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Florence Dafe
Dennis Essers
Ulrich Volz

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Department of Economics
SOAS University of London
Thornhaugh Street, Russell Square, London WC1H 0XG, UK
Phone: + 44 (0)20 7898 4730
Fax: + 44 (0)20 7898 4759
E-mail: economics@soas.ac.uk
http://www.soas.ac.uk/economics/

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

Florence Dafe[*]
Dennis Essers[†]
Ulrich Volz[‡]

Abstract

This paper analyses the development of local currency sovereign bond markets (LCBMs), a potentially important but often overlooked source of longer-term public finance, in Sub-Saharan Africa (SSA). We construct a novel dataset comprising 28 SSA countries for the period 2000-2014 to identify the main correlates of LCBM capitalization, of local currency bond (LCB) tenors and of LCB issue yields. Our econometric analysis is complemented by case studies of Ghana, Kenya and Nigeria, where we further investigate the drivers of LCBM development and place LCBMs in a broader public debt context. We find that LCBMs have become important sources of financing in SSA but that new vulnerabilities emerge from the costs of domestic borrowing, short bond tenors and the composition of the investor base.

Keywords: Public debt; local currency bond markets; long-term finance; Sub-Saharan Africa.

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

[*] City, University of London and German Development Institute. Address for correspondence: Department of International Politics, City, University of London. Northampton Square, London EC1V 0HB, UK. Tel: +44 207 0400 466. Email: florence.dafe@city.ac.uk

[†] University of Antwerp. Address for correspondence: Institute of Development Policy and Management (IOB), University of Antwerp, Lange Sint-Annastraat 7S.S.119, 2000 Antwerp, Belgium. Tel. +32 655935. Email: dennis.essers@uantwerpen.be

[‡] SOAS University of London and German Development Institute. Address for correspondence: Department of Economics, SOAS University of London. Russell Square, London WC1H 0XG, UK. Tel: +44 207 898 4721. Email: uv1@soas.ac.uk

1. Introduction

The public debt situation of Sub-Saharan Africa (SSA) has undergone profound changes over the last decade. Thanks to vast debt relief under the Heavily Indebted Poor Country (HIPC) initiative and its successor, the Multilateral Debt relief Initiative (MDRI), many SSA countries were given a 'clean slate' (Cassimon et al., 2015; Merotto et al., 2015). Indeed, in the average SSA HIPC the public debt-to-GDP ratio came down from over 100% before debt relief to below 30% just after HIPC/MDRI completion. To address large infrastructure and other needs, SSA governments have accumulated new debt. Until recently, the rise in SSA public debt-to-GDP ratios was mostly moderate, helped by rapid growth, high commodity prices and large non-debt (FDI) inflows; apart from a few cases of explosive debt dynamics (Battaile et al., 2015). More important than 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 than before (Prizzon and Mustapha, 2014). In the academic and policy literature, as in the financial press, most attention has gone to the large US dollar-denominated bonds that SSA governments have issued in international markets in recent years (see for instance Mecagni et al., 2014; Adams, 2015; Gueye and Sy, 2015; 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 market economies in other regions, be it with a considerable lag (Didier and Schmukler, 2014).

In this paper, we aim to shed light on the factors driving the development of local currency sovereign bond markets (LCBMs) in SSA. To this end we construct a novel dataset comprising 28 SSA countries for the period 2000-2014, which allows us to identify 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 three countries with relatively large, yet heterogeneous LCBMs, i.e., Ghana, Kenya and Nigeria. For these countries we investigate in more detail LCBM development and its drivers, and place LCBMs in a broader public debt context.

Our paper contributes to the understanding of SSA LCBM development, first of all, by extending prior studies on LCBM capitalization (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. To preview our main conclusions, panel regressions indicate that democracy and institutional quality relate positively to LCBM capitalization, most likely because of the confidence they instill in investors. We further find positive correlations of LCBM capitalization with banking sector size, proxied by private sector credit, and a broader index of financial development, suggesting that LCBMs and other segments of the financial sector are complements rather than substitutes. Banking sector size and overall financial development are also positively correlated with average LCB tenors, at least in most of our specifications. We observe a positive link between democracy and LCB tenors, again hinting at the importance of government credibility, which may be particularly important for

investments in longer-term securities. Likewise, high inflation, found to be negatively correlated 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 (i.e., GDP per capita), banking sector size and overall financial development, as well as with past fiscal balances, which may reflect investor confidence in governments' ability to repay. As expected, the association of LCB issue yields with past inflation is strongly positive. By and large, these key findings are confirmed in our country case studies of Ghana, Kenya and Nigeria.

The remainder of this paper is structured 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 the LCBM and broader public debt dynamics of SSA countries with case studies from Ghana, Kenya and Nigeria. Section 5 concludes.

2. Public debt and local currency bond market development in SSA

Academic and policy debates on debt dynamics in SSA have tended to focus on the external side of public debt. While external debt levels indeed deserve attention, not the least because of the associated currency risks and their central role during SSA debt crises in the past, the focus on external debt is too narrow. As explained in the introduction, next to major changes in (external) public debt levels, there have also been shifts in the composition of public debt in SSA. SSA public debt is increasingly owed to the private sector and, in most countries, to domestic investors. Both trends are epitomised by the growing reliance of governments on borrowing through LCBMs. This section provides a short overview of these interrelated trends and situates the rise of LCBMs within the broader SSA public debt landscape.

2.1 Tapping private sources of financing

Since the mid-2000s, the role of private as opposed to official creditors (like the World Bank, African Development Bank, IMF and bilateral donors), has increased in SSA. In particular, several SSA governments have issued US dollar-denominated bonds in international capital markets since 2006. Excluding South Africa, which issued international bonds regularly even before 2006 and has continued to do so thereafter, no less than 16 SSA sovereigns have tapped international bond markets so far, most of them for the first time ever.[1] According to figures obtained from Thomson Reuters Datastream, taken together these countries raised about US$ 29 billion through 35 international issuances between September 2006 and September 2016. Initially, issuance was spurred by lower debt burdens and rapid growth in many SSA countries, 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.

[1] These countries are Angola, Cameroon, the Republic of Congo, Côte d'Ivoire, Ethiopia, Gabon, Ghana, Kenya, Mozambique, Namibia, Nigeria, Rwanda, Senegal, Seychelles, Tanzania and Zambia.

In addition, SSA governments have begun to raise private financing in *local currency* from *domestic* capital markets. As Figure 1 shows, most SSA LCBMs have grown relative to GDP since 2000, with renewed momentum from 2009 onwards. Evaluated over 2000-2014 the largest LCBMs in SSA could be found in South Africa (31% of GDP on average), followed by island states Mauritius (20%) and Cabo Verde (16%), Kenya (11%), Ghana (10%) and Namibia (10%). The (unweighted) 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 3.2 for more details on our dataset).

While domestic commercial banks continue to be the dominant investors in LCBs in most SSA countries (Essers et al., 2016), several governments have made strides in attracting other domestic private investors too, especially non-bank institutional investors such as local pension and insurance funds, as well as foreign private investors. In Nigeria, for instance, foreign investors' share in the primary market for sovereign LCBs increased considerably, from less than 1% in 2011 to 10.5% in 2012, due to the inclusion of these bonds in international benchmark indices (African Financial Markets Initiative, 2016d).[2]

[Figure 1 about here]

Of course, to a large extent, SSA's greater reliance on private investors reflects changes in donor policies, most notably large debt relief initiatives (cf. Introduction) and a general shift from loans to grants by donor institutions in the wake of debt relief (Cassimon et al., 2015), both reducing publicly held debt. But that is only part of the story. Several SSA countries have made deliberate efforts to scale up private borrowing so as to reduce their reliance on donors, and the influence these have on domestic policy through the conditionality attached to their support. For example, Cassimon et al. (2016) find that international bond issuance in Rwanda may have been motivated, in part, by the desire of Rwandan authorities to reduce interference of international donors in domestic policy. In addition, reliance on private sources of government borrowing has increased in response to pressures from the IMF and others to reduce central bank lending to the government, in an attempt to increase central bank independence and fight inflation (Brownbridge et al., 1998; Jácome et al., 2012).

2.2 Domestic borrowing

The efforts of SSA authorities in promoting LCBM development also reflect a broader trend of debt 'domestication', in line with the experiences of emerging market 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

[2] See section 4.3 on Nigeria's LCBM.

of total public debt in 2013. In 11 of these 31 countries, obligations to domestic creditors amounted to 40% or more of public debt (see Figure 2).[3]

[Figure 2 about here]

While domestic public borrowing can take various forms, domestic capital markets are generally considered the cornerstone. Historically, however, SSA countries, much like developing countries in general, faced significant challenges in borrowing in local currency at longer maturities (and at reasonable cost), a phenomenon known as original sin (Eichengreen and Hausmann, 1999). Even now, developing countries with access to international capital markets tend to face difficult trade-offs. International borrowing in foreign currency tends to be cheaper, in nominal terms, than borrowing in local currency in domestic markets. In the latter case investors require additional compensation for currency risks, higher (expected) inflation, and risks related to changing local taxation/regulation and financial market frictions, including illiquidity (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 will have to be refinanced more frequently and possibly at a higher rate (Blommestein and Horman, 2007; Panizza, 2010). For instance, between 2007 and 2014 Ghana issued three Eurobonds with tenors between 10 and 12 years, whereas the average tenor of its LCBs at issuance was about two years only (Olabisi and Stein, 2015; African Financial Markets Initiative, 2016a). With the deepening of LCBMs, however, maturities of domestic public debt are slowly lengthening, even though the costs of domestic borrowing remain relatively high for most SSA countries. Again in Ghana, average LCB issue yields stood at no less than 23% in 2014.

Why then, given the comparatively high costs and rollover risks of domestic borrowing, have governments of SSA countries increased their reliance on domestic creditors? The literature suggests at least three factors underlying the trend towards domestic debt in general and borrowing from LCBMs in particular. First, tightening external financing conditions during the global financial crisis might have played a role, as the increase in borrowing from domestic financial markets following the global financial crisis suggests (Battaile et al., 2015). Second, both policymakers across SSA and international financial institutions increasingly see the development of domestic capital markets, notably LCBMs, as a key strategy to mitigate currency mismatches arising from external borrowing while meeting significant longer-term financing needs (IMF et al., 2013; Berensmann et al., 2015; Cassimon et al., 2016). Third, international financial institutions have actively promoted the development of LCBMs, aimed at enhancing both domestic and international financial stability (Rethel, 2010; IMF et al., 2013).

[3] In some of the countries in Figure 2 where the share of domestic public debt has come down between 2007 and 2014, such as Ghana and Zambia, this was due to the issuance of several large, US dollar-denominated international bonds.

