

Sovereign bonds in developing countries: Drivers of issuance and spreads[☆]

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Abstract

In the last decade there has been a new wave of sovereign bond issuances in Africa. What determines the ability of developing countries to issue bonds in international capital and what explains the spreads on these bonds? This paper examines these questions using a dataset that includes 105 developing countries during the period 1995–2014. We find that a country is more likely to issue a bond when, in comparison with non-issuing peers, it is larger in economic size, has higher per capita GDP, a lower public debt, and a more effective government. Spreads on sovereign bonds are lower for countries with strong external and fiscal positions, as well as robust economic growth and government effectiveness. We also find that primary spreads for the average Sub-Saharan African issuer are higher than in other regions. With regard to global factors, our results confirm the existing evidence that issuances are more likely during periods of global liquidity and high commodity prices, especially for Sub-Saharan African countries, and spreads are higher in periods of higher market volatility.

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1. Introduction

Over the past decade or so, a number of low-income developing countries (LIDCs)¹ have issued sovereign bonds in the

international capital markets, driven in part by African frontier markets.² Given the declining trend of aid flows,³ sovereign bonds could represent a sizeable source of external finance, which can contribute to the financing of investment projects, helping LIDCs make progress in closing the infrastructure and development gap. Since 2005, 15 LIDCs have issued international sovereign bonds, 11 of which are in Sub-Saharan Africa (SSA). In 2013, LIDCs issued sovereign bonds amounting to US\$4 billion, and this trend continued in 2014, with Côte d'Ivoire, Ethiopia, Ghana, Kenya, Senegal, Vietnam, and Zambia having issued bonds totaling about US\$8 billion (Table 1). In 2015, partially reflecting worsening global conditions and lower commodity prices, the number of issuances slowed down and countries that have been able to issue sovereign bonds

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¹ The definition of income groups follows the IMF World Economic Outlook (WEO), which distinguishes advanced economies (AEs) and emerging market and developing economies (EMDEs, here called also developing countries). Low income developing countries (LIDCs)—60 countries in all—are a sub-group of lower income EMDEs, defined in IMF (2014). Frontier markets—14 countries in all—are LIDCs that have some degree of access to international capital markets (see IMF, 2014 for further discussion).

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² See IMF (2013), Standard and Poor's (2013), AfDB, OECD and UNDP (2014), Gueye and Sy (2015) and te Velte (2014).

³ According to the 2015 OECD DAC bilateral aid (excluding debt relief) to the least-developed countries fell by 8% in 2014. See OECD at: <http://www.oecd.org/development/development-aid-stable-in-2014-but-flows-to-poorest-countries-still-falling.htm>.

Table 1
International sovereign bond issuances by LIDCs, 1995–2014.

Issuer	Issue date	Yield at issue	Tenor	Amt (USD mn)	Spread (bps)	S&P rating at issue
Moldova	12/10/96		3	30		
Moldova	6/6/97	9.88	5	75	340.0	Not rated
Vietnam	10/27/05	7.25	10	750	256.4	BB–
Ghana	9/27/07	8.50	10	750	387.0	B+
Republic of the Congo	12/7/07	8.77	22	480	458.0	Not rated
Senegal	12/15/09	9.47	5	200	691.0	B+
Vietnam	1/26/10	7.07	10	1000	332.7	BB
Côte d'Ivoire	4/8/10	17.35	23	2330	393.0	Not rated
Nigeria	1/21/11	7.13	10	500	372.0	B+
Senegal	5/6/11	9.34	10	500	596.4	B+
Zambia	9/13/12	5.63	10	750	383.6	B+
Bolivia	10/22/12	4.88	10	500	306.0	BB–
Côte d'Ivoire	11/15/12		20	187		Not rated
Mongolia	11/29/12	4.17	5	500	358.0	BB–
Mongolia	11/29/12	5.19	10	1000	358.0	BB–
Tanzania	2/27/13		7	600	600.0	Not rated
Honduras	3/12/13	7.50	11	500	547.9	B+
Rwanda	4/25/13	7.00	10	400	515.7	B
Nigeria	7/2/13	5.45	5	500	381.0	BB–
Nigeria	7/2/13	6.74	10	500	393.0	BB–
Ghana	7/25/13	8.00	10	750	540.0	B
Ghana	7/25/13		10	250		
Bolivia	8/15/13	6.25	10	500	347.5	BB–
Zambia	4/14/14	8.63	10	1000	592.6	B+
Kenya	6/24/14	6.88	10	1500	429.0	B+
Kenya	6/24/14	5.88	5	500	418.0	B+
Kenya	12/24/14	5.00	10	500		B+
Kenya	12/24/14	5.90	5	250		B+
Côte d'Ivoire	7/23/14	5.63	10	750	308.9	
Senegal	7/30/14	6.25	10	500	379.3	B+
Ghana	9/11/14	8.25	11	1000	572.0	B–
Vietnam	11/6/14	4.80	10	1000	238.7	BB–
Ethiopia	12/4/14	6.625	10	1000	435.6	B

Source: Bloomberg. Updated to end-December 2014.

(Cameroon, Cote d'Ivoire, Ghana, and Zambia) did so at higher yields.

What determines the ability of developing countries to issue bonds in the international capital markets? What are the factors that influence the spreads on these bonds? Do the recent bond issuances by African countries respond to different factors? What can LIDCs learn from the experience of other developing countries (and emerging markets) that have market access? To address these questions, this paper examines the experience of 105 EMDEs during the period 1995–2014, including 52 countries that had issued sovereign bonds at least once in the international capital markets, with the remainder having never issued (Table 2).

