Fiscal dominance and inflation: evidence from Sub-Saharan Africa

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PUBLIC SECTOR ECONOMICS
48 (3) 363-391 (2024)

Abstract

During the Covid-19 pandemic, the debate on monetary financing was reignited and several economists called for governments to borrow from their central banks to finance larger deficits. Sub-Saharan Africa provides useful insights into this debate since it is a region where "fiscal dominance" has long been widespread. We find that fiscal dominance is stronger during periods of pressure on public finances, particularly when alternative financing options are limited. We also find that central bank financing of government does have an inflationary impact through the exchange rate channel. Numerical legal limits on central bank financing can be an effective way to mitigate the risks, even if they are not always binding.

Keywords: inflation, monetary policy, central bank, fiscal policy, fiscal dominance, quasi-fiscal, policy coordination, exchange rate

1 INTRODUCTION

Central bank financing of government returned to the fore of the policy debate during the Covid-19 crisis as many countries faced additional budgetary pressures at a time when debt levels were already high. "Fiscal dominance", or the coordination scheme in which fiscal policy dominates monetary policy (Sargent and Wallace, 1981) has long been a feature of policy discussions in Sub-Saharan Africa (SSA). But questions of whether (or by how much) central banks should finance fiscal deficits have recently returned to the forefront of the policy debate in the wake of increased borrowing needs from the steady rise in government deficits since the mid-2000s and additional budgetary pressures from the 2020 Covid-19 pandemic (IMF, 2018; 2020).[1] Several economists called for an expansion in Quantitative Easing programs and injections of "Helicopter Money" for explicitly fiscal purposes (Blanchard and Pisany-Ferri, 2020; Gali, 2020), lifting the "taboo" on central bank financing of governments, at least temporarily (Yashiv, 2020). This paper therefore examines evidence for central bank financing of government deficits and its macroeconomic impact in SSA in the two decades before the onset of the Covid-19 crisis.

Central bank lending to governments has a long history and has been associated with hyperinflationary episodes. The first central banks were created explicitly to meet fiscal needs (Riksbank created in 1668 and the Bank of England created in 1694). Many central banks founded in the nineteenth century were also fiscally motivated, often for the financing of wars (Bordo and Siklos, 2018). At the same time, many hyperinflation episodes have been associated with central bank financing of government debt: Weimar Germany (1922-23), Hungary (1945-46), Greece (1941-45), Latin America during the debt crisis in the 1980s, to name a few (Hanke and Krus, 2012).[2] Governments that borrow from their central banks to

[1] For example, in the context of the Covid-19 pandemic, the South African Reserve Bank faced political pressure to directly fund government, while the Bank of Ghana was quick to extend additional financing to the government (See Cotterill, 2020 and Ministry of Finance of Ghana, 2020).

[2] Cagan (1956) defined hyperinflation as beginning when monthly inflation rates exceed 50 percent and ending in the month before the rate declines below 50 percent (where it must remain for at least a year).

PUBLIC SECTOR ECONOMICS
48 (3) 363-391 (2024)

finance fiscal deficits or debt have long been a pressing problem in many countries in the SSA region too. The episodes in Zaire (1991-92 and 1993-94), Angola (1994-97), Democratic Republic of Congo (1998), and Zimbabwe (2007-08, 2019-20) are the starkest examples where unsustainable deficit financing by the central bank led to hyperinflation.

As a result of the macroeconomic risks from fiscal dominance, legal limits on central bank financing of fiscal debt became a feature of Central Bank acts in all regions over the past three decades. In most countries, advances and loans cannot exceed 10 percent of government revenues of the previous fiscal year or the average of the last three fiscal years (Jácome et al., 2012). The aim of allowing some limited budgetary financing from the central bank is to provide a lender-of-last-resort facility to cover intra-year fluctuations in revenue in economies in which alternative market financing options may be sparse and shocks relatively frequent (Cottarelli, 1993). In SSA countries, these limits are set somewhat higher than in other regions but still permit only modest and temporary levels of central bank lending to the government.

In practice, however, lending by central banks to the government in SSA has not been modest and temporary as intended in the laws. Central bank lending to governments during 2001-17 amounted to 2 percent of GDP on average for SSA countries, compared to less than a half a percent in other regions. In four SSA countries, this ratio exceeded 10 percent of GDP.[3] Furthermore, after declining in the first part of the past decade, it started to pick up again in 2014, coinciding with a rise in deficits and debt. Unsurprisingly, large increases in central bank lending to the government meant that legal limits were often exceeded: our study suggests 16 percent of revenue on average.

Yet despite the importance of central bank lending in practice, academic literature has given limited attention to fiscal dominance, either in SSA or elsewhere. The gap in the literature likely reflects the declining importance of central bank financing of government deficits in advanced economies over the past few decades.[4] However, there is a closely related strand of literature that looks at the much broader concept of central bank independence and inflation. For example, based on a sample of 16 advanced economies between 1955 and 1988, Alesina and Summers (1993) found a negative relationship between central bank independence and both the level and the variance of inflation. Fischer (1995) presented theoretical and empirical evidence to support the case for enhancing central bank independence. Most recently, Garriga and Rodriguez (2020) found that higher central bank independence is associated with lower inflation rates, using a sample of 118

[3] The median for SSA countries is 2 percent of GDP, while the arithmetic mean is 4 percent during the same time period. Given the presence of extreme outliers in the sample, the median is reported in this paper.
[4] The Covid-19 crisis notwithstanding, during which some advanced economies provided loans directly to government. For example, the Bank of England temporarily increased the limit on its overdraft facility with the Treasury: https://www.bankofengland.co.uk/news/2020/april/hmt-and-boe-announce-temporary-extension-to-ways-and-means-facility.

PUBLIC SECTOR ECONOMICS
48 (3) 363-391 (2024)

developing countries between 1980 and 2013. These studies tended to focus on monetary policy aspects only and used broad composite indices of *de jure* independence, in which central bank lending was only one element. A few studies that touch on fiscal aspects have not found a strong relationship between central bank independence and fiscal policy, including Sikken and de Haan (1998) and Alagidede (2016), who investigated its relationship with budget deficits, and Alpanda and Honig (2009), who examined its role during political monetary cycles. There are a few individual country case studies of central bank lending on inflation in emerging and low-income economies (Brazil, Ghana, DRC), but there has been no systematic empirical study.

This paper therefore looks at what lessons can be drawn from sub-Saharan Africa, a region where government financing by central banks was common even before the Covid-19 crisis. It attempts to answer three main questions: First, what is the evidence for central bank lending to government in practice and how does it relate to legal limits? We construct a new database of quantitative legal limits and compare these with the actual level of lending. Second, why do governments choose to finance deficits through central bank borrowing? We empirically estimate the impact of factors such as the availability of outside financing options and whether legal limits are binding in practice. Third, should we care? We attempt to identify the macroeconomic impacts of fiscal dominance on monetary aggregates, the exchange rate, and inflation.

Our main finding is that although legal limits have not always been binding, they have posed a constraint. Our evidence shows that recourse to the central bank when deficits rise is lower when legal limits are in place. The effect of legal limits is analogous to that of a speed limit for car drivers; the limit is often exceeded, but rarely by an excessive amount. Our results also show that when more financing options are available, less central bank financing is used. We also find conditionality that seeks to limit central bank lending under Fund-supported programs does pose a constraint.