Overall, however, the causes and consequences of the shift towards domestic borrowing in SSA (and developing countries more generally) have been under-researched. The limited attention in the academic and policy literature has two main reasons. First, until recently, the availability of good-quality data on domestic debt in SSA was very limited. Second, the vulnerabilities associated with foreign currency denominated debt are often seen as more significant because central banks in developing countries cannot print the hard currency necessary to repay such debt.

This is not to say that the growing importance of LCBMs has not been recognized. Reinhart and Rogoff (2009), who analyse 800 years of financial crises around the world, emphasise the need for research on the dynamics of domestic public debt. Likewise, Panizza (2010),who examines the increasing reliance on domestic, local currency-denominated debt in developing countries, highlights the need for better monitoring domestic debt to address emerging vulnerabilities. Rethel (2012) makes a plea to pay greater attention to the political and normative implications of the shift towards domestic debt in emerging economies. Bua et al. (2014) zoom in on the characteristics of domestic public debt in low-income countries in particular, including several African countries in their analysis. And Ncube and Brixiová (2015) examine the post-debt-relief sustainability of public debt in SSA. The studies closest related to the current paper are Mu et al. (2013), Berensmann et al. (2015) and Essers et al. (2016), who investigate the determinants of LCBM capitalization in SSA econometrically.

Still, much of the existing literature on public debt in SSA tends to focus on external borrowing, and the economic vulnerabilities it may create. The few studies devoted to sovereign borrowing in domestic financial markets in SSA provide no systematic analysis of LCBMs. Indeed, characteristics of SSA LCBMs such as average maturities, bond yields and investor classes, and their implications for the borrowing governments are hardly addressed. Our econometric analysis and country case studies seek to fill this gap.

3. Regression analysis of local currency bond market capitalization, bond tenors and issue yields

3.1 Model specification

To look deeper into the correlates of LCBM development in SSA we estimate three series of reduced-form panel data models:

$$TBGDP_{it} = \alpha_1 + \beta_1 X_{i,t-1} + \delta_1 FINDEV_{i,t-1} + \gamma_1 \mu_i + \varphi_1 \pi_t + \varepsilon_{1it} \quad (1)$$

$$TBTEN_{it} = \alpha_2 + \beta_2 X_{i,t-1} + \delta_2 FINDEV_{i,t-1} + \gamma_2 \mu_i + \varphi_2 \pi_t + \varepsilon_{2it} \quad (2)$$

$$TBYLD_{it} = \alpha_3 + \beta_3 X_{i,t-1} + \delta_3 FINDEV_{i,t-1} + \gamma_3 \mu_i + \varphi_3 \pi_t + \varepsilon_{3it}, \quad (3)$$

where $TBGDP_{it}$, $TBTEN_{it}$ and $TBYLD_{it}$ are different proxies of LCBM development and our dependent variables of interest: LCBM capitalization as a percentage of GDP, average tenors of LCBs, and average issue yields of LCBs, respectively; $X_{i,t-1}$ is a vector of one-year lagged explanatory variables derived from the literature and further described below; $FINDEV_{i,t-1}$ is a measure of financial development, for which we use various alternatives; μ_i are country-

specific effects; π_t is a global factor common to all countries; and ε_{1it}, ε_{2it}, ε_{3it} are the error terms.

We estimate equations (1), (2) and (3) independently from each other using either simple pooled ordinary least squares (POLS, where γ_1, γ_2 or γ_3 are assumed to be zero) or the fixed effects (FE) estimator. 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; the latter being the dominant source of variation in all three dependent and most independent variables. 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 reverse causality or other 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 the relevant studies on LCBM development in SSA (Mu et al., 2013; Berensmann et al., 2015; Essers et al., 2016) and in 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 by extending prior studies with an inquiry into the covariates of LCB tenors and issue yields and by considering a wider range of financial development measures as regressors.

3.2 Data description

Our three dependent variables are constructed from the African Financial Markets Initiative (AFMI)'s (2016) 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 (African Financial Markets Initiative, 2016a). LCB data in the AFMD is typically based on auction results and official reports. Security-level information is validated, cross-checked and harmonised between countries by the African Development Bank's statistics department and an AFMI team before being aggregated into yearly country-level data. We focus here on local currency Treasury bonds with an original maturity of one year or longer, all of which have been issued in the domestic market. 'LCBM capitalization' is defined as the total amount of 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 the size of each individual bond; and 'average issue yield of LCBs' is the weighted average yield at issuance of all LCBs issued over the year expressed in annual percentages.[4]

Currently the AFMD has information on the LCBM capitalization and average bond tenors of 28 SSA countries over a maximum period of 15 years, 2000-2014, although with uneven coverage. Due to missing values we have 282 and 261 observations in our capitalization and

[4] Ideally we would have studied the yields of outstanding LCBs as quoted on secondary markets. LCBMs are however highly illiquid in most SSA countries and secondary market quotes are not readily available.

bond tenor samples, respectively. The AFMD sample of average issue yields is limited to an unbalanced panel of 14 SSA countries over 2000-2014, good for 128 observations in total. Table A1 in Appendix provides details on the country-year sample for each of the three dependent variables. Table A2 presents the descriptive statistics of these variables. Between-country variation is clearly larger than within-country variation.

For our independent 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) on LCBM capitalization: log GDP and log GDP per capita; the three-year moving average of the fiscal balance to GDP; log inflation; the Chinn-Ito index of capital account openness; a dummy for British legal origins; and composite measures of democracy (from the Polity IV database) and institutional quality (from the World Governance Indicators).[5] Because of the likely importance of broader financial sector 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 that also features in Mu et al. (2013), Berensmann et al. (2015) and Essers et al. (2016). Local banks often serve as primary dealers and market makers in SSA LCBMs and, in most countries, are also important LCB investors. Second, we make use of a novel 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.[6] 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 (as a share of the total number of banks). The Chicago Board Options Exchange (CBOE) Volatility Index or VIX, a forward-looking measure of global financial market uncertainty, is taken as our baseline common global factor. Table A2 in Appendix shows the descriptive statistics of the just-described explanatory variables. Again, between-country variation trumps within-country variation in most variables, with the exception of inflation and fiscal balances.

Figures A1, A2 and A3 in Appendix bring together a series of graphs where each of the three dependent variables is plotted against individual explanatory variables. These scatter plots suggest LCBM capitalization is positively associated with log GDP, log 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 South Africa and Mauritius, which have the most-capitalized LCBMs in relative terms, are excluded from the sample. Similarly, we observe positive relations between average LCB tenors on the one hand, and log GDP per capita, democracy, institutional quality and financial development on the other hand (Figure A2). Only log inflation exhibits a strong negative correlation with average LCB tenors. Excluding outlier South Africa does not seem to alter these relations.

[5] See Mu et al. (2013), Berensmann et al. (2015) and Essers et al. (2016) for the rationale behind including each of these variables.

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

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

3.3 Baseline results and discussion

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, mimicking the results of Berensmann et al. (2015) and Essers et al. (2016). 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 when government policy is credible and when a good institutional framework is in place. LCBM capitalization is also higher in larger, more developed SSA economies with a more open capital account. These relations do not seem particularly robust, however.

[Table 1 about here]

We observe highly significant positive correlations with banking sector size (as proxied by private sector credit) and broader financial development, suggesting LCBMs and other segments of the financial sector are typically complements rather than substitutes in SSA. In addition, banking sector concentration (as measured by the asset share of the three largest banks) 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 large 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 by the government to buy its LCBs.

As expected, it is much harder to find significant results in the FE estimates, which focus exclusively on the limited within-country variation in our sample.[7] That said, we still find a significantly positive association between institutional quality and LCBM capitalization.

[7] Hausman-type overidentification tests strongly reject the null of country effects being uncorrelated with the specifications' regressors, indicating a preference for the FE estimator over the random effects (RE) estimator from a consistency perspective.

Moreover, the coefficients of the different financial sector variables have the same sign and are of a similar magnitude as when estimated by POLS. The VIX has a negative coefficient which borders on significance, suggesting that global market uncertainty may hamper LCBM capitalization.

Table 2 gives the estimation results for Equation (2). When estimated using POLS, the strongest results are observed for banking sector and broader financial development, both of which are positively correlated with average LCB tenors. This seems to be in line with our findings from Table 1. Also the democracy coefficient is again positive and significant. Government credibility may be especially important to ease the minds of investors in longer-term securities. Likewise, high inflation renders longer-term fixed-income investment less attractive. Maybe somewhat surprisingly, a higher VIX is seemingly associated with longer average LCB tenors. One explanation is that in times of greater global market uncertainty long-term external finance is harder to come by for SSA sovereigns and a relative increase in longer-tenor LCBs needs to make up for that. An alternative explanation is that international investors are more willing to take risks in 'frontier markets' when risks rise globally, leading to greater international appetite for longer-tenor LCBs in SSA. Such speculative hypotheses require further research, however. In column (7) of Table 2 we replace our financial development measures with LCBM capitalization. The association with LCB tenors is positive (cf. Figure A.4 in Appendix) but not significant in the presence of our other regressors.

[Table 2 about here]

Turning to the FE regressions for LCB tenors we find very few significant results, apart from the seemingly counterintuitive positive correlation with VIX and a correlation with economic size. Another, notable exception is the highly significant *negative* association between LCBM capitalization and average tenors. This suggests that within one and the same 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). In line with expectations 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 very 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 may be the result of a close relation or even collusion between governments and a few dominant banks in some SSA countries. Moreover, when the banking sector is less concentrated and more competitive, banks may be more engaged in corporate financing, which then provides an alternative to investing in government bonds; lower demand for the latter pushes up yields.The positive coefficient for institutional quality seems counterintuitive. A higher share of foreign banks is associated with higher yields, as foreign banks may need to be compensated more to invest in local currency assets than local banks (which are often naturally hedged because of their local currency liabilities). This sits well with our interpretation of the results in Table 1. Longer LCB tenors

again seem to go hand in hand with lower yields (see Figure A4 in Appendix and Bua et al., 2014).

[Table 3 about here]

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

3.4 Robustness[8]

We test the robustness of our baseline results in several ways, including by augmenting the POLS and FE specifications in Tables 1, 2 and 3 with other variables that may matter for LCBM capitalization, LCB tenors and/or LCB issue yields.

