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#### Article

### The role of foreign public debt on foreign exchange reserve in SSA countries: Does governance really matters?

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#### DEVELOPMENT ECONOMICS | RESEARCH ARTICLE

## The role of foreign public debt on foreign exchange reserve in SSA countries: Does governance really matters?

Solomon Kebede<sup>1</sup>\*, Getachew Zerihun<sup>1</sup>, Kuma Berhanu<sup>2</sup> and Tora Abebe<sup>1</sup>

**Abstract:** The debt and reserve are playing a pivotal role in the growth and development of national economies. To examine the role of foreign public debt (FPD) on foreign exchange reserve (FER) the study used a panel data by considering 20 Sub-Saharan Africa (SSA) countries by interacting FPD with governance index across 15 years. The dynamic and static Generalized Method of Moments (GMM) models were utilized after checking the possible assumptions. The GMM model found that FPD, governance index, labour and human capital predicted the FER positively and significantly. While foreign debt augmented with governance predicted the variation of FER negatively and significantly. Therefore, Sub-Saharan Africa's low performance of foreign debt in enhancing foreign exchange reserve partly attributed to bad governance. Finally, the government of



Solomon Kebede

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Solomon Kebede is a PhD scholar in Development Economics at Arba Minch university, Ethiopia. His teaching and research interests include macroeconomic analysis, financial economics, poverty and livelihood analysis, impact assessment and analysis, value chain analysis and institutional economics.

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#### PUBLIC INTEREST STATEMENT

Now a days, least developed countries are characterized by high level of foreign public debts, low level of foreign exchange reserve and low level of governance indicators. Low level of savings forced these countries to depend on foreign sources of finance in the form of foreign public debts. For instance, SSA's foreign debt is equivalent to 45.99 percent of the region's GDP in 2020 while the reserve holding for the same year covered only 6.17 months of imports of goods and services. Even though foreign debt plays a supplementary role on reserves of nations, SSA region is encountered with a huge shortage of foreign exchange reserve. Hence, the problem of Africa, particularly SSA, is far beyond sources of financing and it might be the guality of governance system and weak institutions.

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© 2023 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. The terms on which this article has been published allow the posting of the Accepted Manuscript in a repository by the author(s) or with their consent. SSA countries should improve their quality of governance to properly utilize FPD to enhance the stock of FER, among others.

Subjects: Monetary Economics; Econometrics; International Economics; Development Economics; Political Economy; Finance

Keywords: Foreign exchange reserve; foreign public debt; GMM model; Sub-Saharan Africa

#### 1. Introduction

Funding challenges of least developed nations are not strange to researchers, policy makers and academics. It is widely held that these nations are constrained of adequate funds to build basic infrastructure that would set the footstep for capital formation, sustaining economic growth and development (Rahaj, 2018; Saheed et al., 2015). The increase in public expenditure enabled by foreign sources of finance creates a huge burden on developing nations. This is due to the spiraling external debt stock needs an immense debt servicing obligation, which has over the years consumed a large sum of domestic budget; thus, hindering national productivity possibilities (Johansson, 2010). The repayment of the amount of accumulated foreign debt and interest exert an enormous load on the foreign exchange reserves (FER) of a nation due to the fact that the repayments are made in hard currency. FER also acts as a monetary policy instrument; as a liquidity buffer in case of an international financial market crash; as an instrument of mitigating the vulnerability to external shocks and strengthening the stability and confidence in financial markets in periods of financial crisis. In addition, accumulation of FER contributes significantly to economic growth of a developing country. This is due to reserve accumulation causes undervaluation of real exchange rate that facilitates and activates export-led growth orientation. Thus, foreign exchange reserves serve the purpose of conserving capital and supplying liquidity to meet the foreign reserve needs of nations (Tule et al., 2015). In fact, foreign reserves is a major pointer to the debtor nation's ability to pay back the the amount of foreign debt (Onwuka & Igwezea, 2014).

FER has been an important pillar and the concern of different scholars, especially the political economists over the last decades with respect to its amount, determination, complementarity and causal links with other macroeconomic variables. This is indeed true, because of the fact that the accumulation of foreign reserves by a few emerging countries has distorted balance of the global economy. Thus, based on this monetarists suggest intervention using different monetary policy tools to properly manage country's FER accumulations. Polterovich and Popov (2003) found that FER has a significant role in the nations economy. According to their findings countries having growing foreign reserves to GDP ratios show relatively higher capital productivity and higher economic growth rates, and if financed by domestic borrowings will involve opportunity or quasifiscal. Aizenman and Lee (2007) pinpoint that the opportunity costs becomes higher in least developed countries because they always have lower accumulation of capital and higher level of marginal product of capital.

Sub-Saharan economy has experienced stunning growth performance over the last decades (1961–2020). The data indicates that an economic growth rate for the period 2021 is only 4.14% percent, which is lower than the growth rate of the World economy, 5.87 percent (IMF, 2021). However, the share FER is lower and the share of foreign debt is higher and increasing at alarming rate. In 2020 fiscal year, the total reserve as a percentage of foreign debt is around 34.63 for Sub-Saharan African countries indicating the problem of debt-reserve gap. This indicates that SSA countries are still struggling with foreign currency shortages over the last two decades and depending on foreign financial sources (World Bank, 2021). On other hand, the problem of FER accumulation is aggravated by having regularity in huge inflows of foreign public debts in SSA economy. Similarly, in the year 2018 the external debt stock of the SSA region reached around 38.9 trillion (World Bank, 2019). In addition, according to World Bank (2021) SSA's foreign debt is equivalent to 45.99 percent of the region's GDP in 2020. This indicates that the region is accommodating abnormality in the accumulation of FER and its FPD capital, which could need a serious of intervention by experts in the arena.