Second, central bank deficit financing matters for inflation. We find a statistically significant contemporaneous impact on the exchange rate and a lagged impact on inflation. An increase in central bank credit to the government by one percentage point of GDP – or about five percentage points of revenue – is associated with the depreciation of the – exchange rate by one percentage point contemporaneously and an increase in inflation by half a percentage point a year later. These results are also robust to many tests, including using alternative variations of the dependent variable, estimation techniques, and different sets of control variables.

The rest of the paper proceeds as follows. Section 2 describes the data in this study and introduces the database on legal limits. Section 3 presents stylized facts on fiscal dominance in SSA. Section 4 discusses the empirical approach and results for estimating the determinants of fiscal dominance. Section 5 then describes the

PUBLIC SECTOR ECONOMICS
48 (3) 363-391 (2024)

approach for estimating the macroeconomic impact of shocks to central bank claims. Section 6 concludes. Additional statistics and robustness checks are in the appendix.

2 DATA AND DEFINITIONS

In this paper, **fiscal dominance** is referred to as in Sargent and Wallace (1981) where fiscal policy dominates monetary policy. That is, the fiscal authority independently sets its budgets (deficits) and determines the amount of revenue that must be raised through bond sales and seignorage, and the monetary authority faces the constraints imposed by the government as it must try to finance with seignorage any discrepancy between the revenue demanded by the fiscal authority and the amount of bonds that can be sold to the public. Separating any central bank's claims on government (on its balance sheet) into monetary and fiscal policy purposes is not straightforward in practice. Some claims are typically extended for monetary policy purposes. For example, central banks may hold treasury bills for liquidity management purposes (or for conducting open market operations). In advanced and some emerging market economies, unconventional monetary policies (UMP) have also involved substantial increases in central bank holdings of government bonds, typically when the policy rate has reached the zero-lower bound (though these programs can sometimes, in theory at least, have a fiscal purpose (Cukierman, 2020)). On the other hand, central bank claims on government extended for fiscal needs are typically provided as loans through overdraft facilities, although governments may also issue bonds to the central bank (or convert outstanding overdraft facilities into long-term bonds).

For our sample of SSA central banks[5], direct government bond issuance to central banks for fiscal purposes or securitization of overdrafts has, to our knowledge, only occurred in a few countries and on an exceptional basis; we, therefore, assume that central bank holdings of government securities are mostly for monetary policy purposes, while loans and advances to governments are for fiscal policy purposes. We also take comfort from the fact that on average, SSA central banks' securities holdings are smaller than their stock of loans, although in our empirical work, we include securities holdings in our measure of central bank financing in our robustness checks.[6]

Central bank financing (CBF) is therefore measured using the outstanding end-year stock of the central bank's loans and advances to the central government from the IMF's International Financial Statistics database, available from 2001-2017.[7] Loans, as opposed to total claims, are used for the reasons described above.

[5] The list of SSA countries in this analysis is in table A8.
[6] Limited central bank holdings of government securities likely reflects, in turn, an absence of UMP needs (the policy rate has not yet reached the lower bound in any SSA country) and the lack of benefit from holding T-bills for liquidity management (since in practice most SSA countries have had a structural surplus of liquidity, which means the central bank needs to sell them to absorb liquidity).
[7] Within-year data on central bank loans are not available. Although there is likely to be some intra-year volatility in central bank lending to government, it is not clear that there would be a particular bias since government financing needs are likely to depend on country-specific seasonality in revenues and expenditures.

PUBLIC SECTOR ECONOMICS
48 (3) 363-391 (2024)

We also use gross loans and do not net out government deposits, since legal limits are typically applied on a gross basis and deposits are not under the control of the central bank. However, to check the robustness of our results, we also take any difference in the outstanding stock of loans from one year to the next to measure new loans extended each year.

We construct a database of numerical *legal limits* on central bank financing from central bank acts (typically found in the section on relations with the government) in SSA. We source the current and historical acts from the IMF's central bank legislation database (CBLD), including relevant amendments where available, to construct a time series of effective legal limits for each country.[8] Table A1 in the appendix presents a summary of the legal limits found in the most recent central bank Act. Out of 45 SSA countries, 41 had legal limits in 2017.[9]

Countries specify legal limits differently (figure 1). A typical example of how a legal limit is specified in central bank acts is: *(i) The bank may make temporary advances to the Government in respect of temporary deficiencies in revenue; or (ii) The total amount of advances shall not at any time exceed X percent of the revenue of the Government of the previous fiscal year.*

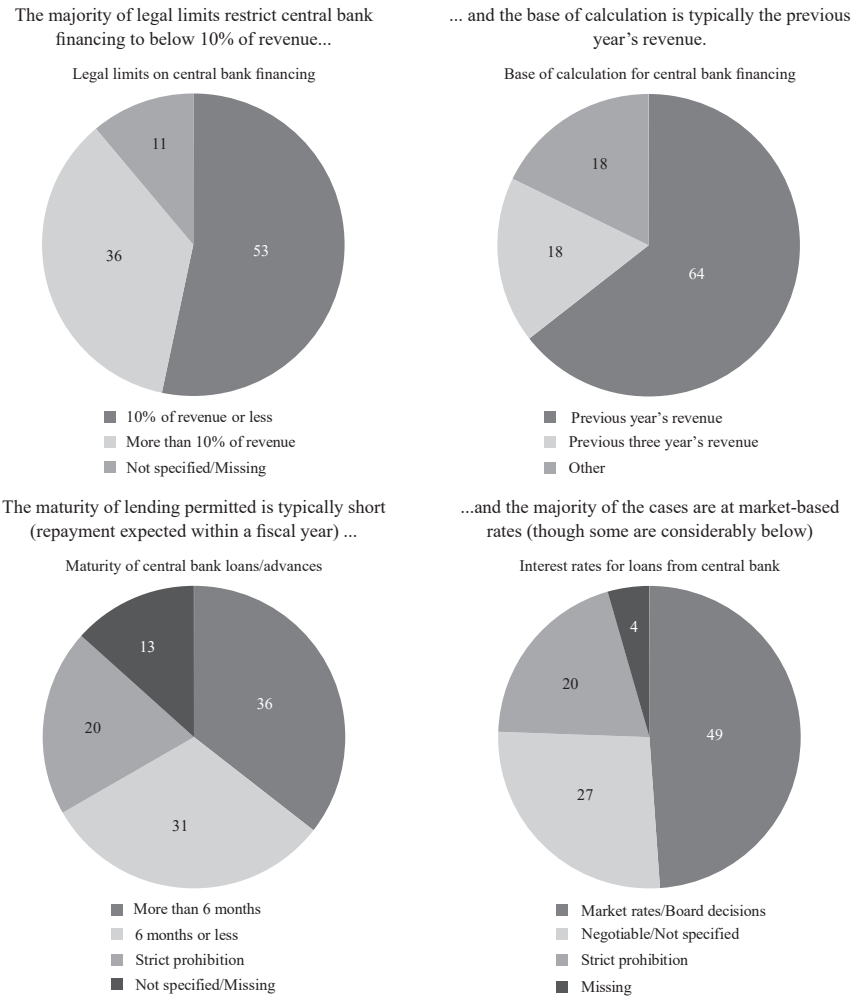
As observed in table A1, the legal limits are typically set in terms of percent of revenue, with varying reference years. The type of lending the limit applies to (e.g., loans, securities, or total claims) varies across countries, and in some cases, the limits apply to stock (e.g., of loans outstanding), while in other cases, they apply to flow rather than stock outstanding (e.g., new loans extended each year). Some acts allow lending in normal times, others only in emergencies. Some allow for securitization of advances, others do not.

