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Sub-Saharan Africa

Analytical Note

The Role of Foreign Exchange Intervention in Sub-Saharan Africa's Policy Toolkit

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Contents

Analytical Note Summary

The IMF has developed the Integrated Policy Framework to help countries develop the most appropriate policy response to global shocks. This new analytical framework considers the combined and potentially interacting role of monetary, exchange rate, macroprudential, and capital flow management policies. In this context, this note considers the role of foreign exchange (FX) intervention as a part of the policy toolkit in sub-Saharan Africa, focusing specifically on countries with flexible exchange rates.

This analysis finds that intervention may indeed have a constructive role to play in the policy toolkit for sub-Saharan African countries, but this must be weighed carefully, given the region's complicated policy environment. Indeed, for most countries, the case for or against intervention is far from straightforward.

Shallow markets, weak monetary policy credibility, and high FX liabilities are common features throughout the region, implying that large exchange rate movements risk de-anchoring inflation expectations and can pose risks to financial stability. In such circumstances, exchange rate flexibility may act as a shock amplifier instead of a shock absorber. Moreover, the widespread dominant foreign currency pricing in the region implies that the potential role of the exchange rate as a shock absorber is weakened. Intervention to lean against certain exchange rate fluctuations could, therefore, be a helpful and less costly addition to the policy toolkit, depending on country-specific circumstances and the nature of shocks.

However, several considerations limit the set of circumstances under which countries in the region should use intervention in response to shocks. First, compared with emerging markets, the region is relatively more exposed to shocks originating in the real economy (and relatively less to temporary financial shocks), which generally do not justify the use of FX intervention except in a limited set of circumstances. Second, with currencies being overvalued in many countries in the region, intervention in support of them risks supporting unsustainable policies and shoring up weak external positions.

With the region facing a challenging and uncertain global environment, paired with a likely tightening in global financial conditions, each country's policy mix must be calibrated carefully. Although FX intervention has a role in cushioning the economy from external shocks, it should be used only when country circumstances and the nature of shocks justify it. For example, the intensity with which central banks in the region have leaned against commodity price shocks in recent years may not have been justified in all cases. Countries with overvalued currencies particularly need to refrain from supporting chronically weak external positions. Policymakers should also avoid FX sales that risk eroding reserve adequacy and use episodes of positive market sentiment to shore up buffers.

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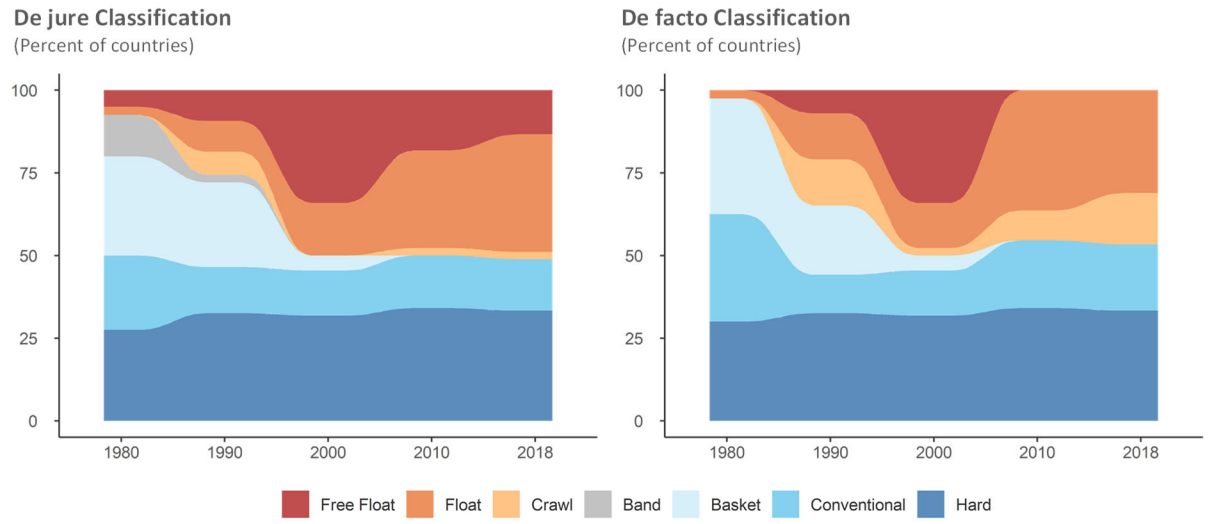
Foreign Exchange Intervention In Sub-Saharan Africa

Exchange rate regimes in the region have evolved since the global financial crisis. As an underlying principle, the IMF has long affirmed that no single exchange rate regime is preferred for all countries at all times. Instead, the appropriate regime depends on a country's particular circumstances and challenges (Ghosh, Ostry, and Tsangarides 2010). In line with this, exchange rate regimes vary considerably across sub-Saharan Africa, and countries have altered their regimes frequently in the face of changing circumstances (Figure 1). Indeed, mirroring trends in other regions, several countries opted for less flexible regimes after the global financial crisis on a de facto basis, though not always on a de jure basis (October 2016 *Regional Economic Outlook: Sub-Saharan Africa*).

