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Localising Sovereign Debt: The Rise of Local Currency Bond Markets in Sub-Saharan Africa

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Abstract

This article analyses the development of local currency sovereign bond markets (LCBMs) in Sub-Saharan Africa (SSA), a potentially important source of longer-term public finance. We make two contributions to the literature. First, we use a novel dataset comprising 28 SSA countries for the period 2000-2014 to uncover the main correlates of LCBM capitalization, of local currency bond (LCB) tenors and of LCB issue yields. We find that LCBM capitalization in SSA relates to politico-institutional factors, overall financial development and financial system structure. For LCB tenors and issue yields, inflation levels matter too. Second, we complement our econometric analysis with qualitative case studies of Kenya and Nigeria, where we further investigate the drivers of LCBM development and place LCBMs in a broader public debt context. We show that LCBMs have gained importance in SSA but also highlight new vulnerabilities, including those related to investor base composition.

Keywords: Public debt, local currency bonds, long-term finance, Sub-Saharan Africa

JEL classification: F21, F34, G23, H63, O11

1. INTRODUCTION

Public debt in Sub-Saharan Africa (SSA) has undergone profound changes over the last decade. After having been given a 'clean slate' through vast debt relief under the Heavily Indebted Poor Country (HIPC) initiative and its successor, the Multilateral Debt relief Initiative, SSA governments have accumulated new debt to address large infrastructure and other needs (Merotto et al., 2015). Until recently, apart from a few cases of explosive debt dynamics, the rise in SSA public debt-to-GDP ratios was mostly moderate, helped by rapid growth, high commodity prices and large non-debt inflows (Battaile et al., 2015). At least as important as the extent of renewed indebtedness, however, is its changing nature. Many SSA governments, including in several ex-HIPCs, now have access to a wider range of lenders and debt instruments (Prizzon and Mustapha, 2014). In the academic and policy literature most attention has gone to the large US dollar-denominated bonds that SSA governments have issued in international markets in recent years (see, e.g., Mecagni et al., 2014; Olabisi and Stein, 2015; Sy, 2015; Gevorkyan and Kvangraven, 2016; Presbitero et al., 2016; UNCTAD, 2016). That notwithstanding, it is important to highlight that in SSA marketable public debt is now increasingly issued in *local currency* to private *domestic* investors, a trend that follows emerging economies in other regions, be it with a considerable lag (Didier and Schmukler, 2014).

In this article we aim to shed light on the factors driving the development of local currency sovereign bond markets (LCBMs) in SSA. We construct a novel dataset comprising 28 SSA countries over 2000-2014, allowing us to study the main correlates of LCBM capitalization, of local currency bond (LCB) tenors and of LCB issue yields by means of simple panel regressions. We complement our econometric analysis with brief case studies of two countries with relatively large, yet heterogeneous LCBMs: Kenya and Nigeria. For both countries we investigate in more detail LCBM development and its drivers, and place LCBMs in a broader public debt context.

Our article contributes to the understanding of SSA LCBM development, first of all, by extending prior studies on LCBM capitalization (Adelegan and Radzewicz-Bak, 2009; Mu et al., 2013; Berensmann et al., 2015; Essers et al., 2016) with an inquiry into the covariates of LCB tenors and issue yields, and second, by considering a wider range of financial development measures as explanatory variables. Our panel regressions indicate that a well-developed financial sector and higher-quality political institutions relate positively to both

LCBM capitalization and average LCB tenors, the latter hinting at the importance of public accountability for longer-term investment. Likewise, high inflation, negatively associated with average tenors, renders longer-term fixed-income investment less attractive. As regards borrowing costs, we find significant negative correlations of average LCB issue yields with economic development, banking sector size and overall financial development, as well as with past fiscal balances, possibly reflect investor confidence in governments' ability to repay. As expected, the relation between LCB issue yields and past inflation is strongly positive. Some of these key relations are corroborated by our qualitative case studies of Kenya and Nigeria.

The article proceeds as follows. Section 2 outlines recent trends in public debt and LCBM development in SSA. Section 3 presents our econometric analysis of the correlates of LCBM capitalization, LCB tenors and LCB issue yields. In Section 4 we illustrate LCBM and broader public debt dynamics in SSA with case studies of Kenya and Nigeria. Section 5 concludes.

2. PUBLIC DEBT AND LCBM DEVELOPMENT IN SSA

Since the mid-2000s, the role of private as opposed to (official) bilateral and multilateral creditors has increased in SSA. Between September 2006 and 2016, SSA governments, excluding South Africa, have raised about US$29 billion through the issuance of 35 dollar-denominated bonds in international capital markets.[1] Initially, issuance was spurred by lower debt burdens and rapid economic growth in the region, combined with low global interest rates and high commodity prices (Sy, 2015; Presbitero et al., 2016), factors which have become much less favourable as of recent.

In addition, SSA governments have begun to raise private financing in *local currency* from *domestic* capital markets. Historically, SSA countries, much like developing countries in general, encountered significant challenges in borrowing in local currency at longer maturities, a phenomenon known as original sin (Eichengreen and Hausmann, 1999). Even now, developing countries with access to international capital markets face difficult trade-offs. International foreign currency borrowing tends to be cheaper, in nominal terms, than local currency borrowing in domestic markets. In the latter case investors require additional compensation for currency risks, higher expected inflation, changing local regulations and

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[1] These totals were calculated with data from Thomson Reuters Datastream. The issuing countries are Angola, Cameroon, the Republic of Congo, Côte d'Ivoire, Ethiopia, Gabon, Ghana, Kenya, Mozambique, Namibia, Nigeria, Rwanda, Senegal, Seychelles, Tanzania and Zambia.

financial market frictions (Du and Schreger, 2016). Conversely, for the debtor government foreign currency borrowing comes with substantial exchange rate risks. Moreover, substituting external, foreign currency debt with domestic, local currency debt may increase rollover and interest rate risks because of the typically shorter maturities of the latter; this implies it needs be refinanced more frequently and possibly at higher rates (Blommestein and Horman, 2007; Panizza, 2010).

Despite such risks, most SSA LCBMs have grown relative to GDP since 2000, with renewed momentum from 2009 onwards (Figure 1). The average LCBM capitalization in the 28 countries for which we could collect such data amounted to 8.3% of GDP in 2014, up from about 5.5% in 2008 (see Section 3 for more details on our dataset). While domestic commercial banks continue to be the dominant investors in LCBs in most SSA countries, several governments have made strides in attracting other domestic private investors too, especially local pension and insurance funds, as well as foreign private investors (Essers et al., 2016). The decline in the concentration of LCB holdings in domestic banks may help to address the sovereign-bank 'doom loop', where greater risks of a sovereign debt crisis raises risks of a banking crisis and vice versa (Farhi and Tirole, 2016).

FIGURE 1

LCBM development in SSA, 2000-2014
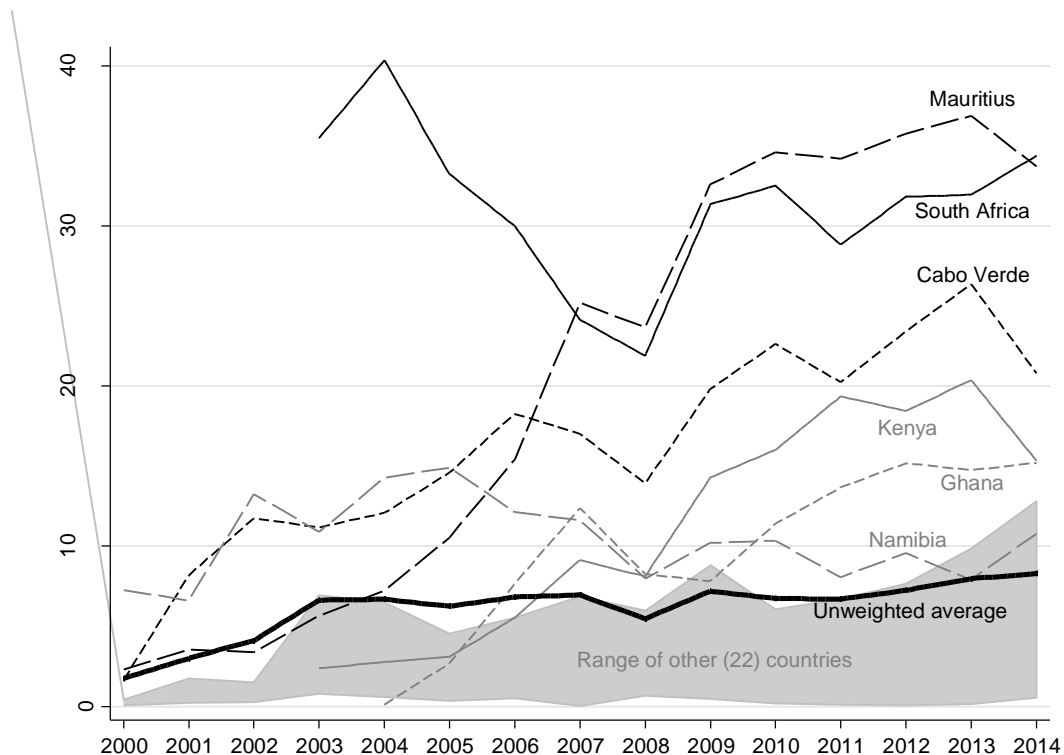
SSA LCBM development follows a broader trend of debt 'domestication', a process also observed in emerging economies in other regions (Didier and Schmukler, 2014). Domestic debt comprises a large and growing share of total public debt in many SSA countries (UNCTAD, 2016). For a sample of 31 SSA countries, Bataille et al. (2015) find that domestic debt constituted on average about one third of total public debt in 2013. In 11 of these countries, domestic creditors accounted for minimum 40% of public debt (Figure 2). This general shift towards more domestic, local currency debt is believed to be the result of governments' desire to mitigate currency mismatches and received a boost when external financing conditions tightened during the global crisis. It is also actively promoted and supported by international institutions (IMF et al., 2013). On the other hand, SSA's growing reliance on private investors (both domestic and external) mostly reflects changes in donor policies, i.e., large external debt relief and a shift from loans to grants thereafter, both of which have reduced publicly held debt (Cassimon et al., 2015).