[8] The database is publicly accessible on request, at https://cbld.imf.org. Since the latest update of the database was in 2016, we complemented the information by checking the Central Bank and Ministry of Finance websites of individual countries for recent legislative updates, up to 2017.

[9] Liberia, South Sudan and Somalia are excluded from our sample of Sub-Saharan African countries due to the incomplete time series of central bank loans to government.

FIGURE 1

Sub-Saharan Africa: quantitative limits on central bank lending, 2017 (percent of sample)



Sources: Central Bank Legislation Database (CBLD); national authorities; and IMF staff calculations.

3 STYLIZED FACTS

Fact 1. Central bank lending to the government is highest in the SSA region. On average, the stock of loans to government was 2 percent of GDP in SSA during 2001-17, compared to 0.2 percent of GDP for the Latin America and Caribbean and the South Asia regions, 0.6 percent of GDP for the Middle East and North Africa region and close to 0 percent of GDP for the other regions.[10] In 2017, the median for SSA countries was 2.2 percent of GDP, and in ten SSA countries, this ratio exceeded 5 percent of GDP (figure 2).

[10] The difference with respect to other regions is even more pronounced in revenue terms: central bank lending to government during 2001-17 amounted to 12 percent of revenue on average for SSA countries, compared to less than 1 percent in other regions.

PUBLIC SECTOR ECONOMICS
48 (3) 363-391 (2024)

Fact 2. The two notable increases in central bank loans to the government in SSA countries over the past two decades occurred during periods of pressure on public finances. The first increase was during the temporary terms-of-trade shock in 2008-09, although the recourse to central bank financing was contained by drawing on fiscal buffers built up during the preceding commodity price boom (IMF, 2014). The second increase in central bank financing occurred in the wake of the decline in commodity prices in mid-2014, which hit SSA countries (particularly commodity-dependent countries) hard because they entered the crisis with few buffers and commodity prices remained low for a prolonged period. During the subsequent years, central bank loans to the government increased more in SSA than in other regions. The timing of the increase also coincided with a rise in gross debt (figure 2).

FIGURE 2

Sub-Saharan Africa: central bank lending to government, 2001-17

Sources: CBLD; International Financial Statistics (IFS); World Economic Outlook (WEO); national authorities; and IMF staff calculations.

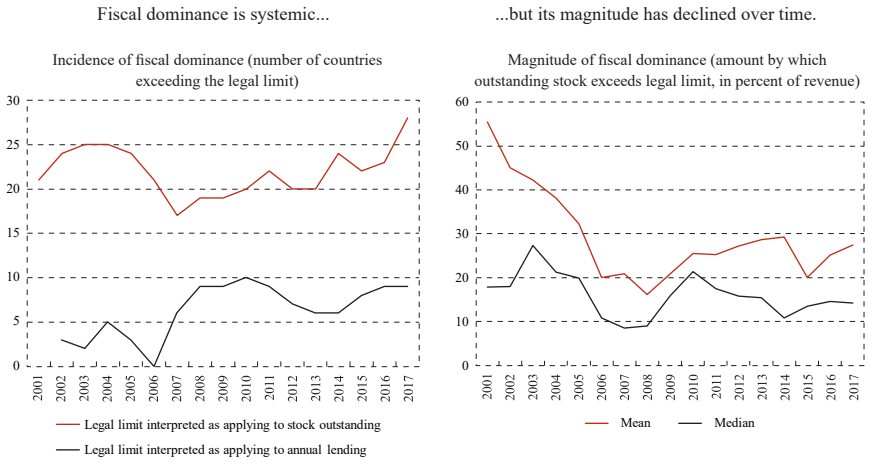
PUBLIC SECTOR ECONOMICS
48 (3) 363-391 (2024)

Fact 3. Legal limits in SSA countries have become stricter over time. Almost all SSA countries have legal limits on central bank lending (table A1). These limits, expressed in terms of percent of revenue, vary substantially between 0 and 20 percent of revenue. The median of legal limits was 18 percent in the early 2000s but declined in 2003/4 to 10 percent of revenue, and again in 2017 to 8.5 percent (figure 2). The average legal limits declined more gradually over this period from 15 percent in 2001 to 9.8 percent in 2017.

Fact 4. Fiscal dominance has declined over time, despite the tightening of legal limits. Central bank lending above the legal limit (what we call "fiscal dominance") appears to be a systemic phenomenon in SSA.[11] In 2017, lending exceeded the limit in between 9 and 29 countries (out of 41 countries) depending on whether the legal limit is interpreted as applying to the outstanding stock or the flow of lending (figure 3).[12] Noncompliance (or the *incidence* of fiscal dominance) is more common for those with stricter limits (i.e., legal limits are interpreted as applied to the stock of loans outstanding), most likely because some central banks are carrying legacy loans from the past. Nevertheless, the amount by which central bank lending exceeds legal limits (or the *magnitude* of fiscal dominance) has fallen, despite the tightening in limits.

FIGURE 3

Sub-Saharan Africa: fiscal dominance, 2001-17



Sources: CBLD; national authorities; MFS; WEO; and IMF staff calculations.

[11] However, we cannot assess whether a legal violation occurred in practice. There may be many reasons why it doesn't, including differences in legal interpretations, accounting practices, and independence of the judiciary.
[12] There is sometimes ambiguity in the central bank Act whether the limit applies to the outstanding stock of loans, or new lending only. When it is specified, the laws always refer to the outstanding stock but when it is not specified there is a possibility the law may be interpreted as applying to new lending, particularly in countries with large legacy central bank claims on government.

PUBLIC SECTOR ECONOMICS
48 (3) 363-391 (2024)

4 WHY DO GOVERNMENTS BORROW FROM CENTRAL BANKS?

In this section, we examine the effects of legal restrictions and alternative financing options on central bank lending. Why do governments borrow from central banks? The most obvious reason is that the government has a financing need (otherwise there is no need to borrow from anyone, let alone the central bank).[13] A more interesting question therefore is what determines the extent to which a government meets its financing need through recourse to the central bank, relative to other sources of funds?

We also examine the effect of other restrictions on central bank lending, such as conditionality in IMF-supported programs. In addition to limits on central bank lending in legislation, quantitative ceilings on central bank lending to the government are often observed in IMF-supported macroeconomic adjustment programs in the region. The conditionality to amend (revise downwards) the limits in the laws themselves also features in IMF-supported programs.

4.1 EMPIRICAL APPROACH

Governments typically have several financing options other than borrowing from the central bank. A government typically finances its fiscal deficits by a combination of borrowing abroad, borrowing from domestic banks (either from commercial banks or the central bank), and borrowing from domestic nonbank institutions (e.g., pension funds).[14] The amount of borrowing from the central bank therefore depends on the size of financing needs and the government's ability to borrow from the market (e.g., by selling sovereign bonds to commercial banks, pension funds, or nonresidents).[15] The availability of external assistance (concessional loans from official bilateral or multilateral creditors), the size of the government's deposits, and the extent of legal or any other limits on central bank financing also affect the government's borrowing from the central bank.