In columns (1) and (2) of Table 4 we re-estimate the baseline specifications of columns (3) and (4) of Table 1 without South Africa and Mauritius, the two countries with the most-capitalized LCBMs. As in Table 1, we find clear positive correlations of LCBM capitalization with private sector credit and broader financial development, and a negative association with the fiscal balance (in POLS regressions). The positive links with democracy and institutional quality are again most visible in POLS and FE regressions, respectively. Next, in column (3) of Table 4 we replace the overall financial development index with its sub-indices for financial institutions and financial markets. Whereas the coefficients of both sub-indices are positive, those of the former are statistically more significant, indicating once more the importance of banks for LCBMs.[9] Inflation volatility, calculated as the yearly standard deviation of monthly inflation rates, seems to hamper LCBM capitalization (column (4)), as expected. Real exchange rate volatility, i.e., the yearly standard deviation of first differences in log monthly real exchange rates (a proxy of unanticipated deviations from a constant trend), also has a significant negative coefficient, but only when estimated using POLS (column (5)). Inclusion of those extra variables does not alter the conclusions of our baseline models. In unreported regressions we experimented with substituting the baseline VIX by other common factors, such as international commodity price indices, global liquidity (proxied by international bank claims or total credit in US dollar, euro and yen; see BIS, 2016) or the US Effective Federal Funds rate. Very similar results as in the baseline regressions were obtained. Replacing the VIX with year dummies has little effect on the POLS estimations but renders the coefficient of the financial development index insignificant in the FE model, most probably by removing even more of the already limited variation

[8] To save space, we do not report all robustness results discussed in this section. All unreported results are, however, available upon request.

[9] The financial institutions sub-index is dominated by variables measuring the depth, access to, and efficiency of countries' banking sector. The financial markets sub-index covers stock market variables as well as the international issuance of debt securities by governments and total debt issuance by corporations (see Svirydzenka, 2016).

(column (6)). In column (7) we test the substitutability between LCBs and different forms of *external* public debt, i.e., outstanding loans from official (multilateral and bilateral) creditors, outstanding international bonds, and outstanding loans from non-resident commercial banks and other private creditors (all expressed as percentages of GDP and constructed from the World Bank's International Debt Statistics). Interestingly, the only significant substitution we find, at least in the POLS regression, is between (domestic) LCBs and internationally issued foreign currency bonds. Net official development aid (ODA) disbursements have a weak positive correlation with LCBM capitalization (results not shown). Adding dummies for the years following countries' graduation from the HIPC initiative and Nigeria's large Paris Club deal in 2005 indicates there is no direct link between debt relief and LCBM development, in line with the results of Essers et al. (2016).[10]

[Table 4 about here]

Table 5 collects the robustness results for our average LCB tenor regressions. In columns (1) and (2) (which mirror columns (3) and (4) of Table 2) we exclude outlier South Africa from our baseline sample. As before, democracy is significantly associated with longer average tenors, while the association with inflation is negative, at least in the POLS regressions. Banking sector and broader financial development remain positively related with tenors in the POLS models but their coefficients lose statistical significance. Somewhat surprisingly, the negative associations between our financial development measures and average tenors in the baseline FE models become statistically significant once South Africa is dropped. A possible (but maybe not entirely satisfactory) explanation are crowding out effects, i.e., when banks increase their lending to the private sector they may cut back on their longer-term lending to the government (more so than on their shorter-term lending). But this would only explain the negative within-country association between average tenors and private sector credit, not between tenors and broader financial development.

[Table 5 about here]

We again observe positive associations with the VIX (in the POLS and FE models) and with the size of the economy (in the FE models). A split of overall financial development into separate indices for financial institutions and markets in column (3) of Table 5 points to the particular relevance of the former in the POLS regression, similarly as in Table 4. Inflation volatility is linked negatively to average LCB tenors, as it creates uncertainty for longer-term investment in fixed-income assets (column (4)). We find a positive link between exchange

[10] Of the 27 countries included in our baseline regressions no less than 17 received debt relief under the HIPC initiative and subsequent MDRI. All but one (Chad) reached their HIPC completion point during the sample period: Uganda (2000), Mozambique (2001), Tanzania (2001), Burkina Faso (2002), Benin (2003), Mali (2003), Ghana (2004), Niger (2004), Senegal (2004), Rwanda (2005), Cameroon (2006), Malawi (2006), The Gambia (2007), Burundi (2009), Togo (2010) and Cote d'Ivoire (2012). Ideally, we would use present value measures of HIPC and other debt relief, rather than dummies, to account for the concessionality of the original debt being forgiven/restructured (and for the concessionality of the debt relief operation itself). Present value estimates of debt relief have been constructed by Depetris Chauvin and Kraay (2005) but, to our knowledge, have not been updated beyond 2003.

rate volatility and LCB tenors in the POLS variant of the model (column (5)), which is probably spurious; flexible exchange rates coexist with relatively long LCB tenors in countries such as South Africa and Namibia, without there being a clear causal relation. Experimentation with global variables other than the VIX leaves the baseline results qualitatively unchanged (results not shown). Introducing year dummies again has only a limited effect on the POLS estimations (column (6)). In column (7) we use insurance company assets scaled to GDP instead of the broad financial development index, as a proxy for the size of the domestic non-bank institutional investor base. While this reduces our sample considerably, we do find a highly significant positive correlation between the size of a country's insurance sector and average LCB tenors in the POLS estimation, even when excluding outlier South Africa.[11] We cannot confirm this positive association in the FE model, however, which may be due to the very limited within-country variation in insurance fund assets.

Finally, we also subject our baseline estimates for the correlates of average LCB issue yields to a set of robustness tests. Columns (1) and (2) of Table 6 show that excluding high-yield Ghana and Mozambique from our sample leaves intact most of the conclusions we drew from Table 3: average issue yields are correlated positively with inflation, GDP and institutional quality, and negatively with GDP per capita, private sector credit and overall financial development (although the coefficient of that last variable is no longer statistically significant). In addition, both in the POLS and FE models the democracy coefficient turns negative and statistically significant. In line with the robustness results in Tables 4 and 5, column (3) of Table 6 suggests the financial institutions dimension of overall financial development matters most for LCBM development (here: lower issue yields). Inflation and exchange rate volatility are positively linked to LCB issue yields, the former significantly so (columns (4) and (5)). Adding these variables to the model does not influence the other estimated coefficients much; neither does the replacement of the VIX with commodity price indices, global liquidity or the Fed Funds rate (results not shown). The inclusion of year dummies in column (6) has little effect on the POLS regression but makes that the financial development coefficient is very imprecisely estimated and hence no longer significant in the FE model. Lastly, we find a highly significant positive association between the average LCB issue yield and the central bank's policy rate, the key reference rate in the domestic economy (column (7)).[12]

[Table 6 about here]

4. Country case studies

What new possibilities does the deepening of LCBMs open up in SSA and what new constraints does it impose? On the one hand, vulnerability to external financial and economic shocks is likely to decline if the deepening of LCBMs reduces currency mismatches and the

[11] Due to data gaps for our sample, it was not feasible to include pension fund assets in the estimations.
[12] We estimate the model in column (7) without log inflation because of its strong collinearity with the policy rate. When both variables are included the inflation coefficient loses its significance.

dependence on external finance more generally. It should be noted, however, that LCBMs may still be a transmitter of international financial contagion if a high share of LCBs is held by international investors. Furthermore, a greater reliance on domestic capital is likely to reduce governments' exposure to the demands of international donors and financial institutions. On the other hand, new vulnerabilities may emerge if LCBM development is associated with a high concentration of local sovereign bond holdings in the domestic banking sector. In most SSA countries, commercial banks are the dominant holders of sovereign bonds and, as a result, a deepening of LCBMs usually goes hand in hand with increasing interdependence between the state and commercial banks. When there is a greater risk of a sovereign debt crisis, the likelihood of a domestic banking crisis increases and vice versa, a phenomenon often referred to as the sovereign-bank 'doom loop' (e.g., Farhi and Tirole, 2016). To address this problem, a broadening of the investor base is crucial.

The remainder of this section will illustrate these points with brief case studies from Ghana, Kenya and Nigeria. They have been selected from our SSA sample as countries with a LCBM that has become large enough to affect the wider economy and the governments' policy space. Moreover, these three countries vary across different dimensions, most importantly their reliance on external financing and the composition of the investor base of domestic debt.

4.1 Ghana

The composition of Ghana's public debt has changed markedly since the 2000s. In 2005, external debt constituted a major component of Ghana's public debt, amounting to 76% of the total (MOFEP, 2010). In 2014, external debt constituted still the majority of total debt but the domestic debt share amounted to 44% (MOFEP, 2016). The rise in the share of domestic debt reflects two developments. First, external debt declined significantly in 2006 in absolute terms, notably because of Ghana's participation in multilateral debt relief. While Ghana issued large Eurobonds in 2007, 2013, 2014, 2015 and 2016, the proportion of external debt has only increased gradually since debt relief. Second, domestic borrowing has increased significantly from the second half of the 2000s onwards (UNCTAD, 2016). Especially in recent years, Ghana's government has faced large gross financing needs induced by weakening economic performance and compounded by the sharp drop in oil and other commodity prices and by power shortages.

Before the mid-2000s, the government's domestic borrowing in local currency was mainly short-term, especially through Treasury bills. However, from the late 2000s onwards, the government was able to lengthen maturities and to rely more on LCBs (African Financial Markets Initiative, 2016b; UNCTAD, 2016). At end-2012, Treasury bonds with a maturity of one year or more represented 62% of the total domestic debt stock (African Financial Markets Initiative, 2016b). LCBM capitalization amounted on average to 11% of GDP between 2005 and 2014. While Ghana's weakly developed banking sector was not conducive to bond market development, Ghana had high rates of economic growth over the past decade, averaging 9% between 2008 and 2013. Moreover, Ghana scores high with respect to institutional quality, epitomised by relatively efficient public institutions and political

stability, which our empirical analysis confirms to be one of the key correlates of LCBM development.

That said, Ghana's government has had problems in lengthening maturities. The average tenor of its LCBs at issuance was only about two years between 2007 and 2014. Half of the outstanding treasury bonds (52%) had a maturity of three years. Only in 2013, the Ghanaian government was able to issue its first seven-year LCB, followed by a 10-year LCB in November 2016, the longest tenor issued so far.

Another challenge is the cost of domestic borrowing. The government has been increasingly able to meet its financing needs through the issuance of LCBs, even though fiscal deficits rose in recent years. To compensate for a greater perceived risk of fiscal unsustainability, however, investors have demanded greater returns on their LCBs. Between 2005 and 2014, average issue yields in Ghana have been around six percentage points higher than in Nigeria and Kenya, for instance, even though average maturities have been considerably shorter (African Financial Markets Initiative, 2016a).

