

# **Local Currency Bond Markets and the SDGs: Potentials, Challenges and Policy Recommendations for Sub-Saharan African Economies**

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**PRELIMINARY – COMMENTS ARE WELCOME!**

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This paper discusses the role that local currency bond markets (LCBMs) can play in the long-term financing of sustainable development of Sub-Saharan African (SSA) economies and presents an empirical analysis of the factors which may hinder or promote the development of LCBMs in SSA. Using a new dataset for 27 SSA countries, our findings support earlier research on SSA and other regions, showing that LCBM development benefits from country size, larger banking systems, higher public financing needs, lower inflation rates and better quality of political institutions. Promoting regional bond markets may be one way of addressing the problems associated with small economic size and small banking systems – including illiquid debt instruments, short maturities, a restricted and undifferentiated investor base, and undeveloped secondary markets. Establishing an adequate institutional structure and a solid legal framework are important to overcome the problems impeding the issuance domestic debt. For a better monitoring of domestic debt an appropriate debt management strategy needs to be in place.

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## **1 Potentials of the local currency bond markets for SDGs**

Long-term private financial flows – including Foreign Direct Investment (FDI), cross-border bank lending, bond and equity financing, as well as remittances – may assume a crucial role in attaining the Sustainable Development Goals (SDGs). Even though bond financing accounted for only 14% of international private capital flows to developing countries in 2012, much lower than FDI, which made up about 60%, it was much more important than Official Development Assistance (ODA) and Other Official Flows (OOF), which together made up only 1% total international capital flows to developing countries in the same year (World Bank, 2013: 23).

To date, local currency bond markets (LCBMs) still play a minor role in the long-term private financing of Sub-Saharan African (SSA) economies because capital markets are not well developed in this region. However, experiences of developing countries in other regions such as Asia suggest that LCBMs can potentially take on an important role in SSA in the future. One indicator for the nascent stage of bond market development in SSA is the outstanding stock of government securities, which accounted for only 14.8% of GDP in 2010 on average, being significantly lower than in other developing, emerging, and advanced economies. A further indicator of the shallowness of the LCBM in SSA is that government securities issues significantly exceed corporate bond issues. Government securities made up nearly 90% of total outstanding local currency denominated bonds in 2010. Compared to other regions of the world the difference between these two types of securities is much larger (IMF, 2013: 40; Mu et al., 2013).

The development of LCBMs can contribute to mobilising long-term domestic financial resources for achieving the SDGs, in particular for much-needed local or regional infrastructure investments. One main prerequisite for LCBMs meeting this goal is that capital markets as well as banks are able to assume their transformation role of converting relatively short-term deposits in long-term investments in infrastructure (World Bank, 2013: 24). By means of issuing infrastructure project bonds capital is generated for specific projects. Kenya, for example, has successfully issued infrastructure bonds since 2009, raising money for water, road and energy projects. The issuance of these government bonds has made it easier to issue corporate bonds of private or state-owned enterprises (IMF, 2014: 48).

Even though the significance of LCBMs in SSA for long-term investments is limited compared to alternative sources of long-term financing, LCBMs represent a promising instrument to provide long-term financing in the future. There may be various benefits in developing LCBMs

in SAA. One main advantage is that LCBMs can contribute to improving capital allocation by offering alternative sources of financing and by diversifying risks among different groups of investors, both domestic and foreign. Another advantage is that domestic debt markets may contribute to a better financial intermediation and promote domestic investments. Moreover, LCBMs may alleviate the effects of debt and financial crises as well as other external shocks on the domestic economy. By reducing the dependency on foreign debt, LCBMs could also alleviate the ‘original sin’ problem and thereby reduce the risk of currency mismatches (Adelegan and Radzewicz-Bak, 2009: 3; Berensmann, 2010; Eichengreen, Hausmann 1999; Essers et al., 2014: 6-7; IMF, 2007: 55 and 2013: 39; Khan, 2005; Maizad et al., 2013: 5-7).

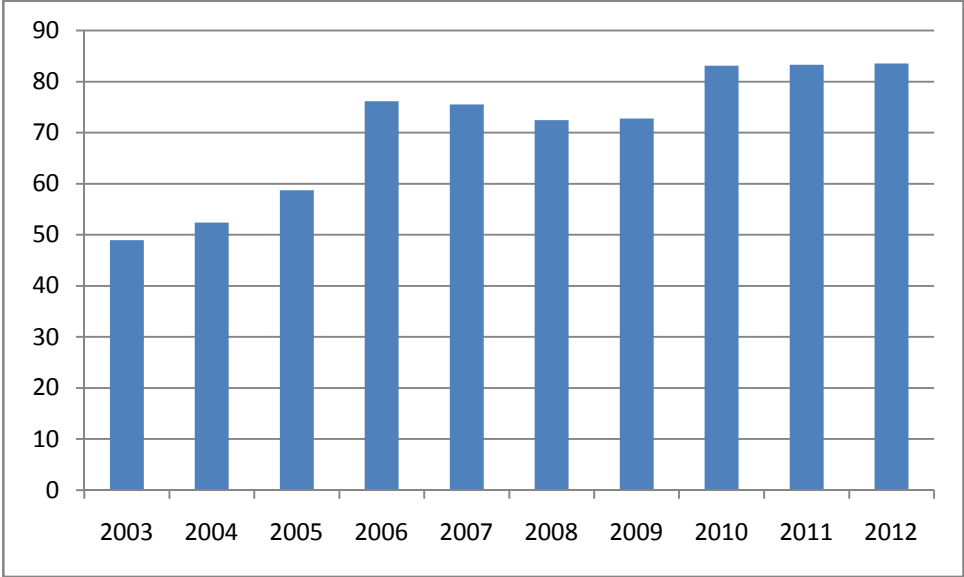
Against this backdrop, this paper discusses the role that LCBMs can play in the long-term financing of sustainable development of Sub-Saharan African economies, with a focus on examining the factors which may impede and promote LCBM development. The next section briefly presents recent trends and challenges of LCBM development in SSA. Subsequently, Section 3 econometrically analyses patterns of LCBM development in SSA. Section 4 highlights the experiences with bond market development from Emerging Markets in Asia and Latin America and discusses possible lessons for countries in SSA. Section 5 concludes with policy recommendations.

## **2 Recent trends and challenges of LCBM development in SSA**

While SSA has long been viewed as reliant on foreign aid as a source of development financing, SSA’s growth performance over the past decade has been remarkable and its sources of development financing are diversifying, albeit slowly. The area of sovereign debt financing is a case in point and highlights the role that LCBMs may play in financing investments in sustainable development in the future.

A key development over the past decade has been the increasing reliance of governments in SSA on markets for debt financing. As Figure 1 shows, governments in SSA have increasingly used marketable debt, comprising bonds, notes and money market instruments, as opposed to non-marketable debt, which consists mainly of loans by official multilateral or bilateral creditors, such as the World Bank, and loans by commercial banks. There was a slight decrease in reliance on markets for debt financing in 2008 and 2009, possibly in response to actual or expected difficulties to raise funds through markets in the wake of the global financial crisis. Yet, overall, there is a positive trend in the share of marketable debt to total debt.

**Figure 1: Central government marketable debt (% of total central government debt) in SSA**



Source: OECD (2013). Note: Figure includes Angola, Cameroon, Gabon, Kenya, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Nigeria, Sierra Leone, South Africa, Tanzania, Uganda and Zambia. Data for Angola is excluded from 2010 onwards; data for Gabon is excluded from 2003 to 2006 and from 2010 onwards and data for Namibia is excluded from 2008 onwards.

The regional aggregates disguise considerable variation in the role debt financing through markets plays for different SSA countries. For instance, while between 2008 and 2012 the average ratio of marketable debt to total debt amounts to 86% in Nigeria, this share amounts to 40% in Uganda (OECD, 2013). Table 1 presents these cross-national differences for a selection of countries in SSA for which data is available, for the period before and after the global financial crisis. It is remarkable that the ratios of marketable debt to total debt increased compared to the pre-crisis period, notably in the categories of low-income and lower middle income countries, as classified by the World Bank. This suggests that the overall positive trend in the use of markets for debt financing in SSA shown in Figure 1 has not been driven by individual or upper middle-income countries.

**Table 1: Central government marketable debt (% of total central government debt) in selected African countries**

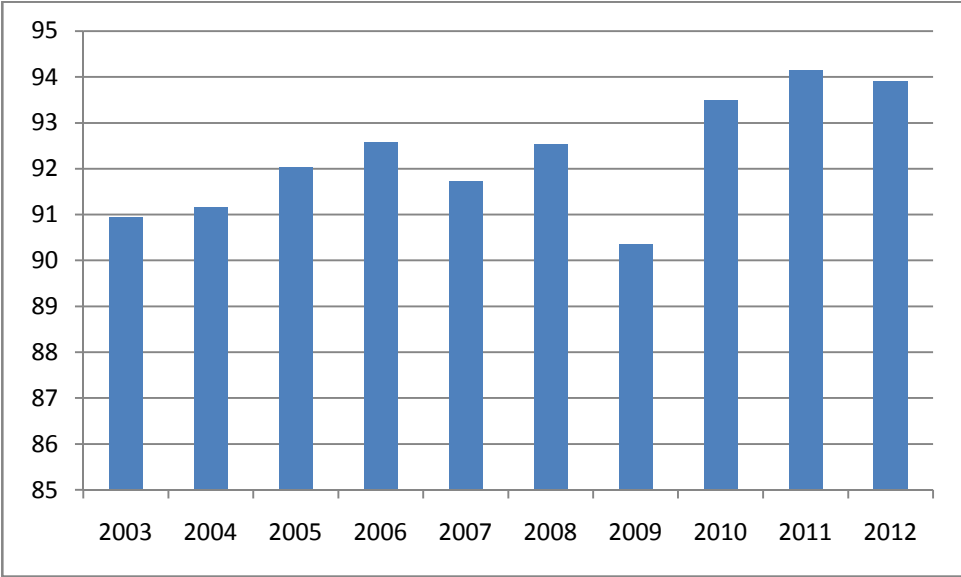
	<b>2003-2007</b>	<b>2008-2012</b>	<b>2012</b>
<b>Low-income countries</b>			
Kenya	44.0	51.3	52.9
Madagascar	15.8	20.7	18.1
Malawi	30.0	52.1	34.0
Mozambique	4.7	9.0	11.2
Sierra Leone	12.6	20.1	20.6
Tanzania	100	100	100
Uganda	23.4	39.8	40.4
<b>Average low-income countries</b>	<b>32.9</b>	<b>41.9</b>	<b>39.6</b>
<b>Lower middle-income countries</b>			
Cameroon	8.3	17.3	21.7
Nigeria	49.0	85.9	87.6
Zambia	30.0	53.9	46.0
<b>Average lower middle-income countries</b>	<b>29.1</b>	<b>52.3</b>	<b>51.8</b>
<b>Upper middle-income countries</b>			
Angola*	18.8	49.1	
Mauritius	100	86.3	81.0
South Africa	95.7	95.5	96.3
<b>Average upper middle-income countries</b>	<b>71.5</b>	<b>77.0</b>	<b>88.6</b>

Source: OECD (2013).

Note: \*Data for Angola in the time period 2008-2012 is only available for 2009.

Another development which indicates the potential LCBM development may have for mobilising funds to finance the SDGs is that marketable debt is increasingly issued in local currency. Specifically, there has been a slight increase in the ratio of local currency marketable debt to total marketable debt between 2003 and 2012, with a dip in the crisis year 2009, as Figure 2 shows.

**Figure 2: Local currency central government marketable debt (% of central government marketable debt) in SSA**



Source: Compiled with data from OECD (2013).

Note: Figure includes Angola, Cameroon, Gabon, Kenya, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Nigeria, Sierra Leone, South Africa, Tanzania, Uganda and Zambia. Data for Angola is excluded from 2010 onwards; data for Gabon is excluded from 2003 to 2007 and from 2010 onwards and data for Namibia is excluded from 2008 onwards.