The analysis builds on a very extensive literature on international debt markets in developing countries; see Eaton and Taylor (1986) and Eaton (1993) for an overview. The existing literature on market access by emerging and developing countries considers the probability that a country has access to international markets issuing sovereign bonds and/or contracting syndicated loans—and possibly the amounts borrowed. Overall, this literature has underscored the importance of global factors, macroeconomic stability, fiscal discipline, economic diversification, and policies and institutions for accessing international capital markets.

Grigorian (2003) focuses on first time and subsequent issues by emerging economies over the period 1980–2002 and finds that both external and internal factors matter: countries with better fiscal position, lower inflation and higher per capita GDP are more likely to issue, and this finding holds better in years when global conditions improve (i.e., international interest rates are lower and US GDP growth is stronger). Thomas (2009) shows that poor credit rating and political instability adversely affected access to international capital markets by LIDCs during 1970–2006; his analysis also suggests that debt relief provided under the Heavily Indebted Poor Countries (HIPC) Initiative has significantly raised market access by low-income countries. This is consistent with SBI by LIDCs being mainly concentrated among HIPCs (IMF, 2014). Gelos et al. (2011) examine a sample of 150 developing countries over the period 1980–2000 and define market access to cover sovereign bond issues or borrowing through private syndicated bank loans. Their analysis shows that larger and richer countries are more likely to access credit markets; the perceived quality of the institutional setting is also a key driver of market access, while countries more vulnerable to shocks are less likely to tap international markets. Two recent papers investigate also the costs of issue sovereign bonds, with a specific focus on African countries. Gueye and Sy (2015) examine the importance of push and pull factors in

Table 2
Sample.

Code	Country	SBI	Code	Country	SBI	Code	Country	SBI
ALB	Albania	1	ERI	Eritrea	0	MNG	Mongolia	1
DZA	Algeria	0	ETH	Ethiopia	1	MAR	Morocco	1
AGO	Angola	0	FJI	Fiji	1	MOZ	Mozambique	0
ARM	Armenia	1	GAB	Gabon	1	NAM	Namibia	1
AZE	Azerbaijan	1	GMB	Gambia, The	0	NPL	Nepal	0
BGD	Bangladesh	0	GEO	Georgia	1	NER	Niger	0
BLR	Belarus	1	GHA	Ghana	1	NGA	Nigeria	1
BLZ	Belize	1	GRD	Grenada	1	PRY	Paraguay	1
BEN	Benin	0	GTM	Guatemala	1	PER	Peru	1
BTN	Bhutan	0	GIN	Guinea	0	POL	Poland	1
BOL	Bolivia	1	GNB	Guinea-Bissau	0	ROM	Romania	1
BIH	Bosnia & Herzegovina	0	GUY	Guyana	0	RUS	Russian Federation	1
BWA	Botswana	0	HTI	Haiti	0	RWA	Rwanda	1
BRA	Brazil	1	HND	Honduras	1	SEN	Senegal	1
BGR	Bulgaria	1	HUN	Hungary	1	SLE	Sierra Leone	0
BFA	Burkina Faso	0	IND	India	0	SLB	Solomon Islands	0
BDI	Burundi	0	JAM	Jamaica	1	LKA	Sri Lanka	1
CAF	C.A.R.	0	JOR	Jordan	1	KNA	St. Kitts and Nevis	0
KHM	Cambodia	0	KAZ	Kazakhstan	1	LCA	St. Lucia	0
CMR	Cameroon	0	KEN	Kenya	1	VCT	St. Vincent & Grenadines	1
CPV	Cape Verde	0	KGZ	Kyrgyz Republic	0	SDN	Sudan	0
TCD	Chad	0	LAO	Laos	0	SUR	Suriname	0
CHL	Chile	1	LVA	Latvia	1	SWZ	Swaziland	0
COM	Comoros	0	LSO	Lesotho	0	SYR	Syria	0
COG	Congo, Republic of	1	LBR	Liberia	0	STP	São Tomé and Príncipe	0
CRI	Costa Rica	1	LYB	Libya	0	TJK	Tajikistan	0
CIV	Cote d'Ivoire	1	LTU	Lithuania	1	TZA	Tanzania	1
HRV	Croatia	1	MKD	Macedonia, FYR	1	TGO	Togo	0
DJI	Djibouti	0	MDG	Madagascar	0	TUN	Tunisia	0
DMA	Dominica	0	MWI	Malawi	0	UGA	Uganda	0
DOM	Dominican Republic	1	MDV	Maldives	0	UKR	Ukraine	1
ECU	Ecuador	1	MLI	Mali	0	VUT	Vanuatu	0
EGY	Egypt	1	MRT	Mauritania	0	VNM	Vietnam	1
SLV	El Salvador	1	MUS	Mauritius	1	YEM	Yemen	0
GNQ	Equatorial Guinea	0	MDA	Moldova	1	ZMB	Zambia	1

Notes: Sovereign bond issuance (SBI) is equal to one for countries that issued at least a sovereign bond between 1995 and 2014. Countries for which the SBI indicator is equal to zero have never issued a sovereign bond. There are 52 sovereign bond issuers out of 105 developing countries in the whole sample.

determining bond yield spreads, and show that the average SSA country would have paid 300 basis points more than the average emerging market borrowers, as of end-2009. [Olabisi and Stein \(2015\)](#) estimate that SSA countries pay higher coupon rates than other issuing countries, once controlling for differences in income levels, reserves and indebtedness.