FIGURE 2

Domestic debt (% of total debt) for selected SSA countries
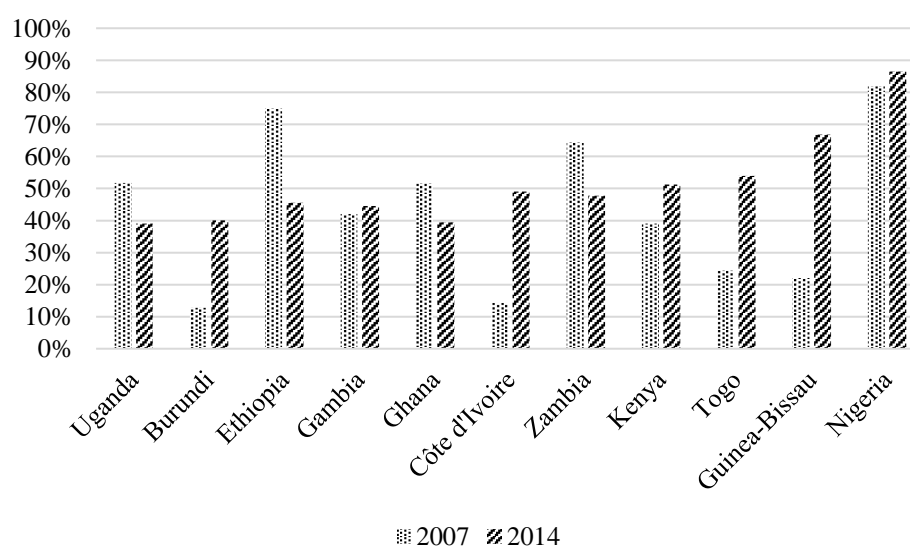
Notes: Compiled from various IMF country reports. Data for Burundi, Gambia and Nigeria are for 2013.

The importance and potential vulnerabilities of LCBMs and, by extension, domestic public debt have been increasingly recognised in studies on advanced, emerging and developing economies (see, among many others, Reinhart and Rogoff, 2009; Panizza, 2010; Rethel, 2012). For SSA, however, the focus is still very much on external public debt, because of its historical dominance and, until lately, a lack of good-quality data on domestic debt (notable exceptions include Bua et al., 2014 and Ncube and Brixiová, 2015). Our article is closest to a set of recent studies that analyse the determinants of LCBM development in SSA econometrically: Adelegan and Radzewicz-Bak (2009), Mu et al. (2013), Berensmann et al. (2015) and Essers et al. (2016). Unlike these studies, which narrowly focus on the determinants of LCBM capitalization, we also investigate the covariates of LCB tenors and issue yields, exploiting a novel panel dataset. Moreover, to better gauge the relation of LCBMs with other segments of the financial sector, we consider a wider range of financial development measures as regressors.

3. REGRESSION ANALYSIS

a. Model specification

We estimate three series of reduced-form panel data models:

$$\text{TBGDP}_{it} = \alpha_1 + \beta_1 X_{i,t-1} + \delta_1 \text{FINDEV}_{i,t-1} + \gamma_1 \mu_i + \varphi_1 \pi_t + \varepsilon_{1it} \tag{1}$$

$$\text{TBTEN}_{it} = \alpha_2 + \beta_2 X_{i,t-1} + \delta_2 \text{FINDEV}_{i,t-1} + \gamma_2 \mu_i + \varphi_2 \pi_t + \varepsilon_{2it} \tag{2}$$

$$\text{TBYLD}_{it} = \alpha_3 + \beta_3 X_{i,t-1} + \delta_3 \text{FINDEV}_{i,t-1} + \gamma_3 \mu_i + \varphi_3 \pi_t + \varepsilon_{3it}, \tag{3}$$

where our dependent variables of interest TBGDP_{it}, TBTEN_{it} and TBYLD_{it} are different proxies of LCBM development: LCBM capitalization as a percentage of GDP, average tenors of LCBs, and average issue yields of LCBs; $X_{i,t-1}$ is a vector of one-year lagged explanatory variables further described below; $\text{FINDEV}_{i,t-1}$ is a measure of financial development; μ_i are country-specific effects; π_t is a global common factor; and ε_{1it}, ε_{2it}, ε_{3it} are the error terms.

We estimate equations (1), (2) and (3) independently using either pooled ordinary least squares (POLS, where γ_1, γ_2 or γ_3 are assumed zero) or fixed effects (FE). Whereas the FE estimator will suffer less from omitted variable bias (by controlling for time-invariant unobserved heterogeneity between countries), the POLS estimator captures both within- and between-country variation. Because of the small sample sizes of our panels and short, unbalanced time dimensions, we do not attempt to correct for potential non-stationarity or other dynamics of

and between our variables. Also, other than by taking one-year lags, we do not address possible endogeneity problems, due to the difficulty of finding good instruments. Our results should hence not be interpreted as demonstrating causality, a caveat that also applies to earlier studies of LCBM development in SSA (Mu et al., 2013; Berensmann et al., 2015; Essers et al., 2016) and other regions (Burger and Warnock, 2006; Claessens et al., 2007; Eichengreen et al., 2008; Bhattacharyay, 2013). Nonetheless, we believe the econometric analysis that follows contributes to our understanding of SSA LCBMs and helps to lay the groundwork for better identification of causal relations as wider samples and longer time series become available.

b. Data description

Our three dependent variables are constructed from the African Financial Markets Initiative (AFMI)'s African Financial Markets Database (AFMD), for which data is collected through a network of liaison officers from African central banks and finance ministries, complemented with information from debt management offices, stock exchanges, regulators and other agencies, and harmonised between countries (AFMI, 2016a). We focus here on local currency Treasury bonds with a minimum original maturity of one year, issued in the domestic market. 'LCBM capitalization' is defined as year-end outstanding LCBs as a percentage of GDP; 'average tenor of LCBs' is the average tenor of year-end outstanding LCBs expressed in years, weighted by individual bond sizes; and 'average issue yield of LCBs' is the weighted average yield at issuance of all LCBs issued over the year, expressed in annual percentages.[2]

The AFMD has information on the LCBM capitalization and average bond tenors of 28 SSA countries over a maximum of 15 years, 2000-2014, although with uneven coverage. The AFMD sample of average issue yields is limited to an unbalanced panel of 14 SSA countries over 2000-2014 (see Table A1 in the Appendix for details).

For our explanatory variables in vector $X_{i,t-1}$ we start with a selection of regressors that appear in the prior work of Mu et al. (2013), Berensmann et al. (2015) and Essers et al. (2016). Log GDP and log GDP per capita are included as proxies of economic size and economic development, which we expect to be positively related with LCBM capitalization and LCB tenors, and negatively with average issue yields. The three-year moving average of the fiscal balance to GDP is likely inversely related to LCBM development, since sustained surpluses

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[2] LCBMs are highly illiquid in most SSA countries and therefore secondary market quotes are not readily available.

reduce the need to issue LCBs. However, large fiscal deficits could possibly also deter potential LCB investors, so that the net effect remains an empirical question. Log inflation is taken as an indirect measure of monetary policy (in)credibility; we expect high inflation to be a key impediment to LCB issuance, in particular longer-maturity issues, and to require higher nominal issue yields to compensate investor losses. Capital account openness, as measured by the Chinn-Ito index, helps to impose market discipline and attract foreign investors to LCBMs but makes it harder to create a captive investor base. We also include a British legal origins dummy, as common law is believed to offer better investor protection than French civil law and therefore to positively affect LCBM development. We use composite measures of democracy (from the Polity IV database) and institutional quality (from the World Governance Indicators) to capture the (likely positive) role of government accountability and overall credibility in LCBM development.[3]

Because of the expected importance of financial development for LCBMs we experiment with various measures. First, we consider private sector credit by banks (and other financial institutions) to GDP, an oft-used proxy of domestic banking sector size. Local banks often serve as primary dealers and market makers in SSA LCBMs and, in most countries, are important LCB investors too. Second, we use a composite index of financial development recently developed by IMF staff, which captures dimensions of depth, access and efficiency of both financial institutions and financial markets.[4] In alternative specifications we look at associations of LCBM development with banking sector concentration, operationalized as the asset share of the largest three banks, and the presence of foreign-owned banks in the economy. Ceteris paribus, we expect both variables to be negatively related to LCBM capitalization. Banks with more market power and foreign banks are arguably harder to be swayed to finance the government at favourable terms. We take the well-known VIX, a forward-looking measure of global financial market uncertainty, as our baseline common global factor.