If we turn to local currency treasury bond market development, the picture that emerges is more ambiguous. At present, the database of the African Development Bank’s African Financial Market Initiative (AFMI) seems to have the largest coverage of local currency treasury bonds, in terms of both countries and years. However, there remain significant gaps in the dataset for many SSA countries up to the year 2006, thus we will focus on developments within the years 2007 to 2012 in the following analysis.

As Figure 3 shows, local currency treasury bonds issuance as share of GDP in SSA increased from 2007 onwards and decreased from 2010 onwards. The regional aggregate disguises significant differences in the size of local currency sovereign bonds issued between SSA countries in different income groups. However, there has been an increase in the average size of local currency treasury bonds in all three groups of countries, low-income, lower middle-income and upper middle income countries as classified by the World Bank, from the first period (2007-2009) to the second period (2010-2012) as Table 2 shows. In addition, the data suggests that low income countries issue on average a smaller amount of bonds as share of GDP than do middle-income countries. As Table 2 shows, between 2010 and 2012, the average bond size in low income countries was about 2% of GDP, whereas in lower middle-income and upper middle-income countries the average bond size amounted to 3% of GDP. That said, the amounts issued

by low-income African countries in recent years are not negligible. In 2012, for instance, the total amount of local currency bonds issued in our sample of low-income countries amounts to 2.5% of GDP,<sup>4</sup> which is equivalent to 28% of net Official Development Assistance received by these countries or 34% of their net inflows of foreign direct investment in 2012.

To what extent have LCBMs in SSA deepened in recent years? Using the ratio of local currency treasury bonds outstanding to GDP as a measure of the depth of the local currency treasury bond market, Figure 4 shows that in SSA as a whole LCBMs have deepened between 2007 and 2012. That said, the amount of local currency treasury bonds outstanding has slightly declined between 2010 and 2012. Table 3 presents averages of local currency bonds outstanding by income group and a comparison of these averages in the time period from 2007-2009 and the time period from 2010 to 2012. The data presented in Table 3 show that LCBMs have, on average, deepened in the recent time period, a finding that holds for the group of low-income, lower middle-middle income and upper middle-income countries. In addition, the data indicates that the level of economic development may have a positive relationship with LCBM depth: In both time periods under consideration, the relative size of LCBMs is smallest in low-income countries and largest in upper-middle income countries.

The literature on bond market development suggests some factors which may pose challenges to LCBM development in SSA. Among those are many structural challenges in building up LCBMs, including illiquid debt instruments, short maturities, a restricted and undifferentiated investor base, and undeveloped secondary markets. Country-specific factors such as governance, regulatory and institutional frameworks have a significant impact on the development of LCBMs.

Illiquid debt instruments and short maturities of government securities represent major structural challenges of LCBMs in SSA. First of all, underdeveloped government bond markets inhibit the development of corporate bond markets, since government bonds cannot assume their benchmarking role. Secondly, undeveloped domestic debt markets increase rollover risks, generate higher interest rates and reduce the effectiveness of monetary policy (IMF, 2013: 40).

A further structural challenge is the restricted and undifferentiated investor base in domestic debt markets which is largely concentrated on bank financing. This narrow investor base exists albeit

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<sup>4</sup> In 2012, Benin, Burkina Faso, Kenya, Mali, Mozambique, Tanzania, Togo and Uganda are included in our sample of low-income countries.

auctions of government debt have been oversubscribed in many countries, including those of the West African Economic and Monetary Union (WAEMU).

Underdeveloped secondary markets represent a further structural constraint of the low developed LCBMs in SSA. Barriers to secondary market development include the low liquidity in the banking system and short-term papers obstructing secondary market development. Due to the fact that auctions of government debt have repeatedly been oversubscribed, a number of investors hold their papers to maturity which also impedes secondary market development.

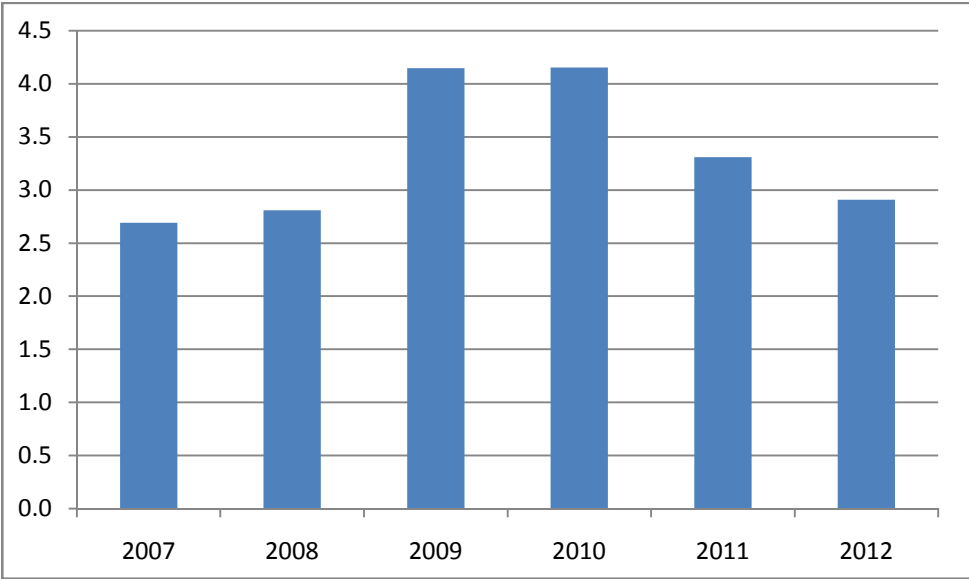
Several factors impede the issuance and monitoring of domestic debt including a lack of an efficient institutional structure and a solid legal framework. Similarly, a lack of personnel trained in debt management being crucial for the issuance of domestic securities contributes to the slow development of LCBMs in this region. A further problem is that government bonds could crowd out corporate bonds (IMF, 2007: 64-65 and 2014: 40).

In addition to these structural weaknesses, there are risks of LCBMs. Often real interest costs of domestic issuance at longer maturities significantly exceed foreign borrowing costs mainly because there is little trust in the markets including high expected inflation rates and a lack of secondary market liquidity (IMF, WB, EBRD and OECD, 2013). There are also risks for investments in sustainable development. One main risk is the mispricing of the needs and challenges of sustainable development due to a lack of information and of internalization of environmental and social costs (Waygood, 2014).

The picture that emerges from this discussion of recent trends in the development of sovereign bond markets in SSA is that LCBMs are indeed at a nascent stage but have seen significant development progress over the past decade. This suggests that it is the right time to learn and think about ways to spur the continued development of these markets but also about potential risks of LCBM development. In following section, we focus on the first issue and examine empirically the factors which may hinder and promote the development of LCMBs.



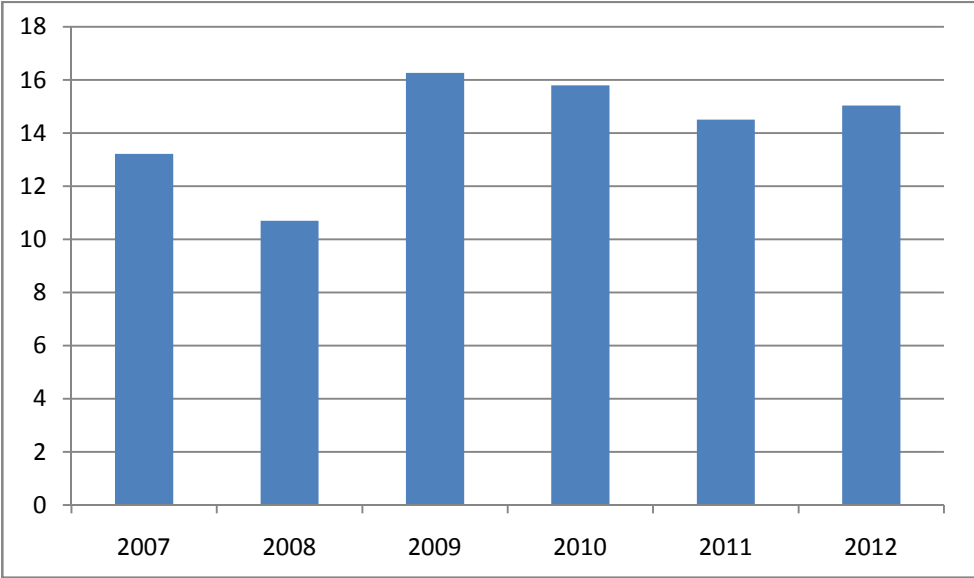
**Figure 3: Local currency treasury bonds issued (% of GDP) in SSA**



Source: Compiled with data from African Development Bank (2014).

Note: Figure includes Angola, Benin, Botswana, Burkina Faso, Cabo Verde, Cote d’Ivoire, Gabon, Ghana, Kenya, Mali, Mauritius, Mozambique, Namibia, Nigeria, Senegal, South Africa, Tanzania, Togo, Uganda and Zambia. Data for Benin for 2010 is missing. Data for Botswana is included from 2008 onwards. Data for Burkina Faso for 2008 is missing. Data for Mali and for Mozambique is included from 2008 onwards.

**Figure 4: Local currency treasury bonds outstanding (% of GDP) in SSA**



Source: Compiled with data from African Development Bank (2014).

Note: Figure includes Angola, Benin, Botswana, Burkina Faso, Cabo Verde, Cote d’Ivoire, Gabon, Ghana, Kenya, Malawi, Mali, Mauritius, Mozambique, Namibia, Nigeria, Senegal, South Africa, Tanzania, Togo, Uganda and Zambia. Data for Mali is included from 2008 onwards.

**Table 2: Local currency treasury bonds issued (% of GDP)**

	<b>2007-2009</b>	<b>2010-2012</b>	<b>2012</b>
<b>Low-income countries</b>			
Benin	1.3	0.0	0.0
Burkina Faso	1.7	0.9	0.6
Kenya	3.8	5.7	5.0
Mali	0.7	0.3	0.0
Mozambique	0.1	0.7	0.8
Tanzania	1.2	1.9	1.9
Togo	0.6	2.3	2.4
Uganda	2.3	2.9	2.8
<b>Average low-income countries</b>	<b>1.4</b>	<b>1.8</b>	<b>1.7</b>
<b>Lower middle-income countries</b>			
Cabo Verde	3.3	4.7	4.7
Cote d'Ivoire	0.9	2.5	2.0
Ghana	4.0	7.1	7.7
Nigeria	2.6	1.5	1.2
Senegal	1.0	2.3	3.5
Zambia	1.6	1.8	1.7
<b>Average lower middle-income countries</b>	<b>2.2</b>	<b>3.3</b>	<b>3.5</b>
<b>Upper middle-income countries</b>			
Angola	1.2	0.9	0.8
Botswana	1.5	1.2	0.5
Gabon	0.5	0.0	0.0
Mauritius	7.5	8.6	9.3
Namibia	0.8	2.0	2.2
South Africa	5.0	6.4	5.4
<b>Average upper middle-income countries</b>	<b>2.7</b>	<b>3.2</b>	<b>3.0</b>

Source: African Development Bank (2014).

**Table 3: Local currency treasury bonds outstanding (% of GDP)**

	<b>2007-2009</b>	<b>2010-2012</b>	<b>2012</b>
<b>Low-income countries</b>			
Benin	2.5	2.7	2.2
Burkina Faso	2.2	3.8	4.0
Kenya	10.5	21.8	22.7
Malawi	0.8	0.2	0.1
Mali	1.0	1.6	1.2
Mozambique	2.2	2.4	2.6
Tanzania	4.2	5.7	6.4
Togo	3.2	5.3	7.5
Uganda	6.8	7.4	7.5
<b>Average low-income countries</b>	<b>3.7</b>	<b>5.7</b>	<b>6.0</b>
<b>Lower middle-income countries</b>			
Cabo Verde	17.0	22.0	23.2
Cote d'Ivoire	2.9	6.3	8.2
Ghana	9.4	13.4	15.3
Nigeria	7.1	5.7	5.8
Senegal	2.8	5.7	7.6
Zambia	5.3	5.6	6.1
<b>Average lower middle-income countries</b>	<b>7.4</b>	<b>9.8</b>	<b>11.0</b>
<b>Upper middle-income countries</b>			
Angola	1.5	4.3	4.3
Botswana	3.7	5.1	5.2
Gabon	1.2	0.3	0.2
Mauritius	27.2	34.9	35.8
Namibia	10.1	9.3	9.3
South Africa	25.8	32.1	33.1
<b>Average upper middle-income countries</b>	<b>11.6</b>	<b>14.3</b>	<b>14.6</b>

Source: African Development Bank (2014).