Vulnerabilities in Ghana not only emerge from the costs of domestic borrowing and associated rollover risks but also from the fact that LCBs are mainly held by Ghana's commercial banks. If the Ghanaian government encounters problems in servicing its debt, the stability of the banking sector will also be affected. Greater interdependencies might also have another negative effect, namely weaker enforcement of prudential banking regulation. In the past, Ghana's government was hesitant to employ disciplinary measures against Ghanaian banks which experienced financial distress because they held a high portion of government paper (IMF, 2003). Incentives for regulatory forbearance are likely to increase as the government seeks to expand its medium and long-term borrowing from LCBMs.

That said, Ghana's reliance on LCBMs may also enhance the country's policy space, in at least two ways. First, the combined effect of a still largely domestic investor base and the interdependence between the government and banking sector may lower the risk that investors exit the market when the government's default risk rises in response to economic shocks (Hardie, 2011). Reliance on local capital may thus reduce the vulnerability to the vagaries of financial markets because local capital tends to be more concerned about the longer-term performance and thus more patient than foreign capital. Second, Ghana might be able to enhance its policy autonomy vis-à-vis international donors by further reducing aid dependence. The IMF's seal of approval of Ghana's economic policies is likely to remain important to enhance investor confidence. Yet significant demand for Ghanaian sovereign bonds, both in local and foreign currencies as evident in oversubscriptions of bonds, enhances the government's bargaining power vis-à-vis donors and international financial institutions (Dontoh and Wallace, 2016).

4.2 Kenya

Kenya's LCBM is much more developed than Ghana's, both with respect to size and maturity. Between 2005 and 2014 local currency Treasury bonds outstanding amounted on average to 13% of GDP in Kenya (African Financial Markets Initiative, 2016a). For

comparison, in our 28-country sample only Cabo Verde, Mauritius and South Africa had a higher average LCBM capitalization during the same period, highlighting the great strides that Kenyan authorities have made. The Kenyan government has also been successful in lengthening the tenors of the LCBs it issues. While the ratio of Treasury bills to bonds stood at 73 to 27 in 2001 it stood at 26 to 74 in 2014 (African Financial Markets Initiative, 2014). In 2008, the Central Bank of Kenya (CBK) issued the first LCB with 20-year maturity. This was followed by successful issuance of a 25-year LCB in 2010 and a 30-year 'savings development bond'" to promote private saving in 2011 (Ndung'u, 2011: 1). In 2015, LCBs accounted for 73% of all domestic debt (Republic of Kenya, 2015: 8). The average tenor of outstanding LCBs was about 10 years between 2005 and 2014.

In addition, Kenya has a more diversified investor base for LCBs than most other SSA countries. While non-resident investors play a negligible role in domestic debt markets, holding only about 1% of domestic debt in 2014, resident investors cover a variety of sectors. Commercial banks hold about 48% of LCBs, the insurance sector holds 11%, and 38% is held by other investors, notably pension funds, which are required to invest up to 70% of their assets in government securities (African Financial Markets Initiative, 2016c). Kenyan authorities have also sought to increase participation from the domestic retail sector through several measures. For instance, in 2009 the CBK reduced the minimum amounts required for investments in Treasury bills and bonds from KES 1 million to KES 100,000 and KES 50,000, respectively (UNCTAD, 2016: 74). In addition, the government has sought to encourage retail participation, by means of education initiatives and the development of an mobile phone application, Treasury Mobile Direct, to facilitate mobile phone-based investments and ease redemption of maturing debt.[13]

What explains Kenya's relative success in LCBM development? It is probably of no small importance that Kenya's economy has several features which our analysis has identified as key factors associated with a greater capitalization of LCBMs. Specifically, Kenya has a comparatively well-developed banking sector, which is comprised mostly of privately owned domestic banks. Moreover, its banking sector is among the most competitive in SSA, with the assets of the three major banks averaging around 44% of total commercial banking assets between 2005 and 2014. Equally important for the development of Kenya's LCBMs was political initiative. Kenya's government had a thorny relationship with bilateral donors, the World Bank and the IMF throughout the 1990s because these external actors withheld financial assistance out of concerns about the quality of governance, especially in relation to corruption, despite the slow but steady progress the Kenyan government made in improving macroeconomic stability (Grosh and Orvis, 1996; Throup and Hornsby, 1998; IMF, 2008). Finding the route to official borrowing relatively closed and lacking access to financing from international capital markets due to Kenya's perceived high risk of default, Kenya's government began to rely heavily on domestic rather than external borrowing from the late 1990s onwards.

[13] However, the launch of Kenya's maiden KES 5 billion mobile-phone-only bond, the so-called M-Akiba bond, originally planned for October 2015, has been postponed several times, mainly due to high and volatile interest rates.

To facilitate domestic borrowing and improve the sustainability of public debt, the government stepped up efforts to develop LCBMs, as epitomised by the Market Leaders Forum. The government established this forum in 2001 for consultation and exchange among LCBM participants, notably the CBK, commercial banks, fund managers, the National Treasury, diaspora representatives, insurance companies and investment banks (Ndung'u, 2011; African Financial Markets Initiative, 2016c). The forum's initial objective was to lengthen the tenors of LCBs. Yet over the years it has also served to discuss other LCBM goals of the government such as the development of the secondary market and a diversification of the investor base.

While Kenya's LCBM is relatively dynamic, the government has limited some of the vulnerabilities that may arise from borrowing from LCBMs. In particular, the Kenyan government has developed a strong revenue base with the ratio of taxes to GDP averaging around 15% between 2010 and 2012, which is significantly higher than the average for SSA (World Bank, 2016). Kenya has also reduced rollover risks by lengthening maturity profiles. In addition, yields are significantly lower than in Ghana, enhancing the sustainability of Kenya's debt. While it is difficult to pin down the exact reasons for lower issue yields, it is again notable that Kenya possesses several of the features which our analysis identified as important correlates of lower borrowing costs, including a reasonable level of inflation, averaging 8% between 2005 and 2014; comparatively high institutional quality, around the median in our sample between 2005 and 2014; a relatively well-developed banking sector with private credit to GDP averaging 29% between 2005 and 2014; and a comparatively low share of foreign bank ownership, averaging 29% between 2005 and 2013, which is below the mean and median in our sample.

The development of Kenya's LCBM has also widened the government's policy room. In particular, the ability to rely on domestic long-term financing through LCBMs has allowed the government to finance infrastructure projects, an area in which many SSA countries face resource mobilization challenges. For example, between 2009 and 2014, the Kenyan government issued six LCBs targeted explicitly to infrastructure development. The reliance on domestic financing provides the government with funds over which it has significant discretion and reduces pressures to take into account the reactions of international financial markets or donors in choosing policies.

This is not to say that the government is freed from pressures to maintain fiscal discipline. Kenya's investor base is quite diverse, introducing an element of competition in the LCBM and aiding liquidity in the secondary market. As long as there remain other options besides LCBs for domestic investors, greater competition in the LCBM is likely to result in greater responsiveness of domestic investors to changes in the government's perceived creditworthiness. If only a few dominant domestic banks held a significant portion of government securities, in contrast, each one would be affected significantly by a drop in prices, lowering the incentives to sell bonds quickly when the government's perceived creditworthiness declines. Moreover, pressure to maintain fiscal discipline arises from Kenya's vulnerability to economic, political and environmental shocks. Kenya's economy has large agricultural and tourism sectors and is export-oriented, which means that it is

vulnerable to shocks arising from drought, terrorism and declines in export demand. Adverse shocks may quickly impair its ability to service external as well as domestic debt.

4.3 Nigeria

In relative terms, Nigeria's LCBM is smaller than the markets in Kenya and Ghana, with LCBs outstanding averaging 6% of GDP between 2005 and 2014 (African Financial Markets Initiative, 2016a). In absolute terms, however, it is much larger. Between 2010 and 2014, LCBs outstanding amounted to roughly to US$ 28 billion in Nigeria, compared to US$ 6 billion in Ghana and US$ 9 billion in Kenya. The investor base, although mainly composed of residents, is relatively diversified. Whereas banks hold 39% of LCBs, the Central Bank of Nigeria holds 10% and the non-bank public, which includes the insurance sector, accounts for the remaining 52% (DMO, 2015: 42). So what has driven LCBM expansion in Nigeria? The quality of Nigerian institutions is notoriously limited, which does not help the deepening of LCBMs. However, Nigeria does score high with respect to other categories our empirical analysis has highlighted as important correlates of LCBM capitalization such as a comparatively well-developed and competitive financial sector.

The depth of Nigeria's LCBM also results from concerted efforts of the Nigerian authorities in the early 2000s to rely more on domestic rather than external debt and to develop a secondary market. In particular, Nigeria's government, which had borrowed heavily from international banks and official creditors such as the World Bank in the late 1970s and early 1980s, relied from 2004 onwards increasingly on domestic borrowing. While in 2004 78% of the public debt stock was foreign and 22% domestic, the corresponding figures for 2013 were 16% external and 84% domestic public debt (DMO, 2007: 28; DMO, 2015: 17).[14] The government was also successful in lengthening LCB tenors. While Treasury bills with a maturity of less than a year dominated domestic public debt before 2003, this is no longer the case. In 2015, for instance, the ratio of Treasury bonds to bills was 69 to 31. In addition, the government has increasingly issued longer-term bonds from the late 2000s onwards. Whereas 10-year LCBs represented 20% of domestic issuance in 2007, they accounted for 55% of all tenors issued in 2012 (DMO, 2007: 61; African Financial Markets Initiative, 2016d). LCB maturities available today include 3, 5, 7, 10 and 20 years.

The Nigerian case also demonstrates the opportunities and vulnerabilities arising from deep LCBMs. As with Kenya and Ghana, Nigeria's ability to borrow from LCBMs reduced the reliance on external commercial and concessional financing to meet financing needs. In particular, the government used the proceeds of LCBs to fund its infrastructure deficit and special government stimulus initiatives between 2008 and 2014, when Nigeria felt the repercussions of the global financial crisis and a domestic financial crisis in 2010. Nigeria also largely avoided the vulnerabilities arising from borrowing at shorter maturities and at high costs from the LCBM, partly because a significant portion of this borrowing was not intended to fill financing gaps but rather to stimulate LCBM development (Blommestein and

[14] In the medium term the government seeks to decrease the ratio of domestic to external debt to 50-60%, in order to avoid a crowding out of private sector credit. This is evident from Nigeria's past (2011 and 2013) and planned international bond issuance (DMO, 2015).

Horman, 2007: 228). Especially before Nigeria's banking crisis in 2010, proceeds from oil revenues provided a comfortable cushion to finance recurrent expenditures.

