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International reserves, currency depreciation and public debt: new evidence of buffer effects in Africa[1]

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Abstract

The paper adds to the literature on the issue of public debt in African economies, by investigating the role foreign exchange reserves play in improving the level of indebtedness and as buffer of the negative effect of exchange rate depreciation while considering the exchange rate policy. Our results show a direct link between the level of foreign currency reserves and that of external debt in Africa. Particularly, we demonstrate that higher foreign currency reserves tend to decrease the public debt stock to GDP. This effect is even more significant when countries go through high exchange rate depreciation episodes (10% or higher). This impact, however, is not homogenous among country groups, as only countries with a floating exchange regime tend to benefit from this buffer effect compared to anchored regimes. In a time where most African economies face severe exchange rate depreciation episodes following the U.S. monetary tightening policy, central bankers and policy makers need to consider a plethora of policy issues including interventions in the FX market to mitigate depreciations and maintain a sustainable public debt stock.

Keywords: Exchange Rate, International Reserves, Buffer Effect, Public Debt.

JEL: F3, F31, F32, F34, H6

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1. Introduction

After the global financial crisis, the persistence of low interest rates has raised several questions in public debates. The consequences on public debt dynamics have been at the center of the stage. Blanchard (2019) argues that public debt is not safe even with persistent low interest rates. The author underlines two important points about too large a public debt-to-GDP ratio, namely: (i) it may reduce capital accumulation; therefore, the welfare costs may be higher than expected; and (ii) it could induce multiple equilibria where investors require a risk premium. Thus, the fiscal costs of debt are lower than in a high interest regime, but governments still have strong incentives to maintain their debt trajectory on a sustainable path.

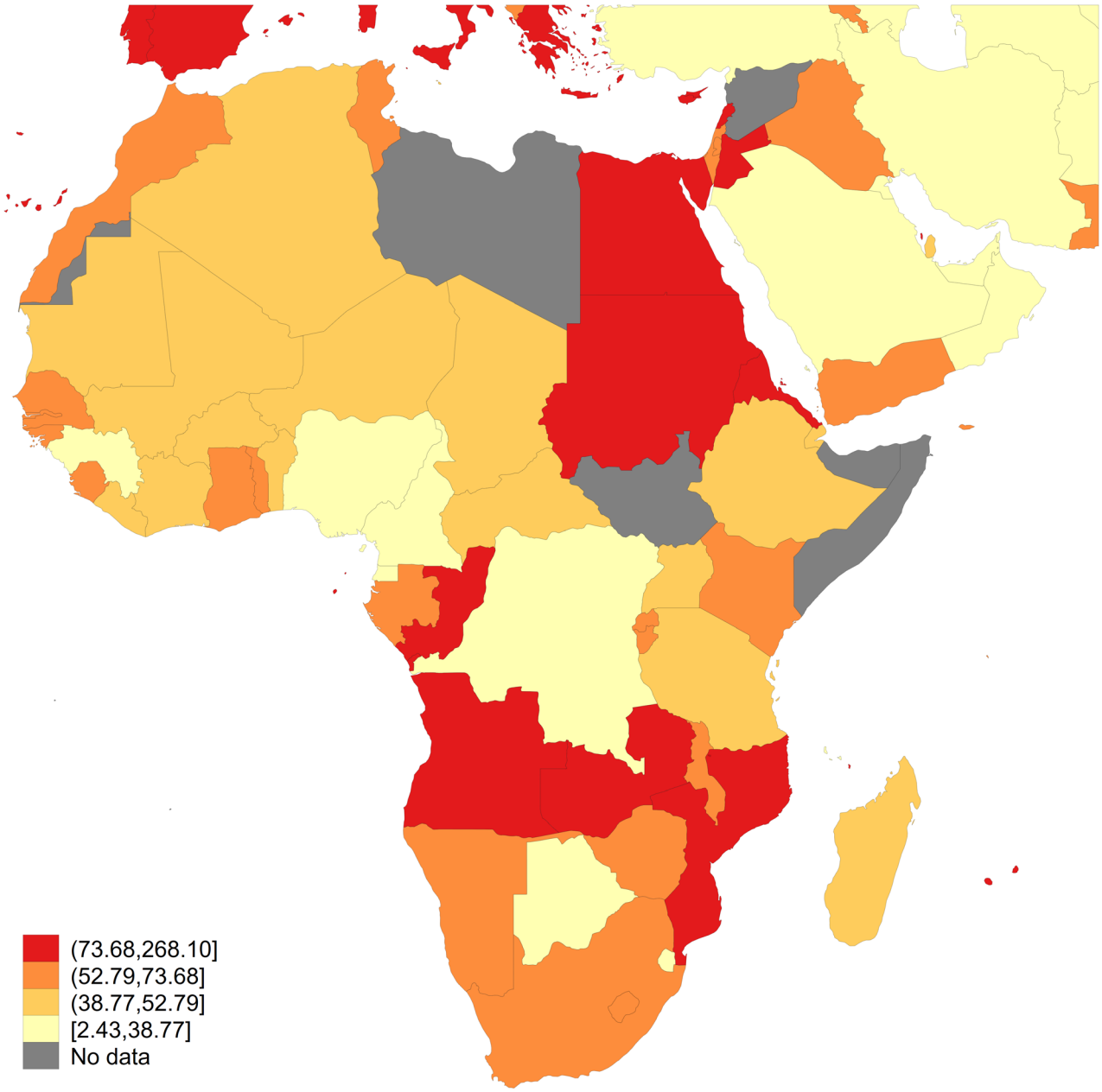
In 2022, we entered a high interest rate cycle to tame inflation at the global level. The U.S. has led their most aggressive tightening cycle since at least 1983 resulting in a strong appreciation of the US dollar against other currencies, particularly for countries that do not have enough margin to support their currency. For many African countries, this tightening monetary policy cycle around the world has meant slowing external demand, higher domestic interest rates, elevated sovereign spreads, and ongoing exchange rate pressures (see IMF, 2023). As a result, their debt increased to reach an unprecedented level since the majority of African countries benefited from debt relief initiatives, namely under the Heavily Indebted Poor Countries (HIPC) Initiative and Multilateral Debt Relief Initiative (MDRI). Figure 1 shows that the public debt-to-GDP ratio in most African countries has been higher than 50% on average over the period 2015-2022.