### **3 Patterns of LCBM development in Sub-Saharan Africa: Cross-country economic evidence**

The previous sections highlighted that significant efforts are still needed to develop LCBMs if they are to become a reliable and major source of long-term financing for sustainable development in SSA. How could this be done? This section approaches this question empirically by examining the factors that influence LCBM development. Our aim is to explore what has been driving LCBM development in SSA and whether the drivers in SSA are different from elsewhere. Specifically, we will employ cross-country econometric analysis to examine the broad patterns of LCBM development in SSA and learn about its key drivers and obstacles. Our focus is on the relationship between a broad set of macroeconomic and institutional variables on the one hand and LCBM development on the other.

There is little empirical research on the drivers of bond market development in Africa to date, and empirical scholarship on *local currency* bond market development in Africa is even more scant.<sup>5</sup> A major reason for the limited empirical research on LCBM development in Africa is probably the poor quality and availability of data on local currency bond markets in SSA. In a recent study, Essers et al. (2014), for instance, use a dataset on local currency debt in SSA to examine the drivers of LCBM development. Yet their sample also remains limited to 15 African countries and the time period from 2003 to 2012 because data for their dependent variable, year-end outstanding marketable central government debt in or indexed to local currency as a percentage of GDP, is only available for relatively few African countries and years. The relatively small sample size does not only limit the degree to which results are representative but also meant that tests did not provide definitive answers to questions of model choice (Essers et al., 2014: 17). As previous scholars, Essers et al. (2014) have dealt with uncertainty about model specification by using various estimators and models in parallel.

Drawing from the African Development Bank's AFMI database, among others, we compile a dataset comprising 27 African countries, ranging over a maximum of 13 years. For sure, our sample size remains limited as well, weakening the power of statistical tests for model specification. Thus, we will follow the approach to employ a wide array of econometric tests to probe the robustness of results. Overall, we think that our analysis based on a much larger

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<sup>5</sup> For previous studies on the determinants of bond market development see Mu et al. (2013) and Adelegan and Radzewicz-Bak (2009). For a recent paper on the drivers of local currency bond market development see Essers et al. (2014).

sample than used in previous studies will help to generate robust insights in LCBM development in SSA.

### *Model specification*

Following existing studies on the determinants of LCBM development such as Essers et al. (2014) and Mu et al. (2013), we employ a model of the following form:

$$Y_{i,t} = \alpha + \beta X_{i,t-1} + \delta \mu_i + \varepsilon_{i,t}$$

where  $Y_{i,t}$  is the dependent variable, i.e., the outstanding amount of local currency treasury bonds as a percentage of GDP for country  $i$  in year  $t$ ; this variable is our indicator for the depth of local currency bond markets;  $X_{i,t-1}$  is a vector of one-year lagged explanatory variables derived from the literature and described below;  $\mu_i$  are country-specific effects and  $\varepsilon_{i,t}$  is an error term. While it is not possible to establish causal relationships with the data and models we use, we seek at a minimum to ensure that changes in the explanatory variable precede changes in the dependent variable by using lags of the explanatory variables.

As already noted, we will employ a wide range of estimators in order to probe the robustness of our results, similar to Essers et al. (2014) and Mu et al. (2013). In particular, we estimate:

- pooled ordinary least squares (POLS) with panel-corrected standard errors (PCSE) to address panel heteroscedasticity; this model assumes a common intercept across countries ( $\delta = 0$ );
- feasible generalised least squares (FGLS) with heteroskedastic error structures and panel-specific autocorrelation;
- the random effects (RE) model, which models the country-specific constant terms  $\mu_i$  as distributed randomly across countries and as independent from the other explanatory variables;
- the AR1 error model, which employs panel-corrected standard errors, country fixed-effects (FE) and a Prais-Winston transformation to address the potential serial correlation of errors; Prais-Winston regressions involve a transformation of the data based on an estimate of the autocorrelation of the error terms.<sup>6</sup> Fixed effects serve to capture country-specific constant factors, which, if not included in the model, would give rise to omitted variable bias. Yet eliminating time-invariant unobserved heterogeneity between countries comes at the cost of less efficient estimates. Specifically, it is not possible to examine the effects of time-invariant explanatory variables such as the surface of a country.

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<sup>6</sup> The Wooldridge test for serial correlation revealed the presence of serial correlation of the errors.

### *LCBM development – The dependent variable*

Data on local currency sovereign bond market development in SSA is scarce. The recent study by Essers et al. (2014) used data on local currency central government debt from the OECD's African Central Government Debt Statistical Yearbook (OECD, 2013) as dependent variable in their analysis of the drivers of LCBM development, probably the first empirical study to make use of this dataset for analysing LCBMs. This paper seeks to complement the existing literature by using data on local currency marketable central government bonds from the African Development Bank's AFMI. The AFMI data is available for a larger set of SSA countries than the set of countries included in the analysis by Essers et al. (2014),<sup>7</sup> allowing us to gain insights on the correlates of LCBM development based on a slightly different set of countries. Our paper is also different in that our focus is on treasury bonds of a maturity of one year or greater. While Essers et al. (2014) include short-term government securities with a maturity of less than one year in their analysis, we exclude them because short-term securities may be less appropriate instruments to finance the long-term investments needed to achieve the SDGs.

To measure the depth of LCBMs we use a variable capturing the total amount of medium and long-term (maturity of one year or more) sovereign bonds in local currency outstanding as percentage of GDP (*BondsGDP*). The data on the total amount of bonds outstanding is from the AFMI database, the GDP data is from the World Development Indicators (WDI) of the World Bank (2014).

### *Explanatory variables*

In selecting the explanatory variables of the analysis, we follow various studies that examine the drivers of bond market development in Africa and elsewhere, allowing us to draw conclusions on whether the determinants of LCBM development in SSA are the same as elsewhere. The first group of explanatory variables relates to economic structure. There is some evidence for a positive relationship between country size and bond market development from studies which focus on regions other than Africa.<sup>8</sup> One possible reason is that smaller-sized economies face greater obstacles to bond market development because economies of scale, which are important to reduce the costs of the establishment of LCBMs, are more difficult to realise (Claessens et al., 2007: 379). Another possible reason for a positive relationship between country size and bond

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<sup>7</sup> Table A1 in the appendix provides an overview over the countries included in our sample and the sample of Essers et al. (2014).

<sup>8</sup> See for instance Eichengreen and Luengnaruemitchai (2004) and Claessens et al. (2007)

market development is that larger economies offer greater diversification benefits to foreign investors (Hausmann and Panizza, 2003). The greater availability of (potential) buyers and sellers in larger-sized economies may also enhance bond market development by reducing price volatility (Eichengreen and Luengnaruemitchai, 2004). We use two indicators to capture the size of an economy. First, the natural log of GDP in constant 2005 United States Dollars (USD) (*lnGDP*) and second, the log of a country's surface in squared kilometres (*lnSize*). Data for both indicators is from the WDI database.

The discussion of recent trends in LCBM development in the previous section suggests that there is a positive relationship between LCBM development and the stage of economic development, a finding that is in line with some studies on the determinants of financial market development more generally.<sup>9</sup> We use the natural log of the GDP per capita in constant 2005 USD (*lnGDPPC*) as an indicator of the level of economic development. The data is from the WDI.

Following Essers et al. (2014) and Mu et al. (2013) we also include a measure for trade openness. Trade openness may be positively correlated with financial development for several reasons. One reason may be that trade openness supports bond market development indirectly by encouraging an economic enthusiasm and institutional development in ways not completely captured by other variables (Eichengreen et al., 2008: 265). Another reason may be that established industrial interests may be less opposed to financial development despite encouraging market entry and benefiting newcomers when an economy allows cross-border trade flows (Rajan and Zingales, 2003).<sup>10</sup> Yet a negative correlation is also plausible as countries which are less integrated into world markets may have more incentive to develop domestic bond market markets in order to meet their financing needs (Adelegan and Radzewicz-Bak, 2009). We use WDI data on the ratio of total exports of goods and services as a percentage of GDP (*trade*) as an indicator for trade openness.

The size of the banking sector may also affect LCBM development. As banks play an important role in the development of liquid and functioning bond markets as dealers and market makers, a more developed banking sector may be positively associated with bond market development (Eichengreen and Luengnaruemitchai, 2004: 13). In addition, in most African countries banks are the major class of government bond investors, suggesting a strongly developed banking sector may enhance bond market development. However, a larger banking sector may also be

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<sup>9</sup> See for instance Calderon and Liu (2003), who find a bi-directional relationship between finance and growth.

<sup>10</sup> Specifically, Rajan and Zingales (2003) argue that incumbents' opposition to financial development, which encourages competition, will be weaker when an economy allows both cross-border trade and capital flows.

associated with lower bond market development as powerful banks may oppose bond market development which breeds competition (Adelegan and Radzewicz-Bak, 2009) or as banks may substitute for bond financing. To probe the relationship between banking sector development and bond market development we employ as an indicator for the size of the banking sector private credit by banks as percentage of GDP (*bankcredit*), again taken from the World Bank's WDI database.

In addition, we include in some specifications a variable capturing the sum of rents from oil, minerals and gas as a percentage of GDP (*ResRents*) from the WDI.<sup>11</sup> We include this structural economic variable because there is some evidence that resource dependence influences financial sector development (Beck, 2011) and resource dependence is quite prevalent in the African context. As regards LCBM development, the direction of the expected relationship is not clear: On the one hand, windfall gains from the extraction of natural resources may reduce the government's demand for financing and hence the incentives for LCBM development. On the other hand, large natural resource revenues increase the creditworthiness of the government which may encourage LCBM development. We include *ResRents* only in some of our baseline models because the availability of data for this variable data is limited.

The second group of explanatory variables captures macroeconomic policy choices. One of these variables is the fiscal balance, defined as revenues minus expenditure. There is some evidence for a negative relationship between the fiscal balance and bond market development (Mu et al., 2013; Essers et al., 2014). Yet a priori, the effect of the fiscal balance on bond market development is ambiguous: The government's financing needs may provide an important impetus for LCBM development (Maziad et al., 2013). More negative fiscal balances (that is, larger fiscal deficits) may thus be positively associated with LCBM development. Yet large fiscal deficits may also raise doubts about macroeconomic stability and the government's ability to repay debt among potential investors and may thus have a negative influence on government bond market development. Moreover, it is plausible to assume in the African context that the fiscal balance is endogenous to bond market development as the ability to run fiscal deficits is likely to be constrained by bond market development (Essers et al., 2014: 20). We follow other scholars such as Eichengreen and Luengaruemitchai (2004), Adelegan and Radzewicz-Bak (2009) and Essers et al. (2014) in using the three-year moving average of past budget balances

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<sup>11</sup> Rents are defined in this study as the difference between the price of a commodity and the average cost of producing it.



(*cashsurplus*) to reduce the effects of cyclical fluctuations. Data is, again, from the WDI database.

There is considerable empirical evidence that high inflation rates, indicating low monetary policy credibility and thus the likelihood that creditors' interest rate earnings might be eroded by inflation, are an obstacle to LCBM development (Hausmann and Panizza, 2003; Claessens et al., 2007; Essers et al., 2014). Moreover, in countries with a history of high inflation, governments are likely to face pressure to offer higher coupon rates on fixed-rate bonds *ex ante*, which could result in higher real interest costs if the expected inflation does not materialise *ex post*, rendering the issuance of such bonds less attractive to governments in the first place (Essers et al., 2014). We include WDI data on inflation as measured by the consumer price index (*inflation*) as an explanatory variable and – admittedly imperfect – proxy of monetary policy credibility.