Although economic growth is both supplementing and complementarity with FER, empirical investigations have focused on it, and little research has been done on the role of FPD on FER. For instance, studies conducted by Alfaro and Kanczuk (2005), Victoria et al. (2016), Senibi et al. (2016), Shariful et al. (2018), Peter and Dumani (2020) and Gergely et al. (N. A.) considered the theme by using time series data considering a single country and mixing it with economic growth. They also considered the aggregate external debt and only examined the direction of causation with the respective variables, and even found mixed results. Other empirics done by Higgins and Klitgaard (2004), García and Soto (2004), Garton (2005), Shin-Ichi and Yoshifumi (2007) and Jochen (2019) only considered the advantage and implication of accumulating FER. For others like Layal (2013) considered the economic growth role of FER for emerging countries. Furthermore, there are limited literature that empirically linked FPD and FER without considering the importance of governance and institutional quality on the relationship among the two variables (Fukuda & Kon, 2010; Gergely et al., N.A.; Quilent, 2015; Sebastian, 1984).

The originality of this paper lies in the following points. First, this paper is the stepping stone on linking the importance of governance on the relationship between FPD and FER of countries. This stands on the believe that the problem of Africa, particularly SSA, is far beyond foreign sources of financing in the form of FPD, aid and donations, and hence the problem might be the level of governance indicators such as poor governance system and poor voice and accountability issues, political instability and presence of terrorism acts, lack of government effectiveness, poorer regulatory quality, absence of rule of law as well as lack of control of corruption should be addressed. Second, it disaggregated FPD in to major types of debts, and only considered the long term FPD inflows, which accounts for the lion's share from the total external debt inflows for the period 2000–2020 in the SSA economy. Last but not the least, this study uses Static and Dynamic GMM models taking twenty countries from SSA region for the period from 2006 to 2020.

The objective of the study is to examine the importance of governance on relating FPD and FER in selected twenty SSA countries. We consider foreign public debt due to for its dramatic growth in recent decades as the currency composition of public debt largely determines foreign exchange reserve of nations. In cognizant of the difficulty of SSA countries in obtaining public debts denominated in their own domestic currencies thus nations are by chance supplementing their stock of reserves. Yet, the reserve accumulation of these selected countries is relatively lower that needs intervention to consider the significance of governance in utilizing the foreign public debt on the intended activities like minimizing the reserve shortage of nations. Again, the selection of these nations is based on the fact that they jointly account for more than 48 percent of the entire SSA countries' stock of foreign debt in 2020 (World Bank, 2021), making them a relevant prospect in any discourse on foreign indebtedness in SSA region.

The remaining part of the paper is structured as follows: The review of relevant theoretical and empirical studies is presented in section two, and the study's methodology concern is presented in section three. Section four presents the results and discussion. The conclusion and remarks with policy implications appear in section five.

#### 2. Review of literature

#### 2.1. The theory of foreign exchange reserve and public debt

The self-insurance theory of external reserves holds that nations should accumulate foreign reserves in the form of hard currency, bank deposits, near money instruments in the foreign currency denominations like treasury bills and certificates, gold reserves and special drawing rights that would help in the time of short falls in the domestic economy. The theory indicates that this would help the country to mitigate external shocks and serve as a buffer stock to intervene in the foreign exchange market in the country. Thus, the self-insurance theory holds that reserve

accumulation insures the repayment capacity of the nation, as well as mitigates the shortfalls of the domestic gaps existing in trade balance.

A sudden large fall in reserve accumulation requires foreign debt to finance the imbalances at steady-state level. On the other hand, an increase in foreign debt needs an imposition of a higher lump-sum tax on the private sectors, which implies that large accumulation of FER is financed by lump-sum taxes. Yet for others unexpected accumulation of FER increases the share of liquid foreign debt from the total foreign debt. This is because short term debts are more liquid than long term debts as sudden reversals in capital flows are more likely when the maturity period of debt is shorter. This shows that a sudden increase in FER not only increases the level of foreign debt, but also shifts the accumulation of debt from long term to short term debt. Therefore, the accumulation of FER is important for nations to accommodate liquidation and to show the capacity of nations in the world financial market to attract FDI as well as public debts.

The theory of optimal reserves allocation paves the way to accommodate external source of financing in the form of FPD. It shows the decision of borrowing from the rest of the world is inevitable with the existing situations of the domestic economy to curb the imbalances. This theory is extended to a dynamic framework to provide a theory for the increase in FERs and the pattern of sudden stops in emerging economies. It states that while temporary reserves, temporary liquidation, and the interest rate are functions of the aggregate liquidity shock, the rollover policy is a function of both the aggregate state and the individual liquidity shock of an investor. In these times foreign debt contractual agreement becomes feasible on the government side. In other words, initial FERs and invested capital cannot be above the loan amount; and similarly, temporary reserves and temporary payments cannot be above the initial FER and temporary output of the nation. Obviously, the main friction here is that the government cannot lend the interim against the future output from the initial investment. Hence, liquidation and reserves are the only resources available to make interim debt payments. Similarly, final output and residual reserves are the only resources available to make final payments. The theory suggests a condition which requires that the interim rollover policy is to roll over the loan if and only if rolling over yields a higher payment than calling the loan in the interim.