Table A2 in the Appendix presents the descriptive statistics of the just-described variables. Between-country variation is clearly larger than within-country variation in the dependent and most independent variables, with the exception of inflation and fiscal balances.

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[3] See Mu et al. (2013), Berensmann et al. (2015), Essers et al. (2016) for a more elaborated theoretical motivation for including these variables.

[4] See Svirydzenka (2016) for more details. Importantly, the index does not include direct measures of domestic government debt, making it complementary to our dependent variables.

In Figures A1, A2 and A3 in the Appendix we plot each of the three dependent variables against individual explanatory variables. LCBM capitalization is positively associated with GDP, GDP per capita, democracy, institutional quality, private sector credit and overall financial development, and negatively with fiscal balances, log inflation, bank concentration and the share of foreign banks (Figure A1). Most of these associations remain visible when excluding South Africa and Mauritius, which have the most-capitalized LCBMs in relative terms. Similarly, we observe positive relations between average LCB tenors and GDP per capita, democracy, institutional quality and financial development (Figure A2). Log inflation exhibits a strong negative correlation with LCB tenors. Excluding outlier South Africa does not alter these relations. Average LCB yields generally increase with GDP, inflation and foreign bank shares, and decrease with GDP per capita, democracy, institutional quality, financial development and bank concentration, also when high-bond-yield countries Ghana and Mozambique are discarded (Figure A3).

Finally, Figure A4 in the Appendix shows the interrelations between our three dependent variables. Higher LCBM capitalization, longer LCB tenors and lower issue yields tend to go hand in hand in SSA, even when outliers are excluded. This corresponds well with Bua et al. (2014), who find that in low-income countries domestic debt portfolios of longer maturity bear lower costs, especially in countries with higher financial development.

c. Baseline results

Table 1 presents the estimation results for different variations on Equation (1). The POLS estimates show that better past fiscal balances are negatively correlated with LCBM capitalization. Most likely, smaller borrowing needs translate into lower volumes of outstanding LCBs. Also in line with prior studies, democracy and institutional quality relate positively to LCBM capitalization, although not very significantly. Taken at face value, this seems to imply LCBMs can better thrive in a context of good governance. LCBM capitalization is also higher in larger, more developed SSA economies with a more open capital account, but these relations are not particularly robust.

We observe highly significant positive correlations with private sector credit and broader financial development, suggesting LCBMs and other financial sector segments are typically complements rather than substitutes in SSA. In addition, banking sector concentration correlates negatively with LCBM capitalization, as does the presence of foreign-owned banks.

An explanation may be that in a concentrated, oligopolistic banking sector the few banks that exist may enjoy high returns, which would give them little incentive to help the government in financing itself through the capital market. Foreign banks may have more outside investment options than domestic banks and may be less easily persuaded to buy government LCBs.

As expected, it is much harder to find significant results in the FE estimates, due to limited within-country variation in our sample.[5] That said, we still find a significantly positive association between institutional quality and LCBM capitalization. Moreover, the coefficients of the different financial development variables have the same sign and are of similar magnitude as when estimated by POLS. The VIX has a negative coefficient which borders on significance, suggesting global market uncertainty hampers LCBM capitalization.

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[5] Hausman-type overidentification tests indicate a preference for FE over random effects (RE) from a consistency perspective.

TABLE 1

Regression results for LCBM capitalization

	POLS						FE					
	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
Log GDP	0.360	0.430	0.401	0.497	-0.491	1.423***	-2.732	-3.291	2.941	2.823	-4.759	3.014
	[0.449]	[0.414]	[0.538]	[0.594]	[0.878]	[0.435]	[12.129]	[12.188]	[12.452]	[13.576]	[14.682]	[16.360]
Log GDP per cap.	0.982*	0.926*	0.974*	0.252	0.397	-0.957+	6.776	7.379	-0.122	0.442	9.166	0.645
	[0.558]	[0.526]	[0.529]	[0.729]	[0.758]	[0.720]	[14.294]	[14.339]	[14.366]	[16.394]	[17.539]	[20.005]
Av. fiscal balance	-0.399**	-0.367***	-0.386***	-0.463***	-0.371**	-0.466***	0.005	-0.001	-0.004	0.000	0.025	-0.093
	[0.149]	[0.124]	[0.120]	[0.113]	[0.160]	[0.151]	[0.074]	[0.075]	[0.081]	[0.080]	[0.094]	[0.072]
Log inflation	5.233	3.597	3.606	-3.437	-0.196	-2.230	4.587	4.437	6.887	9.502	9.419	12.771
	[4.480]	[4.216]	[4.485]	[4.310]	[5.332]	[4.153]	[7.546]	[7.558]	[7.389]	[7.694]	[9.225]	[12.167]
Cap. acc. openness	0.554+	0.536+	0.572	0.310	-0.054	0.700+	1.198	1.212	0.929	-1.014	-0.728	-0.876
	[0.397]	[0.405]	[0.446]	[0.551]	[0.615]	[0.468]	[1.739]	[1.741]	[1.487]	[0.977]	[1.068]	[1.065]
British legal origins	-0.062	-0.066	-0.187	-0.741	-0.220	-1.671						
	[0.773]	[0.717]	[0.837]	[0.918]	[0.840]	[1.335]						
Democracy		2.760+	2.965+	3.298+	2.791+	0.316		2.535	-1.958	-1.119	-2.605	1.146
		[2.026]	[2.075]	[2.207]	[1.945]	[1.821]		[3.291]	[3.945]	[4.110]	[4.362]	[4.301]
Institutional quality			0.029	0.740	-0.051	2.658			13.128**	10.006*	7.674+	11.405*
			[2.071]	[1.909]	[1.922]	[2.167]			[6.308]	[5.619]	[4.786]	[6.518]
Private credit	0.221***	0.211***	0.210***				0.276	0.276	0.244			
	[0.028]	[0.031]	[0.036]				[0.221]	[0.221]	[0.199]			
Fin. development				52.504***	56.292***	51.072***				57.163+	74.842+	51.027
				[7.595]	[8.975]	[8.895]				[42.629]	[46.113]	[55.909]
Bank concentration					-0.097*						-0.089+	
					[0.057]						[0.052]	
Foreign bank share						-0.035+						-0.063
						[0.024]						[0.082]
VIX	0.001	-0.004	0.004	0.005	0.022	0.006	-0.047+	-0.046	-0.062+	-0.071*	-0.059+	-0.059
	[0.036]	[0.035]	[0.038]	[0.034]	[0.035]	[0.034]	[0.036]	[0.036]	[0.037]	[0.038]	[0.041]	[0.046]
Constant	-31.898+	-25.521	-26.036	7.631	1.511	9.374	-61.786	-65.807	-57.291	-72.003	-105.418	-89.617
	[21.502]	[19.444]	[21.370]	[22.246]	[25.209]	[20.913]	[90.237]	[90.167]	[89.690]	[107.721]	[120.003]	[148.153]
Obs./countries	270/27	270/27	254/26	261/27	242/26	232/23	270/27	270/27	254/26	261/27	242/26	232/23
R^2/R^2-within (FE)	0.782	0.786	0.792	0.755	0.771	0.781	0.354	0.355	0.367	0.321	0.428	0.297

Notes: Dependent variable is outstanding LCBs (% of GDP). Sample countries, years and variables as defined in text and Tables A1-A2 in Appendix. All independent variables are one-year lagged, except for VIX. Country-clustered standard errors reported in brackets. ***$p<0.01$;**$p<0.05$;*$p<0.10$;+$p<0.20$.

Table 2 gives the estimation results for Equation (2). When using POLS, the strongest results are observed for banking sector and broader financial development, both of which correlate positively with average LCB tenors (in line with Table 1). The democracy coefficient is again positive and significant. Government accountability may be important to ease the minds of investors in longer-term LCBs. Likewise, high inflation renders longer-term fixed-income investment less attractive. Somewhat surprisingly, a higher VIX is associated with longer average LCB tenors. One possible explanation is that in times of greater uncertainty long-term external finance is harder to come by for SSA governments and a relative increase in longer-tenor LCBs needs to make up for that. Or, alternatively, international investors may be more willing to take risks in 'frontier markets' when risks rise globally, leading to greater appetite for longer-tenor SSA LCBs. Such speculative hypotheses require further research. In column (7) of Table 2 we replace our financial development measures with LCBM capitalization. The association with LCB tenors is positive but not significant in the presence of other regressors.