As highlighted by AfDB (2021), the exchange rate depreciation is one of the main drivers of public debt in Africa. Indeed, exchange rate depreciation affects the public sector balance sheet and its effect is exacerbating in emerging and developing countries facing among others the phenomenon of "Original sin"[2] (see section 2). To overcome this phenomenon, developing countries may decide

[2] The Original sin is defined as a situation in which most countries cannot borrow abroad in their own currency (see Hausmann and Panizza, 2003).

to manage international reserves strategically to buffer the impact of external finance shocks (Ahmed *et al.*, 2023).

Figure 1: Average central government debt as a percentage of GDP in Africa (2015-2023)



Source: IMF and authors calculations.

The question of holding international reserves in African economies have important implications, as it may have welfare costs (Ben-Bassat and Gottlieb, 1992; Rodrik, 2006; Korinek and Serven, 2016). This arbitrage may be delicate in economies with growing needs for investment and local development plans and subject to a continuous series of global shocks: severe repercussions on the supply chain brought about by Covid-19 and the Russia-Ukraine war, among others. According to the International Monetary Fund (IMF), the median public debt to GDP ratio has risen by 30 percentage points between 2012 and 2022 to reach 59.1%, following a decade of sharp decrease (Lemaire *et al.*, 2023). Ample scholarly research has been published on the external public debt issue and its impact on growth and other development targets. Kedir *et al.* (2023) looked at a sample of 49 African economies during the 1991-2018 period; they showed that external debt could have a negative or a positive impact on growth depending on the institutional context, particularly the governance quality. Moreover, external debt could be impacted by the change in other macroeconomic indicators such as the exchange rate depreciation or appreciation, as well as the exchange rate regime. IMF researchers found that since the onset of the COVID pandemic, exchange rate pressure (depreciation) has led to a 10 percentage points increase in public debt on average in sub-Saharan African countries. The increase is estimated to be higher amongst non-pegged exchange rates regimes (Komeo et al., 2023).