Figure 1. Exchange Rate Regimes in sub-Saharan Africa

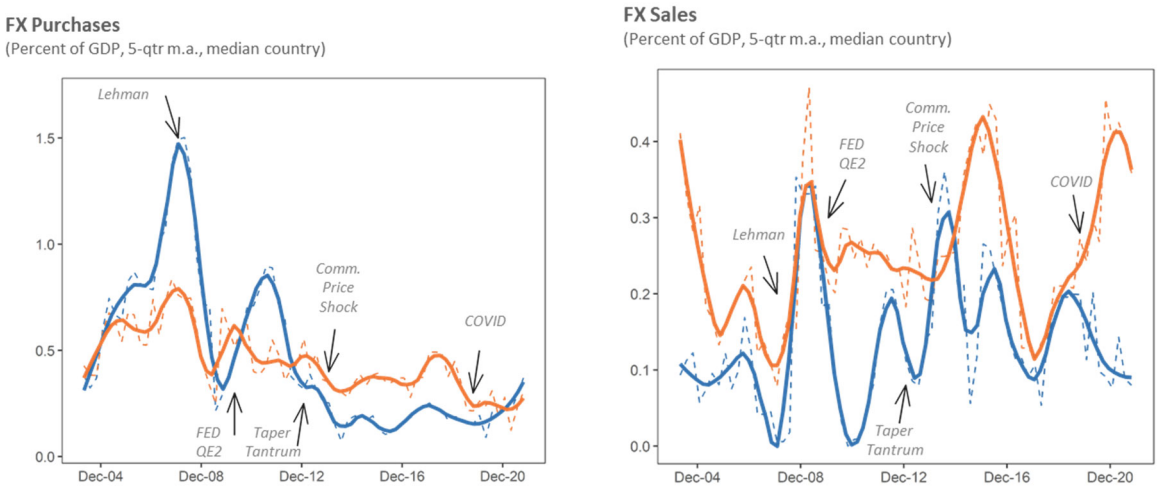


Source: IMF *Annual Report on Exchange Arrangements and Exchange Restrictions* .
Note: The chart shows the distribution of de jure exchange rate regime classifications for sub-Saharan Africa for the period 1980-2018. The regimes are grouped into seven categories: (1) hard pegs (exchange arrangement with no separate legal tender and currency board arrangements), (2) conventional pegs (to a single currency), (3) basket pegs (conventional pegs to a basket of currencies), (4) pegged exchange rates with horizontal bands, (5) crawling pegs or crawl-like arrangements, (6) floating, and (7) free-floating arrangements.

This note focuses on sub-Saharan African countries with flexible exchange rates. Flexible exchange rates are defined on a de jure basis as either floating or free-floating regimes per the Annual Report on Exchange Arrangements and Exchange Restrictions classification.[1] The analysis thereby applies to about half of sub-Saharan African countries, which account for more than 80 percent of the region's GDP. Throughout the analysis, sub-Saharan African countries are benchmarked against a sample of highly integrated emerging markets with flexible exchange rates, which have typically been the focus of the existing literature on foreign exchange (FX) intervention. This gives a sample of 17 sub-Saharan African countries and 17 emerging market benchmark countries when the sample is limited to countries for which the quarterly FX intervention proxy proposed in Adler and others (2021) is available and given that South Africa is included in the group of emerging markets rather than sub-Saharan African countries (see Annex 1).

[1] Specifically, countries that maintained floating or free-floating regimes for at least half of the sample period were included in the analysis. See Habermeier and others (2009) for an overview of the classification of exchange rate regimes.

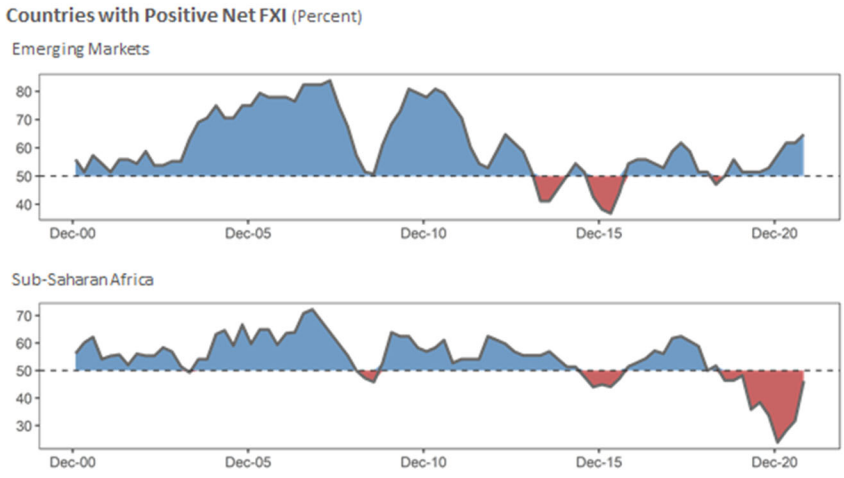
Figure 2. FX Intervention: sub-Saharan Africa versus Emerging Markets



Sources: Adler and others 2021; and authors' calculations.
Note: The left (right) chart shows the five-quarter moving average of FX purchases (FX sales) over GDP for emerging markets (in blue) and sub-Saharan African countries (in orange). The dashed lines show the un-averaged data. Fed = Federal Reserve; FX = foreign exchange; QE2 = Quantitative Easing 2.