This paper contributes to this literature in two ways. First, the analysis of sovereign bond issuance (SBI) by EMDEs is extended by jointly estimating the factors that influence the spread on these bonds. Second, the paper captures the experience in recent years when several African LIDCs issued international sovereign bonds for the first time, thus extending the analysis on emerging markets by [Eichengreen and Mody \(2000\)](#) and [Gelos et al. \(2011\)](#), as well as work done on first-time issues by developing countries ([Grigorian, 2003](#); [Thomas, 2009](#); [IMF, 2013](#); [Guscina et al., 2014](#); [Gueye and Sy, 2015](#)) (Table 2).⁴

⁴ This paper builds on the literature that identifies the determinants of EMDEs' sovereign bond spreads in both primary ([Kamin and von Kleist, 1999](#)) and secondary markets ([Bellás et al., 2010](#); [Rocha and Moreira, 2010](#); [Baldacci et al.,](#)

A simple comparison of the data on EMDEs that issued sovereign bonds in global capital markets (issuers) and those that did not issue (non-issuers) provides useful insights. Issuers typically have higher per capita real GDP, deeper financial markets, stronger external positions, greater government effectiveness,⁵ and are more likely to have had an IMF program in place over the previous 3 years (compared to non-issuers). Among countries that have issued, we separate the sample between regular issuers (those that have issued in 5 or more years during 1995–2014) and occasional issuers. We find that regular issuers have higher per

[2011](#); [Siklos, 2011](#); [Comelli, 2012](#); [Kennedy and Palerm, 2014](#); [Csontó, 2014](#); [Guscina et al., 2014](#)). These papers generally show that global risk aversion, macroeconomic fundamentals (especially the fiscal stance) and political risk are significantly correlated with interest rate spreads.

⁵ Government effectiveness, published in the World Bank's Worldwide Governance Indicators, captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies ([Kaufmann et al., 2010](#)).

capita real GDP, stronger external reserve positions, and more effective governments than occasional issuers.

The econometric analysis indicates that a country is more likely to issue sovereign bonds in the global market when it is large and has higher per capita GDP (than those that are smaller and less developed), a relatively low external debt-to-GDP ratio, and strong government effectiveness. Spreads on sovereign bonds are lower for countries with strong external position and lower public debt, as well as robust economic growth and government effectiveness. There is evidence that once a country issues for the first time, there is a higher likelihood that it will reissue in the future and at lower spreads. We find a catalytic role of IMF programs for market access. With regard to global factors, we find that bond spreads are lower in periods of declining global market volatility, while global liquidity and higher commodity prices are associated with a higher likelihood to issue sovereign bonds, especially when considering SSA countries. Finally, even considering a broad set of country characteristics, we find that spreads on sovereign bonds issued by SSA countries are significantly higher than on bonds issued elsewhere.

The rest of the paper is organized as follows. Section 2 discusses the data and some stylized facts about sovereign bond issuances over the last 20 years. Section 3 presents the empirical approach and the associated econometric results, while Section 4 concludes.

2. Stylized facts

2.1. The dataset

The analysis is based on a sample of a set of 105 EDMEs during 1995–2014. Fifty-two of these countries have issued international sovereign bonds at least once since 1995.⁶ The other 53 countries are used as a “control” group; these are countries with per capita income level in the same range as the ones that issued bonds (i.e., countries with a GDP per capita lower than US\$10,000 in 1995⁷), but which did not issue bonds in global capital market. In contrast to some of the existing literature (Thomas, 2009; Gelos et al., 2011), the paper focuses on international bonds, excluding commercial bank syndicated loans to national governments.⁸ The motivation for focusing on sovereign bonds is twofold. First, the volume of syndicated loans is smaller than from sovereign bonds (Fig. 1).⁹ Second, looking exclusively at sovereign bonds—for which information on size

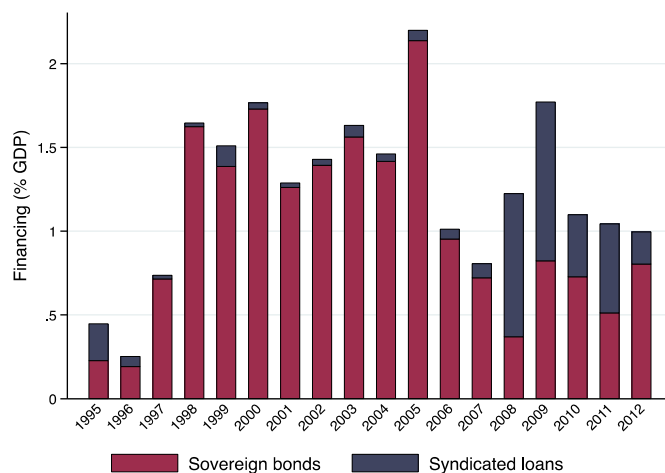


Fig. 1. Sovereign bonds and syndicated loans to the public sector. Notes: Based on annual data for 105 emerging markets and developing economies, over 1995–2012. GDP-weighted averages. Syndicated loans to the public sector include the central government and state/provincial authorities as borrowers. Source: Dealogic Loan Analytics and Bloomberg.

and spread at issue is available—allows a joint analysis of factors associated with the likelihood to issue and the associated price.¹⁰

Data on sovereign bonds are from Bloomberg and include information on the date of issuance, maturity, amount, yield and spread at issue. Data on macroeconomic and institutional variables are from the *World Economic Outlook* database and the *World Development Indicators*.