#### 2.2. Empirical literature review

There exists limited empirical studies that examine the relationship between FER and FPD. A study using the Markov switching model with time varying model for five emerging countries in Asia and Latin America argued that public debt had increased the probability for a country to suffer from financial crisis; however FER did not necessarily provide peace in the highly indebted nations with some exceptions. The study concludes that although public debt and FER have an opposite association in economic theories, in most cases the negative effects of public debt might outweigh the beneficial effects of FER (Layal, 2013). Senibi et al. (2016) investigated the impact of public debt has a positive and statistically significant impact on FERs in Nigeria. In contrary, Peter and Dumani (2020) based on error correction model and using data from 1981 to 2018 have found that foreign debt stock exerts a negative and statistically significant impact on Nigeria's FER portfolios.

A study examining the causal relationship among foreign debt, FER and economic growth in Bangladesh concluded that there exists a unidirectional causation from foreign debt to FER as of the Granger-causality results (Shariful et al., 2018). A study on the Hungarian economy examined the impact of public debt on FER and found that although debt in the form of foreign currency can contribute significantly to the growth of FER, it can drive serious difficulties in assessing the adequacy of reserve. It also indicates that the issue aggravates during a crisis when it becomes almost impossible to refinance maturing public debts at a time when the reserve requirement may be still rising. Thus, the study concluded that rising public debt causes the uncertainty in FER dynamics (Gergely et al., N.A.).

In the contrary, Alfaro and Kanczuk (2005) stressed that both FER and foreign debt are not perfect substitutes yet they both are denominated in hard currency. Subsequently their study established that FER accumulation did not play a quantitatively vital role by means of even consumption, and hence FER accumulation did not raise debt sustainability. Victoria et al. (2016) in Nigeria using Fully Modified Ordinary Least Square model found that public debt has a positive and statistically significant effect on FER stock in the long run that suggests the nation's debt crisis is the result of both exogenous and endogenous factors such as economic policies, the nature of the economy, high dependence on oil, and swindling foreign exchange receipt. However, the study by Peter and Dumani (2020) for the period covering 1981–2018 of Nigerian economy found that foreign debt stock had a negative and statistically significant impact on FER accumulation of the nation.

The previous empirical studies are considered the aggregate public debt's value, and hence this study is justified on the grounds that it relies on using the trimmings methods of decomposition developed by Meyer (1999), the consideration of disaggregating FPD yields that the long term foreign debt relatively has a permanent component. On other hand, in SSA countries long term FPD takes the lions share from the total FPD inflows across the period 2006 to 2020. Thus, this study only considers the long-term FPD flows in selected SSA economy. As of our knowledge, no empirics touched the contribution of the quality of governance in the relationship between FPD's to FER in the world, particularly SSA region. In addition, the previous empirics are more focused on independently linking FPD and FER with economic growth taking a single country case. However, this paper takes twenty SSA countries by adopting GMM methods of estimation technique.

As a result, keeping the dis-aggregation of FPD, we added to the literature by developing a a composite governance index depending on World Bank (2021) Worldwide Governance Indicators (WGI) measures. The quality of governance have six measure components: voice and accountability, political stability and absence of violence/terrorism, government effectiveness, regulatory quality, rule of law, and control of corruption. Each indicators are having a magnitude running from approximately -2.5 (weak) to 2.5 (strong) governance performance. Last not least, the issue of examining the role of FPD on FER is critical in the the economy of SSA region requiring thorough empirical investigation.

#### 3. Methodology of the study

This study analyzes the role of FPD on FER for selected SSA economy using a panel data analysis approach. It used secondary data from WB data sets. The main variables under this study are FER, FPD and governance index, and structural transformation, human capital, labour force and financial development indicator as a control variables over the period covering from 2006 to 2020 considering 20 countries from the region. It used both descriptive statistics to summarize the statistical characteristics of the variables, and employed static and dynamic GMM estimation technique.

Our empirical study is based on a panel datasets covering 20 Sub-Saharan African Countries—Gambia, Kenya, Mauritius, Nigeria, Tanzania, Botswana, Ghana, Lesotho, South Africa, Cameroon, Ethiopia, Mauritania, Sudan, Djibouti, Guinea, Zambia, Mozambique, Morocco, Gambia and Gabon over the period of 2006–2020. All the data used in this study are secondary data collected from World Development indicator database publications by World Bank. The choice of sample countries is based on data availability covering the period of study and heterogeneity based on their income category.

In an effort to examine the role of FPD on FER, this study adopted the theory of optimal foreign reserves allocation. First, reserve is commonly denominated in foreign currencies. Second, the borrowing by the state from foreign source is inevitable in times of economic shortage, which is also a sign of a fall in reserve accumulation. Basing on the theory of optimal reserves allocation the paper utilized generalized method of moments (GMM) estimators introduced by Holtz-Eakin et al. (1990), Arellano and Bond (1991) and Arellano and Bover (1995). The GMM model is estimated with panel data allowing for country and time specific components. Accordingly we have:

$$FER_{it} = f(FPD, X_I,$$
(1)

where FER is foreign exchange reserve, FPD is foreign public debt and X<sub>i</sub> stands for other control factors that predict the variation of FER. Accommodating other factors in the functional relationship we have:

$$FER_{it} = \beta_1 + \beta_2 FPD_{it} + \beta_2 G_{it} + \beta_2 FD_{it} + \beta_2 ST_{it} + \beta_2 H_{it} + \beta_2 L_{it} + \gamma_i + \rho_t + \epsilon_{it}$$
(2)