We also include capital account openness as an explanatory variable. *Ex ante*, the effect is ambiguous: On the one hand, an open capital account may help promote bond market development, for instance by encouraging foreign investors to enter the market. Claessens et al. (2007: 389) argue that an open capital account also raises the interest of domestic investors in bonds by exposing countries to greater market discipline. On the other hand, capital controls may prevent domestic capital from leaving the country and thus create a captive investor base (Forslund et al., 2011). We follow existing research such as Essers et al. (2014) in using the Chinn-Ito Financial Openness Index (Ito and Chinn, 2014), a *de jure* measure of capital account openness (*kaopen*).<sup>12</sup> Higher values of the index indicate a more open capital account.

As a final economic policy variable we include in some specifications exchange rate volatility (*d\_exrate*). Eichengreen and Luengnaruemitchai (2004), for instance, find that lower exchange rate volatility is positively correlated with bond market development. The reason may be that exchange rate stability can provide credibility and may lower currency risk which may in turn encourage foreign participation and lead to greater domestic currency intermediation (Eichengreen and Luengnaruemitchai, 2004; Claessens et al., 2007). However, *a priori* a negative relationship between exchange rate volatility and LCBM development seems as well plausible as stable exchange rates may increase the incentives to issue debt in foreign, rather than local currency. We measure exchange rate volatility by the 5-year rolling standard deviation of the change of the log of exchange rates. Data is from the IMF's International Financial Statistics.

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<sup>12</sup> For information on how the index is constructed see Ito and Chinn (2008).

The third group of explanatory variables we consider refers to the quality of institutions. We include a variable capturing the legal origin because there is some evidence that in countries whose legal rules originate in the British common law tradition as opposed to the civil law tradition financial markets are more developed, arguably because legal rules originating in the British common law tradition tend to offer a better protection to investors.<sup>13</sup> We construct a dummy variable capturing whether a country has a British law legal origin or not (*commonlaw*).

There is considerable evidence from studies on other world regions that there is a positive relationship between the ability of the government to pursue policies that promote private sector development and the rule of law on the one hand, and bond market development on the other (Eichengreen and Luengnaruemitchai, 2004; Burger and Warnock, 2006).<sup>14</sup> We therefore include an additional variable, *governance*, which is a composite indicator that is based on two indices from the Worldwide Governance Indicators dataset (Kaufmann et al., 2014), namely regulatory quality and rule of law. Regulatory quality captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. Rule of law captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. The two components, regulatory quality and rule of law, have been weighted equally. Higher values of the index indicate better governance.

Finally, we include a variable capturing the openness of political institutions, *polity2*. There is a considerable body of research which argues that countries which have more open political institutions are likely to have more developed financial markets.<sup>15</sup> *Polity2* measures regime types on a scale ranging from -10 (strongly autocratic) to +10 (strongly democratic). Data is taken from the Polity IV dataset (Marshall et al., 2014).

Table A2 in the Appendix provides descriptive statistics for our dependent and explanatory variables. There is a significant amount of missing values. Therefore, the analyses that follow extend to a maximum of 27 African countries, a maximum of 13 years (in most specifications

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<sup>13</sup> Key publications championing this “legal origin view” are La Porta et al. (1998) and Beck et al. (2003). For evidence for a positive relationship between British legal origin and bond market development see for instance Essers et al. (2014).

<sup>14</sup> See for instance Burger and Warnock (2006) and (Eichengreen and Luengnaruemitchai, 2004)

<sup>15</sup> An excellent overview provide Haber et al. (2008). Evidence for a positive relationship between democracy and bond market development provide for instance Claessens et al. (2007) and Essers et al. (2014).

2000-2012), and a maximum of 248 observations.<sup>16</sup> Comparing the overall, between and within variation in Table A2 suggests, that for our dependent and most other variables, most variation arises from differences between countries rather than from within-country changes over time. This predominance of cross-country variation not only renders it difficult to discover significant relationships with the AR1 error model, which examines variation within countries over time, but also suggests that it is important to compare results of the AR1 error mode with those of other estimators that capture cross-country variation.

### *Caveats*

While our model specifications build on existing studies on bond market development in Africa, there remain some important methodological concerns. The most serious concern refers to the number of observations due to missing values. The limited number of observations limits both the power of statistical tests and the degree to which the results may be generalisable across SSA. In addition, the POLS model, the RE model and the AR1 error model do not address potential reverse causality and endogeneity beyond using lags of the explanatory variables. That said, we still think that the empirical analysis in this paper helps to improve our understanding of LCBMs in SSA and complements existing studies because it relies on a novel, relatively large dataset with a focus on SSA, hence the ability to probe the robustness of the results of existing studies and compare our results with those relating to other world regions.

In order to address challenges arising from endogeneity we employ, in addition to the estimators described above, generalised method of moments (GMM) estimators, which use internal instrumental variables to overcome dynamic panel bias and allow controlling for the potential endogeneity of other explanatory variables.<sup>17</sup> As is standard in GMM-estimation, we include a lagged dependent variable, which accounts for the possibility that LCBM development is a process of gradual adjustment, where LCBM development in one period heavily influences LCBM development in the next period. While GMM estimators are commonly used in macroeconomic research, results of the estimation should be interpreted with caution because GMM estimators are designed for situations with a large number of cross-sectional units (large N) and short time series (small T). In the analysis of the correlates of LCBM development, N, which amounts to a maximum of 27 countries, is definitely not large due to limited data

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<sup>16</sup>Our dependent variable, for instance, is available for a maximum of 28 (countries) times 14 (years) minus 128 (missings), that is 264 observations.

<sup>17</sup> The inclusion of a lagged dependent variable may render estimates inconsistent if FE are included. This is referred to as dynamic panel bias.

availability, weakening the power of the analysis and highlighting the need to consider the GMM- estimations as robustness checks.

### *Results*

Figure A1 in the appendix consists of a series of scatterplots, showing correlations between the dependent variable, namely the stock of local currency treasury bonds, and the various lagged explanatory variables in 2012. Table A3 in the appendix shows the pair-wise correlations between stock of local currency treasury bonds, and the various lagged explanatory variables in 2012. We find: a significant, positive correlation between LCBM development and the natural log of GDP; a negative correlation between LCBM development and the natural log of the surface area, which is largely driven by the depth of the LCBM in Mauritius (MUS);<sup>18</sup> a significant, positive correlation between LCBM development and the natural log of GDP per capita, which appears to be driven by Mauritius and South Africa;<sup>19</sup> a positive correlation between LCBM development and trade openness; a significant, positive correlation between LCBM development and private credit by banks; a negative correlation between LCBM development and the resource rents in percentage of GDP; a negative correlation between LCBM development and past fiscal surpluses; a positive correlation between LCBM development and inflation rates, which appears to be driven by Kenya;<sup>20</sup> a positive correlation between LCBM development and capital account openness; a positive correlation between LCBM development and exchange rate volatility; a positive correlation between LCBM development and British legal origin; a significant, positive correlation between LCBM development and the quality of governance (the composite index capturing regulatory quality and the rule of law); a significant positive correlation between LCBM development and the degree to which countries are democratic. Our results are broadly in line with those presented in the study on LCBM development in SSA by Essers et al. (2014), except that they do not find a significant relationship between GDP and LCBM development and that they find a negative relationship between LCBM development and inflation rates.

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<sup>18</sup> If we exclude Mauritius from the sample, the slope of the fitted line is almost flat.

<sup>19</sup> If we exclude Mauritius and South Africa from the sample, the positive correlation loses significance.

<sup>20</sup> In 2010 and 2011 Kenya, which has deep financial markets, experienced high inflation rates. If we exclude Kenya from the sample, the slope of the fitted line is almost flat. In 2011, and 2010, the slope of the fitted line is as well flat or negative if we exclude Kenya.

### *Results of baseline models*

Tables 4 and 5 show the estimation results of our baseline models. The estimation results of the POLS with PCSE are presented in columns 1 to 5 of Table 4 and the estimation results of the FGLS model are presented in columns 6 to 10 of Table 4. Table 5 displays the estimation results of the RE model (columns 1 to 5) and of the AR1 model with FE (columns 6 to 10). While the estimation results for the different models differ slightly, two variables seem to be robustly correlated with LCBM development. First, countries with greater economic size, as measured by the natural log of GDP, seem to have more developed LCBMs. This result is in line with the findings of other studies such as Mu et al. (2013: 131), Eichengreen and Luengnaruemitchai (2004) and Claessens et al. (2007). Second, having larger fiscal deficits is associated with deeper LCBMs. This finding supports the proposition that larger fiscal deficits provide incentives for LCBM development and is in line with results from studies focusing on other world regions such as Eichengreen et al. (2008). The models employing POLS with PCSE, the RE and the AR1 error model also provide significant evidence that is robust to the inclusion of control variables suggesting that lower stages of economic development are associated with deeper LCBM in. While this finding is surprising, other studies of the determinants of LCBM development, for instance Essers et al. (2014: 43) and Eichengreen and Luengnaruemitchai (2004), present similar results. One possible explanation is that governments in richer economies have a broader fiscal base which allows them to rely less on LCBM financing. In addition, there is evidence that greater trade openness and deeper banking sectors are associated with deeper LCBM in the models employing POLS with PCSE, FGLS and RE. Other studies, such as and Eichengreen and Luengnaruemitchai (2004) and Essers et al. (2014), also present results that suggest that there is a significant and positive relationship between the size of the banking sector and trade openness on the one hand and LCBM development on the other. There is also some evidence that capital account openness and *governance* are significantly and positively related to LCBM development, but these results are less consistent in our models. Finally, it is important to note that resource dependence does not seem to have a significant effect on LCBM development but that it appears to mediate the effect of other variables. Specifically, *lnSize* and variables capturing the quality of institutions (*polity2* and *governance*) lose significance in several specifications once we control for resource dependence.

We also employ Breusch-Pagan LM Tests and Hausman tests to examine the appropriateness of different models. The results are presented in Table A4 in the appendix. Columns 1 to 5 represent the results of the RE model and columns 6 to 10 present the results of the FE model.

The results of the Breusch-Pagan tests are mixed, providing no clear picture on whether there are significant differences across units and thus on whether RE models are to be preferred over the POLS model. The Hausman tests, however, suggest that the unique errors ( $u_i$ ) are correlated with the regressors and thus that models with country FE are preferable to the RE model. That said, the power of tests that help with model choice may be weakened by the limited number of observations and much of the variation of key variables stems from within country rather than cross-country variation, highlighting the importance of looking beyond the FE-, i.e. within estimator (Essers et al., 2014: 23). If we return to Table 5, the main difference between the RE model and the AR1 error model with FE that emerges is that GDP per capita has consistently a negative effect in the AR1 error models. In addition, in the AR1 model there is no consistent statistically significant relationship between the size of the banking sector and LCBM development and between the fiscal balance and LCBM development.

#### *Results of GMM-estimation*

Tables 6 and 7 present the GMM estimation results. In all models, we sought to reduce the number of instruments because GMM estimations with too many instruments tend to overfit the endogenous variables (thereby failing to isolate their exogenous components), while concurrently weakening the power of Hansen tests for instrument validity (Roodman, 2009). We reduced the number of instruments by limiting the number of lags used to two lags and collapsing the instrument matrix, as suggested by Roodman (2009).

We implemented the GMM estimator using Stata's `xtabond2` command. In doing so, we used forward orthogonal deviations as an alternative to differencing because this helps to preserve sample size in panels with gaps. We implemented two-step GMM as opposed to one-step GMM because two-step standard errors, with the Windmeijer finite sample correction to the reported standard errors, are considered quite accurate and seem modestly superior to robust one-step (Roodman, 2006).<sup>21</sup> We also implemented time FE (the estimates are not reported here) to reduce the risk of a contemporaneous correlation of errors.