Following this introduction, the rest of the paper is organized as follows. Section 2 provides a summary of recent literature exploring the interaction between exchange rate, international reserves holding, and public debt in Africa. Section 3 outlines the empirical methodology used to answer the research questions. Section 4 details the empirical results and their interpretations. Section 5 concludes with a summary and policy implications for African economies.

2. Literature review

The theory on the dynamics of public debt indicates that the level of public debt depends on several macroeconomic variables, including: the nominal interest rate, the inflation rate, the real growth rate, the depreciation of the nominal exchange rate (depending on the weight of foreign currency-denominated external debt), and the primary deficit (Greenidge et al. 2010). Concerning the relationship between public debt and the exchange rate, the literature relies on the balance sheet effect of exchange rate depreciation or devaluation suggesting that changes in the exchange rate affect the public sector balance sheet (assets and liabilities) by increasing debt services and risk premium and reducing capacity of government to borrow and invest. This balance sheet effect is more present in emerging and developing economies facing Original sin and Currency mismatch[3] (see Eichengreen et al. 2003 and 2007, Goldstein and Turner, and Reinhart et al. 2023). These economies are more exposed to exchange rate depreciation pressures, and to the phenomenon of debt intolerance highlighted by Reinhart et al. (2003). Furthermore, some authors show that exchange rate policy matters in the analysis of balance sheet effects of exchange rate changes (see Céspedes et al., 2000, and Elekdag and Tchakarov, 2004).

There are numerous empirical studies on the impact of exchange rate depreciations on public debt in emerging and developing economies, particularly their external debt. However, very few studies have investigated factors that could reverse the spiraling public debt crisis. This constitutes an important policy recommendation that our paper aims to address. Using a sample of 41 emerging countries over the years 1999-2019, Fisera et al. (2021) find that domestic currency depreciation leads

[3] According to Goldstein and Turner (2004), Currency mismatches are defined as "the sensibility of net worth or the present discounted value of net income to changes in the exchange rate" considering external and domestic composition of assets and liabilities.

to an increase in external debt to GDP ratio over the long-term and reduces the sustainability of external debt, particularly in the case for large depreciations. They show that this effect depends on the level of development (poorer and emerging countries, more vulnerable than developed ones), the exchange rate volatility and flexibility associated with higher external debt burden, and on the higher central bank independence (limiting the effect of currency), while higher financial development and illicit financial flows increase the effect of depreciation on external debt. Focusing on Heavily indebted poor countries (HIPCs), Mijiyawa (2020) shows that economic growth, nominal exchange rate and remittance inflows negatively and significantly affect the ratio of external debt to GDP and highlights the role of better policies and institutions.

The literature lends little heft to the determining role of foreign exchange interventions (FX) in the debt dynamics of emerging and developing economies although policy makers have historically resorted to this instrument to navigate global shocks and mitigate the rise of indebtedness. Qian and Steiner (2017) used a different approach and examined the impact of foreign reserves holdings on the maturity of external debt. Using a theoretical model, the authors show that reserves tend to lengthen the maturity of external debt. Further evidence was provided through econometric analysis of data from 66 emerging markets and developing economies indicating that international reserves increase long-term external debt. Historically, FX interventions served as an important toolkit for sub-Saharan African central banks, following major global finance crises.

Our paper presents valuable contribution to the recent literature on the topic. First, we utilize a large sample of African economies allowing for heterogeneity analysis between the different country groups. Second, our work is timely as the region continues to face large currency depreciation due to