$$FER_{it} = \beta_1 FER_{i,t-1} + \beta_2 FPD_{it} + \beta_2 G_{it} + \beta_2 FD_{it} + \beta_2 ST_{it} + \beta_2 H_{it} + \beta_2 L_{it} + \gamma_i + \rho_t + \epsilon_{it},$$
(3)

where FD is financial development indicator, ST is structural transformation indicator, H is human capital, L is labour,  $\gamma_i$  is a country-specific effect,  $\rho_t$  is a period-specific effect common to all countries,  $\mathcal{E}$  is the error term, i is country i (i = 1,2,3...,21), t is time period in years (t = 2006,2007,...,2020) and  $\beta_i$  is partial slope parameters showing the effect of other variables on FER. The definitions, measurements and source of the variables used in the FER and FPD analysis are shown in Table 1.

In general, three panel data analysis techniques are usually adopted in economics literature, these were Pooled Ordinary Least Square (OLS), Fixed Effect, and Random Effect technique of estimation. Pooled OLS technique of estimation for panel data uses the usual OLS approach. However, Pooled OLS estimation slope difference, time and country specific concerns (Cornwell and Rupert, 1988; Gujarati, 2003). Fixed effect estimation considers heterogeneity across countries, enabling country specific intercept term yet being constant across periods (Gujarati, 2003). Although Random Effect provides for heterogeneity and homogeneity across time, the individual's particular effect is orthogonal to the outcome variable (Greene, 2003). The Hausman specification test is used to select whether random effect technique is preferable than the fixed effect. If the p-value of the test is greater than 0.05, we do not reject the null hypothesis and it implies that random effect is consistent and efficient.

However, it is questionable for fixed effect technique to be utilized considering a dynamic model approach as shown in Equation (3) above due to the fact that such technique is not able to capture for the endogeneity of the lagged outcome variable. This pinpoints that conventional fixed effect and random effect panel data estimation technique are inconsistent (Teixeira & Queiros, 2016). Accordingly, Arellano and Bond (1991) propose generalized method of moment (GMM) technique of estimation, that minimizes endogeneity problem via internal instruments by differencing the variables included in the equation (Moral Benito et al., 2018; Samouel & Aram, 2016). This approach fundamental creed is to begin with the first difference in the regression equation and work backwards to avoid the effect by each variable. The lagged variable will thus be viewed as the difference equation's corresponding instrumental variable for the endogenous variables. Therefore, we adopted Arellano and Bond (1991) GMM approach to examine the role of foreign public debt on FER. This study used Stata 14.0 to observe the results from descriptive and econometric analysis.

#### 4. Results and discussions

#### 4.1. Descriptive Data Analysis

#### 4.1.1. Summary Statistics of macroeconomic variables in selected SSA countries

Table 2 indicates the summary statistics of the variables in this study. Accordingly, the share of foreign public debt from GDP across the study period (2006 to 2020) reached maximum of 429 percent with a mean values of 47 percent and minimum 3.89 percent. Similarly, the share of FER from GDP for the time period reached a maximum 339 percent with an average value of 17.94 percent and minimum 0.14 percent. While the average value of governance index, structural

Table 1. Symbol, definition an	d measurement of variables inc	luded in the study
Symbol	Definition and Measurement	Sources
FER	Stands for Foreign Exchange Reserve and measured by the ratio of Foreign Exchange Reserve to GDP.	WB
FPD	Stands for Foreign Public Debt and measured by the ratio of Foreign Public Debt to GDP.	WB
FinanceDev	Stands for financial development indicator and measured by the ratio of money supply, $M_2$ , to GDP.	WB
Governance	Stands for Governance Indicator which measures the quality of governance. It is a composite index developed from six measure components of governance, these are voice & accountability, political stability, absence of violence, government effectiveness, regulatory quality, rule of law and control of corruption.	WB
Foreign Debt*Governance	Stands for the interaction of Foreign Public Debt with governance Index.	WB
Structural Transformation	Stands for the share of manufacturing sub-sector from GDP.	WB
HumanCapita	Stands for the output of human capital. It is proxied by maternal mortality ratio which is the number of women who die from pregnancy-related causes while pregnant or within 42 days of pregnancy termination per 100,000 live births.	WB
Labour	Stands for labor force participation rate. It is the proportion of the population ages 15 and older that are economically active.	WB

transformation indicator, and financial development indicator is -0.026, 9.36, and 42.43, respectively, across the time period.

#### 4.1.2. FER and FPD in selected SSA countries

As seen in Figure 1, the FPD and FER trends are showing a regularity across the selected SSA countries. For these countries the share of FER and FPD are showing a huge gap across the time span of the study except for Nigeria, Kenya and Cameroon. It indicates that in these selected countries of SSA FPD is outweighing FER, and implying that across the study period these nations are highly indebted having relatively low stock of FER (except Botswana). The figure also indicates that the gap between the share of FPD and FER is the highest for Mozambique, Lesotho and Mauritius, and the lowest for Nigeria, Kenya and Cameroon.

