-IV approach is considered appropriate as it addressed the problem of reverse causality. The Hansen test of overidentifying restrictions is determined to provide some evidence of the instruments' validity. The test conducted shows that the null hypothesis that the Instruments are appropriate cannot be rejected for all the regression models. In each specification, p-value for Hansen test is quite high than the conventional 5 percent level. The only results that are presented are those that are reasonably favored in terms of the diagnostic tests of overidentification (Hansen J-test). The analysis is conducted at both individual country and panel levels.

5.1.1 Financial Development and Exports Nexus (Panel)

The panel GMM results of the regressing variables are reported in Tables 7. The table reveals that total merchandise exports exert a significant negative impact on financial development. The magnitude of -31.193 reveals that a 1% increase in total merchandise exports has the potentials to decrease the level of financial development by 31.19%. However, the impact of financial development on trade is negative and insignificant. This conclusion supports the findings of Babatunde and Fowowe, (2010), and Yakubu *et al.* (2018). Hence, the assertion in the literature that financial development contributes positively to trade performance cannot be confirmed in the case of SSA countries, rather it is trade that influences the level of financial development but negatively. The impact of labour force and GDP per capital on exports and financial development appears to be positive and

significant in SSA, while exchange rate exerts significant negative impact on both the exports and the level of financial development.

Table 7: GMM estimation of Financial Development and Total Merchandise Exports Nexus

	Global Panel	
	Model 1	Model 2
	TME	FD
Total Merchandise Exports (TME)	-	-31.193* (0.000)
Financial Development (FD)	-0.032 (0.320)	-
Gross Fixed Capital Formation (GFCF)	0.009 (0.691)	0.289 (0.690)
Labour force (LAB)	0.107** (0.092)	3.332** (0.095)
GDP per capital	0.022* (0.047)	0.680* (0.046)
Inflation (INF)	0.017 (0.260)	0.535 (0.260)
Real effective exchange rate (REER)	-1.426* (0.000)	-44.485* (0.000)
Constant	-0.516* (0.051)	-16.086** (0.053)
Observations	475	475
No. of parameters	14	14
No. of moments	18	18
DWH-Test		
Hansen J-Test	2.0216 (p = 0.732)	

Note: *, **, *** indicate significant levels at 1%, 5% and 10% respectively

5.1.2 Financial Development and Exports Nexus (Individual Country)

To shed light on each country's specific characteristics that might be obscured by aggregation and generalization implications of the panel results. Tables 8 and 9 provide single country simultaneous gmm results on the causal effect of financial development on trade in 25 countries that make up the panel. The empirical results in Table 8 with total merchandise exports as the dependent variable shows that financial development has a positive and significant impact on total merchandise

exports in 8 countries (Burkina Faso, Gambia, Namibia, Nigeria, Rwanda, South Africa, Tanzania and Uganda), while also in 8 countries (Cape Verde, Central African Rep., Cote'd'Ivoire, Ethiopia, Ghana, Kenya, Togo and Zambia) the impact of financial development on total merchandise exports is negative and significant. For the remaining countries, no significant relationship is found. The magnitude of 0.183, 1.100, 0.116, 0.522, 0.166, 0.145, 0.251, 0.254 implies that a 1% increase in the level of financial development raises merchandise exports by 18.3% in Burkina Faso, 1.10% in Gambia, 0.12% in Namibia, 0.52% in Nigeria, 0.17% in Rwanda, 0.15% in South Africa, 0.25% in Tanzania and Uganda, while merchandise exports decreases by 0.45%, 0.14%, 0.20%, 0.22%, 0.07%,0.59% and 0.19% in Cape Verde, Central African Rep., Cote'd'Ivoire, Ethiopia, Ghana, Kenya, Togo and Zambia respectively. The coefficient of gross fixed capital formation appears to be negative and significant in Cote'd'Ivoire, Ethiopia, South Africa, and Uganda. The coefficient of the labour force has a positive impact in Nigeria, Rwanda, and Tanzania but negative in Uganda. Inflation has a significant positive impact on merchandise exports in Cote'd'Ivoire, Mauritius, and Rwanda. Real effective exchange rate exerts a negative significant influence of exports in Central African Rep., Cote'd'Ivoire, Rwanda, Tanzania, and Zambia but positive and significant for merchandise exports in Gambia and Uganda.