The set of domestic factors included in the model as potential determinants of sovereign bonds follows the existing empirical literature on market access.¹¹ The analysis takes into account differences in economic development and macroeconomic performance by including per capita real GDP, GDP growth, inflation, current account balance as a ratio to GDP, international reserves in months of imports, fiscal balance as a ratio to GDP, and external public and publicly guaranteed debt as a ratio to GDP. The importance of the institutional setting is taken into account by incorporating institutional strength in the analysis, measured by an index of government effectiveness.

The paper also considers participation in IMF lending programs as a potential determinant of sovereign bond issuance and spread (Mody and Saravia, 2006). On the one hand, IMF-supported programs may act as a seal of approval, reassuring investors and catalyzing private capital flows; on the other hand, IMF-supported programs could generate moral hazard and signal high financial and sovereign risks (Bird, 2007). The hypothesis that sovereign bond issuance could be persistent is

⁶ See Table 2 for countries used in the sample, including those that issued international bonds. Three countries that issued during the sample period are excluded due to lack of data (Iraq, Serbia and Montenegro).

⁷ The adoption of this threshold implies the exclusion from the sample of some richer countries (Antigua & Barbuda, The Bahamas, Bahrain, Brunei, Kuwait, Oman, Qatar, Seychelles and UAE).

⁸ Private placements are excluded. In the recent LIDC experience, only Tanzania issued a US\$600 million floating rate note in 2013 via a private placement. For a discussion of government securities and corporate bond markets (see Mu et al., 2013).

⁹ The increase in syndicated loans in 2008 and 2009 was due to large borrowing from countries in Europe (e.g., Hungary, Poland, and Ukraine).

¹⁰ Limited and non-random data availability on prices of syndicated loans prevent an extension of our analysis to the issuance and price of syndicated loans (see Cerutti et al., 2014 for a discussion of data issues).

¹¹ Throughout the paper, we use a standard terminology and consider a country as having market access or not only on the ground of bond issuance (Grigorian, 2003; Gelos et al., 2011). We acknowledge that this is a simplification, as access to markets depends also on the amounts issued relative to funding needs, tenor, currency of denomination and interest rate against benchmarks.

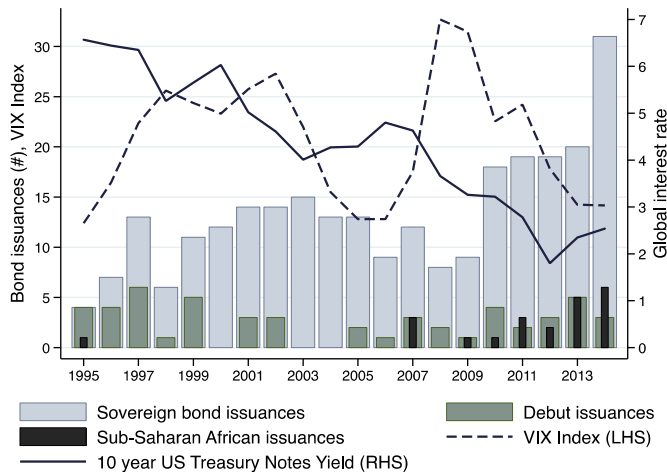


Fig. 2. Sovereign bond issuances and global conditions, 1995–2014. Notes: Based on annual data for 105 developing countries (52 issuers), over 1995–2014.

tested by including in both equations a dummy variable equal to one for countries that have issued at least once in the previous three years. Finally, the paper considers country size, measured by population, since it could affect the ability to borrow because of the fixed costs associated with market access and the potential punishment of a default (Faria et al., 2010; Gelos et al., 2011).

We measure the influence of global factors considering the yield on the 10-year US Treasury notes, as a measure of global liquidity, and the Vix index as a measure of market volatility.¹² As a robustness exercise we will also look at the correlation between market access and commodity prices, measured by two indexes of energy and non-energy prices published by the World Bank (2015).¹³

To mitigate the influence of extreme values, GDP growth, inflation, private credit, total debt, fiscal balance, current account, reserves have been winsorized at the 1st and 99th percentiles.¹⁴ Summary statistics, definition and sources of all variables are provided in Table 3.

2.2. Descriptive analysis

Sovereign bond issuances by EMDEs in global markets have steadily increased over time, moving from an annual average of 8 per year in the late 1990s, to 12 in the 2000s and 20 since 2010 (Fig. 2). During 1995–2014, LIDCs issued 27 sovereign bonds (10% of all SBIs in the sample), 18 of which have been issued by SSA countries. With the exception of Moldova, LIDCs started

¹² The CBOE Volatility Index (Vix), computed and disseminated by the Chicago Board Options Exchange, is a measure of market expectations of near-term volatility conveyed by S&P500 stock index option prices.

¹³ See <http://www.worldbank.org/en/research/commodity-markets>. We do not include commodity prices and the US rate jointly given its strong negative correlation with the energy price index (−0.86) and non-energy price index (−0.76).

¹⁴ The main results are not affected when these observations are trimmed (i.e., set to missing values) rather than winsorized (i.e., extreme values are set equal to the 1st and 99th percentiles).