Table 6 presents the results of a two-step difference GMM estimation and Table 7 the results of the two-step system GMM estimation. Note that we exclude the variable capturing resource dependence from the analysis due to the limited availability of data. Following Essers et al. (2014) and Mu et al. (2013), we employed several models which make different assumptions about endogeneity and use different instrument sets: Column 1 of both Table 6 and Table 7

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<sup>21</sup> Without the Windmeijer correction standard errors tend to be severely downward biased (Roodman, 2006).

presents the results of a simple autoregressive model, taking a maximum of two instrument lags and collapsing the instrument matrix. In columns 2, 4 and 5 of Table 6 and columns 2, 4, 5, and 6 of Table 7 *cashsurplus* is modelled as endogenous, taking a maximum of two instrument lags and collapsing the instrument matrix. In column 3 of both Table 6 and Table 7, *cashsurplus* and *inflation* are modelled as endogenous, taking a maximum of two instrument lags and collapsing the instrument matrix. Finally, in columns 6 and 7 of Table 6 and columns 7, 8 and 9 of Table 7 *cashsurplus* and *d\_exrate* are modelled as endogenous, taking a maximum of two instrument lags and collapsing the instrument matrix. While these specification choices allow us to keep the number of instruments close to the number of our cross-sectional units as recommended by Roodman (2009), the number of instruments remains high in some specifications. This has weakened the power of statistical tests and suggests that the results of the GMM estimation should be assessed with caution.<sup>22</sup>

While the results of the two-step difference GMM estimation are except for the lagged dependent variable insignificant, there is some evidence in the two-step system GMM estimation, which is relatively robust to controls, that a lower stage of economic development and greater trade openness are conducive to LCBM development. These results are in line with those of the models presented above.

Table 8 summarises the main results of the analyses presented above and provides a comparison with the findings of the study of the drivers of LCBM development in SSA by Essers et al. (2014) and of three studies which focus on other regions, namely Claessens et al. (2007), who examine the drivers of LCBM development in a global sample covering emerging and developed economies; Eichengreen and Luengaruemitchai (2004),<sup>23</sup> who examine the drivers of LCBM development in Asia; and Eichengreen et al. (2008),<sup>24</sup> who examine the drivers of domestic bond market development in Latin America. The picture that emerges is that in Africa, as in other world regions, there appear to be benefits for LCBM development if countries are larger in economic terms, if they have higher fiscal deficits and larger banking systems, and if countries are more open to trade. According to our analysis, past inflation has no significant relationship with bond market development as suggested by others such as Claessens et al. (2007) and Essers et al. (2014).

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<sup>22</sup> An indicator of which is for instance p-values of 1.000 of some Hansen overidentification tests.

<sup>23</sup> Our focus is on the results of the regression models where government bond market development is the dependent variable.

<sup>24</sup> Our focus is on the results of the regression models where government bond market development is the dependent variable.

**Table 4: Baseline models: POLS with PCSE and FGLS**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	BondsGDP	BondsGDP	BondsGDP	BondsGDP	BondsGDP	BondsGDP	BondsGDP	BondsGDP	BondsGDP	BondsGDP
L.lnGDP	0.0188*** (0.00395)	0.0268*** (0.00399)	0.0319*** (0.00388)	0.0389*** (0.00527)	0.0368*** (0.00532)	0.0243*** (0.00525)	0.0283*** (0.00610)	0.0352*** (0.00586)	0.0372*** (0.00808)	0.0355*** (0.00660)
lnSize	-0.00553+ (0.00336)	-0.0137*** (0.00217)	-0.0167*** (0.00243)	-0.00196 (0.0163)	-0.0112 (0.0126)	-0.00973* (0.00405)	-0.0201*** (0.00405)	-0.0267*** (0.00399)	-0.0204 (0.0163)	-0.00600 (0.0101)
L.lnGDPPC	0.00191 (0.00556)	-0.0128 (0.0105)	-0.0272* (0.0109)	-0.0519** (0.0200)	-0.0499** (0.0171)	-0.00518+ (0.00265)	0.00360 (0.00797)	-0.00698 (0.00782)	-0.00555 (0.0188)	-0.0363** (0.0125)
L.trade	-0.000731* (0.000310)	0.000294 (0.000330)	0.00109* (0.000457)	0.00197* (0.000720)	0.00205* (0.000660)	-0.000234 (0.000154)	-0.0000747 (0.000268)	0.000479+ (0.000282)	0.00128*** (0.000351)	0.00129*** (0.000371)
L.bankcredit	0.00323*** (0.000216)	0.00373*** (0.000445)	0.00322 (0.000477)	0.00341 (0.000725)	0.00336*** (0.000668)	0.00215*** (0.000236)	0.00275*** (0.000352)	0.00172*** (0.000379)	0.00130** (0.000469)	0.00202*** (0.000469)
L.cashsurplus		-0.00340*** (0.000841)	-0.00274*** (0.000691)	-0.00288*** (0.000839)	-0.00256** (0.000983)		-0.000694 (0.000538)	-0.00109* (0.000479)	-0.00147+ (0.000760)	-0.00158* (0.000789)
L.inflation		0.000668 (0.000680)	0.0000410 (0.000617)	0.0000271 (0.000892)	0.000257 (0.000989)		-0.0000314 (0.000287)	-0.0000653 (0.000277)	-0.0000406 (0.000404)	0.00000284 (0.000428)
L.kaopen		0.00710*** (0.00122)	0.00352* (0.00158)	0.00653* (0.00261)	0.00722** (0.00260)		0.00784** (0.00243)	-0.00122 (0.00267)	0.00973 (0.00659)	0.00710+ (0.00406)
commonlaw			0.00792 (0.0115)	-0.0242 (0.0295)	-0.00672 (0.0238)			0.00940 (0.0123)	-0.0244 (0.0231)	-0.0205 (0.0221)
L.polity2			0.00228** (0.000870)	0.00120 (0.00207)	0.00228 (0.00167)			0.00113 (0.000917)	-0.000456 (0.00170)	-0.000903 (0.00139)
L.governance			0.0288 (0.0179)	0.0642 (0.0398)	0.0392 (0.0312)			0.0442** (0.0149)	0.0898*** (0.0264)	0.0842*** (0.0238)
L.ResRents				-0.000506 (0.000407)	-0.000765 (0.000494)				-0.000432 (0.000329)	-0.000452 (0.000354)
L.d_exrate					0.129+ (0.0745)					0.0433 (0.0541)
Constant	-0.363*** (0.0461)	-0.393*** (0.0936)	-0.386*** (0.0888)	-0.560*** (0.137)	-0.446*** (0.117)	-0.389*** (0.0750)	-0.414*** (0.0895)	-0.400*** (0.0890)	-0.506*** (0.127)	-0.462*** (0.105)
Observations	248	130	130	96	89	248	128	128	95	88
R <sup>2</sup>	0.7312	0.8073	0.8254	0.7826	0.8077					
χ <sup>2</sup> p-value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Standard errors in parentheses. + $p < 0.10$ , \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$



**Table 5: Baseline models: RE and AR1 error model with country-FE**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	BondsGDP	BondsGDP	BondsGDP	BondsGDP	BondsGDP	BondsGDP	BondsGDP	BondsGDP	BondsGDP	BondsGDP
L.lnGDP	0.0231** (0.00736)	0.0370*** (0.00812)	0.0450*** (0.00956)	0.0519** (0.0174)	0.0368*** (0.00746)	0.107** (0.0396)	0.390*** (0.0792)	0.367*** (0.0752)	0.569*** (0.103)	0.539*** (0.106)
lnSize	-0.00706 (0.00537)	-0.0240*** (0.00683)	-0.0293*** (0.00758)	-0.0270 (0.0233)	-0.0112 (0.0124)					
L.lnGDPPC	-0.00129 (0.00869)	0.00687 (0.0121)	-0.0106 (0.0145)	-0.00873 (0.0249)	-0.0499*** (0.0150)	-0.0546 (0.0574)	-0.492*** (0.129)	-0.475*** (0.121)	-0.762*** (0.153)	-0.725*** (0.159)
L.trade	-0.000471 (0.000403)	0.000156 (0.000514)	0.000886 (0.000567)	0.00115 (0.000955)	0.00205** (0.000681)	-0.000219 (0.000387)	0.000210 (0.000481)	0.000345 (0.000471)	0.000311 (0.000661)	0.000564 (0.000614)
L.bankcredit	0.00330*** (0.000389)	0.00215*** (0.000543)	0.00120* (0.000588)	0.000404 (0.000816)	0.00336** (0.000552)	0.00166* (0.000717)	-0.000339 (0.000659)	-0.000407 (0.000630)	-0.00120 (0.000811)	-0.000529 (0.000677)
L.cashsurplus		-0.00353** (0.00119)	-0.00373** (0.00115)	-0.00467** (0.00150)	-0.00256+ (0.00148)		-0.000903 (0.000914)	-0.00131 (0.000850)	-0.00102 (0.000789)	-0.00140+ (0.000842)
L.inflation		-0.000367 (0.000704)	-0.000492 (0.000687)	-0.000724 (0.000885)	0.000257 (0.000893)		-0.000438 (0.000527)	-0.000318 (0.000518)	-0.000307 (0.000568)	-0.000300 (0.000734)
L.kaopen		0.00413 (0.00486)	-0.00309 (0.00677)	-0.00635 (0.0128)	0.00722 (0.00472)		-0.0181 (0.0217)	-0.0199 (0.0222)	-0.0431+ (0.0259)	-0.0544 (0.0355)
commonlaw			0.00901 (0.0231)	0.00983 (0.0444)	-0.00672 (0.0207)					
L.polity2			0.00298 (0.00198)	0.00287 (0.00419)	0.00228 (0.00230)			0.00313* (0.00155)	0.0000113 (0.00348)	-0.00355 (0.00406)
L.governance			0.0496+ (0.0261)	0.0558 (0.0480)	0.0392 (0.0268)			0.0651 (0.0420)	0.0562 (0.0513)	0.0351 (0.0524)
L.ResRents				-0.000225 (0.000878)	-0.000765 (0.000616)				0.000504 (0.000610)	0.000516 (0.000566)
L.d_exrate					0.129 (0.0815)					0.0244 (0.0794)
Constant	-0.431*** (0.115)	-0.584*** (0.135)	-0.584*** (0.159)	-0.777* (0.303)	-0.446** (0.142)	-2.173*** (0.585)	-5.743*** (1.022)	-5.222*** (0.990)	-8.022*** (1.453)	-7.649*** (1.517)
Observations	248	130	130	96	89	248	130	130	96	89
R <sup>2</sup>	0.7287	0.7787	0.7863	0.6735	0.8077	0.7287	0.8636	0.8683	0.8453	0.8768
χ <sup>2</sup> p-value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Standard errors in parentheses. + $p < 0.10$ , \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.00$

**Table 6: Difference GMM models**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	BondsGDP	BondsGDP	BondsGDP	BondsGDP	BondsGDP	BondsGDP	BondsGDP
L.BondsGDP	1.055*** (0.248)	2.552 (1.756)	1.775 (2.352)	2.653+ (1.359)	2.887+ (1.570)	0.925+ (0.445)	0.0238 (0.975)
lnGDP	0.0187 (0.0896)	-1.448 (1.580)	-0.716 (1.741)	-1.711 (1.443)	-1.778 (1.306)	-0.267 (0.258)	-0.0402 (0.311)
lnGDPPC	-0.0870 (0.0898)	1.073 (1.335)	0.506 (1.477)	1.595 (1.759)	1.507 (1.166)	-2.626 (2.506)	-4.254 (3.912)
trade	0.000134 (0.000279)	0.00638 (0.00710)	0.00377 (0.00938)	0.00715 (0.00582)	0.00819 (0.00692)	-0.00346 (0.00377)	-0.00788 (0.00774)
bankcredit	0.0000100 (0.000865)	-0.00190 (0.00276)	-0.000676 (0.00360)	-0.00191 (0.00188)	-0.00207 (0.00240)	0.000793 (0.000578)	0.00151 (0.00107)
cashsurplus		-0.0139 (0.0172)	-0.00803 (0.0227)	-0.0171 (0.0159)	-0.0189 (0.0164)	0.0278 (0.0259)	0.0438 (0.0397)
inflation		0.00230 (0.00384)	0.000888 (0.00576)	0.00251 (0.00313)	0.00315 (0.00481)	-0.00231 (0.00170)	-0.00243 (0.00166)
kaopen		-0.199 (0.170)	-0.128 (0.249)	-0.144 (0.167)	-0.194 (0.230)	-0.734 (0.622)	-1.147 (0.980)
polity2				0.000522 (0.00444)		-0.0173 (0.0161)	
governance					-0.0636 (0.197)		0.187 (0.195)
d_exrate						-0.125 (0.300)	0.231 (0.336)
Observations	187	94	94	94	94	93	93
Number of countries	26	18	18	18	18	18	18
Number of instruments	18	19	20	20	20	21	21
AR(1) p-value	0.039	0.395	0.627	0.325	0.461	0.000	0.037
AR(2) p-value	0.491	0.274	0.570	0.187	0.177	0.485	0.441
Hansen p-value	0.306	0.927	0.721	1.000	1.000	1.000	1.000

Standard errors (with Windmeijer correction) in parentheses. Number of observations refers to number of data points in the transformed (first-differenced) equation in the case of difference GMM. + $p < 0.10$ , \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ . Column 1: simple autoregressive model, taking a maximum of two instrument lags and collapsing the instrument matrix; columns 2, 4 and 5: *cashsurplus* endogenous, taking a maximum of two instrument lags and collapsing the instrument matrix; column 3: *cashsurplus* and *inflation* endogenous, taking a maximum of two instrument lags and collapsing the instrument matrix; columns 6 and 7: *cashsurplus* and *d\_exrate* endogenous, taking a maximum of two instrument lags and collapsing the instrument matrix.