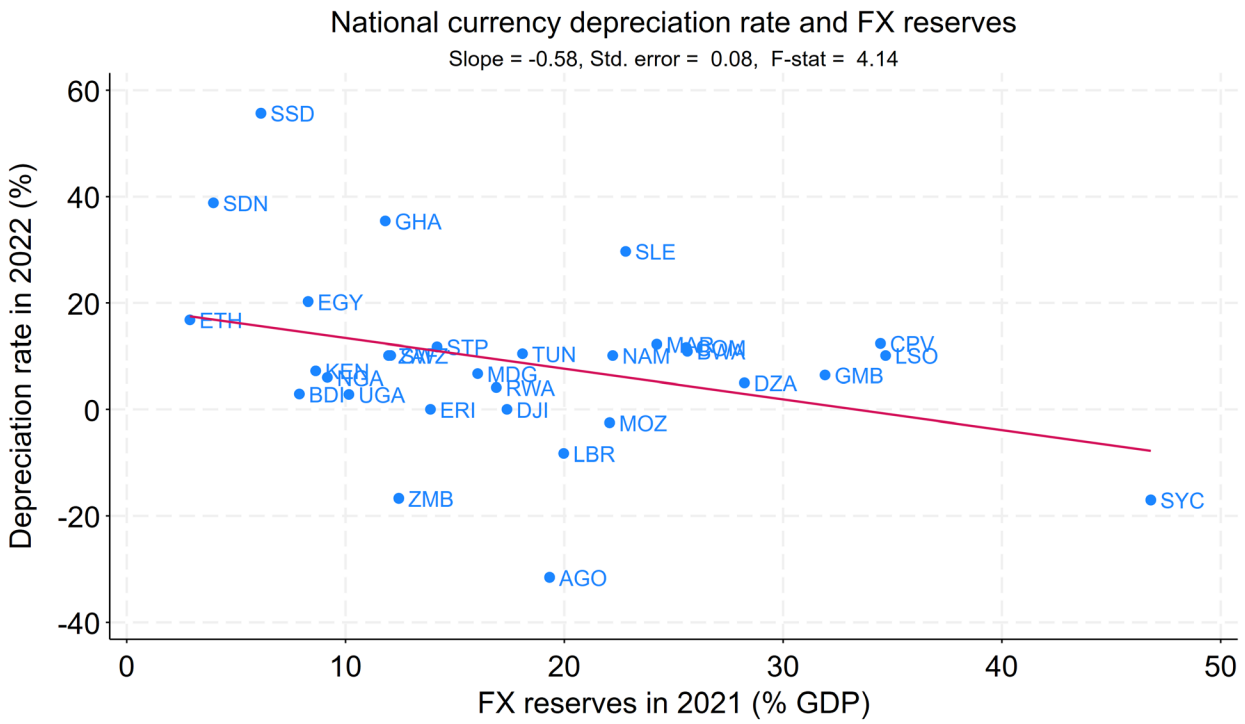
lingering effects of Covid-19 and the Russia-Ukraine war. If confirmed, the buffer effect hypothesis would constitute a key policy message for central bankers and donors.

3. Methodology and data

3.1. Data

For our analysis, we use different sources as outlined in the data sources annex section below. Initially, we conduct a simple descriptive analysis on the indicators of interest. As illustrated in Figure 2, we note a negative linear relationship between FX reserves in 2021 and exchange rate depreciation in 2022 for 52 African economies. The plot shows that as the country's foreign exchange reserves increase, it is less likely to experience depreciation. For instance, for countries with high reserves emanating from oil (Angola) and tourism revenues (Seychelles) it is low and in some cases, countries experience an exchange rate appreciation instead. These primary results are consistent with the latest literature on the topic. In a cross-country analysis, Aizenman et al. (2023) found that variations in the size of foreign exchange reserves (FX) explain differences observed in the level of exchange rate depreciations. The authors estimated that a 10 percentage-point-increase in FX reserves/DGP held before the advent of the 2021-2022 Federal Reserve monetary policy tightening, led to 1.5-2 percent less exchange rate depreciations. This will be tested more rigorously using our econometric and identification approaches outlined below.

Figure 2. Effectiveness of reserves for SSA countries



Source: authors' calculations. Note: countries with fixed exchange rate regimes are excluded.

3.2. Methodology

Cross sectional analysis: difference-in-differences

We begin our analysis by testing the robustness of the relationship highlighted in Figure 2 to see whether the *ex-ante* accumulation of foreign exchange reserves limits the magnitude of exchange rate depreciations. We are particularly interested in the year 2022 when African economies experienced an average depreciation of 10%. This depreciation was mainly induced by the tightening of monetary policy in 2022 following the war between Russia and Ukraine. Our empirical strategy follows the cross-sectional regression analyses of Eichengreen and Gupta (2015), Ahmed et al. (2017), and Ahmed (2020). Identification is achieved under the assumption that these countries did not anticipate the extent of adverse events (geopolitical, like the first stage of the War in Ukraine, or economic, like the US tightening cycle) and the ensuing variation of the domestic currency.