Turning to the FE regressions for LCB tenors we find very few significant results, apart from the same positive correlation with VIX and a correlation with economic size. The highly significant *negative* association with LCBM capitalization suggests that within one single country an increase in the outstanding volume of LCBs may come at the expense of maturity lengthening.

Lastly, Table 3 contains the POLS and FE estimation results for Equation (3). The former display significant negative correlations of average LCB issue yields with log GDP per capita, banking sector size and overall financial development, and a strong positive correlation with log inflation. The negative association with fiscal balances may be due to more sustainable government finances instilling greater investor confidence. The negative correlation with bank concentration could be the result of a close relation (collusion) between governments and a few dominant banks. Moreover, when the banking sector is less concentrated (more competitive), banks may be more engaged in corporate lending, lowering demand for government LCBs and pushing up yields. The positive coefficient for institutional quality seems counterintuitive. A higher foreign bank share is associated with higher yields, as foreign banks may need to be compensated more to invest in LCBs than domestic banks (often naturally hedged because of their local currency liabilities). Longer LCB tenors again seem to go hand in hand with lower yields (see Figure A4 in the Appendix and Bua et al., 2014).

TABLE 2
Regression results for average LCB tenors

	POLS							FE						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log GDP	-0.054	0.014	-0.043	-0.025	0.281	-0.125	0.278	5.672*	6.070*	3.858	4.460	6.888*	2.061	6.697**
	[0.202]	[0.201]	[0.303]	[0.283]	[0.394]	[0.290]	[0.355]	[2.942]	[3.066]	[3.766]	[3.614]	[3.913]	[3.891]	[3.092]
Log GDP per cap.	0.151	0.113	0.126	-0.005	-0.202	0.230	0.244	-5.154	-5.588+	-2.856	-3.555	-6.477	-0.770	-5.874+
	[0.359]	[0.320]	[0.347]	[0.284]	[0.321]	[0.379]	[0.352]	[3.925]	[4.029]	[4.771]	[4.624]	[5.149]	[4.930]	[4.171]
Av. fiscal balance	0.059	0.081	0.107+	0.089	0.103+	0.143+	0.084	-0.011	-0.008	0.006	0.010	0.037	0.042	0.011
	[0.073]	[0.074]	[0.070]	[0.071]	[0.078]	[0.084]	[0.107]	[0.057]	[0.056]	[0.059]	[0.056]	[0.048]	[0.048]	[0.058]
Log inflation	-5.034	-5.997	-7.217	-9.330+	-8.911+	-9.805+	-13.408**	3.146	3.186	1.518	0.579	3.038	1.933	-3.470
	[4.943]	[5.466]	[5.985]	[5.941]	[5.815]	[6.322]	[6.342]	[3.493]	[3.499]	[3.693]	[3.934]	[3.481]	[4.238]	[3.212]
Cap. acc. openness	0.121	0.083	0.055	0.012	0.106	-0.005	-0.087	-0.005	-0.009	0.191	0.749	0.619	0.675	0.232
	[0.336]	[0.309]	[0.362]	[0.330]	[0.332]	[0.353]	[0.368]	[1.319]	[1.321]	[1.272]	[0.813]	[0.764]	[0.798]	[0.853]
British legal origins	0.532	0.505	0.723	0.638	0.447	0.902	0.806							
	[0.695]	[0.703]	[0.836]	[0.745]	[0.790]	[0.714]	[0.752]							
Democracy		2.023+	2.334+	2.705*	2.480+	3.020*	3.193**		-1.413	-0.290	-0.823	-0.909	1.057	-0.886
		[1.323]	[1.552]	[1.362]	[1.518]	[1.534]	[1.361]		[1.359]	[1.815]	[1.643]	[1.528]	[2.049]	[1.637]
Institutional quality			-0.193	-0.241	0.102	-0.792	0.973			-3.608	-2.446	-0.466	-1.774	-1.935
			[1.612]	[1.437]	[1.534]	[1.680]	[1.329]			[3.511]	[3.266]	[2.805]	[2.932]	[2.649]
Private credit	0.053***	0.046***	0.046**					-0.040	-0.040	-0.029				
	[0.010]	[0.013]	[0.017]					[0.046]	[0.046]	[0.040]				
Fin. development				11.632**	11.628**	11.967**					-7.754	-7.707	-0.941	
				[4.775]	[5.147]	[5.300]					[14.458]	[14.208]	[17.317]	
Bank concentration				0.019							0.012			
				[0.022]							[0.014]			
Foreign bank share						0.010							0.029	
						[0.018]							[0.023]	
LCBM capitalization							0.039							-0.093***
							[0.068]							[0.031]
VIX	0.039**	0.037**	0.030*	0.024+	0.020	0.015	0.036**	0.042***	0.041***	0.041**	0.038**	0.032**	0.024+	0.039**
	[0.016]	[0.017]	[0.016]	[0.017]	[0.016]	[0.017]	[0.017]	[0.014]	[0.014]	[0.015]	[0.015]	[0.012]	[0.015]	[0.015]
Constant	26.645	30.114	36.064	46.105+	43.210+	47.255+	61.456*	14.797	17.750	16.443	23.473	21.826	-2.007	51.619**
	[23.154]	[25.574]	[28.349]	[28.566]	[28.557]	[30.038]	[30.436]	[26.229]	[26.903]	[27.192]	[28.611]	[28.111]	[32.020]	[24.576]
Obs./countries	249/27	249/27	234/26	241/27	225/26	218/23	222/25	249/27	249/27	234/26	241/27	225/26	218/23	222/25
R^2/R^2-within (FE)	0.432	0.454	0.467	0.465	0.487	0.487	0.388	0.155	0.159	0.184	0.179	0.188	0.218	0.258

Notes: Dependent variable is average tenor of outstanding LCBs (years). Sample countries, years and variables as defined in text and Tables A1-A2 in Appendix. All independent variables are one-year lagged, except for VIX. Country-clustered standard errors reported in brackets. ***$p<0.01$;**$p<0.05$;*$p<0.10$;+$p<0.20$.

TABLE 3

Regression results for average LCB issue yields

| | POLS | | | | | | | | FE | | | | | | | |
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log GDP	0.633+	0.640+	1.395***	1.271***	0.864**	0.781***	0.937*	0.833**	7.024	6.633	11.685	10.835	7.616	6.622	9.431	23.756**
	[0.415]	[0.419]	[0.333]	[0.368]	[0.378]	[0.226]	[0.446]	[0.278]	[11.458]	[12.096]	[9.667]	[8.940]	[9.064]	[7.124]	[9.788]	[8.019]
Log GDP per cap.	-1.489**	-1.541**	-2.571***	-2.347***	-2.419***	-1.592***	-2.881***	-2.227***	-8.959	-8.565	-14.217	-12.504	-11.170	-8.905	-12.159	-28.569**
	[0.509]	[0.513]	[0.469]	[0.504]	[0.483]	[0.450]	[0.504]	[0.359]	[13.176]	[13.743]	[11.126]	[11.093]	[11.330]	[8.984]	[11.159]	[9.744]
Av. fiscal balance	-0.223	-0.211	-0.214+	-0.211+	-0.178	-0.256*	-0.265+	-0.181+	-0.131+	-0.136	-0.125	-0.113	-0.103	-0.084	-0.167	-0.096
	[0.189]	[0.173]	[0.129]	[0.119]	[0.138]	[0.136]	[0.172]	[0.132]	[0.094]	[0.101]	[0.103]	[0.097]	[0.086]	[0.116]	[0.128]	[0.115]
Log inflation	34.332***	33.905***	23.412***	24.937***	21.313**	17.083**	28.435**	19.958**	16.545**	16.590**	16.322**	16.719**	13.160+	11.188+	10.733+	0.311
	[7.566]	[7.082]	[5.617]	[5.941]	[8.761]	[5.708]	[10.024]	[7.497]	[5.636]	[6.016]	[7.306]	[6.776]	[7.550]	[6.581]	[6.504]	[6.409]
Cap. acc. openness	-0.150	-0.154	-0.411+	-0.320	-0.556+	-0.528**	-0.283	-0.277	-2.088	-2.083	-2.109	-0.404	0.113	-0.813	-0.270	0.512
	[0.272]	[0.282]	[0.258]	[0.275]	[0.343]	[0.225]	[0.287]	[0.213]	[2.468]	[2.479]	[2.107]	[1.193]	[0.976]	[0.840]	[1.299]	[1.202]
British legal origins	0.266	0.395	0.361	1.435+	1.529+	1.932**	1.467+	2.363**								
	[1.077]	[1.184]	[0.753]	[0.912]	[0.878]	[0.654]	[0.867]	[0.804]								
Democracy		0.988	-0.817	0.152	0.541	3.324***	-0.110	1.921+		3.248	1.966	-1.659	-0.759	-9.759+	8.335	-6.572
		[1.534]	[1.238]	[1.283]	[1.672]	[0.948]	[1.140]	[1.124]		[10.845]	[7.488]	[6.109]	[4.822]	[6.079]	[9.950]	[5.535]
Institutional quality			5.764***	5.582***	5.185***	2.670*	4.134**	2.667**			7.581+	10.734*	6.246	9.596*	6.163	1.786
			[1.358]	[1.520]	[1.499]	[1.374]	[1.652]	[0.905]			[5.244]	[5.203]	[5.698]	[4.429]	[4.612]	[3.455]
Private credit	-0.029+	-0.031+	-0.053**						-0.104+	-0.103+	-0.149**					
	[0.019]	[0.020]	[0.019]						[0.073]	[0.074]	[0.055]					
Fin. development				-12.992**	-12.007**	-12.356**						-44.523*	-43.073**	-26.485		
				[5.773]	[4.319]	[4.487]						[21.456]	[18.253]	[24.119]		
Bank concentration					-0.032+								-0.059***			
					[0.021]								[0.017]			
Foreign bank share						0.050***								0.233***		
						[0.010]								[0.063]		
LCBM capitaliz.							-0.056								-0.073	
							[0.048]								[0.055]	
Av. tenor of LCBs								-0.503***								-0.479
								[0.115]								[0.381]
VIX	0.011	0.008	-0.010	-0.015	-0.013	0.011	0.007	-0.020	0.025	0.025	0.005	0.000	0.006	0.029	0.023	0.023
	[0.046]	[0.045]	[0.035]	[0.032]	[0.038]	[0.033]	[0.036]	[0.028]	[0.038]	[0.038]	[0.035]	[0.033]	[0.042]	[0.038]	[0.035]	[0.036]
Constant	-140.2***	-138.6***	-92.26***	-101.2***	-79.968*	-69.047**	-112.26**	-72.908*	-15.302	-19.971	-1.637	-14.012	11.500	-13.962	7.951	164.764**
	[37.192]	[35.239]	[27.667]	[29.084]	[40.858]	[28.427]	[47.730]	[34.782]	[79.887]	[88.978]	[74.596]	[78.689]	[77.172]	[58.482]	[80.727]	[69.682]
Obs./countries	123/13	123/13	113/12	117/13	104/13	104/12	111/13	106/13	123/13	123/13	113/12	117/13	104/13	104/12	111/13	106/13
R²/R²-within (FE)	0.568	0.570	0.670	0.645	0.660	0.636	0.611	0.669	0.148	0.149	0.203	0.187	0.184	0.300	0.119	0.140