#### 4.1.3. Correlation matrix of the variables under study

As shown Table 3, the pairwise correlation coefficient among our time variants is relatively lower, and indicating absence of severe multicollinearity problem. We note that there is a positive relationship between FPD and financial development indicator and labour participation rate. Where as the remaining

Table 2. Summary	v Statistics of varia	ble in the study		
Variable	Mean	Std. Dev.	Min	Max
FER	17.94531	25.05316	.13717	339.2809
FPD	47.17646	51.70008	3.895006	429.7383
Governance	-0.0256215	2.110547	-1.658034	15.08531
Structural Transformation	9.631008	4.255855	1.958124	22.24107
FinanceDev	42.43228	28.39573	11.72897	156.8433
HumanCapita	488.9576	271.7691	53	1199.021
Labour	62.26396	13.66413	31.44	88.35

Source: Own computation using Stata 14, 2022.

#### Figure 1. FER and FPD trend in Selected SSA countries.



variables, governance index, foreign public debt supplemented with governance, structural transformation indicator and human capital were negatively related with FPD.

#### 4.2. Econometrics results

As shown on Table 4, the Arellano and Bond (1991) estimation test for zero autocorrelation in both first-differenced error and second-order serial correlation for first-order serial correlation is accepted because the p-values are greater than 5% critical values. This implies that the Arellano–Bond estimation is free from both first and second-order serial correlation. In addition, the Sargan test and Hansen test of over-identification restriction test failed to reject the null hypothesis that over-identification restrictions are valid.Furthermore, the test involved to identify

I able 3. Correlation	n matrix of the varia	bles under study					
Variable	FDebt	Gov	Debt#Gov	strucTransm	FinanceDevI	HumanK	
FDebt	1						
Gov	-0.044	1					
Debt#Gov	-0.325	0.791	-				
strucTransm	-0.086	0.105	0.138	1			
FinanceDevI	0.160	0.218	0.184	0.144			
HumanK	-0.065	-0.244	-0.196	-0.267	-0.635	1	
	0.044	0.004	-0.0229	0.059	-0.386	0.206	1
FDebt-foreign public del HumanK- human capital	ot, Gov- governance inde I, and L- labour.	x, Debt#Gov- interaction	of debt with governanc	e, strucTransm- structurc	al transformation indicato	', FinanceDevI- financial	development indicator,

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among random effect or fixed effect estimation technique indicated that better to adopt random effect estimation technique (Since Prob>chi2 = 0.9427 is greater than 5% critical value).

#### 4.2.1. Static and Dynamic Panel Model Estimation results

Under this section, both static and dynamic GMM regressions result from empirical techniques are discussed on the relationship between foreign public debt and FER of SSA countries. Four techniques of estimations were utilized under the category of static and dynamic models to examine the role of the FPD on FER. These technique are Fixed Effect-OLS, Random Effect-OLS, the one-step difference and two step-difference GMM developed by Arellano and Bond (1991). Our discussion was based on two techniques of estimation (one from the static model and the other from the dynamic model) concerning the theme and attached the remaining techniques under appendix part Appendix I and II. Initially, we estimated by using the random effect method since the Hausman Test result pinpoints to utilize random effect estimation technique as compared to fixed effect (see Table 4).

Furthermore, we utilized a dynamic panel data model developed by Arellano and Bond (1991) one-step difference GMM estimation technique to examine the linkage among the variables. As shown on the basic test results displayed on the above Table 4 for over identification Hansen test and test of first and second serial correlation of Arellano and Bond were used. Results from Hansen test allowed acceptance of validity of instruments. The Arellano and Bond test result also confirmed the hypothesis of absence of both first and second serial correlation of residuals. Moreover, to minimize heteroscedasticity problem we used robust standard deviations.

4.2.1.1. Static Panel Model Estimation results: Fixed Effect technique. According to the random effect estimation result, all variables except structural transformation and labour are significantly predicting the variation on foreign exchange reserve (Table 5). It revealed that increasing the amount of FPD by one percent increases FER by around 0.21 percent which is strongly statistically significant, ceteris paribus. This might be due to the fact that in developing countries like SSA almost all debt inflows are in the form of hard currency and hence it supplements on the reserve accumulation of nations. This finding is inline with the postulates of the dual-gap theory theory developed by Chenery and Strout (1966) and optimal reserves allocation theory which argued that external source of financing either in the form of debt or FDI encourages economic growth and thereby enhances competitiveness and accumulation of FER. This supplements the findings for Hungarian economy that revealed FPD has a positive effect on FER (Gergely et al. (N.A.). A percentage increase in capital leads to a more than 0.01 percentage point increase in FER, ceteris paribus. This finding indicates that investment on human capital improves productivity and saving culture and thereby capacitates countries to invest on export oriented goods and services that generates hard currencies. Whereas the increase in the financial development indicator variable measured by the ratio of M2 to GDP by a percent increases FER by around 0.33 percent, ceteris paribus. This indicates that an improvement in the financial development indicator makes nations more competitive in attracting FDI, thereby improving trade balance and hence this in turn raises stock of FER of the host countries.

Considering the relevance and role of governance, we took governance as one factor, and further treated the interactive influence of governance and foreign debt, on FER. Accordingly Table 5 shows that a one percent improvement in governance index increases the stock of FER by around 2.12 percent, ceteris paribus. However, the interaction of foreign public debt with governance index (Foreign Debt\*Governance) leads to a negative and significant impact on the stock of FER of SSA countries. According to Ibrahim Index of governance report (2022) shown that even though there is improvement in the last decade for African countries yet it's by far lower as compared to to other countries in the world. Thus, the result of this study suggests that the impact of FPD on FER would be worst when it is augmented with bad governance in SSA countries.