Intervention has been an important part of the policy toolkit for central banks in sub-Saharan Africa. Before, during, and after the global financial crisis, sub-Saharan African countries have often intervened significantly, including in response to terms of trade and global growth shocks, and surging capital flows and reversals (Blignaut and others 2007; Schanz 2019). Both FX sales and FX purchases have been comparable to (or larger than) those in emerging markets throughout much of the sample period (see Figure 2; and Adler, Chang, and Wang [2020])—one notable exception was the sizable accumulation of reserves in emerging markets during the period before the global financial crisis and in the early 2010s, which was not quite as significant in sub-Saharan Africa. Similar to emerging markets, Intervention in sub-Saharan African countries has also typically been asymmetric, with purchases generally larger than sales. However, net sales have become increasingly prevalent in recent years amid large swings in commodity prices and shocks to global trade and growth, and to the recent COVID-19 crisis (Figure 3).

Figure 3. Asymmetry of FX Intervention



Sources: Adler and others 2021; and authors' calculations.
Note: The top (bottom) chart shows the share of emerging markets (sub-Saharan African) countries with net positive FX purchases in each quarter over the period 2002–20. FX = foreign exchange; FXI = foreign exchange intervention.

The Role of Country Circumstances and the Nature of Shocks

The IMF has developed a new analytical framework to help countries develop the most appropriate policy response to global shocks. The Integrated Policy Framework (IPF; Box 1) reaffirms that a simple reliance on flexible exchange rates may not always offer full insulation against external shocks. It considers the joint role of monetary, exchange rate, macroprudential, and capital flow management policies in developing an adequate policy mix. The work provides useful insights to policymakers on when and how to deploy multiple tools, with special attention to country-specific considerations, initial conditions, the nature of shocks, and potential interactions between different policy tools. For example, circumstances that may determine whether FX intervention is appropriate include country-specific vulnerabilities (for example, limited market depth, significant unhedged FX liabilities, or lack of monetary policy credibility) and constraints that may limit the benefits of exchange rate flexibility (for example, dominant currency pricing). At the same time, the framework emphasizes that the active use of intervention should generally be limited to temporary financial (risk-on/risk-off) rather than real shocks, unless there are financial stability concerns, inefficiencies in the reallocation of production, or a risk of disanchoring of inflation expectations.

Box 1. Integrated Policy Framework

The IMF has made a concerted push to develop a new analytical approach to help countries respond to shocks. The Integrated Policy Framework (IPF**)** was motivated by the intention to advance the understanding of policy options and trade-offs available to policymakers in a systematic fashion by considering jointly the role of monetary, exchange rate, macroprudential, and capital flow management policies and their interactions. As such, the IPF aims to provide a systematic, analytical approach to selecting an appropriate policy mix for managing large and volatile capital flows and more generally preserving macroeconomic and financial stability in the face of domestic and external shocks. The IMF's Executive Board discussed the staff paper (IMF 2020) in October 2020 (see also the findings of the wealth of analytical work that staff conducted and compiled).[1,2]

A key IPF finding is that although policymakers face trade-offs that may warrant the use of multiple tools under certain conditions, there is no one-size-fits-all solution. The optimal policy response to shocks does not necessarily involve complete reliance on exchange rate flexibility but could involve foreign exchange (FX) intervention, depending on the nature of shocks and country circumstances:

- *Country circumstances.* When markets are shallow, for example, FX intervention can be valuable in leaning against certain exchange rate fluctuations. This can be even more important when large and unhedged FX exposures and imperfect monetary policy credibility exacerbate the costs associated with excessive exchange rate movements in the context of external shocks. FX interventions can also be appropriate when aimed at providing FX liquidity to constrained domestic agents in the context of an external crisis. Moreover, FX purchases can be employed for the purpose of precautionary reserve accumulation during normal times or as a tool to ease monetary conditions in countries in a liquidity trap, but interventions should not be used to attain a competitive advantage or support misaligned exchange rates. Finally, dominant currency pricing and financing reduces the shock-absorbing role of the exchange rate, implying that the benefits associated with exchange rate flexibility are muted.
- The *nature of shocks*. In general, FX intervention is better suited to respond to temporary financial (for example, risk-on/risk-off) shocks rather than shocks originating in the real economy (for example, shocks to productivity or commodity prices). In the case of temporary real shocks, however, FX intervention could be used if these give rise to financial stability concerns, inefficiencies because of friction in reallocating production, or a disanchoring of inflation expectations (see IMF (2020) for more detail).