Consider a simple two-period setup in the spirit of differences-in-differences in Equation (1):

$$p_{it} = \mu + \gamma_i + \delta_t + \boldsymbol{\beta} X_i D_t + \epsilon_{it}, \quad (1)$$

where p_{it} is the log exchange rate vis-à-vis the USD for country i in period $t \in \{0,1\}$. Period 0 denotes the period before the event began and Period 1 denotes the treatment period of the event. Country and time-fixed effects are given by γ_i and δ_t, respectively. The variable X_i contains a set of *ex-ante* or pre-treatment values of country fundamentals and currency factors including FX reserves, trade openness, GDP per capita, inflation rate, current account, and D_t denotes an indicator equal to 0 in the pre-event period and equal to 1 in the treatment period.

The vector of coefficients of interest, $\boldsymbol{\beta}$, captures the relationship between country i's *ex-ante* country fundamentals and its *ex-post* variation vis-à-vis the dollar. Because our setting involves two periods, the specification can be expressed in a simpler form by taking differences of the dependent variable to consider the exchange rate *return* over the treatment period, as shown in Equation (2):

$$\Delta p_i = \alpha + \boldsymbol{\beta} X_i + u_i \quad (2)$$

where $\Delta p_i = p_{i1} - p_{i0}$, $\alpha = \delta_1 - \delta_0$ and $u_i = \epsilon_{i1} - \epsilon_{i0}$.

Panel Regressions

To study the impact of the depreciation of the exchange rate on the public debt of African countries, conditional on the foreign exchange reserves accumulated *ex-ante*, we then use panel regressions on the period 1980-2022. Specifically, we estimate Equation (3) below:

$$debt_{i,t} = \mu_i + \beta_1 res_{i,t-1} + \beta_2 hde_{i,t} + \beta_3 res_{i,t-1} \times hde_{i,t} + \alpha' \mathbf{x}_{i,t} + u_{i,t} \quad (3)$$

where subscripts $i = 1,\ldots, n$ represents the country and $t = 1,\ldots, T$ index the time. μ_i is the country-specific fixed effect, and $u_{i,t}$ is the error term. Where *debt* represents the debt-to-GDP ratio; *res* is the international reserves holdings; *hde* is a dummy representing episodes of large depreciations; and **x** is a vector of control variables including GDP per capita in log, inflation rate, trade openness, current account balance, government consumption expenditure, financial openness index, financial development index, democracy index, household consumption expenditure, gross fixed capital formation, broad money growth, and exchange regime peg (as a dummy). As we intend to study the potential buffering effect of foreign exchange reserves accumulated *ex-ante*, it is possible to rearrange equation (3) to highlight their influence in the relationship between episodes of strong depreciation and public debt, as follows:

$$debt_{i,t} = \mu_i + \beta_1 res_{i,t-1} + \left[\left(\beta_2 + \beta_3 \right) hde_{i,t} \right] res_{i,t-1} + \alpha' \mathbf{x}_{i,t} + u_{i,t} \quad (4)$$

Equation (4) thus shows that the impact of depreciation episodes on debt depends on the reserves accumulated in the past. Thus, in equation (2), the coefficient β_3 associated with the interaction variable is of crucial importance. A positive and significant value β_3 implies that more *ex-ante* reserves accentuate the impact of large depreciations while a negative sign means that they attenuate this impact (buffering effect).

While the panel data regression models offer more precision with regard to the estimates, we control for temporal and cross-sectional dependencies thanks to the Driscoll and Kray estimation (D-K) which has the advantage of a non-parametric covariance matrix estimator convenient for a large array of temporal and spatial dependencies.

4. Empirical results

The results from the regressions of equation (1) are reported in Table 1.. They confirm the existence of a negative and significant relationship between *ex-ante* foreign exchange reserves and currency depreciation in African economies. In other words, countries that have accumulated more foreign exchange reserves are more likely to limit the depreciation of their currency. The buffering impact of reserves seems statistically more significant (at 1%) for countries facing high depreciations of their currencies (above 10%). Such results were highlighted by Ahmed et al. (2023) on a larger sample of countries.