The empirical results of Table 9 report the causal impact of financial development on total merchandise exports. The table reveals that financial development positively and significantly impact merchandise exports of 6 countries (Gambia, Namibia, Nigeria, South Africa, Tanzania, and South Africa. According to the table, a 1% increase in the level of financial development increases total merchandise exports by 0.89% in Gambia, 8.19% in Namibia, 1.87% in Nigeria, 6.16% in South Africa, 3.34% in Tanzania, and 3.86% in Uganda respectively. The impact of financial development on merchandise exports is negative and significant in 9 countries. The impact is -1.89% in Benin, -2.12% in Cape Verde, -6.63% in Central African Rep., -

4.62% in Cote 'd'Ivoire, -3.27% in Ethiopia, 4.56% in Ghana , -12.83% in Kenya, -3.09% in Mauritius and -5.28 in Zambia. The impact of gross fixed capital formation on trade is significant and negative for Cote'd'Ivoire (0.387), Ethiopia (-0.667), South Africa (-0.338) but positive for Uganda. The influence of labour force on exports is positively reinforced in Nigeria, Rwanda, and Tanzania, while its impact on export is negative in Uganda. The coefficient of GDP per capital is positive and significant in Ghana (0.086) and Zambia (0.207) but negative for Rwanda (-0.230) and Uganda (-0.174). Inflation only matters for trade-in Cote'd'Ivoire, Mauritius and Rwanda, while real effective exchange rate impacts total merchandise exports negatively and significantly in Central African Rep., Cote,d'Ivoire, Ghana, Rwanda, Tanzania and Zambia. However, its impact on trade is positive in Gambia and Uganda.

Table 8: *GMM estimation of Financial Development and Total Merchandise Exports*

Independent Variables	Dependent Variable: Total Merchandise Exports							
	FD	GFCF	LAB	GDPC	INF	REER	Constant	Hansen J-Test
Benin	-0.283	0.193	-0.021	-0.015	-0.169	1.826	0.465	1.355
Botswana	-0.074	-0.135	-0.908	0.018	-0.206	-2.138	7.567**	3.536
Burkina Faso	0.183*	0.162	-0.403	-0.206*	-0.139	1.945	-9.866	2.628
Burundi	-0.657	0.448	1.102	-0.059	0.204	-0.258	-4.715	2.159
Cape Verde	-0.451*	0.091	0.158	0.237	0.057	-4.583	1.830	1.667
CAR	-0.146*	0.072	-0.604	-0.011	0.006	-4.986*	2.492	3.220
Cote Ivoire	-0.204*	-0.387*	-0.869	-0.037	0.775*	-7.758*	0.959	3.104
Ethiopia	-0.302*	-0.667*	-1.063	0.163	0.118	-0.767	7.130	2.656
Gambia, The	1.100*	0.194	1.382	-0.338	-0.013	6.774**	-5.662	3.324
Ghana	-0.216*	-0.106	-0.072	0.086**	-0.189	-1.815*	1.047	2.548
Guinea	0.172	-0.342	-0.170	-0.004	0.329	-0.993	0.329	2.298
Kenya	-0.077*	-0.063	0.175	0.056	0.262	-0.927	-1.242	1.169
Lesotho	0.313	0.565	-0.029	-0.138	0.248	-1.717	-1.954	4.218
Madagascar	-0.691	0.754	0.155	0.199	0.360	-1.063	-2.481	2.611
Mauritania	0.060	-0.071	-0.075	0.103	-0.046	-2.452	-0.385	2.875
Mauritius	-0.819	-0.297	-0.036	0.149	0.181*	0.001	-0.785	6.099
Namibia	0.116*	0.029	0.042	-0.031	-0.052	-0.326	-0.363	2.326
Nigeria	0.522*	-0.456	1.260*	0.340	0.064	-0.280	-2.533*	1.484
Rwanda	0.166*	0.091	1.159*	-0.230*	0.112*	-1.096*	-3.457*	4.095
Senegal	0.529	0.141	0.038	-0.100	-0.048	-0.107	-0.568	5.357
South Africa	0.145*	-0.338*	-0.211	0.092	0.168	-0.100	0.496	5.673
Tanzania	0.251*	0.067	1.054*	-0.101	0.407	-4.036*	-5.093*	6.003
Togo	-0.590*	-0.103	0.680	0.125	-0.145	-1.313	-11.292	2.603
Uganda	0.254*	0.299*	-0.868*	-0.174*	0.238*	0.849*	4.457*	5.770
Zambia	-0.187*	-0.127	-0.095	0.207*	-0.462	-1.994*	-0.059	1.270

Source: Authors computations from Stata

Note: *, **, *** indicate significant levels at 1%, 5% and 10% respectively

Notably from the above analysis is a one-way causal directional relationship from finance to exports in Burkina Faso and Rwanda and from exports to finance in Benin, Mauritius, and Togo. Further, there is evidence that finance –trade nexus is bi-directional in 14 SSA countries. A positive bi-causal relationship exists for Gambia, Namibia, Nigeria, South Africa, Tanzania, and Uganda. The results suggest that just as financial development is capable of enhancing trade, so does trade enhances the level of financial development in those countries. However, the bi-causal impact of financial development on trade is negative in Cape Verde, Central Africa Rep., Cote'd'Ivoire, Ethiopia, Ghana, Kenya, and Zambia, implying that the effect of financial development is detrimental to trade in those countries. The results further suggest that the effect of financial development with regards to trade is country-specific.