Notwithstanding the potential role for FX intervention under some of the circumstances listed, the active use of FX intervention could lead to unintended consequences. For example, it could hinder FX market development, amplify currency mismatches, and risk de-anchoring of inflation expectations. Hence, short-term benefits should be weighed against potential unintended costs and side effects.

[1] Although the Integrated Policy Framework already provides broad policy guidance, its operationalization—including additional considerations for the use of policies in practice—remains work in progress.

[2] The analytical work can be found here: https://www.imf.org/en/Topics/IPF-Integrated-Policy-Framework

Central bank surveys have contributed to our understanding of why and under what circumstances countries intervene. Surveys of central banks are commonplace in the case of emerging market policymakers (see, for example, Mohanty and Berger [2013] and Patel and Cavallino [2019]) but are uncommon for low-income economies' central banks. One exception is the recent Bank for International Settlements survey of African central bank governors summarized in Schanz (2019). Interestingly, most governors in the region have highlighted the need to alleviate FX shortages as a key motivation for intervention, likely because sources of FX are often not very diversified, for example, because of a heavy reliance on commodity exports. However, this is reportedly less of a concern for emerging market central banks (Patel and Cavallino 2019). This finding may stem from the absence of market depth in low-income economies, suggesting that these markets may be particularly vulnerable to large, disruptive shifts in FX demand and supply (for example, because of large debt redemptions). Although price stability is an important consideration in both emerging market and sub-Saharan African central banks, some sub-Saharan African countries also mentioned the goal of stabilizing fiscal revenues in the context of volatile commodity exports (Schanz 2019).

This note sheds light on the potential motivations behind FX intervention in sub-Saharan Africa by looking at the relative importance of financial and real shocks and country circumstances. Particular attention is given to the circumstances and shocks outlined in the IPF. In this vein, a range of proxies was assembled for both financial and real shocks and the relevant characteristics of both sub-Saharan African and emerging market countries. In the cases where data availability was scarce (for example, FX market depth), every effort was made to find good and comparable proxies and to impute missing data to the extent possible (Annex 2).

Country circumstances in sub-Saharan African countries were benchmarked, and the determinants of FX intervention decisions were modeled. The focus of the regression analysis was to understand the role of shocks and country circumstances in driving intervention decisions. More specifically, simple hurdle models were run that separate the decisions on *whether* and *how much* to intervene by allowing each of these to be determined by separate reaction functions (Annex 3). The analysis concentrated on FX purchases and FX sales as separate dependent variables, again allowing the two decisions to be driven by separate models, with potentially distinct determinants.[2]

The findings suggest that country circumstances may provide support for a role of FX intervention as a policy tool in sub-Saharan Africa. As shown in Figure 4, markets are particularly shallow compared with emerging markets, indicating that they could be prone to disorderly market conditions when faced with large shocks to FX supply or demand. Moreover, inflation volatility—a proxy for policy credibility—is relatively high in sub-Saharan African countries, potentially giving a role to FX intervention in preventing large exchange rate movements from (further) disanchoring inflation expectations.[3] Furthermore, the significant foreign liabilities on private and public balance sheets implies that exchange rate adjustment can be costly and threaten financial stability (Christensen and Upper 2017).[4] Finally, the high share of exports priced in dominant currencies may limit the role of the exchange rate as a shock absorber, thus weakening the relative benefits of exchange rate flexibility.

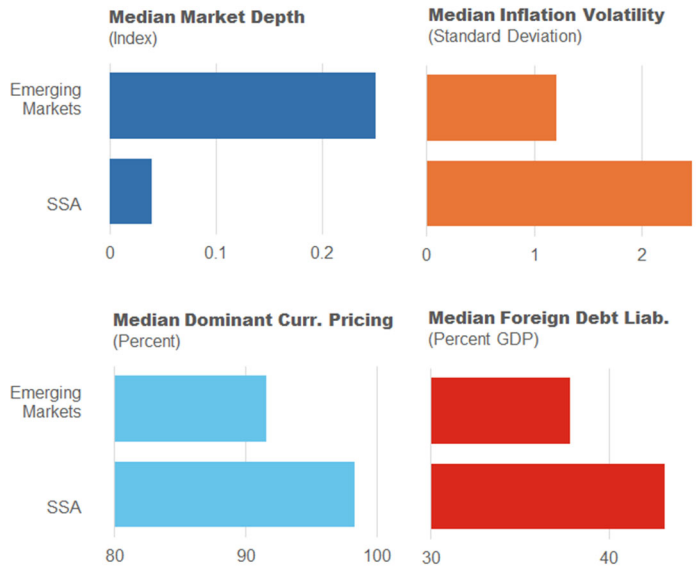
[2] The results should be interpreted with caution, given potential biases related to reverse causality and the presence of omitted variables.

[3] Weak credibility, however, could also pose communicational challenges arising from having multiple tools and multiple objectives. For an assessment of monetary policy frameworks, including the role of communication, see Unsal, Papageorgiou, and Garbers (2022).