**Table 7: System GMM models**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	BondsGDP	BondsGDP	BondsGDP	BondsGDP	BondsGDP	BondsGDP	BondsGDP	BondsGDP	BondsGDP
L.BondsGDP	1.016*** (0.0965)	0.658 (0.919)	0.798** (0.243)	0.541 (0.796)	-1.117 (1.893)	-0.104 (0.974)	-1.304 (2.302)	-1.278 (1.537)	0.707* (0.322)
lnGDP	0.00264+ (0.00139)	0.0508 (0.0605)	-0.00266 (0.0146)	0.0212 (0.0180)	0.0257 (0.0240)	0.0138 (0.0137)	0.0206 (0.0174)	0.0271 (0.0162)	0.00591 (0.00501)
lnSize	-0.00349*** (0.000862)	-0.0151 (0.0168)	0.000347 (0.00643)	-0.0141 (0.0121)	-0.0186 (0.0173)	-0.0222 (0.0189)	-0.0217 (0.0202)	-0.0203 (0.0128)	-0.00673 (0.00795)
lnGDPPC	-0.00333+ (0.00193)	0.0378 (0.0583)	-0.0162 (0.0121)	-0.00675 (0.00956)	-0.0496 (0.0346)	-0.0131** (0.00390)	-0.0329 (0.0232)	-0.0532+ (0.0303)	-0.00562 (0.00953)
trade	0.000162 (0.000124)	0.0000969 (0.000917)	0.000561 (0.000513)	-0.0000952 (0.000777)	0.0000854 (0.000581)	0.0000419 (0.000526)	-0.00125 (0.00178)	0.0000706 (0.000487)	0.000402+ (0.000231)
bankcredit	0.0000405 (0.000288)	-0.000916 (0.00522)	0.00109 (0.000849)	0.000891 (0.00286)	0.00770 (0.00664)	0.00351 (0.00294)	0.00835 (0.00827)	0.00827 (0.00549)	0.000942 (0.000946)
cashsurplus		-0.00637 (0.00870)	-0.000689 (0.00129)	0.00119 (0.00314)	0.00412 (0.00480)	0.00118 (0.00232)	0.00538 (0.00663)	0.00387 (0.00399)	0.000733 (0.00445)
inflation		-0.00191 (0.00320)	-0.00191 (0.00139)	-0.00149 (0.00152)	0.000723 (0.000905)	-0.00195 (0.00160)	0.00143 (0.00204)	0.000856 (0.000922)	-0.00115 (0.000712)
kaopen		0.00298 (0.00459)	0.00464 (0.00346)	0.00513 (0.00456)	0.00803 (0.00666)	-0.00327 (0.00410)	0.0117 (0.0108)	0.00860 (0.00530)	-0.000957 (0.00252)
polity2				0.00235 (0.00222)			0.00682 (0.00572)		
governance					0.0746 (0.0649)			0.0780 (0.0523)	
commonlaw						0.0766 (0.0621)			0.0311 (0.0219)
d_exrate							0.220 (0.238)	0.0751 (0.256)	-0.229 (0.457)
Observations	214	113	113	113	113	113	112	112	112
Number of countries	27	19	19	19	19	19	19	19	19
Number of instruments	21	23	25	24	24	24	26	26	23
AR(1) p-value	0.011	0.429	0.035	0.444	0.605	0.890	0.561	0.523	0.185
AR(2) p-value	0.476	0.656	0.106	0.452	0.940	0.890	0.336	0.712	0.232
Difference in Hansen p-value	0.733	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Standard errors (with Windmeijer correction) in parentheses. Number of observations refers to number of data points in the untransformed (level) equation in the case of system GMM. + $p < 0.10$ , \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ . Column 1: simple autoregressive model, taking a maximum of two instrument lags and collapsing the instrument matrix; columns 2, 4, 5 and 6: *cashsurplus* endogenous, taking a maximum of two instrument lags and collapsing the instrument matrix; column 3: *cashsurplus* and *inflation* endogenous, taking a maximum of two instrument lags and collapsing the instrument matrix; columns 7, 8 and 9: *cashsurplus* and *d\_exrate* endogenous, taking a maximum of two instrument lags and collapsing the instrument matrix.

**Table 8: Comparison of results**

Model	POLS, PCSE	FGLS	RE	AR1, Unit FE	Difference GMM	System GMM	Eichengreen and Luengnaruemitchai (2004)	Claessens, Klingebiel and Schmukler 2007	Eichengreen et al. (2008)	Essers et al. (2014)
Size of the economy (GDP)	+	+	+	+			+	+	GDP: +; GDP <sup>2</sup> : –	+
Surface area				n.a.	n.a.		n.a.	n.a.	n.a.	–
Stage of economic development	–			–			–	n.a.	GDPPC: +; GDPPC <sup>2</sup> : –	
Trade openness	+	+					+	n.a.	+	+
Size of the banking sector	+	+					+	+		+
Fiscal balance	–	–	–				–	n.a.	–	–
Inflation							n.a.	–	n.a.	–
Capital account openness	+						+	n.a.	–	
British legal origin				n.a.	n.a.		+	n.a.	–	+
Democracy							n.a.	+	n.a.	+
Regulatory quality and/or rule of law		+					Rule of law: +; Bureaucracy quality: –	n.a.		+
Resource dependence							n.a.	n.a.	n.a.	
Exchange rate volatility	+						–	n.a.	n.a.	

Note: += Relationship positive and significant; – = Relationship negative and significant. As regards results from the analysis presented in this paper, we only report a relationship as “significant” in this table where results are significant in all more fully specified models, i.e. in all models which include besides other variables one or more variables relating to the quality of institutions (*polity2*, *governance* and/or *commonlaw*). n.a. = not applicable because not included in the analysis.

#### 4 Lessons from emerging markets

Since the emerging market crises of the late 1990s, many emerging markets have sought to develop LCBMs to reduce foreign currency debt and overcome the currency and maturity mismatch problems that had previously contributed to financial vulnerability. This strategy has been apparently quite successful (Turner 2012) as markets in Latin America and Emerging Asia managed to significantly increase the share of bonds denominated in local currency (Table 9). LCBMs provided an important cushion during the Global Financial Crisis when U.S. and European financial institutions struggled for survival and would not extend credit to emerging markets.<sup>25</sup>

**Table 9: Currency denomination in bond markets by broad area**

	2000		2005		2010		2011*	
	Local currency	Foreign currency	Local currency	Foreign currency	Local currency	Foreign currency	Local currency	Foreign currency
Euro area	90.0	10.0	89.9	10.1	89.8	10.2	90.3	9.7
Japan	98.5	1.5	99.1	0.9	99.4	0.6	99.4	0.6
Latin America	46.0	54.0	59.9	40.1	71.2	28.8	70.8	29.2
Emerging Asia	88.4	11.6	91.2	8.8	94.2	5.8	94.3	5.7

Note: \*End-September 2011

Source: Turner (2012).

Since experiences differ significantly across economies, both emerging and mature, it is difficult to pinpoint one single element of reform or practice that will help the emergence of a deep and liquid LCBM (Luengnaruemitchai and Ong 2005). Broadly speaking, the experiences of emerging economies in Asia and Latin America confirm the importance of the variables that we found to be significant in our empirical analysis of the drivers and obstacles to LCBM development in SSA.<sup>26</sup> However, it is important to point out that in both Latin American and Asian countries successes in LCBM development can be linked to concerted

<sup>25</sup> As pointed out by Citi Securities and Fund Services (2013: 3): “The Asian [local currency] corporate bond market, which underwent significant changes in the aftermath of 1998 Asia financial crisis, acted as a cushion for corporate financing during the global crisis. The markets operated as a balancing-act against fluctuating sentiment in global markets as well as slowing banking credit.”

<sup>26</sup> Eichengreen and Luengnaruemitchai (2004: 1), for instance, find that “[l]arger country size, stronger institutions, less volatile exchange rates, and more competitive banking sectors tend to be positively associated with bond market capitalization” while “Asian countries’ strong fiscal balances, while admirable on other grounds, have not been conducive to the growth of government bond markets.”

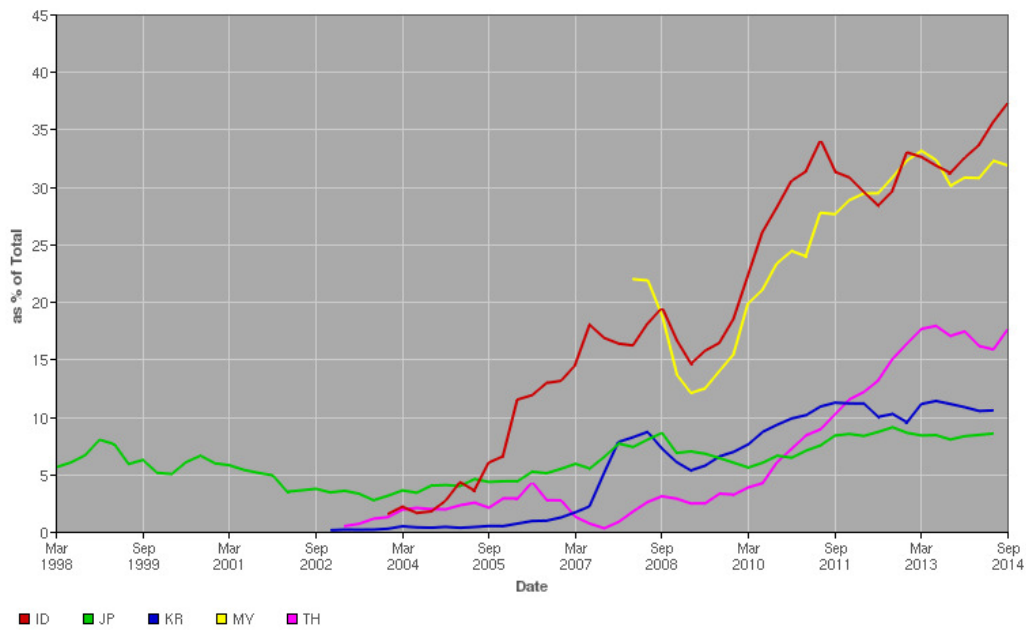
policy efforts at the national level, which have been supported by regional and international initiatives. Regional cooperation for LCBM development has been a decisive factor particularly for the laggard markets of East Asia, where in 2002 the ASEAN+3 Finance Ministers launched the ASIAN+3 Bond Market Initiative (ABMI), under which a number of initiatives were developed aimed at improving the regulatory framework, facilitating bond issuance and broadening the investor base.<sup>27</sup> One example for an ABMI activity is the ASEAN+3 Bond Market Forum (ABMF), which was launched as a platform to promote standardisation of market practices and harmonisation of regulations relating to cross-border transactions across the region in 2010. Another example of regional cooperation is the Asian Bond Fund (ABF) initiative, where a number of central banks invested parts of their reserves in the Pan Asia Bond Index Fund as well as eight country-specific index funds.