In this context, we estimate the following empirical model. The model is estimated on annual data with central bank lending to the government in country i at time t as the dependent variable.

$$Y_{it} = \beta_1 F_{it} + \beta_2 F_{it} \times L_{it} + \beta_3 F_{it} \times MKT_{it} + \beta_4 F_{it} \times QPC_{it} + [a]'X_{i,t} + [b]'Z_{i,t-1} + \varsigma_i + \theta_t + \varepsilon_{it} \quad (1)$$

where Y_{it} is the central bank lending as a percent of GDP; F_{it} is the fiscal deficit as a percent of GDP; L_{it} is the legal limit on central bank lending as a percent of

[13] This is of course a bit of a simplification: several governments continue to issue marketable debt, but for market development purposes even when they have a fiscal surplus, which they might use to retire existing debt or build cash buffers.

[14] Running arrears to suppliers or staff has also sometimes been an informal way of borrowing in many SSA countries but is not considered in this paper, due to data constraints.

[15] "Ability" of the government to borrow from the market here can refer to both the existence of an investor base for additional debt issuance but also willingness to pay the market rate, since where notional borrowing rates are high, the central bank may not be the only option, just the apparently (much) cheaper option.

revenue; MKT_{it} is the dummy for market access (=1 if country issues government securities over 1-year maturity, 0 otherwise); QPC_{it} is the dummy for the IMF conditionality on central bank lending (=1 if the country has conditions in IMF-supported program, 0 otherwise); $X_{i,t}$ is a vector of [L_{it}, MKT_{it}, QPC_{it}]; $Z_{i,t-1}$ is a vector of control variables; ς_i is the country fixed effect; θ_t is the time fixed effect; and ε_{it} is the residual.

This specification has one particularly noteworthy feature. The interaction terms allow us to assess how legal limits, domestic market development, and IMF conditionality may be associated with the size of central bank financing (for a unit increase in fiscal deficit) by looking at the partial derivative of equation (1) for F_{it}. We expect a positive sign for β_2 and negative signs for β_3 and β_4, as lower legal limits, more domestic market development, and IMF conditionality are likely to be associated with lower central bank lending, respectively.

We use the Arellano-Bond estimator with several lagged control variables and country- and time-fixed effects (FEs) to address various endogeneity concerns. First, we use the dynamic panel model using the Arellano-Bond generalized method of moments (GMM) estimator since our panel is large in the cross-sectional dimension relative to the time dimension.[16] Second, the lag of the dependent variable is included as a regressor to account for inertia.[17] Third, we include country- and time-FEs to address a possible selection bias.[18] More specifically, to control for *time-varying local factors* that are heterogeneous across countries, we have included observable macroeconomic factors that reflect each economy's strength and its government's fiscal position, including the real GDP growth, government deposits at the central bank, and the levels of government debt. To control for *time-varying global factors* that can affect both the extent of fiscal dominance and the broader economic conditions (e.g., the terms-of-trade shock in 2008-09 or the decline in commodity prices in mid-2014), we include the time fixed effect. To control for all *time-invariant country-specific characteristics* (e.g., a country with strong institutions may have both lower legal limits and less fiscal dominance, or a country with a history of high inflation due to fiscal dominance may tend to enforce stricter legal limits and have less central bank lending to the government), we include country-specific fixed effects. Finally, a few other lagged variables (lags of real GDP growth, lag of government deposit to GDP ratio, and lag of government debt to GDP ratio) are included to control for country-specific variation in the macroeconomic environment, not captured by the country and time fixed effects.[19]

[16] See Arellano and Bover (1995) and Blundell and Bond (1998).

[17] The central bank lending series are persistent as confirmed by statistical significance of the coefficients of the lags of central bank loans/GDP in table 2.

[18] Other sources of endogeneity such as simultaneity and measurement errors are less likely to be present in our sample. For example, amendments to the central bank laws, even if prompted by macroeconomic outcomes, are rarely completed within a year. And to reduce the possibility of measurement error, all the legal limits in the CBLD database were checked against the original legislation.

[19] Other estimators such as the IV estimator or the matching estimator may be superior in establishing causal relationships to the GMM estimator with FEs. In our sample, however, it is challenging to find good instruments or counterfactuals without losing too many degrees of freedom.

PUBLIC SECTOR ECONOMICS
48 (3) 363-391 (2024)

4.2 RESULTS

Our database covers 41 countries and a period of 18 years, from 2001 to 2017.[20] Descriptive statistics of key variables are presented in table 1. For all our variables of interest, a full time series of data is available for most of the countries in our sample.

TABLE 1

Sub-Saharan Africa: descriptive statistics, 2001-17 (percent; otherwise indicated)

Variable	No. of obs.	Mean	St. dev.	Min.	Max.
Central bank claims/GDP	719	6.1	8.9	0.0	63.2
Percentage change of central bank claims/GDP	675	5.2	22.8	-217.5	150.7
Central bank loans/GDP	719	3.7	5.6	0.0	61.5
Percentage change of central bank loans/GDP	677	2.1	21.6	-260.5	162.1
Fiscal deficit/GDP	756	2.6	5.6	-27.2	30.4
Real GDP growth	770	4.6	5.2	-36.7	60.1
Legal limit/revenue	703	11.2	7.8	0.0	25.0
Government deposits/GDP	731	4.4	5.1	0.0	33.0
Government gross debt/GDP	754	62.1	49.6	0.5	406.7
Dummy for domestic market development (1 or 0)	781	0.5	0.5	0.0	1.0
Dummy for IMF conditionality on central bank lending (1 or 0)	781	0.2	0.4	0.0	1.0
Interaction between fiscal deficit and legal limits (% × %)	678	15.7	88.6	-610.1	545

Sources: WEO; IFS; and IMF staff calculations.

Our baseline results confirm both the existence of fiscal dominance in SSA and its mitigation by *de jure* limits and outside financing options. Our main findings are based on estimating variants of equation (1) and are presented in table 2. First, *the size of central bank lending is positively correlated with financing needs*. The size of fiscal deficits and the size of central bank lending are highly correlated. Second, *the presence of limits on central bank lending matters*. The government's propensity to borrow from the central bank is higher if limits are looser (the coefficients on interaction terms are all statistically significant in Models 2-5). Third, *the government's ability to borrow from the market is associated with lower central bank financing*. The ability to raise resources from the market, by issuing sovereign bonds to banks, nonbanks, and nonresidents, tends to be associated with lower central bank lending (coefficients on the dummy for market development in Models 3 and 5 are statistically significant). Being able to raise resources from the market

[20] Countries were excluded in cases where: (i) no Central Bank Act was found (Burundi and Eritrea), and (ii) where the Central Bank Act did not specify a numerical legal limit on central bank lending (South Africa and Seychelles).

PUBLIC SECTOR ECONOMICS
48 (3) 363-391 (2024)

also matters (coefficients on interaction terms are all statistically significant in Models 3 and 5).