[4] Exchange rate depreciation would be costly in the presence of FX liabilities only to the extent that they are unhedged, but exact information on hedging is not available for the countries in the sample. Moreover, although foreign liabilities are likely to be a good proxy for FX liabilities in sub-Saharan African countries, they would overestimate FX liabilities in emerging markets where a significant portion of external liabilities is denominated in local currencies.

However, the region's exposure to commodity price shocks suggests that intervention may not always be the most appropriate policy response. Sub-Saharan African countries are relatively more exposed to commodity price shocks than their emerging market counterparts (see Figure 5). Conversely, the average sub-Saharan African country is less open to financial shocks than the average emerging market. Given that FX intervention is better suited to respond to temporary financial shocks than to shocks originating in the real economy (unless these are temporary and give rise to financial stability concerns, inefficiencies because of friction in reallocating production, or a disanchoring of inflation expectations), this would, all else equal, weaken the case for FX intervention in the region relative to the average emerging market.[5]

Figure 4. Country Circumstances



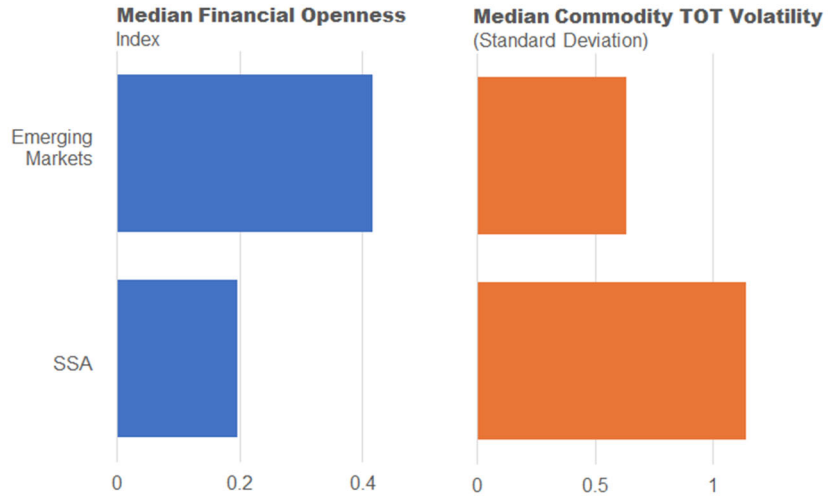
Sources: IMF Financial Development Index database; IMF, April 2021 *World Economic Outlook*; Boz and others 2020; and External Wealth of Nations database.
Note: The charts show medians across country averages for 2016–20. See Annex 2 for variable definitions. SSA = sub-Saharan Africa.

The data suggest that FX sales in sub-Saharan Africa react relatively more strongly to commodity price shocks and less strongly to financial shocks, compared with emerging markets. Panel 2 of Figure 2 illustrates the evolution of FX sales over GDP in sub-Saharan Africa versus emerging markets. Whereas peaks and troughs in FX interventions in emerging markets are often associated with global financial risk-on and risk-off episodes (boom before the global financial crisis, global financial crisis, Federal Reserve quantitative easing, taper tantrum), FX interventions in sub-Saharan Africa appear to be less responsive to these events and instead seem to peak around major commodity price and global growth shock episodes (and the unique COVID-19 shock).[6] The regression models confirmed these descriptive findings and suggest that FX sales in sub-Saharan African countries respond relatively less to movements in the Chicago Board Options Exchange Volatility Index (VIX) compared with emerging markets and relatively more to movements in commodity prices (Annex 3).

[5] That said, the IPF sees a role for FX intervention in responding to real shocks to the extent that these lead to financial stability concerns, allocation inefficiencies, or a disanchoring of inflation expectations. And commodity price shocks may be more likely to lead to financial stability concerns in countries that are more exposed to them.

[6] Indeed, Schanz (2019) noted that the 2014 oil price shock was accompanied by a fall of 1/3 in FX reserves in oil-exporting African countries, while Christensen and Upper (2007) argued that "when commodity prices declined and pressures mounted, only a few countries (for example, Zambia) let their currency depreciate" in Africa.

Figure 5. Exposure to Shocks



Sources: Chinn and Ito 2006 for capital account openness; and Gruss and Kebhaj 2019 for commodity terms of trade.
Note: The charts show medians across country averages for 2016–20. Financial openness is defined as the overall Chinn-Ito indicator; the commodity terms of trade index is a country-specific variable taken from Gruss and Kebhaj (2019) that measures the income gains and losses associated with commodity price movements. The standard deviation is calculated across the whole sample period for each country. SSA = sub-Saharan Africa; TOT = terms of trade.