While Nigeria's status as a major oil exporter has at times been a source of economic dynamism and financial market growth, it has, throughout Nigeria's history, also been a regular source of economic volatility and vulnerability. To be sure, a sustained decline in oil revenues has a direct impact on the creditworthiness of a government which derives more than 60% of its revenues from oil exports. Moreover, a decline in oil revenues might also have indirect effects on debt sustainability, as Nigeria's experience in 2015 shows, when foreign investors exited the LCBM. While the LCBM is, as in most other SSA economies, dominated by resident investors, foreign investment increased between 2011 and 2013 from 0.7% to 15%, partly due to a search for higher yields in a low-interest-rate environment and spurred by the inclusion of Nigeria into major benchmark indices for LCBs in emerging markets, most notably the JP Morgan Government Bond Index for Emerging Markets and Barclays Emerging Markets Local Currency Government Index (Minto, 2012; UNCTAD, 2016: 78). When the Nigerian government introduced restrictions on exchange transactions to deal with foreign exchange shortages arising from low oil-prices and revenues in 2014, foreign investors became concerned about the liquidity of their investments. Such concerns prompted JP Morgan and Barclays to exclude Nigeria from their LCB indices in 2015 and 2016 respectively. These exclusions, in turn, caused foreign investors to exit and LCB yields to rise. This episode illustrates once more the financial stability risks associated with foreign portfolio capital inflows, especially if domestic markets are still shallow. Foreign investment into LCBMs may certainly provide a welcome boost to liquidity and helps diversifying the investor base, but a rapid build-up of foreign investor positions as in Nigerian LCBMs between 2011 and 2013 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 market conditions deteriorate.

5. Conclusions

Our empirical analysis of the drivers underlying the development of LCMs 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, according to our estimation results, a high concentration in the banking sector correlates negatively with LCBM capitalization, possibly reflecting close cooperation/collusion between governments and a few dominant banks. A large presence of foreign-owned banks also correlates negatively with LCBM capitalization, arguably because foreign-owned banks enjoy more alternative investment opportunities abroad than domestic institutions.

A further contribution made in this paper is our analysis of tenors and issue yields of LCBs 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 credibility, and a stable inflation environment 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 Ghana, Kenya and Nigeria as illustrative case studies, we have also highlighted the importance of diversifying the investor base in order to develop liquid and stable markets. While foreign investment into LCBMs can spur market development, at the same time it increases the risk of international financial contagion and capital flight in case of external shocks. Moreover, the domestic investor base needs to be sufficiently diversified in order to avoid too high a concentration of LCB holdings in the domestic banking sector, which could contain the seeds of a sovereign-debt-cum-banking-crisis.

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 this paper. Ideally, we would use individual bond-level data, allowing us to construct more detailed measures of LCBM development at various points in time. 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. Other avenues for further research include a more in-depth inquiry of the effects of LCBM investor base composition and of the regional aspects of LCBM development in SSA.

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Table 1: Baseline 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]
Observations	270	270	254	261	242	232	270	270	254	261	242	232
Countries	27	27	26	27	26	23	27	27	26	27	26	23
Overall F *p*-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.010	0.000
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
Intra-class corr. ρ							0.828	0.852	0.789	0.745	0.941	0.758
Hausman *p*-value							0.000	0.000	0.002	0.000	0.004	0.000

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

Table 2: Baseline 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]
Observations	249	249	234	241	225	218	222	249	249	234	241	225	218	222
Countries	27	27	26	27	26	23	25	27	27	26	27	26	23	25
Overall F *p*-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.000	0.011	0.001	0.011	0.000
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
Intra-class corr. ρ								0.975	0.978	0.965	0.967	0.985	0.878	0.986
Hausman *p*-value								0.010	0.017	0.000	0.000	0.000	0.007	0.000

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

Table 3: Baseline 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]
Observations	123	123	113	117	104	104	111	106	123	123	113	117	104	104	111	106
Countries	13	13	12	13	13	12	13	13	13	13	12	13	13	12	13	13
Overall F *p*-value	0.000	0.000	0.000	0.000	0.000	N/A	0.000	0.000	0.095	0.001	0.000	0.001	0.000	0.000	0.000	0.000
R^2/R^2-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
Intra-class corr. ρ									0.966	0.961	0.988	0.982	0.976	0.954	0.976	0.997
Hausman *p*-value									N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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

Table 4: Robustness results for LCBM capitalization regressions

	POLS							FE						
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Log GDP	0.720*	0.211	0.801+	0.421	0.311	0.383	0.510	7.744	10.132	4.634	1.888	3.183	-30.318	7.301
	[0.390]	[0.521]	[0.480]	[0.616]	[0.607]	[0.606]	[0.481]	[8.615]	[8.622]	[13.647]	[13.689]	[13.770]	[32.865]	[11.644]
Log GDP per cap.	0.490	0.769	-0.242	0.163	0.252	0.055	0.558	-5.634	-8.022	-2.218	0.875	-0.062	28.858	-4.579
	[0.484]	[0.644]	[0.804]	[0.672]	[0.708]	[0.748]	[1.056]	[10.509]	[10.391]	[16.490]	[16.736]	[16.703]	[32.073]	[14.165]
Av. fiscal balance	-0.360**	-0.514***	-0.453***	-0.451***	-0.436***	-0.510***	-0.407***	-0.041	-0.044	0.009	0.003	-0.001	-0.029	-0.010
	[0.142]	[0.113]	[0.122]	[0.106]	[0.105]	[0.135]	[0.122]	[0.080]	[0.083]	[0.078]	[0.078]	[0.079]	[0.086]	[0.073]
Log inflation	0.982	-5.256	-2.432	-3.691	-5.838+	-5.491	-7.744	4.131	5.031	9.896	7.586	9.705	0.938	14.868
	[4.570]	[5.098]	[4.855]	[4.729]	[4.417]	[5.559]	[9.736]	[7.609]	[7.160]	[7.998]	[7.179]	[7.750]	[9.643]	[11.678]
Cap. acc. openness	0.299	0.219	0.458	0.254	0.213	0.292	0.028	-0.122	-1.015	-0.703	-1.078	-1.030	-1.301	-1.123
	[0.523]	[0.690]	[0.558]	[0.555]	[0.562]	[0.544]	[0.558]	[1.916]	[0.919]	[1.087]	[0.928]	[0.986]	[1.149]	[0.966]
British legal origins	0.681	0.263	-1.151	-0.481	-0.220	-0.555	0.138							
	[1.060]	[1.222]	[1.138]	[1.087]	[0.863]	[0.929]	[1.143]							
Democracy	2.067	4.368*	3.084+	3.626+	3.300+	3.318+	2.823+	0.848	1.122	-0.866	-0.953	-1.142	-2.515	0.608
	[1.675]	[2.148]	[2.031]	[2.631]	[2.162]	[2.332]	[2.010]	[3.224]	[3.524]	[4.019]	[3.739]	[4.132]	[5.587]	[4.033]
Institutional quality	-0.513	-0.452	0.542	0.646	0.618	0.907	0.744	4.817*	3.712	9.493+	9.856*	10.178*	10.876*	12.015+
	[1.530]	[1.769]	[1.976]	[2.016]	[1.905]	[1.933]	[1.883]	[2.702]	[3.089]	[5.616]	[5.616]	[5.607]	[5.443]	[7.394]
Private credit	0.282***							0.155+						
	[0.075]							[0.093]						
Fin. development		39.321***		52.481***	54.644***	53.792***	56.406***		22.389		60.123+	57.668+	-3.059	69.990+
		[13.409]		[7.768]	[7.362]	[7.792]	[7.987]		[29.458]		[42.472]	[42.716]	[26.406]	[47.048]
Financial institutions			34.751**							35.939+				
			[14.476]							[22.873]				
Financial markets			18.637*							10.290				
			[10.246]							[24.033]				
Inflation volatility				-0.396							-0.961+			
				[0.653]							[0.651]			
Exch. rate volatility					-0.342**							0.043		
					[0.165]							[0.178]		
Official external debt							0.030							0.031
							[0.040]							[0.026]
External bonds							-0.249*							-0.166
							[0.142]							[0.149]
Other external debt							0.082							-0.346
							[0.323]							[0.469]
VIX	0.016	0.025	0.008	0.012	0.034		0.009	-0.026	-0.028	-0.059+	-0.059+	-0.073+		-0.076+
	[0.026]	[0.029]	[0.035]	[0.035]	[0.036]		[0.036]	[0.030]	[0.038]	[0.037]	[0.041]	[0.046]		[0.049]
Constant	-11.886	15.066	4.806	9.722	19.378	12.152	24.506	-4.609	3.160	-59.422	-63.419	-70.679	-157.319	-78.984
	[21.577]	[26.590]	[23.776]	[24.310]	[22.524]	[27.278]	[50.927]	[68.091]	[67.476]	[107.212]	[110.126]	[109.230]	[151.290]	[95.956]
Observations	229	236	261	260	260	261	248	229	236	261	260	260	261	248
Countries	24	25	27	27	27	27	26	24	25	27	27	27	27	26
Overall F *p*-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.022	0.001	0.001	0.001	0.000	0.000
R^2/R^2-within (FE)	0.656	0.539	0.759	0.757	0.759	0.776	0.774	0.426	0.395	0.326	0.327	0.319	0.402	0.386
Intra-class corr. ρ								0.944	0.970	0.740	0.745	0.749	0.994	0.893
Hausman *p*-value								0.000	0.000	0.000	0.000	0.000	0.000	0.000

Notes: Dependent variable is outstanding LCBs (% of GDP). Sample countries, years and variables as defined in the text and Tables A1 and A2; columns (1) and (2) exclude South Africa and Mauritius; column (6) includes year dummies. All independent variables are one-year lagged, except for VIX, inflation volatility, exchange rate volatility, and external debt variables. Standard errors, clustered at the country level, are reported in brackets. ***p < 0.01; **p < 0.05; *p < 0.10; +p < 0.20.