The size of the coefficients is economically meaningful. Using the results of Model 5 and taking the partial derivative of equation (1) for the fiscal deficit, we can estimate the government's propensity to resort to central bank financing. On average, about 9 percent of a fiscal deficit is financed by the central bank. But if the government can borrow from financial markets and issue bonds, then only about 3 percent of the fiscal deficit is covered by central bank financing. And if the government has an IMF-supported program with a condition on domestic borrowing or borrowing from the central bank (akin to a quasi-legal limit), then almost none of the deficit is covered by central bank financing.

TABLE 2

Sub-Saharan Africa: determinants of central bank lending, 2001-17

	(1)	(2)	(3)	(4)	(5)
Dependent variable: central bank loans/GDP	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**
Fiscal deficit	**0.1041*** **	0.0362	**0.0409***	0.0216	0.0267
	(0.0359)	(0.0254)	**(0.0209)**	(0.0262)	(0.0220)
Fiscal deficit × Legal limit		**0.0046*** **	**0.0053*** **	**0.0055*** **	**0.0062*** **
		(0.0015)	**(0.0014)**	**(0.0019)**	**(0.0018)**
Fiscal deficit × Domestic market development			**-0.0639****		**-0.0622****
			(0.0284)		**(0.0260)**
Fiscal deficit × IMF conditionality				**-0.0269***	**-0.0255****
				(0.0149)	**(0.0123)**
Legal limit		-0.0014	0.0007	-0.0036	-0.0018
		(0.0317)	(0.0344)	(0.0318)	(0.0343)
Domestic market development			**-0.9234****		**-0.8080****
			(0.4267)		**(0.3835)**
IMF conditionality				-0.7964	-0.6888
				(0.5420)	(0.5166)
Lags of central bank loans/GDP	**0.8049*** **	**0.7952*** **	**0.7992*** **	**0.7904*** **	**0.7952*** **
	(0.0461)	**(0.0381)**	**(0.0402)**	**(0.0354)**	**(0.0368)**
Lag of real GDP growth	-0.0163	**-0.0223****	**-0.0210****	**-0.0221****	**-0.0209****
	(0.0115)	**(0.0108)**	**(0.0098)**	**(0.0112)**	**(0.0100)**
Lag of government deposits/GDP	-0.0737	-0.0811	-0.0952	-0.0735	-0.0873
	(0.0739)	(0.0606)	(0.0640)	(0.0598)	(0.0630)
Lag of government debt/GDP	**-0.0100***	-0.0035	-0.0026	-0.0073	-0.0062
	(0.0057)	(0.0067)	(0.0070)	(0.0068)	(0.0068)
Observations	667	596	596	596	596
Number of countries	45	41	41	41	41

*Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.*

PUBLIC SECTOR ECONOMICS
48 (3) 363-391 (2024)

4.3 ROBUSTNESS

To check the robustness of our results, we estimated several alternative specifications of equation (1), with results shown in appendix tables A2 to A6. First, to ensure that our results are not influenced by the possible endogeneity of the fiscal deficit, we used lagged values of all independent variables as instruments (table A2). Second, to account for the possibility that governments circumvent the legal limit by asking the central bank to lend through channels that are not defined in the legal framework, we used total claims on government as the dependent variable rather than total loans (table A3).[21] Third, because some countries may interpret the legal limit differently, we used the flow of lending as the dependent variable. The stock of outstanding loans is used in our baseline model as it corresponds to the definition of the legal limit in central bank Acts. However, some countries may interpret the law differently, particularly if there is a large outstanding legacy stock of debt to the central bank. The flow of lending also corresponds more closely to annual financing needs (table A4). Fourth, we tested whether alternative aspects of outside financing conditions play a role, such as sovereign risk and international capital market access. In all cases, the results remained robust, while the alternative measures of outside financing options did not seem to matter as much as the availability of domestic market financing (table A5). Fifth, we re-estimated our main results in table 2 with the dynamic bias-corrected least squares dummy variables estimator as proposed by Bruno (2005). This estimator was shown to have a smaller bias in finite samples; however, it is only consistent when we assume that all variables, excluding the lag effects, are exogenous. The results are qualitatively similar when it comes to statistical significance and expected signs of the coefficients (table A6). In summary, we conclude that our main results for the determinants of fiscal dominance are robust to different specifications.

5 WHAT ARE THE MACROECONOMIC IMPACTS?

In this section, we examine the macroeconomic impact of central bank financing. In particular, we explore its impact on monetary aggregates, inflations, and exchange rates.

We estimate the dynamic response of key macroeconomic variables to a shock by combining the local projections (LP) method of Jordà (2005) with country and time-fixed effects. In this paper, we use the LP method to estimate the impulse response functions (IRFs), rather than the vector autoregression (VAR) following Sims (1980) since in our panel data setting, the high-dimensionality of a fully-specified VAR would make its estimation prohibitive, whereas with LP it is possible to achieve a reasonable degree-of-freedom in our estimation and even include additional control variables.

[21] One practice sometimes used is securitization of the government's overdraft with the central bank. For example, if the legal limit applies to the overdraft, once the size of the overdraft exceeds the legal limit, the balance may be converted into a bond. In such cases, total claims would be a better measure of fiscal dominance.

PUBLIC SECTOR ECONOMICS
48 (3) 363-391 (2024)

Our baseline model is

$$W_{i,t+h} = \gamma^{(h)} Y_{it} + [d^{(h)}]' Controls + \zeta_i^{(h)} + \theta_t^{(h)} + u_{i,t+h} \quad (2)$$

where $W_{i,t+h}$ is the macroeconomic variable of interest (base money, inflation, exchange rate, and broad money) measured at time horizon $t+h$, Y_{it} is the ratio of total central bank loans to GDP, and Controls are all the control variables from our baseline regression equation (1). We estimate a separate regression for each horizon h. Standard errors are clustered by country and time. The number of observations for each horizon is presented in table A7.

Table 3

Sub-Saharan Africa: descriptive statistics, 2001-17 (in percent)

Variable	No. of obs.	Mean	St. dev.	Min.	Max.
Base money	729	11.0	7.4	0.1	52.8
Exchange rate	780	4.6	16.6	-28.1	295.5
Inflation	764	8.2	18.0	-72.7	357.3
Broad money	764	32.4	24.2	3.1	150.8