Although significant progress has been made, challenges remain in many of these markets, including low levels of liquidity, a narrow investor base and short maturities. A particular problem has been the high share of foreign bond holdings in individual LCBMs. In Asia, this has at times caused problems in Indonesia and Malaysia, where foreign holdings make up more than a third of the local currency government bond market, but also Thailand, where foreign holdings account for close to 20% (Figure 5). The latter gives a good illustration how a large foreign investor base can be problematic at times: fuelled by unconventional monetary policies in the major advanced economies, non-resident net holding in the Thai bond market increased very rapidly from THB 66 billion in December 2009 to a peak of THB 870 billion in April 2013, the month before Fed Chairman Bernanke's "tapering" announcement. In anticipation of rising U.S. interest rates and a (temporary) current account deficit at the time, Thailand saw large capital outflows and a depreciation of the Thai baht, leading to worries of a repeat of the Thai crisis of 1997. The situation stabilised again relatively quickly, but non-resident net holding in the Thai bond market continued to decline to THB 640 billion in May 2014. For low-income economies with shallow financial markets, such as those in SSA, even relatively small capital outflows can have a seriously destabilising effects on the exchange rate, financial markets and the real economy. This is important to highlight at a time when several SSA economies have become "frontier markets", experiencing large capital inflows, which may reverse again quickly due to domestic or international factors.

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<sup>27</sup>ASEAN+3 comprises the ten member countries of the Association of Asian Nations as well as China, Japan and Korea.

**Figure 5: Foreign holdings in LCY government bonds**



Source: ADB AsianBondsOnline.

While a greater participation of foreign investors may lower long-term government bond yields (Peris, 2010) and increase market liquidity, a high dependency on a foreign investor base increases the risk of sudden outflows and spillovers from global markets. As pointed out by Azis (2013): “...while the growth of individual bond markets in recent years has been impressive, the threat of financial contagion to emerging Asian bond markets from shock and volatility spillovers in mature markets is real. Although emerging Asian local bond market volatilities are more determined by their own respective shocks and volatilities, in some markets the direct shock and volatility spillovers remain significant.” Consequentially, broadening the investor base has been identified as a key challenge in further developing market resilience (ADB, 2013). Moreover, in order to effectively deal with periods of rapid capital outflows, financial authorities should develop tools for managing the capital account, which may also include the temporary re-imposition of capital controls (cf. IMF, 2012).

## 5 Conclusion and policy recommendations

The results of the empirical analysis of the relationship between a broad set of macroeconomic and institutional variables on the one side and LCBM development on the other suggests various factors that may influence LCBM development. In particular greater

economic size, higher financial needs, and larger banking sectors may contribute to better developed LCBMs. These findings are in line with those of other studies on bond market development in SSA.

From these empirical findings and the qualitative findings on the challenges of LCBM development in SSA we derive the following policy recommendations.<sup>28</sup> To overcome the problems associated with small economic size and small banking systems – including illiquid debt instruments, short maturities, a restricted and undifferentiated investor base, and undeveloped secondary markets – regional bond markets should be promoted.

To overcome the problems impeding the issuance of domestic debt it is important to establish an adequate infrastructure including the institutional structure and a solid legal framework. For better monitoring of domestic sovereign debt an appropriate debt management strategy needs to be put in place, not least because larger fiscal deficits are associated with deeper bond markets. It is also important to train personnel in the field of debt management adequately because these skills are needed to issuing domestic securities.

In the area of debt management, donors can be helpful in providing technical assistance. Programmes and initiatives like the World Bank's and the IMF's Debt Management Facility for Low-Income Countries and the Debt Management and Financial Analysis System of the United Nations Conference on Trade and Development (UNCTAD) provide country-specific technical assistance at different levels that broadly covers low-income countries. While donors can help low-income countries define and sequence reforms, countries must institute the reforms themselves (Berensmann, 2015).

Similarly, the World Bank Group's Global Emerging Markets Local Currency Bond Program (Gemloc) supports LCBM development in emerging market countries (EMCs) (World Bank and IFC 2015). One main drawback of this programme is that it focuses on EMCs rather than on low-income countries. For this reason only three SSA countries have been supported by this initiative: South Africa, Nigeria and Kenya.

Since the LCBM development is positively correlated with stable macroeconomic policies, including stable monetary (and exchange rate) policies, governments should ensure an enabling macroeconomic environment, particularly an adequate monetary policy. Even though the LCBM development is positively correlated with higher past fiscal deficits, authorities should not have an incentive for excessive expansionary fiscal policies.

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<sup>28</sup> Some of these policy recommendations comply with those proposed by Adegelan and Radzweicz-Bak, (2009) and IMF, WB, EBRD, OECD (2013).



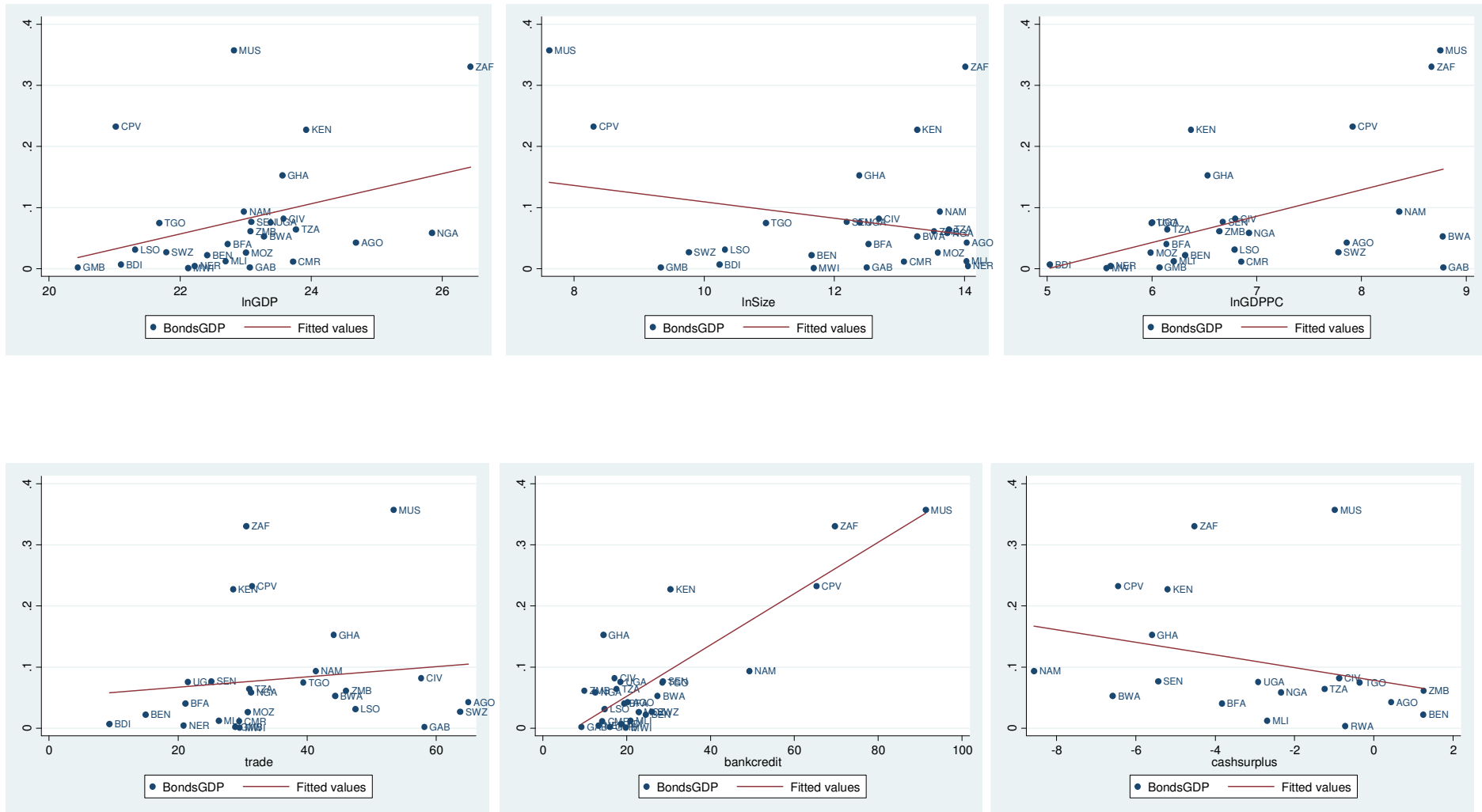
To promote LCBM development, authorities in SSA should address institutional and legal deficiencies and enhance the safety of the investment environment by ensuring and alleviating profit repatriation, lowering payment delays and guaranteeing contract viability. By the same token authorities should ensure the enforcement of laws.

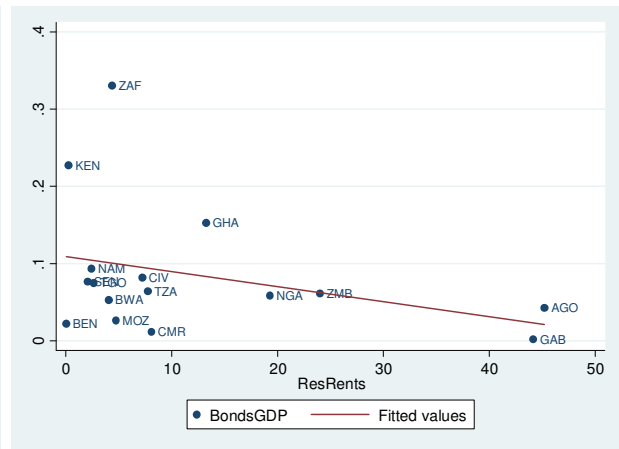
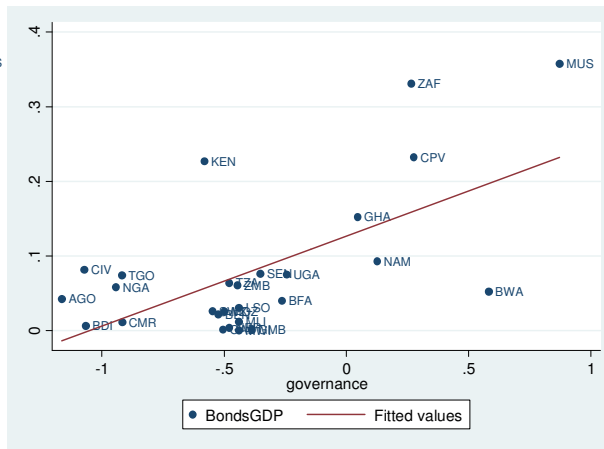
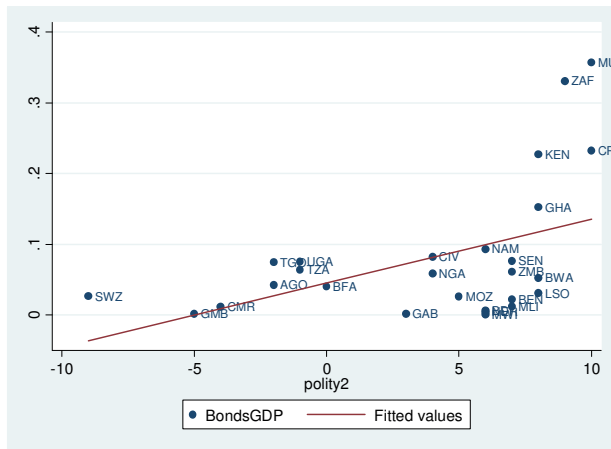
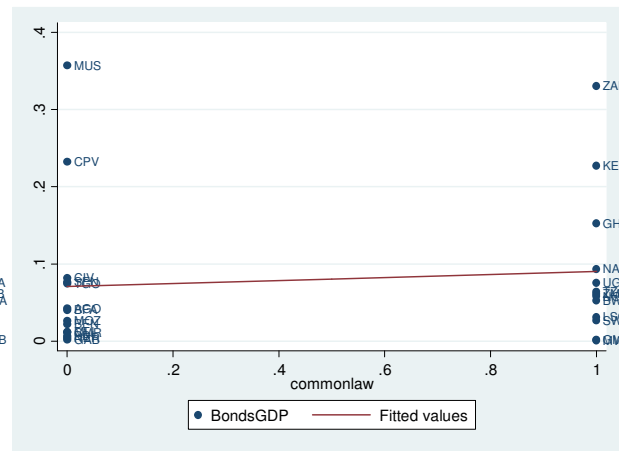
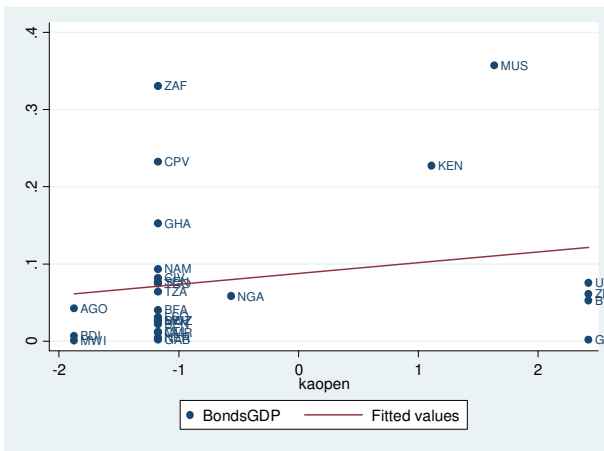
Clearly, the sequence and intensity of these policy measures largely depend on the stage of the LCBM development and the desired goals with respect to the role of LCBMs in the respective countries. As pointed out, considerable foreign investor participation can increase volatility of foreign capital flows. Hence, capital market liberalisation should be pursued only very cautiously and in pace with solid financial and institutional development. Similarly, an enabling macroeconomic environment and an appropriate infrastructure represent a *sine qua non* for LCBM development and further economic development in SSA.