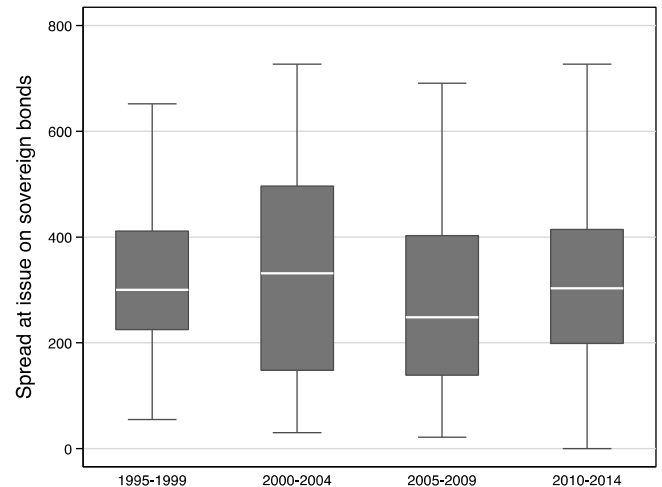


Fig. 3. The distribution of bond spread at issue, 1995–2014. Notes: Based on data for 232 SBIs (by 52 countries), over 1995–2014.

issuing only recently, and SSA countries issued prevalently in 2013 and 2014 (Table 1 and Fig. 2).

Global sovereign bond issuances are concentrated geographically: out of 267 issuances recorded since 1995, 121 are from Europe and Central Asia, 98 from Latin America and the Caribbean, 22 from Sub-Saharan Africa, and 13 each from Middle East and North Africa, and Asia and Pacific region. Limiting the sample to the 232 issuances for which there are data on primary spreads and amounts does not change the overall picture. The average issuance amounts to about 2.4 of GDP and the spread is slightly above 300 basis points. However, there is dispersion across regions, with SSA issuances being, on average, larger (3.8 of GDP) and with higher spreads (458 basis points) than in other regions (Table 4).

The evolution of primary spreads over time shows a decline during 2005–2009, underpinned by strong global conditions, but it moderately picked up thereafter, possibly reflecting the expanding role of frontier markets and SSA issuers, given that the latter were able to place international bonds at higher spreads than the average EMDE (Fig. 3). The average primary spread for the 25 LIDCs that issued international bonds was 431 basis points, while the average spread of the bonds issued by EMDEs was 291 basis points (the difference between the two sample averages being statistically significant).

In line with developments in the 1980s and 1990s, sovereign bond issuances have been influenced by global factors. The number of bond issuances slumped significantly during the peak of the global financial crisis, when the volatility of markets increased substantially and investors retreated from risky-asset classes. Starting in 2010, as risk appetite improved and global interest rates further declined, international investors, inclined to diversify their asset portfolio, resumed their search for yield in a low-interest rate environment and sovereigns took advantage of low global interest rates to finance themselves in international markets. As a result, bond issuances picked up considerably (Fig. 2).

Before formally testing the correlation between country-specific characteristics in the run-up to a bond issuance, we

Table 3
Variables' definition, sources and summary statistics.

Variable	Definition	Source	Mean	St. Dev.	Min	Max	Obs
SBI (0/1)	Dummy equal to one if the country issued at least a sovereign bond in the year, and zero otherwise.	Bloomberg	0.118	0.323	0	1	1851
SPREAD	Spread of the sovereign bond over the EMBI. If a country issues more than one bond in the year, SPREAD is the simple average of the single spreads.	Bloomberg	295.794	176.545	0	825	219
Real per capita GDP	Real per capita GDP in USD, in logarithms.	WDI	7.185	1.120	4.775	9.445	1851
GDP growth	Real GDP growth rate.	WEO	4.313	3.576	−11.967	21.082	1851
Inflation	Consumer price index, annual percent change.	WEO	16.879	75.442	−4.170	1285.254	1851
PPG external debt (% GDP)	Public and publicly guaranteed external debt (% of GDP).	WDI	57.610	45.088	2.202	304.232	1851
Fiscal balance (% GDP)	General government net lending/borrowing (% of fiscal year GDP).	WEO and country reports	−2.347	4.088	−16.435	16.911	1851
Current account (% GDP)	Balance on current account (% of GDP).	WEO	−5.521	8.096	−34.947	18.233	1851
Reserves (in months of imports)	International reserves in months of imports.	WDI, WEO and country reports	4.726	4.268	0.031	30.307	1851
IMF program in the previous 3 years	Dummy equal to one if the country signed at least a loan agreement in the previous 3-year period.	IMF historical dataset	0.146	0.197	0	1	1851
Population (logs)	Total population, in logarithms.	WDI	15.522	1.842	10.642	20.936	1851
Government effectiveness	Government effectiveness index, ranging from approximately −2.5 to 2.5, with higher values corresponding to better outcomes.	WGI	−0.480	0.602	−1.929	1.278	1716
Total debt (% GDP)	Public debt (% of GDP).	WDI	64.115	50.044	5.474	328.583	1849
Resource rich dummy	Dummy equal to one for resource rich countries and zero otherwise.	IMF (2012)	0.200	0.400	0	1	1851
Aid (% GDP)	Net official development assistance and official aid received (% of GDP).	WDI	7.447	8.952	−0.016	100.386	1803
US rates	Yield on the 10-year US Treasury notes.	Federal Reserve	4.222	1.336	1.800	6.570	1851
Vix index	Chicago Board Options Exchange Volatility Index.	CBOE	20.922	6.138	12.389	32.693	1851
Energy price index	World Bank commodity price index, energy (coal, natural gas and crude oil).	World Bank (2015)	76.495	34.535	23.781	125.565	1851
Non-energy price index	World Bank commodity price index, non-energy commodities.	World Bank (2015)	78.736	18.456	55.355	109.942	1851

Notes: Data refer to annual data for 105 emerging markets and developing countries over the period 1995–2014. The variables GDP growth, inflation, private credit (% GDP), PPG external debt (% GDP), total debt (% GDP), fiscal balance (% GDP), current account (% GDP), and reserves (in months of imports) have been winsorized at the 1st and 99th percentiles. See text for a more detailed discussion of some variables.