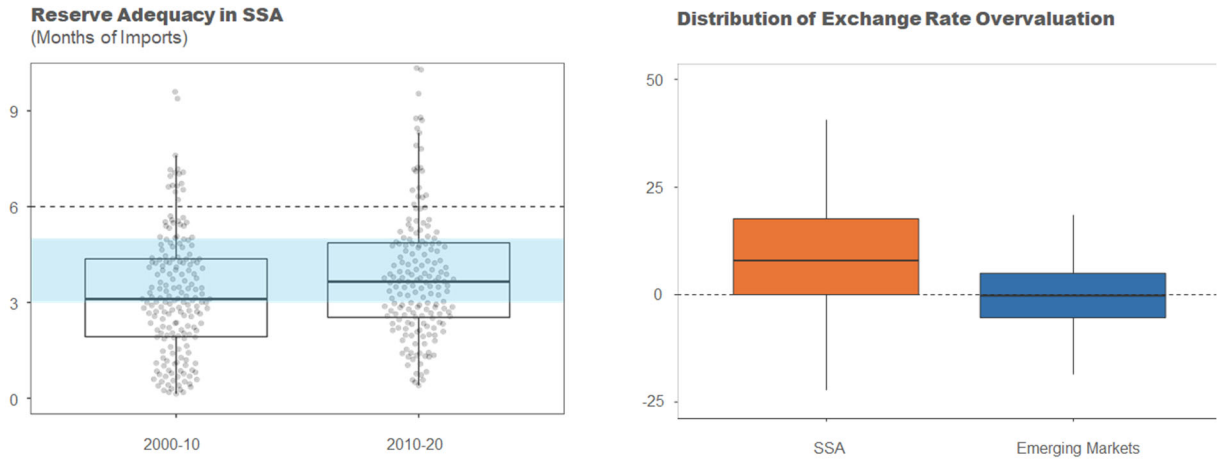
FX purchases have followed a downward trend in recent years, with scant evidence of opportunistic reserve accumulation during favorable market conditions (Figure 2). This trend broadly mirrors the evolution of reserve accumulation in emerging markets (Figure 2). However, a more opportunistic and precautionary approach to reserve accumulation may be a particularly useful strategy in sub-Saharan African countries in which market depth tends to be more limited, implying that opportunities to accumulate reserves without unduly affecting market conditions may not always be present when needed. A second finding is that the regression models do not point to a similarly important role for real and financial shocks in driving FX purchases, as is the case for FX sales, and they also do not indicate a significant difference between sub-Saharan African countries and emerging markets in the responsiveness of FX purchases to shocks. A possible explanation could be the relatively larger role for reserve adequacy considerations as drivers for FX purchases relative to sales. In other words, because purchases may be carried out routinely over time, with large movements or trends dominated by shifts in reserve adequacy considerations, the response of FX purchases to external shocks may be harder to disentangle with precision.[7]

The prevalence of weak external sector positions in sub-Saharan Africa constrains the case for FX sales further. As shown in panel 2 of Figure 6, although the median emerging market in the sample had a fairly valued exchange rate in recent years, the median sub-Saharan African country was overvalued by about 7–8 percent. In fact, an investigation of Article IV exchange rate assessments in sub-Saharan Africa over the past 15 years did not include any examples of significantly undervalued exchange rates. Moreover, although reserves are now generally adequate (Figure 6, panel 1), net reserve accumulation will remain important to sustain reserve adequacy as most sub-Saharan African countries maintain reserves within the range of 3–5 months of imports, with almost no observations significantly above common adequacy thresholds.

[7] See also Fanelli and Straub (2020). FX interventions might be smoothed over time partly because of the presence of a convex cost function for interventions.

Overall, policy advice on FX intervention in the region may be particularly complicated. Country circumstances in sub-Saharan Africa would generally support the use of FX intervention as a policy tool. However, the region is less exposed to financial shocks compared with its more financially integrated emerging market counterparts and is instead more exposed to commodity price shocks. The circumstances under which shocks originating in the real economy would justify intervention according to the IPF are limited. Moreover, circumstances justifying intervention in support of the domestic currency are more limited than in the emerging market world, given that most currencies in the region are overvalued. Finally, policy discussions on FX intervention in sub-Saharan Africa may be hampered by difficulties associated with the identification of shocks, the lesser availability of data, and a lack of consensus on the appropriate definition of FX intervention in a region in which central bank transactions outside the formal FX market are common (for example, aid flows, surrender requirements, or FX liquidity provision to state-owned enterprises).

Figure 6. External Sector Positions



Sources: IMF, April 2021 *World Economic Outlook;* IMF staff, and authors' calculations.
Note: Panel 1 shows each country's level of reserve adequacy each year. Reserve adequacy is defined as the ratio of gross reserves over the subsequent year's imports of goods and services. Panel 2 shows the distribution of exchange rate overvaluation point estimates for sub-Saharan African countries and emerging markets as included in the IMF's Article IV Consultations for the period 2016–20, with gaps filled based on actual real effective exchange rate movements relative to a Hodrick-Prescott trend (see Annex 2). SSA = sub-Saharan Africa.