Sargan test of over identifying restrictions. Ho: overi	identifying restrictions are vali	p		
$chi^2(13) = 11.09$				rob>chi2=0.603
Hansen test of over identifying restrictions. Ho: over	identifying restrictions are val	id		
chi2(13) = 15.08			д	rob>chi2= 0.302
Arellano-Bond test for zero autocorrelation in firs	st-differenced errors			
$H_{0}$ : no autocorrelation				
Order		Z		Prob > z
1		-0.86412		0.3875
2		-0.2968		0.7666
Hausman Test. Ho: difference in coefficients not sys	stematic			
	Coefficients			
	(b) fixed	(B) random	(b-B)	sqrt (diag(V_b-V_B))
			Difference	S.E.
FDebt	.2719585	.2061273	.0658312	.0237539
Gov	1.420249	2.118475	6982253	
DebtGov	0255376	0396313	.0140937	.0025394
strucTrans~m	.143977	.5258546	3818776	.5689208
FinanceDevI	.2790192	.3254499	0464307	.1473495
HumanCapital	.0189392	.013594	.0053452	.0069675
Labour	1.969871	.226693	1.743178	.796609
$chi2(7) = (b-B)'[(V_b-V_B)^{\wedge}(-1)](b-B) = 2.28$				

Prob>chi2 = 0.9427

Source: Own computation using Stata 14, 2022.

Table 4. Basic test of the static and dynamic GMM models

Group variable: ID					Number of groups = 20	
Wald chi2(7) = 100.63					Prob > chi2 =0.0000	
FER	Coef.	Std. Err.	Z	P>z	[95% Conf.	[Interval]
FPD	0.206	.0344892	5.98	0.000***	.1385297	.2737248
Governance	2.118	.9390586	2.26	0.024**	.2779536	3.958995
Foreign Debt*Governance	-0.039	.0195445	-2.03	0.043**	0779379	0013248
strucTransform	0.526	.4835448	1.09	0.277	4218758	1.473585
FinanceDevI	0.325	.0957781	3.40	0.001***	.1377283	.5131715
HumanCapital	0.014	.0082031	1.66	0.097*	0024838	.0296718
Labour	0.227	.1940022	1.17	0.243	1535444	.6069303
cons	-31.556	15.65287	-2.02	0.044	-62.2347	8765917
rho			0.235	96444		
Source: Own computation using St	tata 14 2022					

Table 5. Random effect model estimation result for selected SSA countries

2022.
14,
Stata
using
computation
Own
сe:

Table 6. The Arelland	and Bond (1991) one-st	ep difference GMM est	imation result for SSA	S		
Group variable: ID					Number of obs = 278	
Number of instrumer	its=21				Number of groups = 20	
		Robust				
FER	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
FER_L1	0.111	0.101	1.10	0.286	1002955	.3229023
FPD	0.262	0.065	4.04	0.001***	.1269033	.3976497
Governance	1.249	0.438	2.85	0.010***	.3351805	2.162891
Foreign Debt*Governance	023	0.008	-3.02	0.007***	0383501	0070073
strucTransform	0.198	0.428	0.46	0.648	6946916	1.091671
FinanceDevI	0.294	0.199	1.47	0.157	1228861	.7110498
HumanCapital	0.018	0.025	0.70	0.489	0347372	.0701636
Labour	1.612	0.822	1.96	0.064*	1030583	3.326752
Arellano-Bond test for Al	R (1) in first differences:	-		Z = 0.94	Pr>z=	0.346
Arellano-Bond test for Al	R (2) in first differences:			Z = 0.73	Pr>z=	0.463
Source: Own computation	using Stata 14, 2022.					

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4.2.1.2. Dynamic Panel Model Estimation results: One-step difference GMM technique. Similarly, the result from the Arellano and Bond (1991) one-step difference GMM estimation technique on Table 6 below revealed that foreign public debt, governance index and labour are positively and significantly predicting a variation on FER across SSA countries. Accordingly, a one percent increase in FPD increases the FER of SSA countries by around 0.26 percent, ceteris paribus. This shows that the inflow of debt that might be supplemented with tied projects having advanced technology fuels-up production and productivity of the domestic economy, and thereby enhances the export capacity of countries to generate national income denominated in terms of hard currency or FER. On the other hand, the result might be due to the fact that since debt is provided in the form of foreign currency that supplements the existing stock of FER, and that is why it acts as a syneray. The result also revealed that a one percent improvement in governance index also improves the stock of FER by around 1.25 percent, ceteris paribus. In this study, governance indicator is a composite index composed of voice and accountability, political stability, absence of violence, government effectiveness, regulatory quality, rule of law and control of corruption, and hence an improvement on these components directly or indirectly facilitates economic growth, which in turn improves competitiveness of the domestic economy. In the same way, a percent increase in labour also increases the stock of FER by around 1.61 percent, ceteris paribus.

Interestingly, the dynamic panel model result revealed that FPD supplemented with governance index had an adverse effect on the stock of FER in SSA countries. As mentioned above, SSA countries are relatively having low level of governance that increases the probability of misutilization of FPD inflows in bias of maximizing the interest of the governors and its members in SSA countries. On other hand, the results are pinpointing that FPD with relatively good governance or viable institutions have a great role in enhancing the stock of FER.

#### 5. Conclusion & policy implications

This study investigated the importance of governance on the relationship between FPD and FER using a static and dynamic panel data estimation techniques. It covered the period from 2006 to 2020 considering experiences from twenty SSA countries. The study used the long-term FPD, as it is a permanent component, FER and governance index of SSA countries as target variables, and other macroeconomic variables such as financial development indicator, human capital and labour as control variables.