Table 4
Sovereign bond issuances and primary spreads, by region.

Region	Spread (bps)		Size of issuance (% GDP)		# issuances	
	Mean	St. Dev.	Mean	St. Dev.	Sample	Overall
Asia and Pacific	341.5	91.0	3.05	4.20	10	13
Europe and Central Asia	255.4	181.9	2.41	1.83	106	121
Latin America and Caribbean	343.6	177.9	2.20	2.62	85	98
Middle East and North Africa	192.0	102.7	1.37	0.81	11	13
Sub-Saharan Africa	458.3	107.3	3.76	2.65	20	22
Whole sample	305.9	180.7	2.43	2.36	232	267

Notes: Data refer to annual data for 105 emerging markets and developing countries over the period 1995–2014.

Table 5
Country characteristics by access frequency groups.

Variable	All countries		No issuance		Occasional issuers		Regular issuers		Test of equality of means		
	Mean	N	Mean	N	Mean	N	Mean	N	NI-OI	NI-RI	OI-RI
Real per capital GDP	7.191	105	6.709	53	7.366	34	8.313	18	***	***	***
GDP growth	4.400	105	4.611	53	4.567	34	3.463	18		*	**
Inflation	11.879	105	13.556	53	10.650	34	9.101	18			
External debt (% GDP)	57.978	105	63.868	53	52.676	34	50.027	18			
Fiscal balance (% GDP)	-2.411	105	-2.428	53	-2.079	34	-2.970	18			
Current account (% GDP)	-5.778	105	-7.159	53	-4.831	34	-3.372	18		**	
Reserves (in months of imports)	4.816	105	5.284	53	3.892	34	5.104	18			*
Resource rich dummy	0.210	105	0.259	53	0.242	34	0.000	18		**	**
Population (logs)	15.521	105	15.206	53	15.513	34	16.480	18		**	**
IMF program in the previous 3 years	0.135	105	0.115	53	0.150	34	0.167	18		*	
Government effectiveness	-0.476	105	-0.689	53	-0.415	34	0.051	18	**	***	***

Notes: Based on a sample of 105 emerging markets and developing economies. Simple averages over the sample period 1995–2014 and across market access groups. The “regular issuers” (RI) group includes countries that issued in more than 5 years; “occasional issuers” (OI) includes countries that issued in 5 or less years; and “no-issuance countries” (NI) groups all countries that never issued a sovereign bond. The variables GDP growth, inflation, external debt, fiscal balance, current account, reserves have been winsorized at the 1st and 99th percentiles.

* Significant at 10%.

** Significant at 5%.

*** Significant at 1%.

undertake some simple cross-country analyses, aimed at determining possible systematic and persistent differences across countries that issued bonds regularly or occasionally and those that did not issue. The analysis follows [Gelos et al. \(2011\)](#) and divides the sample into three sub-groups:

- *No-issuance countries* (NI): 53 countries that did not issue a sovereign bond in the sample period 1995–2014;
- *Occasional issuers* (OI): 34 countries that issued sovereign bonds for less than 5 years;
- *Regular issuers* (RI): 18 countries that issued sovereign bonds for 5 or more years over the time period 1995–2014.¹⁵

The analysis shows that access to international capital markets is correlated with country characteristics measuring the level of economic and institutional development, fiscal and external balances, external reserve position, and dependence on natural resources (as measured by a resource rich dummy, see [IMF, 2012](#)). [Table 5](#) reports the average values of the macroeconomic and institutional indicators for the whole sample and for the three groups, over the entire sample period. A series of mean-comparison *t*-tests are conducted to assess whether differences across groups are statistically significant. The cross-country comparison highlights some interesting patterns.

- In comparison with occasional and regular issuers, countries that did not issue at all have lower per capita real GDP and have a worse external position, but, on average, grow at a faster rate.

- Sovereigns that issued bonds have more effective governments and are more likely to have had an IMF program than countries that did not issue.
- There are differences between occasional and regular issuers: the latter have higher per capita real GDP, stronger institutions, and more external reserves.
- There are no statistically significant differences across the three country groups with regard to inflation and fiscal position.

Finally, [Fig. 4](#) shows the correlations between primary spreads and country characteristics in the run-up to issuing sovereign bonds. Macroeconomics variables are measured as the average of the three-year period prior to each issuance. The charts show that lower primary yield spreads are strongly associated with higher per capita real GDP and stronger institutions, while there is a moderate association with faster growth, current account surpluses, and higher international reserves. By contrast, there is no evidence of a significant correlation between primary spreads and the fiscal position, either considering the government balance or external public debt.