Conclusion

FX intervention has a role to play in the policy toolkit of sub-Saharan African central banks, but it should not be used to support misaligned exchange rates and obstruct adjustment to permanent shocks. Circumstances such as shallow markets, noncredible monetary policies, dominant currency pricing, and high FX liabilities can support the case for FX intervention as a policy tool. However, intervention decisions should consider country characteristics and the nature of shocks hitting the economy, particularly in a region that is relatively more exposed to real shocks versus financial shocks. With the region facing a challenging and uncertain global environment, paired with the likely tightening in global financial conditions, each country's policy mix must be calibrated carefully. The intensity with which central banks in the region leaned against commodity price and global growth shocks in recent years, for example, may not have been justified in all cases. Policymakers in countries with overvalued currencies particularly need to refrain from supporting chronically weak external positions or unsustainable policies. Policymakers should also avoid one-sided intervention that risks eroding reserve buffers and use episodes of positive market sentiment to shore up reserve buffers.

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Annex 1: Country Sample

Sub-Saharan Africa Sample	Emerging Market Sample
Angola	Argentina
Burundi	Brazil
Ethiopia	Chile
The Gambia	China
Ghana	Colombia
Guinea	Hungary
Kenya	India
Madagascar	Indonesia
Mauritius	Malaysia
Mozambique	Mexico
Nigeria	Peru
Rwanda	Philippines
Seychelles	Poland
Sierra Leone	Russian Federation
Tanzania	South Africa
Uganda	Thailand
Zambia	Turkey

Annex 2: Country Characteristics: Definitions and Sources

Variable	Definitions and Sources
FX Exposure Overall	Foreign debt liabilities (portfolio and other debt) over GDP (External Wealth of Nations).
FX Exposure Public	Public FX debt over GDP (IMF, April 2021 *World Economic Outlook*).
FX Market Depth	Financial markets depth (IMF Financial Development Index Database).
Dominant Currency Pricing	Exports invoiced in US dollars or euros (percent of total), from Boz and others (2020) database; missing data are filled in by predicting the currency of exports based on a panel regression on macroeconomic fundamentals (such as GDP per capita, financial openness, the concentration of traded goods, a trade complexity index, and regional dummies) for emerging market and developing economies.
FX Overvaluation	As assessed by IMF staff: taken from the (unpublished) IMF vulnerability exercise for emerging markets (VEE) database for emerging markets; for sub-Saharan Africa low-income countries, estimates are taken from Article IV reports to the extent that these entail sufficiently explicit exchange rate assessments. Any gaps are filled in based on actual real effective exchange rate movements relative to Hodrick-Prescott trend.
Lack of Inflation Control	Lack of inflation control is defined as the rolling standard deviation of inflation over a window from the preceding two years to the two years after the present year (IMF, April 2021 *World Economic Outlook*).
Inflation Pass-through	Share of final consumer goods imports in GDP (UN COMTRADE).
Fiscal Discipline	Overall fiscal balance, percent of GDP (IMF WEO April 2021 *World Economic Outlook*).
Reserve Adequacy	Ratio of actual reserves over the norm, where the norm is given by three months of the subsequent year's imports of goods and services for sub-Saharan Africa low-income countries and the assessing reserve adequacy metric for emerging markets.

Annex 3: Regression Analysis

Data. The analysis employed quarterly data for 17 sub-Saharan African countries and 17 emerging markets from the first quarter of 2003 to the fourth quarter of 2020. Annex 1 lists the countries included in the sample. The respective dependent variables are foreign exchange (FX) sales and FX purchases relative to GDP. The analysis followed Adler, Chang, and Wang (2020) in distinguishing FX purchases and FX sales by setting FX purchases (FX sales) to zero in each quarter for a given country when net FX intervention is negative (positive) and equal to net FX intervention when net FX intervention is positive (negative). The two shocks used were a financial shock, proxied by the Chicago Board Options Exchange Volatility Index (VIX), and a real shock, proxied by the commodity terms of trade. The latter measures a country's windfall income gains and losses associated with changes in world commodity prices. Because the country characteristics used are mostly at annual frequency, they were linearly interpolated to quarterly frequency. All variable definitions and sources are reported in Annex 2.

Empirical specification. An exponential hurdle model was specified to allow for the *decision to intervene* and the *decision how much to intervene by* to have different determinants. The focus was on models in which the dependent variable is either FX purchases or FX sales as a share of GDP, rather than net FX intervention, as the analysis showed that purchases and sales have distinct determinants. A hurdle model specification was chosen because the respective dependent variables cannot fall below zero and because there is significant clustering at zero. All country characteristics were lagged by four quarters to address potential endogeneity issues and recoded into four-category ordinal variables based on the quartiles in their respective distributions, to prevent outliers and nonlinearities from affecting the estimation. Both country characteristics and shocks were used to explain the dependent variable and interact the shocks with a sub-Saharan Africa dummy to assess whether the two groups of countries respond differently to distinct types of shocks.

Preferred specifications. Annex Tables 3.1 and 3.2 show the preferred specifications. The first column includes the full list of regressors explored. The second column in the text table shows the coefficients and significance levels for those regressors that are included in the preferred specification of the first hurdle equation for the respective dependent variable (*decision whether to intervene*). The third column presents the equivalent information for the second hurdle equation (*decision how much to intervene by, conditional on the decision to intervene*).