This study reported strong evidence in favor of the view that the quality of institution (governance) matters in utilizing FPD to enhance the stock of FER in selected countries of SSA region. Particularly, the static and dynamic panel data results confirm that there is statistical significant relationship between FPD and FER, FPD augmented with governance and FER, governance index and FER in the selected sub-Saharan African countries. The implication of the result pinpoints that ardent need to improve governance and the quality of institutions to properly utilize foreign sources of financing in SSA countries.

This research has quite a few limitations. To start with, limited availability of data for the selected time variants of all countries in SSA region. Particularly, the data for foreign exchange reserve and governance indicators are limited for these countries which were excluded from this study. Next, even though institutional qualities might vary across developed and developing countries this study was limited in considering this heterogeneity by taking other developed regions. In addition, since this study used the composite index of governance, it recommends others to identify the relative importance of six governance indicators one by one on the relationship between FPD and FER. Moreover, the researcher recommends others to conduct in related topic by increasing the time frame and including other macroeconomic factors that affect the FER of nations.

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#### **Disclosure statement**

No potential conflict of interest was reported by the author(s).

#### Data availability statement

Data are available and can be provided over the emails querying directly to the author at the corresponding author (solomon.kebede@wsu.edu.et) or found on data depository doi: 10.4121/cd4102a7-e2f3-4592-bae0f96989cc08da in Stata Software version 14 https://data. 4tu.nl/private\_datasets/DqyPyn55KqQ0g-OG6Flzesy08S37KqibiLY7pZC05zq.

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#### References

- Aizenman, J., & Lee, J. (2007, April). International reserves: Precautionary versus mercantilist views, theory and evidence. Open Economies Review, Springer, 18(2), 191–214. https://doi.org/10.1007/s11079-007-9030-z
- Alfaro, L., & Kanczuk, F. (2005). Sovereign debt as a contingent claim: A quantitative approach. *Journal* of International Economics, 65(2), 297–314. https:// doi.org/10.1016/j.jinteco.2004.02.006
- Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte carlo evidence and an application to employment equations. *Review of Economics and Statistics*, *58*(2), 277–297. https://doi. org/10.2307/2297968
- Arellano, M., & Bover, O. (1995). Another look at the instrumental variable estimation of error component models. *Journal of Econometrics*, 68(1), 29–52. https://doi.org/10.1016/0304-4076(94)01642-D
- Chenery, H. B., & Strout, A. M. (1966). Foreign assistance and economic development. *American Economic Review*, 9 (2), 679–733. https://doi.org/10.4236/jssm.2016.92015
- Cornwell, C., & Rupert, P. (1988). Efficient Estimation with Panel Data: An Empirical Comparison of Instrumental Variables Estimators. *Journal of Applied Econometrics*, 3(2), 149–155.
- Fukuda, S., & Kon, Y. (2010). Macroeconomic impacts of foreign exchange reserve accumulation: Theory and international evidence. ADBI Working Paper 197. Asian Development Bank Institute.
- García, P., & Soto, C.(2004). "Large hoarding of international reserves: Are they Worth It?" Central Bank of Chile Working Paper No 299.
- Garton, P. (2005). Foreign reserveAccumulation in Asia: Can it be sustained? *mimeo*, (3), 1–21. https://treas

#### ury.gov.au/sites/default/files/2019-03/01\_Foreign\_ Reserve.pdf

- Gergely, B., Ferenc, K., & Zsolt, K. (N.A.). The impact of public debt on foreign exchange reserves and central bank profitability: The case of Hungary. BIS Papers, 67 Greene, W. (2003). Econometric Analysis (1st ed.).
- New York University.
- Gujarati, D. (2003). *Basic econometrics* (4th ed.). McGowan-Hill Higher Education.
- Higgins, M., & Klitgaard, T. (2004). Reserve accumulation: implications for global capital flows and financial markets. In *Current Issues in Economics and Finance* (Vol. 10). Federal Reserve Bank of New York. https:// www.newyorkfed.org/medialibrary/media/research/ current\_issues/ci10-10.html
- Holtz-Eakin, D., Newey, W., & Rosen, H. (1990). Estimating vector autoregressions with panel data. *Econometrica*, 56(6), 1371–1395. https://doi.org/10.2307/1913103
- IMF. (2021). Regional economic outlook. sub-saharan Africa: one planet, two worlds, three stories. *World Economic and Financial Surveys*, 0258–7440. https:// www.imf.org/en/Publications/REO/SSA/Issues/2021/ 10/21/regional-economic-outlook-for-sub-saharanafrica-october-2021
- Jochen, S. (2019). Foreign exchange reserves in Africa: Benefits, costs and political economy considerations. BIS Papers No 105, Bank for International Settlements Monetary and Economic Department.
- Johansson, P. (2010). Debt relief, investment and growth. World Development, 38(9), 1204–1216. https://doi. org/10.1016/j.worlddev.2009.11.021
- Layal, M. (2013). International reserves versus external debts: can international reserves avoid future financial crisis in indebted countries? halshs-00864899.
  Meyer, L.(1999). Inflation Targets and Inflation Targeting.
- Federal Reserve Bank of Philadeliphia. Working Paper. Moral Benito, E., Allison, P., & Williams, R. (2018). Dynamic
- panel data modelling using maximum likelihood: An alternative to arellano-bond. Applied Economics, 51 (20), 2221–2232. https://doi.org/10.1080/00036846. 2018.1540854
- Onwuka, E., & Igwezea, H. (2014). Impact of external reserve and foreign debt on naira exchange rate. Journal of International Academic Research for Multidisciplinary Impact Factor, 2(6), 416–423.
- Peter, E., & Dumani, M. (2020). Impact of external debt on Nigeria's foreign reserve portfolios. Asian Journal of Economics and Empirical Research, 7(1), 1–7. https:// doi.org/10.20448/journal.501.2020.71.1.7
- Polterovich, V., & Popov, V. (2003). Accumulation of foreign exchange reserves and long term growth NES Working Paper, https://doi.org/10.2139/ssrn. 1751866
- Quilent, A. (2015). An analysis on the effect of external public debt on exchange rate volatility in kenyaresearch project submitted in partial fulfillment of the requirement for the award of the degree masters of arts in economic policy and. Management of the University of Nairobi.
- Rahaj, A. (2018). External debt and economic growth in Nigeria: An ARDL approach. *Audoe*, 14(4), 581–596.
- Saheed, Z., Sani, I., & Idakwoji, B. (2015). Impact of public external debt on exchange rate in Nigeria. International Finance and Banking, 2(1), 15–26. https://doi.org/10.5296/ifb.v2i1.7734
- Samouel, B., & Aram, B. (2016). The determinants of industrialization: Empirical evidence for Africa. European Scientific Journal, Special Edition, 12(10), 219–239. https://doi.org/10.19044/esj.2016.v12n10p328