3. The empirical analysis

3.1. Empirical specification

Access to international debt markets can be modeled as a two-step process. The first relates to the willingness of sovereigns to access global markets and of the latter to supply funds. The second concerns the price at which demand and supply are settled. If unobserved factors that determine bond issuance also affect spreads, a standard linear model for the determinants of sovereign spreads at issue would be biased because of sample selection, given that the dependent variable (the spread in

¹⁵ Adjusting the threshold to 10 issuances rather than 5 does not alter the results. In that case, the 7 regular access countries are Brazil, Croatia, Hungary, Jamaica, Lithuania, Poland, and Ukraine.

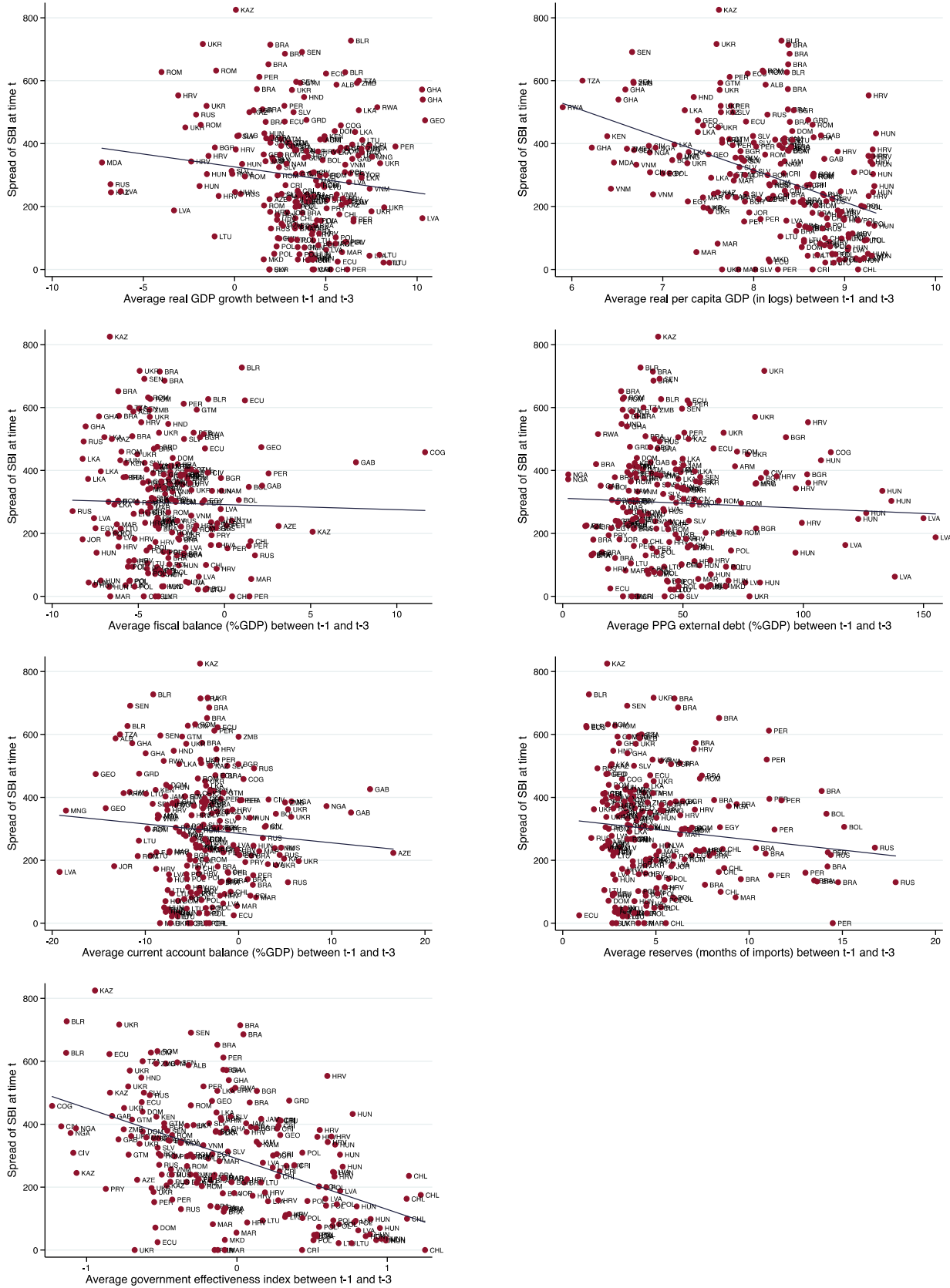


Fig. 4. Spreads and country performance before issuance. *Notes:* Based on data for 213 SBIs (by 52 countries), over 1995–2014.

the primary market) is observed only for a non-random subset of country-year observations. Empirically, this problem can be addressed by specifying a sample selection model *à la* Heckman (1979). According to this procedure, in the first stage (selection equation), the probability of sovereign bond issuance is estimated by a standard probit regression, and in the second stage (outcome equation) the primary spread is a linear function of the set of variables and of the inverse Mills ratio calculated from the first-stage regression, which corrects for sample selection bias.