Table 1: International reserves and currency depreciation during the 2022 US monetary tightening

Variables	*NER depreciation rate*			*High depreciation episodes*		
	(1)	(2)	(3)	(4)	(5)	(6)
Lagged FX Reserves (% of GDP)	**-0.316***	**-0.138***	**-0.141***	**-0.280****	**-0.244*****	**-0.255*****
	(0.158)	**(0.068)**	**(0.072)**	**(0.106)**	**(0.062)**	**(0.077)**
GDP per capita (log)		2.623**	2.655*		2.453	2.572*
		(1.233)	(1.431)		(1.449)	(1.415)
Inflation rate (%)		0.177***	0.176***		0.218***	0.215***
		(0.035)	(0.037)		(0.034)	(0.037)
Trade openness		-0.099*	-0.098*		-0.008	-0.007
		(0.053)	(0.055)		(0.035)	(0.037)
Current account (% of GDP)			-0.011			-0.042
			(0.210)			(0.141)
Constant	15.032***	-2.717	-2.964	15.039***	-6.635	-7.553
	(3.519)	(8.462)	(10.613)	(3.069)	(9.490)	(9.288)
Observations	46	33	33	46	33	33
R-squared	0.083	0.470	0.470	0.093	0.512	0.513

Source: author's calculations. Note: robust standard errors in parenthesis.

Our panel analysis confirms the existence of the buffer effect for African economies (see Table 2).[4] Large foreign exchange reserves in past years tend to reduce the debt to GDP ratio in African

[4] For page limit considerations, we focus only on the interpretation of our main results. The coefficients on the control variables are generally consistent with the literature and are not commented further. Also note that we performed panel regressions considering external debt (as a percentage of GDP) as the dependent variable instead of public debt. The results are similar and available upon request from the authors.

economies. This effect is even more pronounced during high depreciation periods (HDE), as illustrated in the interaction term HDE-Lagged FX reserves. These results are significant at the 1% level and are confirmed when using the Driscoll and Kray estimation techniques, controlling for country fixed effects and cross-country dependencies.

Table 2: Public debt and buffering effect of FX reserves during episodes of currency depreciation

Variables	Pooled OLS regressions			D-K estimator	
	(1)	(2)	(3)	(4)	(5)
Lagged FX Reserves (% of GDP)	**-0.591*** **	**-0.643*** **	**-0.641*** **	**-0.591*** **	**-0.565*** **
	(0.081)	**(0.083)**	**(0.079)**	**(0.084)**	**(0.104)**
High depreciation episodes (HDE)	**17.343*** **	**15.351*** **	**14.508*** **	**17.343*** **	**16.214*** **
	(3.959)	**(3.992)**	**(3.897)**	**(3.611)**	**(3.207)**
Interaction HDE-Lagged FX Reserves	**-0.610*** **	**-0.578*** **	**-0.539*** **	**-0.610*** **	**-0.334*** **
	(0.156)	**(0.157)**	**(0.147)**	**(0.115)**	**(0.073)**
GDP per capita growth	-0.837***	-0.930***	-0.979***	-0.837***	-0.748***
	(0.287)	(0.290)	(0.289)	(0.267)	(0.265)
Government consumption exp. (% of GDP)	2.248***	2.161***	2.147***	2.248***	0.722
	(0.300)	(0.301)	(0.286)	(0.566)	(0.539)
Financial openness	1.192***	1.227***	1.125***	1.192***	0.708***
	(0.121)	(0.120)	(0.118)	(0.238)	(0.105)
Trade openness	-0.142***	-0.135***	-0.086**	-0.142**	-0.156
	(0.040)	(0.040)	(0.039)	(0.069)	(0.103)
Financial development	-0.248***	-0.324***	-0.320***	-0.248	-0.601**
	(0.081)	(0.082)	(0.082)	(0.162)	(0.263)
Democracy index	2.689***	2.567***	2.677***	2.689***	-1.055
	(0.471)	(0.472)	(0.461)	(0.702)	(1.075)
Households' consumption exp. (% of GDP)	0.231**	0.182*	0.252***	0.231**	0.178
	(0.098)	(0.099)	(0.095)	(0.114)	(0.243)
Gross fixed capital formation (% of GDP)	-0.158	-0.207	-0.309*	-0.158	-0.286
	(0.186)	(0.189)	(0.187)	(0.304)	(0.355)
Broad money growth	0.576***	0.525***	0.476***	0.576**	0.335*
	(0.176)	(0.181)	(0.181)	(0.232)	(0.167)
CFA zone/Peg currency system		-9.154***	-15.035***		
		(2.724)	(2.502)		
Constant	-2.218	10.267	8.391	-2.218	72.001**
	(13.729)	(14.507)	(13.635)	(17.562)	(28.239)
Observations	1,070	1,070	1,070	1,070	1,070
R-squared	0.267	0.274	0.290	0.267	
Number of groups				45	45
Cross-sectional dependence				Yes	Yes
Country FE				No	Yes