Table 9: GMM estimation of Financial Development and Total Merchandise Exports

Independent	Dependent Variable: Financial Development							
Variables	TME	GFCF	LAB	GDPC	INF	REER	Constant	Hansen Test
Benin	-1.897*	0.244	-0.295	-0.103	0.202	-11.801*	3.189	4.733
Botswana	-3.181	-0.122	-1.177	0.965	1.988	-13.801	12.839	3.009
Burkina Faso	3.107	-0.312	1.599	0.865*	0.791	-10.795	-9.206	**2.628**
Burundi	-1.580	0.624	-0.852	-0.164	0.187	2.617	11.590	2.159
Cape Verde	-2.118*	0.141	0.392	0.534*	0.069	-8.749	-0.916	1.667
CAR	-6.626*	0.491	-4.109	-0.057	0.020	-33.194*	16.869	3.220
Cote D'Ivoire	-4.622*	-1.814	-4.155**	-0.178	3.690*	-37.222*	4.570**	3.104
Ethiopia	-3.266*	-2.208*	-3.549	0.540	0.394	-2.581	23.608**	2.656
Gambia, The	0.893*	-0.168*	-1.278	0.300	0.008	-6.170*	5.261	3.324
Ghana	-4.564*	-0.499	-0.341	0.400**	-0.868	-8.312*	4.870	2.548
Guinea	3.229	1.959	3.141	0.288	-1.865	-0.994	-11.646	2.298
Kenya	-12.825*	-0.822	2.223	0.716	3.396	-11.936	-15.881	1.169
Lesotho	2.041	-1.592	-0.068	0.504	-0.332	5.770	4.870	4.218
Madagascar	-0.656	1.332*	0.367	0.286**	0.653*	-0.305	-4.854	2.611
Mauritania	1.285	-2.002	8.572	0.187	0.942	0.440	-24.488	2.875
Mauritius	-3.097*	-0.144	0.420	0.613*	-0.028	-2.381	-2.404	6.099
Namibia	8.189*	-0.222	-0.314	0.262	0.462	2.611	2.884	2.327
Nigeria	1.871*	0.865**	-2.358	-0.637	-0.124	0.519	4.773*	1.484
Rwanda	4.229	-0.390	-4.841	1.108*	-0.414	4.351	14.371	4.095
Senegal	1.477	-0.390	0.821	0.350	0.484	3.132	-4.089	5.357

South Africa	6.163*	2.065*	1.442	-0.548	-1.061	0.688	-3.294	5.673
Tanzania	3.336*	-0.232	-3.837*	0.421*	-1.586	14.884*	18.636*	6.003
Togo	-1.139	-0.086	1.119	0.242**	-0.255	-2.010	-2.325	2.603
Uganda	3.858*	-1.167*	3.407*	0.684*	-0.926*	-3.287*	-17.375*	5.770
Zambia	-5.284*	-0.675	-0.500	1.101*	-2.460	-10.596*	-0.326	1.270

*Note: *, **, *** indicate significant levels at 1%, 5% and 10% respectively*
Source: Authors computations from Stata

6. Summary and Conclusion

This study investigated the causal link between financial development and trade using simultaneous-equations models in case of 25 SSA countries over the period 1986-2016. The study is motivated by the fact that there are no studies that have examined the two-way linkages between financial development and trade in SSA. The main findings show that the level of financial development does not affect trade (exports) in SSA, rather it is exports that influences the level of finance. With regards to individual countries in the panel, the causal effect of financial development on trade runs in one direction in 5 countries either from finance to trade or from trade to finance. While the level of financial development dampens merchandise exports in Burkina Faso and Rwanda, trade on the other hand matters for the development of financial sector in Benin, Mauritius and Togo. There is evidence that finance –trade nexus is bi-directional in 14 SSA countries. Positive bi-causal relationship exist for Gambia, Namibia, Nigeria, South Africa, Tanzania, and Uganda. The results suggest that just as financial development is capable of enhancing trade, so does trade enhances the level of financial development in those countries. However, the bi-causal impact of financial development on trade is negative in Cape Verde, Central Africa Rep., Cote'd'Ivoire, Ethiopia, Ghana, Kenya, and Zambia, implying that the eve of financial development is detrimental to trade in those countries. The results further suggest that the effect of financial development with regards to trade is country-specific. As a policy measure, the policymakers in SSA would need to deepen existing trade policy reforms to increase the volume of trade that can raise opportunities for financial sector development of the region. Again, at individual country level, mobilizing domestic

private credit should be of utmost priority to those countries where finance matter for the development of trade. Trade enhancing policies that can address structural constraints that have hampered the prospects of the intermediation function that could help mobilize resources in support of a more trade would be policy options in countries where trade led to the development of finance.

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