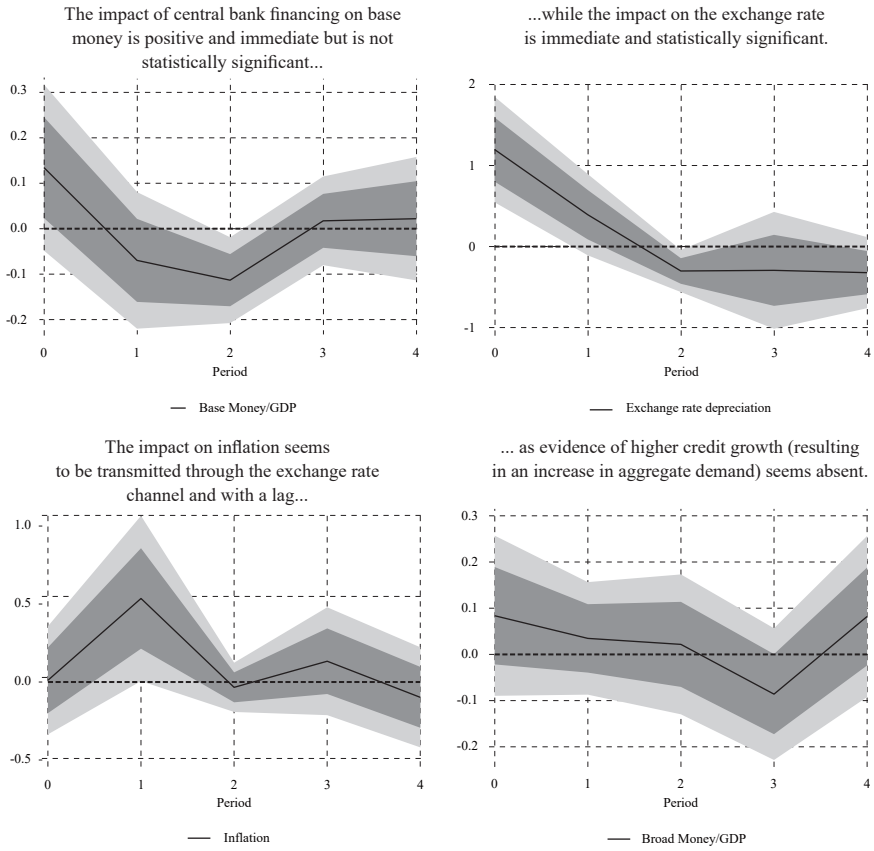
Notes: Base money is defined as a ratio to nominal GDP, exchange rates are defined as the annual percent change in terms of national currency per USD, inflation is the annual growth rate of CPI, and broad money is defined as a ratio to nominal GDP.

Sources: WEO; IFS; and IMF staff calculations.

The results of the IRFs are economically intuitive and some are statistically significant. The precision of the estimations is affected by the large variation in our variables of interest (table 3). So, while the impact of central bank financing on base money is positive and contemporaneous, no statistical significance is observed. On the other hand, the impact on the exchange rate is contemporaneous and statistically significant. An increase in central bank credit to the government by one percentage point of GDP – or about five percentage points of revenue on average – is associated with a depreciation of the exchange rate by one percentage point contemporaneously. The impact on inflation seems to show with a lag. The same increase in central bank credit to the government is associated with an increase in inflation by half a percentage point a year later. Moreover, the impact on inflation seems to be transmitted mostly through the exchange rate channel as the evidence of credit growth (resulting in an increase in aggregate demand) seems absent (figure 4).

FIGURE 4

Sub-Saharan Africa: impact of central bank financing on money, the exchange rate, and inflation



Notes: The figure shows the impulse response functions for a one unit innovation in the ratio of central bank loans to GDP and presents both the point estimates and the 68 and 90 percent confidence intervals around them.

6 CONCLUDING REMARKS

Economists and policymakers often warn of the dangers of direct central bank financing of governments, and history provides no shortage of cautionary tales. However, there has been surprisingly little empirical research on the incidence, magnitude, or impact of central bank financing of government deficits beyond the most extreme episodes of hyperinflation; instead, the focus of studies on a central bank's relations with government has been on the much broader question of central bank independence. This gap in the literature is problematic since the question of whether (or by how much) to restrict central bank lending to the government has been a prominent feature of debates on central bank reform in SSA. And while most central banks in the region do now have legislative limits in place, support has been far from unanimous, while the Covid-19 crisis generated some renewed calls to permit direct financing of government.

PUBLIC SECTOR ECONOMICS
48 (3) 363-391 (2024)

Our study therefore represents a first attempt at systematically studying the issue of central bank deficit financing in the SSA region. We show that central bank financing of government deficits has been (1) common, (2) increasing in the past few years, (3) large at around 2 percent of GDP on average, and (4) quantitatively important relative to other parts of the world. We also construct a new database to document the evolution of *de jure* limits on central bank financing in SSA. We find that the majority of SSA countries now have formal limits on central bank lending to the governments and that these have become both more numerous and stricter over time. Our new database allows us to define and explore the concept of *fiscal dominance*: central bank lending to government for fiscal purposes beyond legal limits, which is empirically more relevant given non-zero limits in many countries in the region.

Our empirical findings show that fiscal dominance is widespread in SSA but efforts to contain it can be effective. Although the *incidence* of fiscal dominance is high (we observed central bank lending above the legal limit in between 9 and 29 countries in 2017), its *magnitude* (the amount by which central bank lending exceeds legal limits) has declined over time. In our empirical analysis, we find an important role for policy: countries borrow less from central banks when they have stricter legal limits (or IMF programs that restrict lending) and more developed financial markets. We also find that even low amounts of fiscal dominance can have important macroeconomic effects: central bank lending is associated with exchange rate depreciation and subsequent higher inflation. These findings suggest that fiscal dominance is a relevant macroeconomic issue that policymakers should take seriously in normal times and not just from the perspective of hyperinflation risk.

Disclosure statement

The authors have no conflict of interest to declare.

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PUBLIC SECTOR ECONOMICS
48 (3) 363-391 (2024)

APPENDIX

Table A1

Sub-Saharan Africa: central bank acts, 2017

Country name	Legal limit	Name of most recent legislation	Year current legislation took effect (last amendment)
Angola	10% of previous year's revenue	Banco Nacional de Angola Act. Law No. 16/10	2010
Benin	0%	Treaty of the West African Monetary Union (UEMOA)	N/S
Botswana	5% of previous three years' average revenue	The Bank of Botswana Act	1997
Burkina Faso	0%	Treaty of the West African Monetary Union (UEMOA)	N/S
Burundi	N/A		
Cabo Verde	5% of previous year's revenue	Organic Law of the Bank of Cape Verde	2002
Cameroon	20% of previous year's revenue	Charter of the Bank of Central African States (CEMAC)	2010
Central African Rep.	20% of previous year's revenue	Charter of the Bank of Central African States (CEMAC)	2010
Chad	20% of previous year's revenue	Charter of the Bank of Central African States (CEMAC)	2010
Comoros	20% of previous three years' average revenue	Statuts de la Banque Centrale des Comoros	2008
Congo, Democratic Rep. of	0%	Law 005/2002 on the Establishment, Organization, and Operations of the Central Bank of Congo	2002
Congo, Rep. of	20% of previous year's revenue	Charter of the Bank of Central African States (CEMAC)	2010
Côte d'Ivoire	0%	Treaty of the West African Monetary Union (UEMOA)	N/S
Equatorial Guinea	20% of previous year's revenue	Charter of the Bank of Central African States (CEMAC)	2010
Eritrea	N/A		
Ethiopia	N/S	Monetary and Banking Proclamation No. 183/1994 and No. 591/2008	1994 (2008)
Gabon	20% of previous year's revenue	Charter of the Bank of Central African States (CEMAC)	2010
Gambia	10% of previous year's revenue	Central Bank of Gambia Act	2005
Ghana	5% of current year's revenue	Bank of Ghana Act	2002 (2016)
Guinea	5% of previous year's revenue	Charter of the Central Bank of the Republic of Guinea	1994 (2017)
Guinea-Bissau	0%	Treaty of the West African Monetary Union (UEMOA)	N/S
Kenya	5% of previous year's revenue	The Central Bank of Kenya Act	1966 (2014)
Lesotho	Net claim is 5% of previous year's budget	Central Bank of Lesotho Act	2000