Table 5: Robustness results for average LCB tenor regressions

	POLS							FE						
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Log GDP	-0.038	-0.105	0.421+	-0.092	0.084	-0.102	-0.316	7.007**	6.557*	4.149	4.665	4.658	-2.125	3.528
	[0.314]	[0.303]	[0.270]	[0.290]	[0.255]	[0.314]	[0.286]	[3.131]	[3.493]	[3.650]	[3.720]	[3.759]	[6.535]	[4.758]
Log GDP per cap.	0.072	0.112	-0.665*	-0.155	-0.019	-0.144	0.098	-6.609+	-5.954	-3.090	-4.010	-3.930	2.787	-2.728
	[0.379]	[0.380]	[0.384]	[0.291]	[0.281]	[0.308]	[0.333]	[4.147]	[4.638]	[4.609]	[4.804]	[4.837]	[6.239]	[6.086]
Av. fiscal balance	0.124+	0.100+	0.100*	0.101+	0.074	0.134+	0.022	0.033	0.031	0.009	0.010	0.008	0.028	0.024
	[0.079]	[0.072]	[0.057]	[0.068]	[0.066]	[0.079]	[0.068]	[0.054]	[0.050]	[0.058]	[0.056]	[0.056]	[0.055]	[0.074]
Log inflation	-7.048	-8.724+	-7.547+	-10.025+	-6.807	-9.144	-10.369*	1.669	1.468	0.515	0.473	0.601	1.756	-3.865
	[6.183]	[6.177]	[4.931]	[6.071]	[5.800]	[7.739]	[5.100]	[3.552]	[3.802]	[3.744]	[3.808]	[4.136]	[4.320]	[3.064]
Cap. acc. openness	0.043	0.069	0.217	-0.009	0.046	0.019	0.158	0.215	0.651	0.686	0.731	0.780	0.809+	0.003
	[0.372]	[0.361]	[0.330]	[0.321]	[0.338]	[0.323]	[0.344]	[1.333]	[0.807]	[0.746]	[0.810]	[0.770]	[0.590]	[1.230]
British legal origins	0.650	0.593	-0.079	0.883	0.313	0.858	0.344							
	[0.861]	[0.761]	[0.660]	[0.733]	[0.830]	[0.771]	[0.781]							
Democracy	2.327+	2.955*	2.403*	3.143**	2.747**	2.984*	3.733*	-1.596	-1.762+	-0.873	-0.841	-0.853	-1.018	-0.108
	[1.633]	[1.471]	[1.281]	[1.418]	[1.333]	[1.452]	[1.964]	[1.252]	[1.233]	[1.642]	[1.578]	[1.629]	[1.674]	[1.465]
Institutional quality	0.142	-0.111	-0.422	-0.428	-0.083	-0.238	-1.680	0.588	1.594	-2.330	-2.259	-2.155	-3.045	-5.650+
	[1.611]	[1.436]	[1.161]	[1.503]	[1.398]	[1.491]	[1.802]	[1.838]	[1.795]	[3.296]	[3.312]	[3.359]	[3.393]	[3.462]
Private credit	0.040							-0.081***						
	[0.037]							[0.012]						
Fin. development		7.651		11.439**	10.047**	12.337**			-25.633***		-6.835	-7.557	-19.046+	
		[8.211]		[4.650]	[4.222]	[4.927]			[6.829]		[14.140]	[14.451]	[14.172]	
Financial institutions			16.792***							-5.220				
			[5.387]							[7.673]				
Financial markets			-4.355							-0.616				
			[3.953]							[11.085]				
Inflation volatility				-0.620+							-0.182			
				[0.376]							[0.318]			
Exch. rate volatility					0.284*							-0.123		
					[0.159]							[0.120]		
Insurance assets							0.121***							-0.007
							[0.032]							[0.049]
VIX	0.031*	0.024+	0.026+	0.032*	-0.002		0.059***	0.033**	0.038***	0.036**	0.041***	0.052**		0.045***
	[0.016]	[0.017]	[0.016]	[0.016]	[0.026]		[0.015]	[0.014]	[0.013]	[0.017]	[0.015]	[0.021]		[0.015]
Constant	35.266	42.875+	40.178*	50.981*	33.965	47.632	52.996**	30.034	27.601	21.187	26.301	25.093	-6.875	44.170
	[29.375]	[29.728]	[23.532]	[29.693]	[27.661]	[37.067]	[24.659]	[24.257]	[26.838]	[30.733]	[28.565]	[28.873]	[39.564]	[35.629]
Observations	222	229	241	240	240	241	195	222	229	241	240	240	241	195
Countries	25	26	27	27	27	27	22	25	26	27	27	27	27	22
Overall F *p*-value	0.001	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.013	0.006	0.023	0.000	0.013
R^2/R^2-within (FE)	0.300	0.305	0.529	0.478	0.477	0.489	0.527	0.225	0.239	0.180	0.175	0.179	0.232	0.212
Intra-class corr. ρ								0.989	0.987	0.963	0.970	0.970	0.950	0.972
Hausman *p*-value								0.000	0.000	0.000	0.000	0.000	0.000	0.000

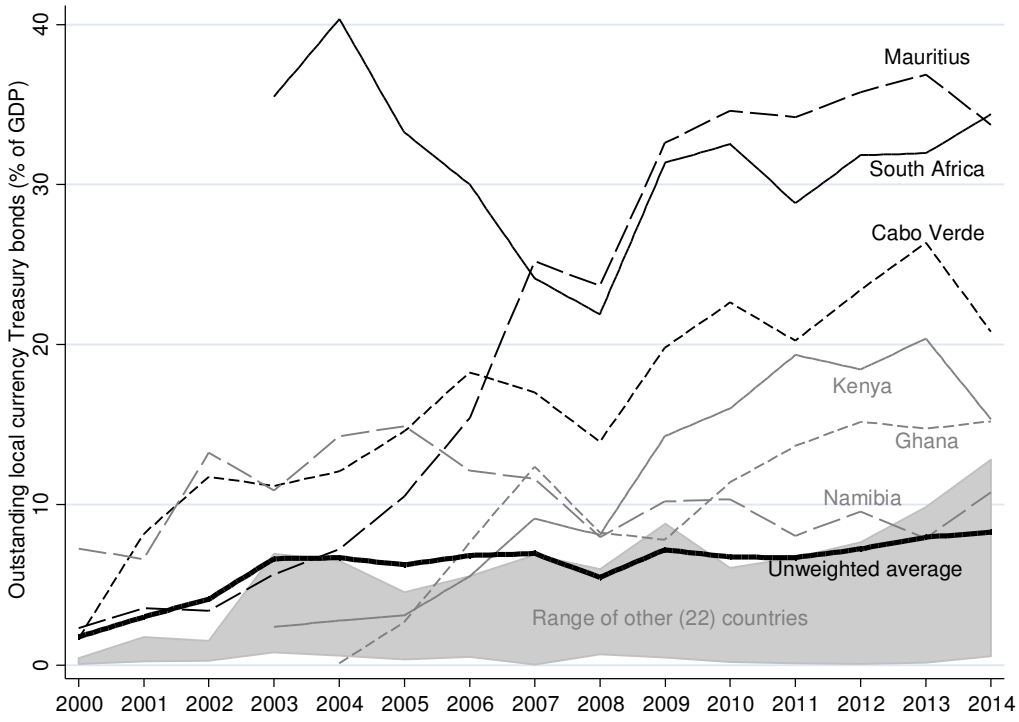
Notes: Dependent variable is average tenor of outstanding LCBs (years). Sample countries, years and variables as defined in the text and Tables A1 and A2columns (1) and (2) exclude South Africa; column (6) includes year dummies. All independent variables are one-year lagged, except for VIX, inflation volatility, and exchange rate volatility. Standard errors, clustered at the country level, are reported in brackets. ***p < 0.01; **p < 0.05; *p < 0.10; +p < 0.20.

Table 6: Robustness results for average LCB issue yield regressions

	POLS							FE						
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Log GDP	0.950***	0.666+	1.016**	1.305***	1.635***	1.418***	0.341	25.850**	23.282**	10.900	12.230+	12.055	25.070+	11.940*
	[0.284]	[0.407]	[0.404]	[0.338]	[0.471]	[0.412]	[0.324]	[8.800]	[8.552]	[8.840]	[8.919]	[9.345]	[15.158]	[6.469]
Log GDP per cap.	-2.103***	-1.866***	-2.081***	-1.804***	-2.335***	-1.951***	-0.760+	-30.712**	-27.947**	-12.627	-13.551	-13.600	-24.173+	-12.755+
	[0.302]	[0.417]	[0.531]	[0.546]	[0.470]	[0.598]	[0.547]	[10.138]	[10.590]	[10.956]	[11.021]	[11.375]	[15.129]	[7.875]
Av. fiscal balance	-0.074	-0.091	-0.195+	-0.210*	-0.232*	-0.233+	-0.197**	-0.016	-0.021	-0.113	-0.116+	-0.108	-0.094	-0.132**
	[0.101]	[0.095]	[0.114]	[0.111]	[0.116]	[0.151]	[0.083]	[0.055]	[0.060]	[0.096]	[0.082]	[0.084]	[0.098]	[0.046]
Log inflation	14.203*	14.335*	23.997***	27.958***	26.864***	26.908***		3.358	4.742+	16.688**	20.803**	18.864**	19.314***	
	[6.963]	[7.323]	[5.204]	[6.533]	[7.230]	[6.350]		[3.939]	[3.221]	[6.893]	[8.463]	[6.635]	[6.015]	
Cap. acc. openness	-0.032	0.123	-0.406+	-0.338	-0.283	-0.300	-0.374+	-0.378	0.364	-0.376	-0.280	-0.475	-0.974	0.206
	[0.186]	[0.242]	[0.254]	[0.258]	[0.274]	[0.257]	[0.265]	[1.761]	[1.118]	[1.190]	[1.148]	[0.995]	[1.342]	[0.480]
British legal origins	0.204	1.493+	1.771**	0.994	0.585	1.234	0.245							
	[1.277]	[1.059]	[0.759]	[0.926]	[0.973]	[1.065]	[1.062]							
Democracy	-1.894**	-1.424+	0.461	-0.834	0.218	-0.548	-0.987	-5.676+	-6.825**	-1.558	-0.747	-4.769	-2.267	-6.087
	[0.792]	[0.879]	[1.068]	[1.206]	[1.104]	[1.461]	[1.174]	[3.322]	[2.391]	[6.211]	[5.920]	[8.879]	[9.844]	[5.300]
Institutional quality	3.142***	2.331	5.204***	5.502***	6.239***	5.400***	0.201	9.343*	8.078+	10.593*	10.894*	10.174*	11.201**	2.466
	[0.904]	[1.863]	[1.509]	[1.257]	[1.712]	[1.623]	[1.801]	[4.980]	[4.876]	[5.129]	[5.275]	[5.327]	[5.039]	[3.707]
Private credit	-0.031*							-0.127*						
	[0.016]							[0.057]						
Fin. development		-4.402		-13.054**	-17.837**	-14.243**	-0.992		-23.482		-44.936*	-45.657*	-14.689	-18.999**
		[6.923]		[5.179]	[7.648]	[5.604]	[5.359]		[22.166]		[21.127]	[20.988]	[35.073]	[7.161]
Financial institutions			-10.004**							-21.822*				
			[4.100]							[10.915]				
Financial markets			-2.210							-24.261				
			[6.066]							[23.748]				
Inflation volatility				1.623+							1.309+			
				[0.982]							[0.818]			
Exch. rate volatility					0.483							0.428		
					[0.385]							[0.511]		
Central bank rate							0.751***							0.764***
							[0.155]							[0.195]
VIX	-0.025	-0.028	-0.016	-0.036	-0.057		-0.006	-0.009	0.002	0.002	-0.017	-0.036		0.004
	[0.027]	[0.028]	[0.032]	[0.042]	[0.069]		[0.028]	[0.036]	[0.031]	[0.038]	[0.041]	[0.069]		[0.026]
Constant	-46.080+	-47.838+	-97.035***	-119.09***	-111.60***	-110.05***	8.584*	152.109**	133.385**	-12.995	-30.760	-16.115	23.985	72.375+
	[31.697]	[33.150]	[26.004]	[32.655]	[35.807]	[31.659]	[4.354]	[48.356]	[55.112]	[79.698]	[72.050]	[69.887]	[66.434]	[45.028]
Observations	94	98	117	116	116	117	85	94	98	117	116	116	117	85
Countries	10	11	13	13	13	13	12	10	11	13	13	13	13	12
Overall F *p*-value	N/A	0.000	0.000	0.000	0.000	N/A	0.000	0.000	0.000	0.000	0.001	0.000	N/A	0.000
R^2/R^2-within (FE)	0.676	0.646	0.648	0.668	0.663	0.687	0.829	0.354	0.295	0.187	0.219	0.213	0.308	0.598
Intra-class corr. ρ								0.999	0.998	0.982	0.987	0.986	0.997	0.995
Hausman *p*-value								N/A	N/A	N/A	N/A	N/A	N/A	0.000