- Sebastian, E. (1984). The role of international reserves and foreign debt in the external adjustment process. International Monetary Fund.
- Senibi, V., Oduntan, E., Uzoma, O., Senibi, E., & Oluwaseun, A. (2016). Public debt and external reserve: The Nigerian experience (1981–2013) Volume 2016, Article ID 1957017. Hindawi Publishing Corporation, Economics Research International.
- Shariful, I., Anowara, K., & Yeaseen, C. (2018). Causal relationship among external debt, foreign exchange reserves and economic growth in Bangladesh. https://www.researchgate.net/publication/ 326989282\_Causal\_Relationship\_among\_External\_ Debt\_Foreign\_Exchange\_Reserves\_and\_Economic\_ Growth\_in\_Bangladesh
- Shin-Ichi, F., & Yoshifumi, K. (2007). Macroeconomic impact of foreign exchange reserve accumulation: A theory and some international evidence. ACE international Conference Paper, University of Tokyo.

- Teixeira, A., & Queiros, A. (2016). Economic growth, human capital and structural change: A dynamic panel data analysis. *Research Policy*, 45(8), 1636–1648. https://doi. org/10.1016/j.respol.2016.04.006
- Tule, M., Egbuna, E., Sagbamah, S., Abdusalam, O., & Oduyemi, A. (2015). Determination of optimal foreign exchange reserves in Nigeria. central bank of Nigeria, monetary policy. Central Bank of Nigeria.
- Victoria, S., Emmanuel, O., Obinna, U., Esther, S., & Akinde, O. (2016). *Public debt and external reserve: The Nigerian experience (1981–2013)* Volume 2016, Article ID 1957017. Hindawi Publishing Corporation, Economics Research International.
- World Bank. (2019). International debt statistics. The World Bank Group.
- World Bank. (2021), "World development indicators." https://databank.worldbank.org/reports.aspx? source=world-development-indicators.

#### Appendices

#### Appendix I: Fixed-effect model result

Fixed-effects GLS regre	ession		Num	ber of obs =	= 299	
Group variable: ID			Numt	per of group	s = 20	
Wald chi2 (7, 272) = 13	.92		Prot	o > chi2 = 0.0	0000	
FER	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
FDebt	.2719585	.0418778	6.49	0.000***	.1895127	.3544044
Gov	1.420249	.9384457	1.51	0.131	4272913	3.26779
DebtGov	0255376	.0197088	-1.30	0.196	0643387	.0132636
strucTransform	.143977	.7466501	0.19	0.847	-1.325971	1.613925
FinanceDevI	.2790192	.1757422	1.59	0.114	0669686	.625007
HumanCapital	.0189392	.0107628	1.76	0.080*	0022497	.0401281
Labour	1.969871	.8198919	2.40	0.017**	.3557306	3.584012
_cons	-140.2555	53.78429	-2.61	0.010	-246.1419	-34.3691
rho			0.736	90799		

Source: Own computation using Stata 14, 2022

		Corrected				
FER	Coef.	Std. Err.	Ŧ	P>t	[95% Conf.	Interval]
FER_L1	.1145354	.1025019	1.12	0.277	0992799	.3283506
FDebt	.269655	.067768	3.98	0.001***	.1282933	.4110166
Gov	.934453	.4695527	1.99	0.060*	0450167	1.913923
DebtGov	016314	.0095383	-1.71	0.103	0362105	.0035825
strucTransform	0871303	.4772741	-0.18	0.857	-1.082707	.908446
FinanceDevI	.2848719	.2144235	1.33	0.199	1624076	.7321514
HumanCapital	.0139829	.0205182	0.68	0.503	0288172	.0567831
Labour	1.529912	.8477693	1.80	0.086*	2385035	3.298328
Arellano-Bond test for AF	(1) in first differences	-		z=0.96	Pr > z	=0.338
Arellano-Bond test for AF	(2) in first differences			z=1.06	Pr > z	=0.289
Source: Own computation	using Stata 14, 2022.					

Appendix II: The Arellano and Bond (1991) two-step difference GMM estimation output