Country name	Legal limit	Name of most recent legislation	Year current legislation took effect (last amendment)
Madagascar	7% of previous year's revenue	Charter of the Central Bank of Madagascar	1994 (2016)
Malawi	20% of current year's revenue	Reserve Bank of Malawi Act – Laws of Malawi (Chapter 44:02)	1989
Mali	0%	Treaty of the West African Monetary Union (UEMOA)	N/S
Mauritania	5% of previous year's revenue	Charter of the Central Bank of Mauritania	2007
Mauritius	10% of current year's revenue	The Bank of Mauritius Act	2004 (2015)
Mozambique	10% of previous year's revenue	Law 1/92	1992
Namibia	25% of previous three years' average revenue	Bank of Namibia Act	1997
Niger	0%	Treaty of the West African Monetary Union (UEMOA)	N/S
Nigeria	5% of previous year's revenue	Central Bank of Nigeria Act	2007
Rwanda	11% of previous year's government revenue	Law No. 55/2007, Governing the Central Bank of Rwanda	2007
São Tomé and Príncipe	5% of previous year's revenue	Law 8/92, Organic Law of the Central Bank of STP	1992
Senegal	0%	Treaty of the West African Monetary Union (UEMOA)	N/S
Seychelles	N/S	Central Bank of Seychelles Act	2004 (2011)
Sierra Leone	5% of previous year's revenue	Bank of Sierra Leone Act	2000
South Africa	N/S	South African Reserve Bank Act 90	1989
Sudan	15% of current year's revenue	The Bank of Sudan Act	2002
Swaziland (Eswatini)	20% of previous three years' average revenue	The Central Bank of Swaziland Order	1974 (1979)
Tanzania	12.5 % of previous year's revenue	The Bank of Tanzania Act	2006 (2010)
Togo	0%	Treaty of the West African Monetary Union (UEMOA)	N/S
Uganda	18% of previous year's revenue	The Bank of Uganda Statute	1993 (2010)
Zambia	15% of previous year's revenue	Bank of Zambia (Amendment) Act	1998
Zimbabwe	20% of previous year's revenue	Reserve Bank of Zimbabwe Act (Chapter 22:15)	2010

Notes: N/S indicates not specified in the Central Bank Act, while N/A indicates no Central Bank Act was found in the CBLD database or on the websites of the relevant Central Bank or Ministry of Finance.

Sources: National Authorities; and Central Bank Legislation Database (CBLD).

TABLE A2

Determinants of central bank lending: treating the fiscal deficit as endogenous

Dependent variable: central bank loans/GDP	Model 1	Model 2	Model 3	Model 4	Model 5
Fiscal deficit	0.0156	-0.0329	-0.0172	-0.0077	-0.0010
	(0.0416)	(0.0415)	(0.0312)	(0.0243)	(0.0207)
Fiscal deficit × Legal limit		**0.0066****	**0.0053****	**0.0056*****	**0.0053****
		(0.0028)	**(0.0025)**	**(0.0021)**	**(0.0021)**
Fiscal deficit × Domestic market development			0.0202		-0.0148
			(0.0555)		(0.0427)
Fiscal deficit × IMF conditionality				**-0.0252****	**-0.0239****
				(0.0119)	**(0.0107)**
Legal limit		0.0098	0.0122	0.0139	0.0043
		(0.0185)	(0.0152)	(0.0226)	(0.0210)
Domestic market development			**-0.8749*****		**-0.7560*****
			(0.2580)		**(0.2244)**
IMF conditionality				-0.5713	-0.5919
				(0.4638)	(0.4116)
Lags of central bank loans/GDP	**0.7584*****	**0.7355*****	**0.7319*****	**0.7243*****	**0.7237*****
	(0.0264)	**(0.0315)**	**(0.0311)**	**(0.0269)**	**(0.0275)**
Lag of real GDP growth	-0.0143	-0.0130	**-0.0146***	-0.0163	**-0.0166***
	(0.0106)	(0.0100)	**(0.0087)**	(0.0102)	**(0.0093)**
Lag of government deposits/GDP	-0.0248	-0.0328	-0.0356	-0.0265	-0.0264
	(0.0443)	(0.0341)	(0.0314)	(0.0270)	(0.0270)
Lag of government debt/GDP	-0.0022	**0.0057****	**0.0059****	**0.0051****	**0.0042****
	0.0156	**-0.0329**	**-0.0172**	**-0.0077**	**-0.0010**
Observations	667	596	596	596	596
Number of countries	45	41	41	41	41

*Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.*

TABLE A3
Determinants of central bank lending: total claims

Dependent variable: central bank claims/GDP	Model 1	Model 2	Model 3	Model 4	Model 5
Fiscal deficit	**0.1449*** **	**0.0375***	**0.0398***	0.0274	0.0298
	(0.0460)	**(0.0228)**	**(0.0210)**	(0.0245)	(0.0230)
Fiscal deficit × Legal limit		**0.0037****	**0.0038****	**0.0044****	**0.0046****
		(0.0015)	**(0.0016)**	**(0.0020)**	**(0.0020)**
Fiscal deficit × Domestic market development			-0.0184		-0.0187
			(0.0373)		(0.0355)
Fiscal deficit × IMF conditionality				-0.0183	-0.0181
				(0.0153)	(0.0135)
Legal limit (measured in percent of revenue)		0.0339	0.0384	0.0320	0.0359
		(0.0382)	(0.0390)	(0.0404)	(0.0410)
Domestic market development			-0.6718		-0.5889
			(0.4664)		(0.4591)
IMF conditionality				-0.6187	-0.5315
				(0.6402)	(0.6146)
Lags of central bank claims/GDP	**0.8974*** **	**0.8269*** **	**0.8272*** **	**0.8240*** **	**0.8251*** **
	(0.0752)	**(0.0360)**	**(0.0374)**	**(0.0335)**	**(0.0348)**
Lag of real GDP growth	-0.0270	-0.0254	-0.0235	-0.0270	-0.0252
	(0.0174)	(0.0206)	(0.0192)	(0.0211)	(0.0195)
Lag of government deposits/GDP	-0.0839	-0.0733	-0.0786	-0.0704	-0.0756
	(0.0768)	(0.0626)	(0.0634)	(0.0643)	(0.0652)
Lag of government debt/GDP	**-0.0148****	-0.0105	-0.0103	**-0.0129***	-0.0125
	(0.0068)	(0.0078)	(0.0080)	**(0.0077)**	(0.0078)
Observations	667	596	596	596	596
Number of countries	45	41	41	41	41

*Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.*

TABLE A4

Determinants of central bank lending: change in central bank loans

Dependent variable: Change in central bank loans/GDP	Model 1	Model 2	Model 3	Model 4	Model 5
Fiscal deficit	**0.6263****	0.0935	0.1016	-0.0331	-0.0253
	(0.3038)	(0.2369)	(0.2366)	(0.2522)	(0.2538)
Fiscal deficit × Legal limit		**0.0415*****	**0.0441*****	**0.0540*****	**0.0565*****
		(0.0159)	**(0.0157)**	**(0.0205)**	**(0.0200)**
Fiscal deficit × Domestic market development			-0.1821		-0.1929
			(0.3505)		(0.3321)
Fiscal deficit × IMF conditionality				**-0.2427***	**-0.2372****
				(0.1256)	**(0.1150)**
Legal limit		0.6758	0.6126	0.5591	0.4772
		(0.5628)	(0.5009)	(0.4962)	(0.4424)
Domestic market development			3.9462		4.9117
			(5.6728)		(4.9638)
IMF conditionality				-8.8235	-9.2823
				(6.8652)	(6.9630)
Lags of change in central bank loans/GDP	**-0.1952****	0.0203	0.0146	0.0052	-0.0022
	(0.0942)	(0.0628)	(0.0677)	(0.0632)	(0.0689)
Lag of real GDP growth	-0.1873	-0.2062	-0.1960	-0.2132	-0.2001
	(0.1644)	(0.2083)	(0.2150)	(0.2213)	(0.2274)
Lag of government deposits/GDP	**-1.1335***	**-0.8138***	**-0.7709***	-0.7390	-0.6889
	(0.6185)	**(0.4752)**	**(0.4557)**	(0.4700)	(0.4486)
Lag of government debt/GDP	**-0.0873***	-0.0132	-0.0059	-0.0373	-0.0280
	(0.0468)	(0.0818)	(0.0852)	(0.0753)	(0.0771)
Observations	629	561	561	561	561
Number of countries	45	41	41	41	41

*Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.*

Table A5

Determinants of central bank lending: additional explanatory variables

Dependent variable: central bank loans/GDP	**Model 1**	**Model 2**	**Model 3**
Fiscal deficit	0.0370	**0.0734***	**0.0752***
	(0.0253)	**(0.0394)**	**(0.0400)**
Fiscal deficit × Legal limit	**0.0046*****	**0.0056****	**0.0056****
	(0.0015)	**(0.0022)**	**(0.0022)**
Fiscal deficit × Domestic market dvpt + Eurobond access	-0.0358		-0.0887
	(0.0778)		(0.1133)
Fiscal deficit × Sovereign risk		-0.0054	-0.0054
		(0.0042)	(0.0042)
Legal limit	-0.0013	-0.0181	-0.0172
	(0.0321)	(0.0470)	(0.0474)
Domestic market dvpt + Eurobond access	0.1744		0.6700
	(0.6399)		(0.8910)
Sovereign risk		-0.0541	-0.0576
		(0.1557)	(0.1515)
Lags of central bank loans/GDP	**0.7947*****	**0.7908*****	**0.7887*****
	(0.0382)	**(0.0533)**	**(0.0533)**
Lag of real GDP growth	**-0.0221****	-0.0207	-0.0204
	(0.0108)	(0.0145)	(0.0147)
Lag of government deposits/GDP	-0.0805	-0.1272	-0.1242
	(0.0605)	(0.0888)	(0.0885)
Lag of government debt/GDP	-0.0034	-0.0023	-0.0023
	(0.0066)	(0.0068)	(0.0066)
Observations	596	443	443
Number of countries	41	35	35

*Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.*

Notes: Sovereign risk measures the risk of debt distress using the ratings from the IMF's Debt Sustainability Analysis (=0 if the rating is "Low"; =1 if the rating is "Moderate"=2 if the rating is "High"=3 if the rating is "In debt distress"). Eurobond access is a dummy (=1 if the country has previously issued a Eurobond, 0 otherwise).

TABLE A6

Determinants of central bank lending: dynamic bias least squares dummy estimators

Dependent variable: central bank loans/GDP	Model 1	Model 2	Model 3	Model 4	Model 5
Fiscal deficit	**0.0833*** **	0.0050	0.0085	-0.0007	0.0031
	(0.0173)	(0.0210)	(0.0211)	(0.0208)	(0.0208)
Fiscal deficit × Legal limit		**0.0037*** **	**0.0040*** **	**0.0047*** **	**0.0050*** **
		(0.0012)	**(0.0013)**	**(0.0013)**	**(0.0013)**
Fiscal deficit × Domestic market development			**-0.0464***		**-0.0469***
			(0.0243)		**(0.0242)**
Fiscal deficit × IMF conditionality				**-0.0336*** **	**-0.0314** **
				(0.0126)	**(0.0127)**
Legal limit		-0.0149	-0.0166	-0.0179	-0.0192
		(0.0264)	(0.0265)	(0.0262)	(0.0263)
Domestic market development			0.0921		0.1098
			(0.2347)		(0.2330)
IMF conditionality				-0.1878	-0.2600
				(0.1926)	(0.1933)
Lags of central bank loans/GDP	**0.7609*** **	**0.7748*** **	**0.7716*** **	**0.7741*** **	**0.7707*** **
	(0.0233)	**(0.0173)**	**(0.0176)**	**(0.0172)**	**(0.0175)**
Lag of real GDP growth	-0.0250	**-0.0217***	-0.0195	**-0.0209***	-0.0187
	(0.0157)	**(0.0123)**	(0.0123)	**(0.0122)**	(0.0122)
Lag of government deposits/GDP	-0.0218	**-0.0397***	**-0.0381***	**-0.0389***	**-0.0370***
	(0.0231)	**(0.0206)**	(0.0209)	**(0.0205)**	(0.0207)
Lag of government debt/GDP	-0.0010	-0.0018	-0.0014	**-0.0036***	-0.0032
	(0.0027)	(0.0021)	(0.0021)	**(0.0021)**	(0.0022)
Observations	667	596	596	596	596
Number of countries	45	41	41	41	41

*Robust standard errors in parentheses. *** p<0.01, ** p<0.05, *p<0.1.*

TABLE A7

Number of observations (countries) in each local projection

Dependent variable	Horizon						
	0	**1**	**2**	**3**	**4**	**5**	**6**
Base money	580	545	507	469	430	391	354
	(40)	(40)	(40)	(40)	(40)	(38)	(37)
Exchange rate	596	560	521	482	442	402	364
	(41)	(41)	(41)	(41)	(41)	(39)	(38)
Inflation	596	560	521	482	442	402	364
	(41)	(41)	(41)	(41)	(41)	(39)	(38)
Broad money	596	560	521	482	442	402	364
	(41)	(41)	(41)	(41)	(41)	(39)	(38)

Note: The table summarizes the number of observations and the number of countries in each local projection. The number of observations in each regression is less than in the summary statistics because a full set of data is not available for all the control variables.

PUBLIC SECTOR ECONOMICS
48 (3) 363-391 (2024)

Table A8

List of the 45 Sub-Saharan countries used in the analysis

Angola	Madagascar
Benin	Malawi
Botswana	Mali
Burkina Faso	Mauritania
Burundi	Mauritius
Cabo Verde	Mozambique
Cameroon	Namibia
Central African Republic	Niger
Chad	Nigeria
Comoros	Rwanda
Congo, Democratic Republic of the	São Tomé and Principe
Congo, Rep.	Senegal
Côte d'Ivoire	Seychelles
Equatorial Guinea	Sierra Leone
Eritrea	South Africa
Ethiopia	Sudan
Gabon	Swaziland
Gambia	Tanzania
Ghana	Togo
Guinea	Uganda
Guinea-Bissau	Zambia
Kenya	Zimbabwe
Lesotho	