Source: author's calculations. Note: robust standard errors in parenthesis. D-K stands for the Driscoll-Kray estimator.

Then, we deepen the analysis by studying the heterogeneity in the buffer effect. More specifically, we investigate the difference between the exchange regimes that are pegged/anchored vs unpegged/unanchored. This is a crucial factor as multiple countries in the region have pegged currencies either to the Euro or Rand. The results of these additional investigations are shown in Table 3. Our findings indicate that there is no significant impact of foreign exchange reserves on the debt to GDP ratio for countries under a currency peg regime, both during and outside of high depreciation periods. On the other hand, for countries with a flexible exchange rate regime (unanchored), there is a high and statistically significant impact of reserves on the level of public debt. This last point is explained by the fact that in the case of pegged regimes, the public debt is expressed in the peg currency (Euro or USD), and therefore is insensitive to spikes in U.S. interest rates. Furthermore, since most of these countries have the same anchor currency, their differences in foreign exchange reserves can have no effect on their level of depreciation. However, in the case of flexible regimes, the effect is much stronger given the absence of a peg currency guarantee and speculative activities on sovereign debt.

Table 3: Public debt and buffering effect of FX reserves according to the exchange rate regime

Explained Variable: Public debt	*Anchored ERR*			*Unanchored ERR*		
	OLS	D-K	D-K	OLS	D-K	D-K
	(1)	(2)	(3)	(4)	(5)	(6)
Lagged FX Reserves (% of GDP)	0.220	0.220	-0.644*	**-0.692*****	**-0.692*****	**-0.460*****
	(0.223)	(0.216)	(0.355)	**(0.089)**	**(0.074)**	**(0.110)**
High depreciation episodes (HDE)	8.382	8.382	1.767	**18.772*****	**18.772*****	**19.270*****
	(7.559)	(9.012)	(8.087)	**(4.350)**	**(3.576)**	**(3.087)**
Interaction HDE-Lagged FX Reserves	-0.103	-0.103	0.181	**-0.581*****	**-0.581*****	**-0.437*****
	(0.358)	(0.401)	(0.353)	**(0.151)**	**(0.116)**	**(0.091)**
GDP per capita growth	-0.495*	-0.495**	-0.222	-1.228***	-1.228***	-0.958***
	(0.300)	(0.234)	(0.268)	(0.380)	(0.420)	(0.314)
Government consumption exp.	-0.996***	-0.996**	0.232	3.094***	3.094***	0.599
	(0.302)	(0.362)	(0.771)	(0.344)	(0.546)	(0.540)
Financial openness	38.378***	38.378***	33.679***	1.050***	1.050***	0.474***
	(5.384)	(11.134)	(4.650)	(0.105)	(0.161)	(0.162)
Trade openness	-0.211***	-0.211**	-0.012	-0.021	-0.021	-0.301***
	(0.053)	(0.087)	(0.170)	(0.061)	(0.090)	(0.084)
Financial development	-0.403**	-0.403***	-1.442***	-0.219**	-0.219	-0.208
	(0.166)	(0.116)	(0.323)	(0.094)	(0.145)	(0.166)
Democracy index	0.440	0.440	1.223	3.444***	3.444***	-2.151
	(0.545)	(0.456)	(1.751)	(0.585)	(0.735)	(1.276)
Households' consumption exp.	0.110	0.110	-0.258	0.264*	0.264	0.249
	(0.109)	(0.204)	(0.241)	(0.147)	(0.190)	(0.370)
Gross fixed capital formation (% of GDP)	-0.701***	-0.701*	-0.241	-0.388	-0.388	-0.395
	(0.243)	(0.399)	(0.407)	(0.241)	(0.259)	(0.346)
Broad money growth	-0.007	-0.007	-0.121	0.734***	0.734*	0.659**
	(0.142)	(0.100)	(0.074)	(0.268)	(0.356)	(0.240)
Constant	40.776***	40.776*	51.242*	-22.746	-22.746	81.478**
	(14.795)	(23.139)	(28.280)	(19.243)	(21.196)	(34.289)
Observations	456	456	456	614	614	614
R-squared	0.290	0.290		0.425	0.425	
Number of groups		20	20		25	25
Cross-sectional dependence		Yes	Yes		Yes	Yes
Country FE		No	Yes		No	Yes