Notes: Dependent variable is average issue yield of LCBs issued over the year (%). Sample countries, years and variables as defined in text and Tables A1-A2 in Appendix. All independent variables are one-year lagged, except for VIX. Country-clustered standard errors reported in brackets. ***$p<0.01$;**$p<0.05$;*$p<0.10$;+$p<0.20$.

Unlike in Tables 1 and 2, the FE results in Table 3 are largely in line with those of the POLS estimations. Most visibly, within-country increases in banking sector size, financial development and bank concentration correlate with decreasing average LCB yields, while increases in inflation and foreign bank shares go together with rising yields.

d. Robustness

To check how sensitive our main findings are to changes in sample, variable definitions and choice of specification, we have performed a battery of robustness tests. For reasons of brevity, we only provides a short summary discussion here and refer to Dafe et al. (2017) for the full robustness results.

First, excluding outliers (cf. Figures A1-A3 in the Appendix) from the samples has little effect on our main results. One exception is the negative association between financial development and average LCB tenors in the FE model, which becomes statistically significant once South Africa is dropped. A possible (but maybe not entirely satisfactory) explanation are crowding-out effects, i.e., when banks increase private sector lending they may cut back on longer-term government lending (more so than on shorter-term lending). Second, replacing our overall financial development index with its sub-indices for financial institutions and financial markets shows that especially correlations with the former are economically and statistically significant, indicating once more the importance of banks for LCBMs. Third, we obtain very similar results when substituting the VIX by other common factors, such as international commodity price indices, proxies for global liquidity from the BIS or the US Federal Funds rate. Fourth, the inclusion of year dummies hardly affects the POLS estimations but renders the coefficient of the financial development index insignificant in the FE models, likely by removing even more of the already limited variation in our dependent variables.

Lastly, we have experimented with adding extra variables to our specifications. Our key findings are unaltered by augmenting the baseline models with inflation or exchange rate volatility, the coefficients of which generally take the expected signs (negative for LCBM capitalization and average LCB tenors, and positive for average LCB issue yields). Interestingly, we find a significant negative correlation between LCBM capitalization and outstanding internationally issued foreign currency bonds (scaled to GDP), at least in a POLS regression, but no substitution between LCBs and loans from official or private creditors. Using debt relief dummies, we cannot establish a direct link between debt relief and LCBM

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capitalization, in line with Essers et al. (2016). The correlation between average LCB tenors and insurance company assets to GDP, a proxy for the size of the domestic non-bank institutional investor base, is positive and strongly significant in a POLS estimation (also when excluding outlier South Africa). However, we fail to confirm this positive association in the FE model, which may be due to very limited within-country variation in this variable. As expected, we find a highly significant positive association between the average LCB issue yield and the central bank's policy rate, the key domestic reference rate.

4. COUNTRY CASE STUDIES

While cross-country regressions have allowed us to lay bare broad patterns of LCBM development in SSA, further country-level analysis is needed to illuminate the routes countries have taken to deepen their LCBMs as well as the new opportunities and vulnerabilities these expanding LCBMs bring. This section addresses these issues with brief case studies of Kenya and Nigeria, two countries where LCBMs have become large enough to affect the wider economy.[6]

a. Kenya

Kenya's LCBM is highly developed by SSA standards, both with respect to size and maturity. Between 2005 and 2014 outstanding local currency Treasury bonds amounted on average to 13% of GDP in Kenya. In our 28-country sample only Cabo Verde, Mauritius and South Africa had a higher average LCBM capitalization over the same period (cf. Figure 1). The Kenyan government has also successfully lengthened the tenors of its LCBs. In 2008 the Central Bank of Kenya (CBK) issued the first 20-year LCB, followed by a 25-year LCB in 2010 and a 30-year 'savings development bond' in 2011 (Ndung'u, 2011).

Kenya has a more diversified LCB investor base than most other SSA countries. Whereas non-resident investors play a negligible role, holding only about 1% of domestic debt in 2014, resident investors include commercial banks (48% of LCBs), local insurance firms (11%), parastatals (4%) and other investors (37%), most notably pension funds (AFMI, 2016b). Kenyan authorities have also sought to increase retail sector participation. In March 2017 the government issued the first long-awaited M-Akiba bond, a LCB dedicated to infrastructure

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[6] More details on Kenya and Nigeria and a third case study on Ghana can be found in Dafe et al. (2017).

financing sold exclusively by mobile phone with a minimum investment of less than US$30 equivalent.

What explains Kenya's relative success in developing its LCBM? Kenya has several features our econometric analysis pointed to as key factors associated with greater LCBM capitalization (Table 4). In particular, Kenya has a comparatively well-developed, competitive banking sector, comprised mostly of domestic banks. Political initiative is also believed to have played an important role. Throughout the 1990s Kenya's government had a thorny relationship with bilateral donors, the World Bank and IMF, who regularly withheld financial assistance out of governance concerns (Grosh and Orvis, 1996; IMF, 2008). Finding the channel of official borrowing relatively closed and lacking access to international capital markets due to high perceived default risk, Kenya began to shift from external to domestic borrowing from the late 1990s onwards.

TABLE 4
Selected drivers of LCBM development for Kenya and Nigeria

	Kenya	Nigeria	Sample median
Log inflation	4.7	4.7	4.6
Democracy	0.90	0.7	0.75
Institutional quality	1.5	1.2	1.6
Private credit	29.1	17.3	16.6
Fin. development	0.17	0.14	0.11
Bank concentration	44.3	63.1	77.7
Foreign bank share	29.1	17.9	60

Notes: Values are 2005-2014 averages. Variables as defined in text and Table A2 in Appendix. Median based on sample in Table A1 in Appendix.

In 2001 the government established the Market Leaders Forum, facilitating consultation and exchange among LCBM participants, notably the Treasury, CBK, commercial banks, insurance companies and diaspora representatives (Ndung'u, 2011). The Forum's initial objective was to lengthen LCB tenors. Over time it has developed into a platform to discuss issues such as secondary market development and investor base diversification.

Kenya has succeeded in mitigating some of the vulnerabilities that may arise from borrowing through LCBMs. Between 2005 and 2014 Kenya's average LCB issue yields amounted to 12%, above our sample median of 10%. Yet rollover risks were reduced by lengthening LCB maturities. In fact, Kenyan LCB tenors averaged nine years between 2005 and 2014, substantially above the six-year sample median. While it remains difficult to pin down the exact

factors underlying maturity lengthening, Kenya does possess several features that we found to correlate with lower borrowing costs, including reasonable inflation, comparatively high institutional quality, a well-developed banking sector and a low foreign bank share.