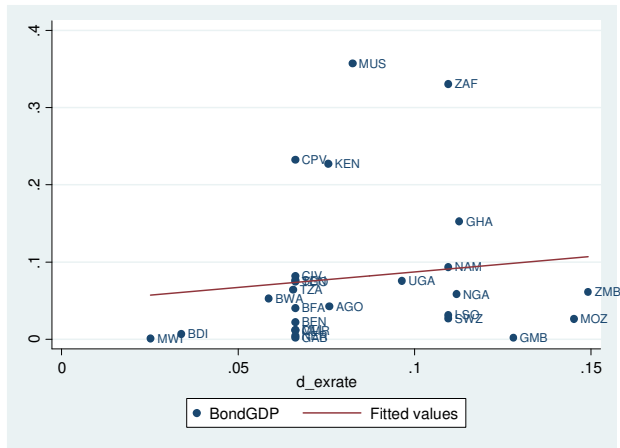
Despite these risks and challenges of LCBM development in SSA, they assume the potential to providing long- or medium-term capital not only for governments but also for companies because the development of government bond markets takes on an important benchmarking role for corporate bonds. LCBM can add to releasing long-term funds for needed infrastructure financing in SSA and thereby contribute to achieving the proposed SDGs.

# Appendix

**Figure A1: Bivariate scatter plots: Local currency bonds outstanding (% of GDP) versus lagged explanatory variables**







**Table A1: Maximum country coverage of the regression analysis**

Essers et al. (2014)	This study
Angola	Angola
Cameroon	Benin
Gabon	Botswana
Kenya	Burkina Faso
Madagascar	Burundi
Malawi	Cabo Verde
Mauritius	Cameroon
Mozambique	Cote d'Ivoire
Namibia	Gabon
Nigeria	The Gambia
Sierra Leone	Ghana
South Africa	Kenya
Tanzania	Lesotho
Uganda	Malawi
Zambia	Mali
	Mauritius
	Mozambique
	Namibia
	Niger
	Nigeria
	Senegal
	South Africa
	Swaziland
	Tanzania
	Togo
	Uganda
	Zambia

**Table A2: Summary statistics**

Variable		Mean	Std. Dev.	Min	Max	Observations
BondGDP	overall	0.0678612	0.0854706	0.0002635	0.4034257	N = 258
	between		0.0703779	0.0017202	0.3145468	n = 27
	within		0.043405	-0.1026752	0.2420337	T-bar = 9.55556
lnGDP	overall	22.74007	1.317338	20.10349	26.47096	N = 378
	between		1.323225	20.31373	26.27761	n = 27
	within		0.2117363	22.06755	23.26822	T = 14
lnSize	overall	12.16718	1.801274	7.620705	14.05216	N = 378
	between		1.833157	7.620705	14.05216	n = 27
	within		2.29E-15	12.16718	12.16718	T = 14
lnGDPPC	overall	6.768702	1.067898	4.968309	8.857665	N = 378
	between		1.079125	5.007828	8.760619	n = 27
	within		0.1266918	6.316537	7.099713	T = 14
trade	overall	35.57558	17.54738	4.685804	100.949	N = 361
	between		16.95913	7.367366	76.33042	n = 27
	within		5.872938	12.25172	60.19416	T = 13.3704
bankcredit	overall	22.20144	18.54089	1.96654	108.0503	N = 378
	between		17.94533	8.685209	78.37554	n = 27
	within		5.730121	1.323331	51.87615	T = 14
cashesurplus	overall	-1.006564	4.583322	-9.36402	18.34381	N = 159
	between		4.384755	-7.163544	12.53809	n = 22
	within		2.980693	-8.898793	10.41374	T = 7.22727
inflation	overall	8.745026	20.34669	-9.616154	324.9969	N = 375
	between		11.21489	1.833918	60.71064	n = 27
	within		17.07737	-43.18952	273.0313	T-bar = 13.8889
kaopen	overall	-0.4772151	1.394604	-1.875024	2.421764	N = 351
	between		1.407286	-1.55195	2.421764	n = 27
	within		0.1799101	-1.31798	0.0078885	T = 13
commonlaw	overall	0.4814815	0.5003192	0	1	N = 378
	between		0.5091751	0	1	n = 27
	within		0	0.4814815	0.4814815	T = 14
polity2	overall	3.243386	5.190179	-9	10	N = 378
	between		5.085658	-9	10	n = 27
	within		1.402104	-5.185185	7.743386	T = 14
governance	overall	-0.4074306	0.5136713	-1.729445	0.9593425	N = 324
	between		0.5127069	-1.299843	0.8097342	n = 27
	within		0.0997096	-0.8370332	-0.1061795	T = 12
ResRents	overall	11.25491	17.0617	0	71.12091	N = 208
	between		16.86194	0.0045451	53.77197	n = 16
	within		4.822781	-4.149553	28.60384	T = 13
d_exrate	overall	0.092191	0.0540915	0.0223836	0.3362769	N = 270
	between		0.0365824	0.0478064	0.1636796	n = 27
	within		0.0404029	-0.0146221	0.2647882	T = 10

**Table A3: Pair-wise correlations for the year 2012**

	Bond GDP
L.lnGDP	0.3431* (0.0798)
lnSize	-0.2520 (0.2047)
L.lnGDPPC	0.4874* (0.0099)
L.trade	0.1277 (0.5255)
L.bankcredit	0.8520* (0.0000)
L.ResRents	-0.3288 (0.2137)
L.cashsurplus	-0.2546 (0.3079)
L.inflation	0.1245 (0.5363)
L.kaopen	0.2094 (0.2945)
L.d_exrate	0.1267 (0.5289)
L.commonlaw	0.1034 (0.6078)
L.governance	0.6146* (0.0006)
L.polity2	0.4704* (0.0133)

P-values in parentheses. \*  $p < 0.10$

**Table A4: Breusch-Pagan LM Tests and Hausman Tests**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	BondsGDP	BondsGDP	BondsGDP	BondsGDP	BondsGDP	BondsGDP	BondsGDP	BondsGDP	BondsGDP	BondsGDP
L.lnGDP	0.0231** (0.00736)	0.0370*** (0.00812)	0.0450*** (0.00956)	0.0519** (0.0174)	0.0368*** (0.00746)	0.0899+ (0.0534)	0.471*** (0.0980)	0.439*** (0.0997)	0.727*** (0.133)	0.609*** (0.134)
lnSize	-0.00706 (0.00537)	-0.0240*** (0.00683)	-0.0293*** (0.00758)	-0.0270 (0.0233)	-0.0112 (0.0124)					
L.lnGDPPC	-0.00129 (0.00869)	0.00687 (0.0121)	-0.0106 (0.0145)	-0.00873 (0.0249)	-0.0499*** (0.0150)	-0.0620 (0.0842)	-0.650*** (0.170)	-0.618*** (0.170)	-1.047*** (0.221)	-0.845*** (0.226)
L.trade	-0.000471 (0.000403)	0.000156 (0.000514)	0.000886 (0.000567)	0.00115 (0.000955)	0.00205* (0.000681)	-0.000587 (0.000529)	0.000228 (0.000673)	0.000324 (0.000677)	0.000570 (0.000964)	0.000834 (0.000977)
L.bankcredit	0.00330*** (0.000389)	0.00215** (0.000543)	0.00120* (0.000588)	0.000404 (0.000816)	0.00336*** (0.000552)	0.00291** (0.000588)	-0.000636 (0.000711)	-0.000663 (0.000710)	-0.00140+ (0.000820)	-0.000178 (0.000817)
L.cashsurplus		-0.00353** (0.00119)	-0.00373** (0.00115)	-0.00467** (0.00150)	-0.00256+ (0.00148)		-0.00173 (0.00124)	-0.00220+ (0.00128)	-0.00184 (0.00150)	-0.00198 (0.00140)
L.inflation		-0.000367 (0.000704)	-0.000492 (0.000687)	-0.000724 (0.000885)	0.000257 (0.000893)		-0.000978 (0.000702)	-0.000817 (0.000707)	-0.000879 (0.000902)	-0.000649 (0.000902)
L.kaopen		0.00413 (0.00486)	-0.00309 (0.00677)	-0.00635 (0.0128)	0.00722 (0.00472)		-0.0454 (0.0453)	-0.0477 (0.0455)	-0.0968+ (0.0517)	-0.0935 (0.0580)
commonlaw			0.00901 (0.0231)	0.00983 (0.0444)	-0.00672 (0.0207)					
L.polity2			0.00298 (0.00198)	0.00287 (0.00419)	0.00228 (0.00230)			0.00308 (0.00340)	-0.00650 (0.00613)	-0.00615 (0.00614)
L.governance			0.0496+ (0.0261)	0.0558 (0.0480)	0.0392 (0.0268)			0.0493 (0.0484)	0.0534 (0.0627)	-0.00308 (0.0628)
L.ResRents				-0.000225 (0.000878)	-0.000765 (0.000616)				0.000813 (0.000911)	0.000734 (0.000869)
L.d_exrate					0.129 (0.0815)					0.0629 (0.0843)
Constant	-0.431*** (0.115)	-0.584*** (0.135)	-0.584*** (0.159)	-0.777* (0.303)	-0.446** (0.142)	-1.622* (0.707)	-6.417*** (1.188)	-5.897*** (1.230)	-9.702*** (1.677)	-8.414*** (1.693)
Observations	248	130	130	96	89	248	130	130	96	89
R <sup>2</sup>	0.7287	0.7787	0.7863	0.6735	0.8077	0.3101	0.3540	0.3699	0.4711	0.4309
χ <sup>2</sup> p-value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001
Breusch-Pagan p-value	0.0000	0.0000	0.0002	0.1381	1.0000					
Hausman p-value						0.2713	0.0000	0.0001	0.0000	0.0038

Standard errors in parentheses<sup>+</sup>  $p < 0.10$ , \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$



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