Annex Table 3.1. Exponential Hurdle Regressions: FX Sales

Dependent: FX Sales/GDP

	Hurdle Equation 1	**Hurdle Equation 2**
	Decision Whether to Intervene	*Decision How Much to Intervene by*
VIX	0.262***	0.612***
Sub-Saharan Africa Interaction	−0.072	−0.356**
Commodity Terms of Trade	−0.205***	−0.891***
Sub-Saharan Africa Interaction	−1.338***	−0.749
Sub-Saharan Africa Dummy	6.282***	4.407
Lack of Inflation Control		0.132***
Inflation Pass-through		0.103***
Fiscal Discipline	−0.091***	−0.094***
FX Overvaluation	0.071***	
Reserve Adequacy		0.139***
FX Exposure Overall		0.097
FX Exposure Public		0.150***
Dominant Currency Pricing		0.056*
FX Market Depth		
Observations	4032	
LR Chi2	233.76***	
Pseudo R2	0.04	

Source: Authors' calculations.

Note: Variables for which no entry is shown in a column were not significant in the regressions. FX = foreign exchange; VIX = Chicago Board Options Exchange Volatility Index.

*p < x implies significance of 90 percent confidence level; **p < x implies significance of 95 percent confidence level; ***p < x implies significance of 99 percent confidence level.

Findings for FX Sales

Shocks. As expected, an increase in the VIX boosts FX sales in both equations, while an increase in the country-specific commodity terms of trade reduces FX sales in both equations. The coefficient sign on the interaction term between the VIX and the sub-Saharan Africa dummy has the opposite sign of the VIX-level term, suggesting that financial shocks have a lesser impact on FX sales in sub-Saharan Africa than in emerging markets. Conversely, the coefficient sign on the interaction term between the commodity terms of trade and the sub-Saharan Africa dummy has the same sign as the commodity terms of trade–level term, suggesting that movements in the commodity terms of trade have a larger impact on FX sales in sub-Saharan Africa than in emerging markets. The interaction terms are significant in one of the two equations in the case of each shock.

Country characteristics. The coefficient signs on the variables that enter the preferred model are broadly as expected: countries appear to decide to sell reserves in response to shocks but also amid weak fiscal and external positions. The decision of how much to intervene by depends on several other country characteristics: countries intervene more when they can (because they have more adequate reserves) but also when they face more significant vulnerabilities that they need to shield such as FX exposures, a weak fiscal position, weak monetary policy credibility, and high direct exchange rate pass-through. Finally, countries appear to intervene more if a larger share of their exports is priced in dominant currencies, consistent with the idea that the role of the exchange rate as a shock absorber is muted in that context.

Findings for FX Purchases

Shocks. The model has more difficulty explaining the dependent FX purchases based on shocks than it does for FX sales. As expected, an increase in the VIX lowers FX purchases while an increase in the country-specific commodity terms of trade increases FX purchases. However, the commodity terms of trade term is only significant in the first hurdle equation. The interaction terms between the VIX and the sub-Saharan Africa dummy and between the commodity terms of trade and the sub-Saharan Africa dummy are insignificant.

Country characteristics. The coefficient signs on the variables that enter the preferred model are broadly as expected: countries appear to decide to purchase FX in response to shocks but also in the presence of strong fiscal and external positions. The decision of how much to intervene by depends on several other country characteristics: countries purchase more FX amid higher reserves and strong external and fiscal positions but also as a buffer to be able to shield vulnerabilities such as FX exposures and weak monetary policy credibility. Finally, countries appear to intervene more if a larger share of their exports is priced in dominant currencies, consistent with the idea that the role of the exchange rate as a shock absorber is weakened in that context.

Annex Table 3.2. Exponential Hurdle Regressions: FX Purchases

Dependent: FX Purchases/GDP

	Hurdle Equation 1	**Hurdle Equation 2**
	Decision Whether to Intervene	*Decision How Much to Intervene by*
VIX	−0.317***	−0.384***
Sub-Saharan Africa Interaction		
Commodity Terms of Trade	0.247***	
Sub-Saharan Africa Interaction		
Sub-Saharan Africa Dummy	−0.046	−0.168**
Lack of Inflation Control		0.088***
Inflation Pass-through		
Fiscal Discipline	0.081	0.055**
FX Overvaluation	−0.085***	−0.069***
Reserve Adequacy		0.068***
FX Exposure Overall		0.064**
FX Exposure Public		0.104***
Dominant Currency Pricing		0.034*
FX Market Depth		
Observations	3798	
LR Chi2	178.82***	
Pseudo R2	0.03	

Source: Authors' calculations.

Note: Variables for which no entry is shown in a column were not significant in the regressions. FX = foreign exchange; VIX = Chicago Board Options Exchange Volatility Index.

*p < x implies significance of 90 percent confidence level; **p < x implies significance of 95 percent confidence level; ***p < x implies significance of 99 percent confidence level.