Source: author's calculations. Note: robust standard errors in parentheses. D-K stands for the Driscoll-Kray estimator.

5. Conclusion

Our paper provides evidence that monetary policy tools mitigate the impact of the rising public debt in African economies. Using both pooled OLS and the Driscoll-Kray estimators, we confirm that holding foreign exchange reserves has a buffer effect against rising public debt, and particularly during periods of high depreciation of exchange rate as experienced most recently with the United States monetary policy tightening. Additionally, we account for heterogeneity among the 52 African economies in the sample by looking at variations between exchange rate regimes. We find that the buffer effect is only present when countries have a floating exchange regime compared to pegged countries. It follows that foreign reserves are an essential tool in combatting debt rise in the region. African policy makers could benefit from implementing better policies to maintain sound foreign exchange buffers to prevent and successfully mitigate the repercussions of unexpected external finance shocks and geopolitical events.

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Appendix A. Data and country list

Table A.1: Data sources and definitions

Variable	Source
Total reserves excluding gold (% GDP)	Milesi-Ferretti, Gian Maria, 2022, "The External Wealth of Nations Database," The Brookings Institution (based on Lane, Philip R. and Gian Maria Milesi-Ferretti, 2018, ""The External Wealth of Nations Revisited: International Financial Integration in the Aftermath of the Global Financial Crisis,"" IMF Economic Review 66, 189-222
External debt stock (% of GNI)	World Development Indicators, World Bank
Official exchange rate (LCU per US$, period average)	World Development Indicators, World Bank
Broad money (% of GDP)	World Development Indicators, World Bank
GDP per capita (constant 2015 US$)	World Development Indicators, World Bank
General government final consumption expenditure (% of GDP)	World Development Indicators, World Bank
Households and NPISHs final consumption expenditure (% of GDP)	World Development Indicators, World Bank
Democracy index (political rights and civil liberties)	Freedom House
GDP per capita growth	World Development Indicators, World Bank
Financial openness (Total assets excl. gold plus Total liabilities as a percentage of GDP)	Milesi-Ferretti, Gian Maria, 2022, ""The External Wealth of Nations Database,"" The Brookings Institution (based on Lane, Philip R. and Gian Maria Milesi-Ferretti, 2018, ""The External Wealth of Nations Revisited: International Financial Integration in the Aftermath of the Global Financial Crisis,"" IMF Economic Review 66, 189-222
Trade openness (Exports + imports, % GDP)	World Development Indicators, World Bank
Gross fixed capital formation (% of GDP)	World Development Indicators, World Bank
Inflation rate	World Economic Outlook, IMF
Current account (% of GDP)	World Economic Outlook, IMF

Country list: Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo, Cote d'Ivoire, Democratic Republic of Congo, Djibouti, Egypt, Equatorial Guinea, Eritrea, Eswatini, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Somalia, South Africa, South Sudan, Sudan, Tanzania, Togo, Tunisia, Uganda, Zambia