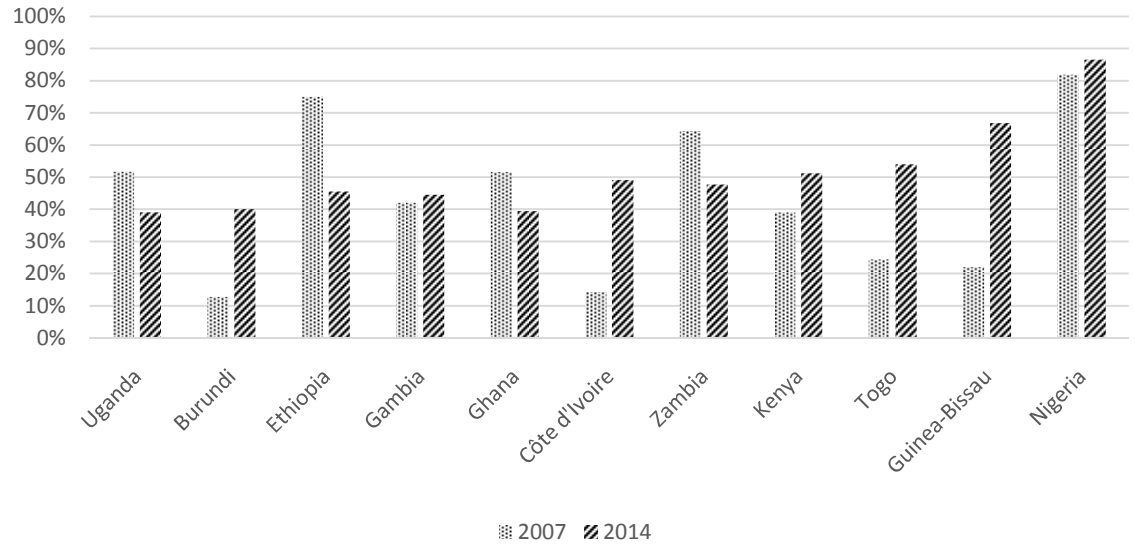
Notes: Dependent variable is average tenor of outstanding LCBs (years). Sample countries, years and variables as defined in the text and Tables A1 and A2columns (1) and (2) exclude Ghana and Mozambique; column (6) includes year dummies. All independent variables are one-year lagged, except for VIX, inflation volatility, exchange rate volatility, and central bank policy rate. Standard errors, clustered at the country level, are reported in brackets. ***p < 0.01; **p < 0.05; *p < 0.10; +p < 0.20.

Figure 1: Local currency bond market development in SSA, 2000-2014



Source: Compiled by the authors with data from the African Financial Markets Initiative (2016a).
Notes: For presentation purposes, only six largest LCBMs (relative to GDP, evaluated over 2000-2014) are shown separately. Thick black line represents unweighted average of 28countries (cf. sample in Appendix Table A1). Range represents the minimum and maximum values of LCBM capitalization for 22 countries, excluding six largest LCBMs.

Figure 2: Domestic debt (% of total debt) for selected SSA countries



Source: Compiled by the authors with data from various IMF country reports.
Note: Data for Burundi, Gambia and Nigeria are for 2013.

APPENDIX

Table A1: Country-year samples by dependent variable

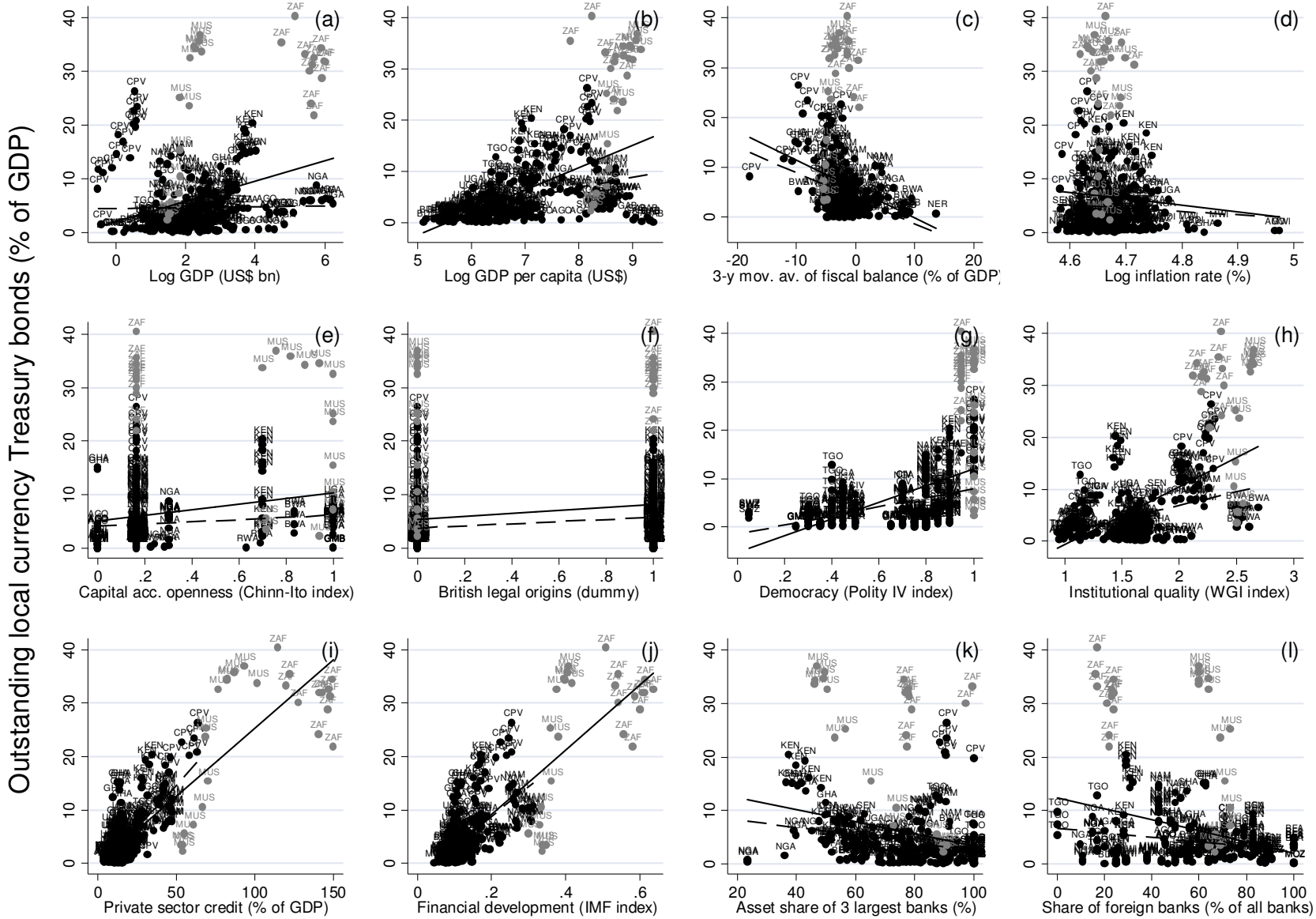
Country	ISO 3 code	Dependent variable (available years) LCBM capitalization	Average LCB tenors	Average LCB issue yields
Angola	AGO	2005-2014	2005-2014	N/A
Benin	BEN	2007-2014	2007-2014	N/A
Botswana	BWA	2003-2014	2003-2014	2003, 2008-2014
Burkina Faso	BFA	2000-2014	2000, 2001, 2003-2014	N/A
Burundi	BDI	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

Notes: 'N/A' means 'not available'.