Kenyan LCBM development has also widened the government's policy space. For instance, between 2009 and 2014 the government was able to finance infrastructure projects through six LCBs targeted explicitly to infrastructure development. But while LCBMs provide the Kenyan government with funds over which it has significant discretion, it is not free from pressures to maintain fiscal discipline. Kenya's relatively diverse investor base introduces an element of competition in the LCBM and adds to secondary market liquidity. As long as alternative options are available to domestic investors, governments remain incentivised to maintain creditworthiness to attract LCB investment. Moreover, Kenya's economy has large agricultural and tourism sectors and is export-oriented, which implies that public finances are vulnerable to shocks arising from drought, terrorism and declines in external demand. This too is likely to exert pressures for fiscal discipline.

b. Nigeria

In relative terms, Nigeria's LCBM is smaller than Kenya's, averaging 6% of GDP between 2005 and 2014. However, with about US$28 billion in Nigerian LCBs outstanding between 2010 and 2014 versus US$9 billion in Kenya, the absolute size of the former LCBM is much larger. Nigeria's resident investor base is again relatively diversified. Local banks hold about 37% of total domestic debt, the Central Bank of Nigeria 10% and the non-bank public, including the insurance and pension sector, the remainder (DMO, 2015).

What has driven LCBM expansion in Nigeria? The quality of Nigerian public institutions is relatively poor, which does not help the LCBM deepening. Conversely, Nigeria does score comparatively well with respect to other important correlates of LCBM capitalization, such as a domestically-owned and competitive banking sector (Table 4). The depth of Nigeria's LCBM also results from concerted efforts by the government to rely more on domestic rather than external debt after having secured Paris Club debt relief on the latter in 2005. Whereas in 2004 78% of the public debt stock was still external and only 22% domestic, this had turned around to 19% external and 81% domestic public debt by 2015. The government has also been successful in lengthening LCB tenors. In 2007 10-year LCBs represented the longest tenor on

offer and accounted for 20% of total issuance. In 2015 the shares of 10- and 20-year LCBs were 19% and 38% (DMO, 2007; DMO, 2015).

The Nigerian case also demonstrates some key opportunities and vulnerabilities arising from deep LCBMs. As with Kenya, Nigeria's ability to borrow from LCBMs reduced the reliance on external financing. Nigeria has also largely avoided the vulnerabilities arising from domestic borrowing at shorter maturities and higher costs, partly because a significant portion of borrowing was not intended to fill fiscal gaps but rather to stimulate LCBM development (Blommestein and Horman, 2007). Especially before Nigeria's 2010 banking crisis, oil export proceeds provided a comfortable cushion to finance recurrent expenditures.

Nigeria's status as a major oil exporter has also been a regular source of economic vulnerability. To be sure, sustained oil price declines greatly impact the creditworthiness of a government which derives more than 60% of total revenues from oil exports. Oil price movements may also have indirect effects on debt sustainability, as Nigeria's recent experience has shown. Between 2011 and 2013 the share of non-resident LCB investment increased from 0.7% to 15%, spurred by the inclusion of Nigeria into JP Morgan's and Barclays' major benchmark indices for emerging market LCBs (Minto, 2012). When in 2014 the Nigerian government introduced restrictions on foreign exchange transactions to deal with forex shortages arising from low oil prices, foreign investors became concerned about the liquidity of their investments. Such concerns prompted JP Morgan and Barclays to exclude Nigeria from their indices in 2015 and 2016, respectively, causing in turn foreign investors to exit and LCB yields to rise (UNCTAD, 2016). This episode illustrates that, whereas foreign investment into LCBMs may provide a welcome boost to liquidity, a rapid build-up of foreign investor positions can be problematic. The Nigerian case underlines the importance of building a base of 'patient capital' that is less likely to exit as soon as external market conditions deteriorate.

5. CONCLUSIONS

Our empirical analysis of the drivers underlying the development of LCBMs in SSA has yielded several interesting results. Importantly, our findings suggest that LCBM capitalization is not only related to democracy, institutional quality and financial development, but also to financial system structure in SSA. In particular, we find that a high concentration in the banking sector correlates negatively with LCBM capitalization, possibly reflecting that oligopolistic returns reduce banks' incentives to provide longer-term financing to governments. A large

presence of foreign-owned banks also correlates negatively with LCBM capitalization, arguably because foreign banks enjoy more alternative investment opportunities abroad than domestic institutions.

A further contribution is our analysis of LCB tenors and issue yields in SSA. We find that both the size of a country's banking sector and its broader financial development are positively correlated with average LCB tenors. Democracy, a proxy of government accountability, and low inflation matter too for attracting investments into longer-tenor LCBs. As regards LCB issue yields, financial and economic development and, above all, inflation appear to be important factors. Using Kenya and Nigeria as illustrative case studies, we have highlighted the importance of investor base diversification in order to develop deep, liquid and stable LCBMs. While foreign participation in LCBMs can spur their development, it also increases the risk of international financial contagion and capital flight in case of external shocks.

We acknowledge that limited within-country variation in our LCBM capitalization, LCB tenor and LCB issue yield samples is an important drawback to our econometric analysis. Longer time series, preferably at a higher frequency, would help to achieve better identification of any causal relations between different dimensions of LCBM development and the covariates we employ in our analysis. Ideally, individual bond-level data would allow us to construct more detailed measures of LCBM development. In addition, we believe it would be interesting to study secondary market variables such as LCBM turnover, bid-ask spreads and the evolution of secondary market yields of LCBs in SSA. Currently such data are, however, not available (not publicly at least) for most countries in the region. As data availability and quality continue to improve, other exciting opportunities for follow-up research on SSA LCBMs may open up too, including topics such as investor base composition, the role of market infrastructure, such as systems for clearing and settlement and electronic trading platforms, and regional integration aspects of LCBM development.

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TABLE A1

### Country-year samples by dependent variable

Country	ISO 3 code	LCBM capitalization	Average LCB tenors	Average LCB issue yields
			Dependent variable (available years)	
Angola	AGO	2005-2014	2005-2014	N/A
Benin	BEN	2007-2014	2007-2014	N/A
Botswana	BWA	2003-2014	2003-2014	2003, 2008-2014
Burkina Faso	BFA	2000-2014	2000, 2001, 2003-2014	N/A
Burundi	BDI	2007-2014	2007-2014	N/A
Cabo Verde	CPV	2000-2014	2000-2014	2000-2014
Cameroon	CMR	2010-2014	2010-2014	N/A
Chad	TCD	2011-2014	2011	N/A
Cote d'Ivoire	CIV	2000-2014	2000-2014	N/A
Gabon	GAB	2007-2014	2007-2014	N/A
Ghana	GHA	2004-2014	2004-2014	2004-2014
Kenya	KEN	2003-2014	2003-2014	2003-2014
Lesotho	LSO	2010-2014	2010-2014	2010-2014
Malawi	MWI	2000-2012	2000-2008	N/A
Mali	MLI	2008-2014	2008-2014	N/A
Mauritius	MUS	2000-2014	2000-2014	2004-2014
Mozambique	MOZ	2000-2014	2000-2004	2001, 2002, 2004, 2005, 2008-2010, 2013, 2014
Namibia	NAM	2000-2014	2000-2014	2000-2014
Niger	NER	2009-2014	2009-2014	N/A
Nigeria	NGA	2003-2014	2003-2014	2009-2014
Rwanda	RWA	2008-2014	2008-2014	2008, 2010, 2011, 2014
Senegal	SEN	2005-2014	2005-2014	N/A
South Africa	ZAF	2003-2014	2003-2014	2011-2014
Swaziland	SWZ	2010-2014	2010-2014	2010, 2011, 2013, 2014
Tanzania	TZA	2002-2014	2002-2014	2002-2014
The Gambia	GMB	2010-2013	2010	N/A
Togo	TGO	2006-2014	2006-2014	N/A
Uganda	UGA	2004-2014	2004-2014	2004-2014

TABLE A2

Variable names, definitions, sources and descriptive statistics

Variable	Definition	Source	Observations			Mean	Min	Max	Standard deviation		
			Total	Countries	Years				overall	between	within
Dependent											
LCBM capitalization	Year-end outstanding amount of local currency Treasury bonds (in % of GDP)	AFMI (2016a)	282	28	2000-2014	6.681	0.026	40.343	8.560	7.033	4.202
Average tenor of LCBs	Weighted average tenor of year-end outstanding local currency Treasury bonds (in years)	AFMI (2016a)	261	28	2000-2014	6.391	1.512	17.098	2.739	2.323	1.345
Average issue yield of LCBs	Weighted average yield at issuance of all local currency Treasury bonds issued over the year (in %)	AFMI (2016a)	128	14	2000-2014	10.971	4.231	24.264	4.236	3.373	2.465
Independent											
Log GDP	Logarithm of GDP (in current US$ billion)	IMF World Economic Outlook (WEO)	420	28	1999-2013	2.054	-0.679	6.257	1.412	1.342	0.502
Log GDP per capita	Logarithm of GDP per capita (in current US$)	WEO	420	28	1999-2013	6.830	4.691	9.392	1.087	1.023	0.411
Fiscal balance	3-year moving average of general government net lending/borrowing (in % of GDP)	WEO; IMF Fiscal Monitor	409	28	1999-2013	-1.616	-17.840	13.688	4.124	2.573	3.262
Log inflation	Logarithm of the y-o-y change in average consumer prices	WEO	420	28	1999-2013	4.676	4.517	6.052	0.121	0.080	0.092
Capital account openness	Chinn-Ito coding of restrictions on cross-border financial transactions based on IMF Annual Report on Exchange Arrangements and Exchange Restrictions	Chinn-Ito KAOPEN database	420	28	1999-2013	0.292	0	1	0.292	0.292	0.054
British legal origins	Dummy which equals 1 for countries with a British common law heritage and 0 otherwise	Andrei Schleifer's personal website: http://scholar.harvard.edu/shleifer	420	28	2000-2014	0.429	0	1	0.495	0.504	0
Democracy	0-1 normalized (revised) Polity 2 score	Polity IV Project database	420	28	1999-2013	0.631	0.050	1	0.265	0.258	0.076
Institutional quality	Unweighted sum of 0-1 normalized scores on four dimensions: 'control of corruption', 'government effectiveness', 'regulatory quality' and 'rule of law'	World Bank World Governance Indicators	351	27	2001; 2003-2013	1.622	0.712	2.688	0.436	0.433	0.097
Private sector credit	Domestic private sector credit by deposit money banks and other financial institutions (in % of GDP)	World Bank Global Financial Development Database (GFDD)	412	28	1999-2013	22.841	1.140	150.210	26.680	26.351	5.563
Financial development	Composite index of financial development, capturing the depth, access and efficiency of financial institutions and financial markets	Svirydzenka (2016)	420	28	1999-2013	0.140	0.046	0.637	0.105	0.105	0.020
Bank concentration	Assets of 3 largest commercial banks (in % of total commercial banking assets)	GFDD	371	28	1999-2013	78.058	23.324	100	18.326	15.353	10.637
Foreign bank share	Number of foreign owned banks (as % of total number of banks in the economy)	GFDD	345	23	1999-2013	54.609	0	100	24.668	23.869	7.873
VIX	Yearly averaged Chicago Board of Options Exchange Volatility Index measuring implied volatility of S&P 500 index options	Federal Reserve Bank of St. Louis	420	28	2000-2014	20.941	12.810	32.690	6.367	0	6.367

FIGURE A1. LCBM capitalization vs. explanatory variables
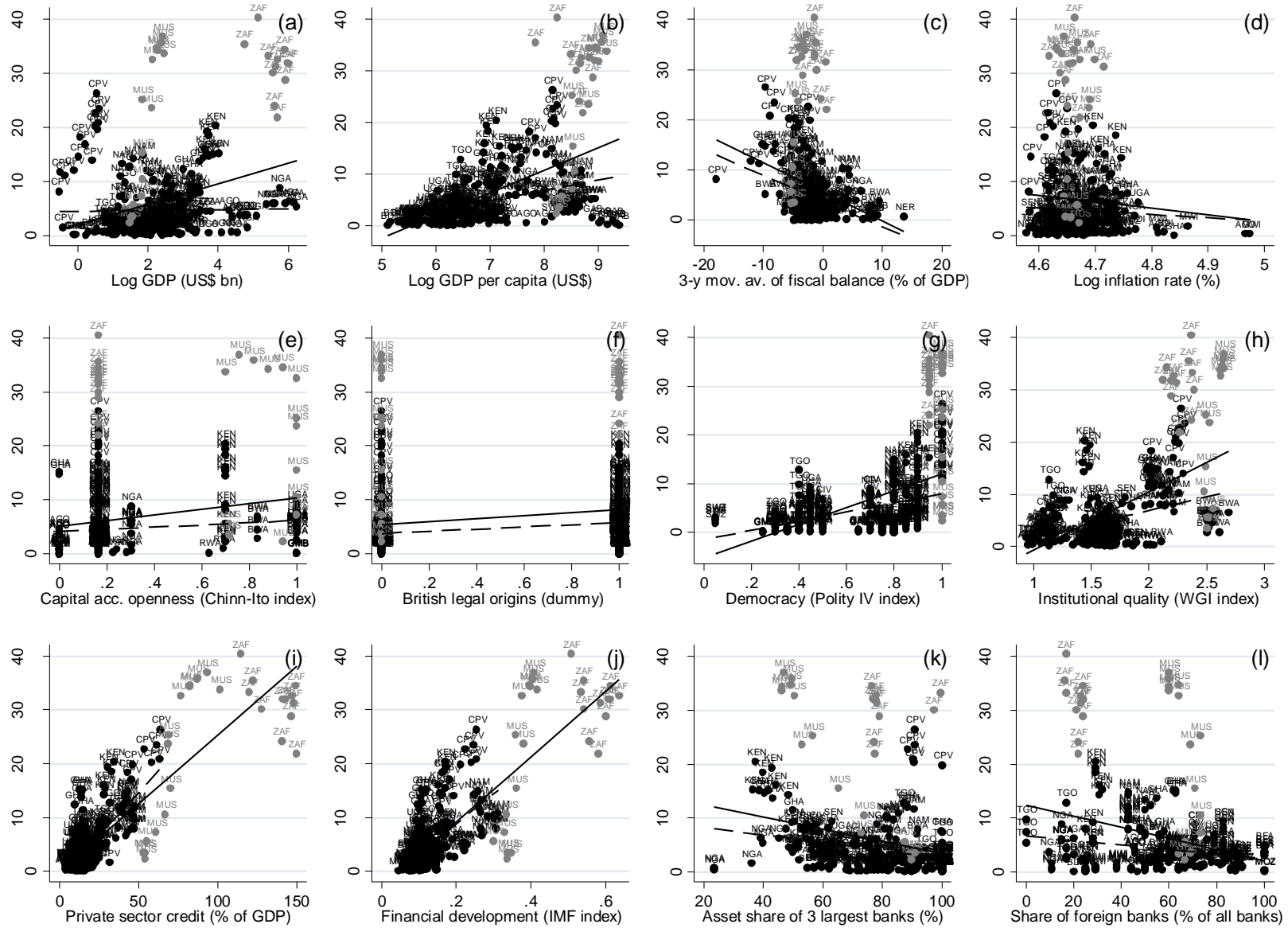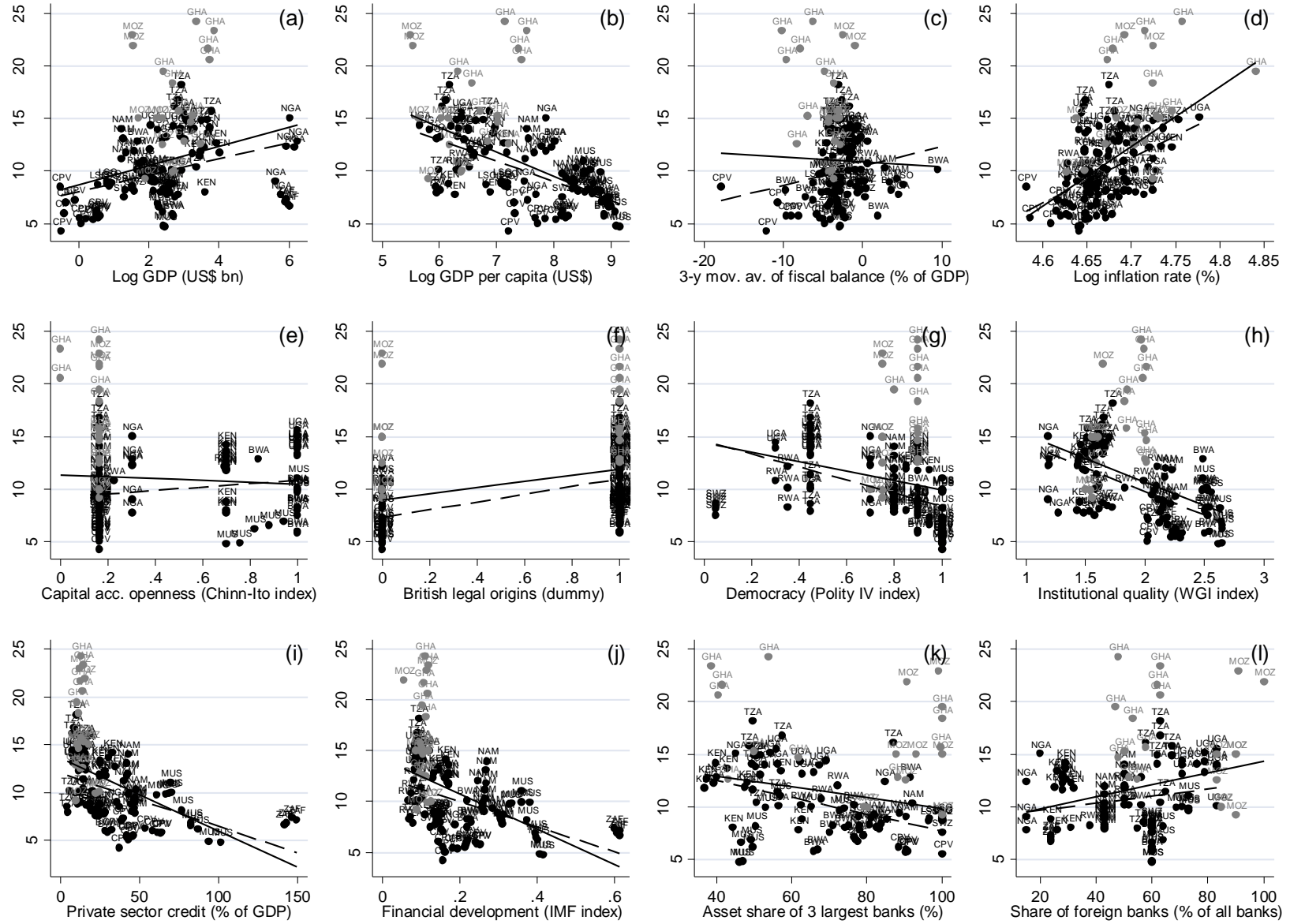