Table A2: Variable names, definitions, sources and descriptive statistics

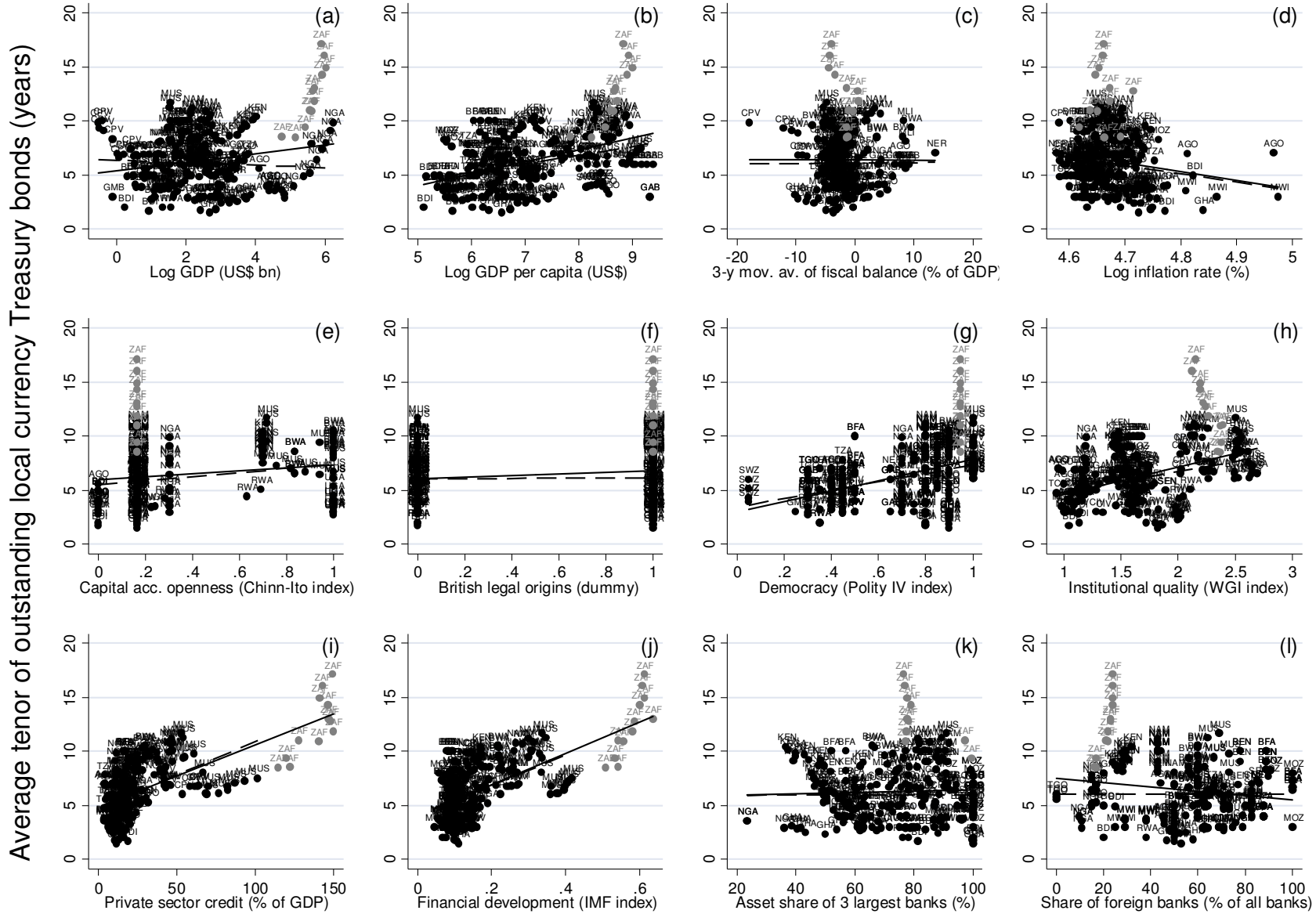
Variable	Definition	Source	Observations			Mean	Min	Max	Standard deviation		
			Total	Countries	Years				overall	between	within
Dependent											
LCBM capitalization	Year-end outstanding amount of local currency Treasury bonds (in % of GDP)	AFMI (2016a)	282	28	2000-2014	6.681	0.026	40.343	8.560	7.033	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 (FM)	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 (AREAER)	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	University of Maryland 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 WGI dimensions: 'control of corruption', 'government effectiveness', 'regulatory quality' and 'rule of law'	World Bank World Governance Indicators (WGI)	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 (CBOE) Volatility Index measuring the implied volatility of S&P 500 index options	Federal Reserve Bank of St. Louis Federal Reserve Economic Data (FRED)	420	28	2000-2014	20.941	12.810	32.690	6.367	0	6.367

Figure A1: Bivariate scatter plots – LCBM capitalization vs. explanatory variables



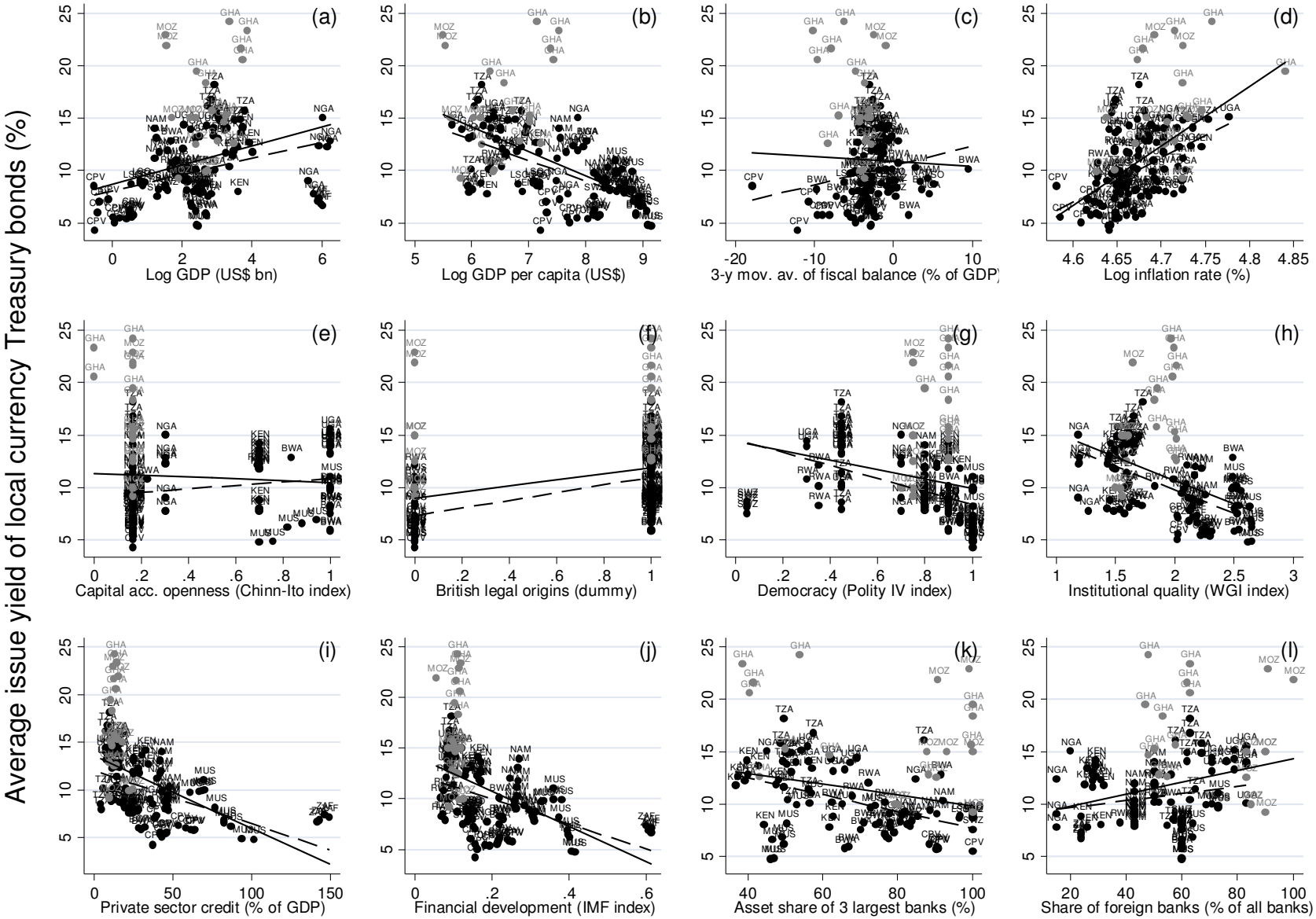
Notes: Sample countries, years and variables as defined in the text and Tables A1 and A2. All explanatory variables are one-year lagged. Grey dots are data points for South Africa and Mauritius. Full lines represent best linear fit for whole sample, dashed lines for sample excluding South Africa and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

Figure A2: Bivariate scatter plots – Average LCB tenors vs. explanatory variables



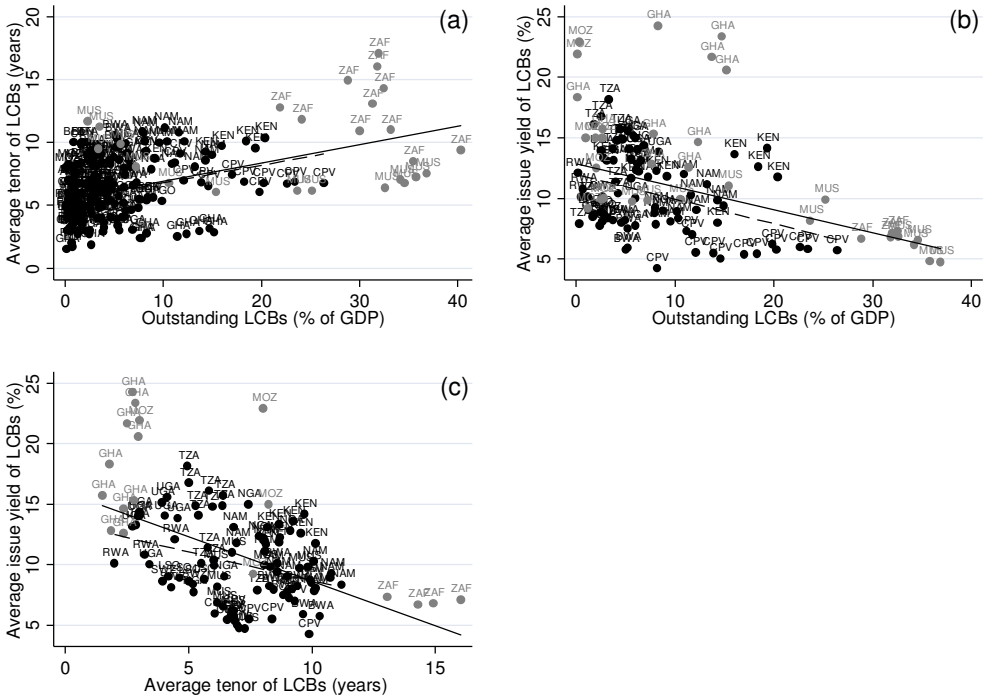
Notes: Sample countries, years and variables as defined in the text and Tables A1 and A2. All explanatory variables are one-year lagged. Grey dots are data points for South Africa. Full lines represent best linear fit for whole sample, dashed lines for sample excluding South Africa.

Figure A3: Bivariate scatter plots – Average LCB issue yields vs. explanatory variables



Notes: Sample countries, years and variables as defined in the text and Tables A1 and A2. 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: Bivariate scatter plots – LCBM capitalization vs. average tenors vs. average issue yields



Notes: Sample countries, years and variables as defined in the text and Tables A1 and A2. 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 South Africa and Mauritius in panel (a); for sample excluding Ghana, Mozambique, South Africa and Mauritius in panel (b); and for sample excluding Ghana, Mozambique and South Africa in panel (c).