Notes: Sample countries, years and variables as defined in text and Tables A1-A2 in Appendix. All explanatory variables are one-year lagged. Grey dots are data points for South Africa and Mauritius. Full lines represent best linear fit for whole sample, dashed lines for sample excluding South Africa and Mauritius.

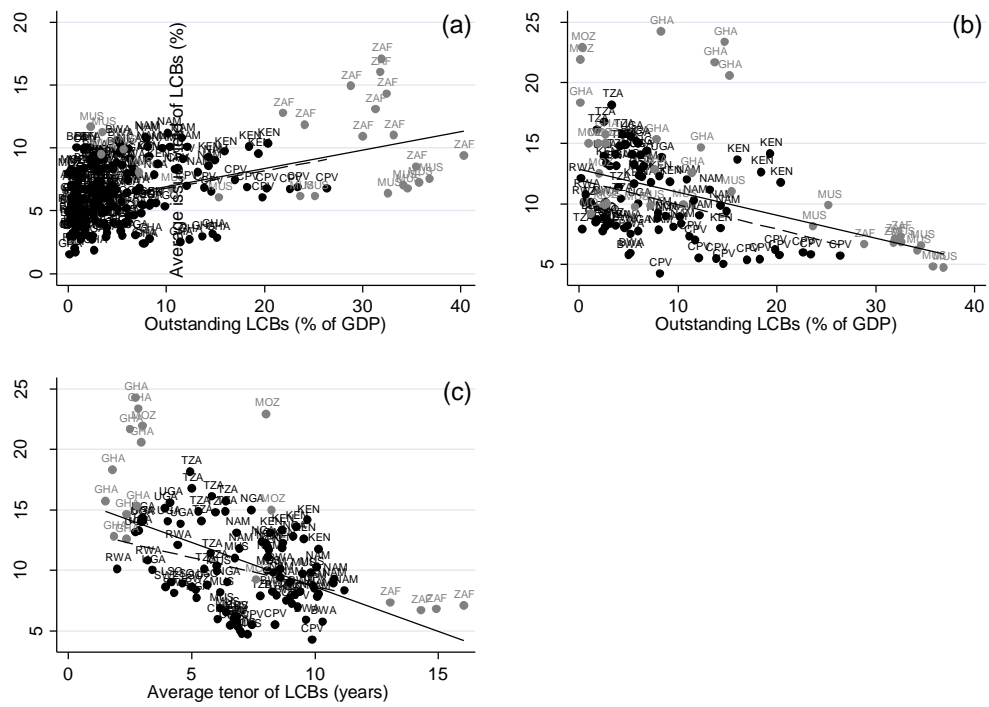FIGURE A2. Average LCB tenors vs. explanatory variables
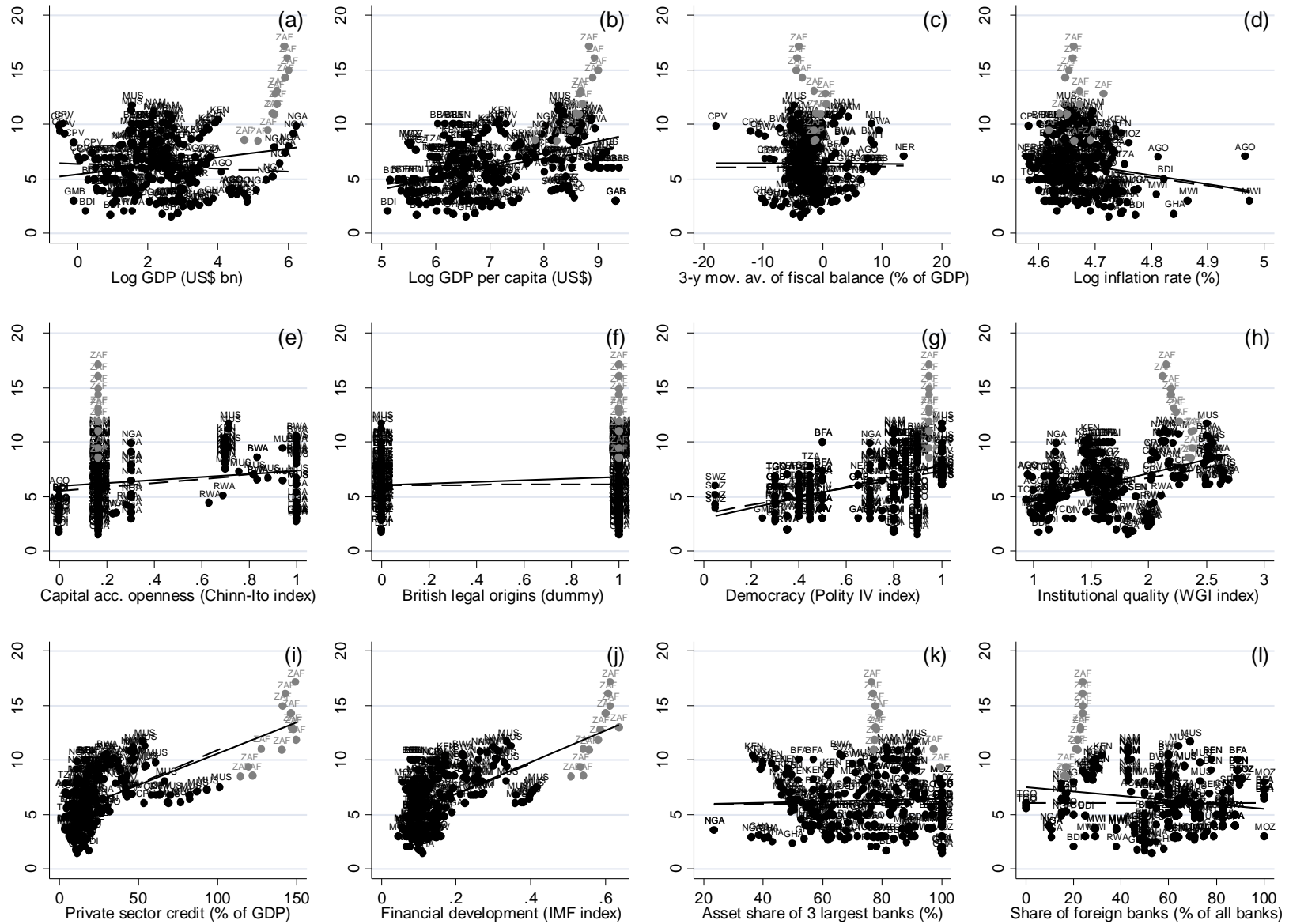
Notes: Sample countries, years and variables as defined in text and Tables A1-A2 in Appendix. All explanatory variables are one-year lagged. Grey dots are data points for South Africa. Full lines represent best linear fit for whole sample, dashed lines for sample excluding South Africa.

FIGURE A3. Average LCB issue yields vs. explanatory variables

Notes: Sample countries, years and variables as defined in text and Tables A1-A2 in Appendix. All explanatory variables are one-year lagged. Grey dots are data points for Ghana and Mozambique. Full lines represent best linear fit for whole sample, dashed lines for sample excluding Ghana and Mozambique.

FIGURE A4. LCBM capitalization vs. average tenors vs. average issue yields

Notes: Sample countries, years and variables as defined in text and Tables A1-A2 in Appendix. Variables on x-axis are one-year lagged. Grey dots are data points for South Africa and Mauritius in panel (a); for Ghana, Mozambique, South Africa and Mauritius in panel (b); and for Ghana, Mozambique and South Africa in panel (c). Full lines represent best linear fit for whole sample. Dashed lines represent best linear fit for sample excluding data points in grey.