Access to international capital markets is likely to be the result of demand and supply factors: disentangling these two would require an exogenous shock in the demand or in the supply schedule. Focusing exclusively on EMDEs (many of which are LIDCs) should help minimize the cases of voluntarily absence from the market (lack of demand), given that these countries generally need large amounts of external funds to finance domestic investment (Eaton and Gersovitz, 1980; Gelos et al., 2011). Countries, however, could still self-select out of international credit markets, especially in the case of sovereigns with sufficient access to grants and concessional loans. We take this possibility into account by controlling for participation in IMF-supported lending programs and, as robustness check, we control also for the amount of aid inflows. In addition, countries could base their demand for international bonds on expected borrowing costs. While it is difficult to fully control for these costs, especially for first-time issuers for whom there are no secondary market bond spreads, the information on expected borrowing costs is indirectly taken into account by inclusion of a comprehensive set of domestic and global controls in the selection equation. However, in the absence of an identification strategy, the empirical exercise focuses on factors associated with sovereign bond issuance without implying causality.

In the selection equation, the likelihood of a sovereign bond issuance (SBI) in the global market by a country is a function of: (1) the 10-year US Treasury notes yield and the VIX index as measures of global liquidity and volatility (*GLOBAL*); (2) a set of j time-varying domestic factors (*DOMESTIC*); and (3) country size (*POPULATION*). The latter is measured by the logarithm of population, which is taken as excluding restriction under the assumption that it affects only the likelihood to issue but not the primary spreads, given that, in the presence of fixed costs for borrowing, smaller countries will access markets less frequently than larger countries (Faria et al., 2010; Gelos et al., 2011). The selection equation is as follows:

$$Prob(SBI = 1)_{i,t} = \Phi \left(\sum_{k=1}^2 GLOBAL_t^k; \sum_{j=1}^n DOMESTIC_{i,(t-1;t-3)}^j; POPULATION_{i,(t-1;t-3)} \right) \quad (1)$$

where the dependent variable is a binary indicator that takes the value of one when country i issued at least one sovereign bond in year t , and zero otherwise, and $\Phi(\cdot)$ is the normal cumulative distribution function. In the outcome equation, the primary spread on the sovereign bond (*SPREAD*) issued by country i in

year t (observed exclusively in country-year observations where $SBI = 1$)¹⁶ is a linear function of the same set of global and domestic factors, plus the inverse Mills ratio (*IMR*) which takes account of the selection bias:

$$SPREAD_{i,t} = \alpha + \sum_{k=1}^2 \gamma_k GLOBAL_t^k + \sum_{j=1}^n \beta_j DOMESTIC_{i,(t-1;t-3)}^j + \rho IMR + \xi_{i,t} \quad (2)$$

In both equations, global conditions include the contemporaneous values of the 10-year US Treasury notes yield and the Vix index, which may affect both the supply of funds by investors and demand for financing by issuing countries. The set of domestic factors includes indicators of overall economic performance, past issuances and participation in IMF-supported programs, external sector position, liquidity, fiscal position, and government effectiveness, as discussed in Section 2.2.¹⁷ All domestic explanatory variables are measured as averages in the 3-year period prior to the year of issuance. Taking a 3-year period rather than measuring independent variables in $t - 1$ further mitigates possible endogeneity concerns (Gelos et al., 2011) and minimizes the incidence of outliers. In addition, this choice assumes that market access does not depend on domestic macroeconomic conditions in place just the year before the issuance, but it is influenced by what happened in the run-up of the issuance. Given that the inclusion of the dummy variable for lagged issuance—which accounts for persistence in market access—may create problems making the model dynamic, we start showing results for a model that excludes the dummy for past sovereign bond issuance.

The model also includes regional dummy variables (for Asia and Pacific, Europe and Central Asia, Latin America and Caribbean, Middle East and North Africa, and Sub-Saharan Africa) to account for regional fixed effects and spillovers (Dell'Erba et al., 2013), and to measure possible differences in market access and spreads across countries that are not picked up by observable heterogeneity. The baseline analysis takes into account the role of global liquidity and volatility including the 10-year US Treasury notes' yield and the Vix index. Alternatively, we replace these two variables with year-fixed effects, which capture global (common) time-variant shocks and allow to focus on the role of domestic factors.

3.2. Results

The maximum likelihood estimates of the 2-equation system are shown in Table 5, which reports the coefficients and the

¹⁶ If a sovereign issues more than one bond in a given year, the variable *SPREAD* measures the (unweighted) average of the spreads of all bonds issued in that year.

¹⁷ As the literature identifies a number of determinants of market access and bond spreads, the set of explanatory variables used considers the trade-off between the inclusion of the most relevant determinants of market access and the reduction in the number of observations due to the inclusion of too many variables.

associated robust standard errors (correcting for heteroskedasticity). Because of data availability on the set of control variables, the analysis is based on 219 bond issuances. For each model specifications, the first column reports the estimates of outcome equation (2) and the second refers to the selection equation (1). We start from the baseline specification and then add the dummy for past bond issuances (columns 3–4), the measure of government effectiveness (columns 5–6) and we finally replace the 10-year US Treasury notes' yield and the Vix index to add year fixed effects (columns 7–8).

Overall, the analysis shows that sovereign bond issuance and spreads depend on global conditions, macroeconomic performance (the fiscal position and indicators of liquidity), and institutional strength in the run-up to bond issuances. The results indicate that country size is a significant predictor of sovereign bond issuance, as there would be fixed costs for borrowing through issuance (Gelos et al., 2011), validating the exclusion restriction.¹⁸ Regional dummy variables and global factors are statistically significant, suggesting the presence of spillovers in market access and the relevance of global demand- and supply-side factors in the sovereign bond market. As in Eichengreen and Mody (2000), the coefficient ρ on the estimated inverse Mills ratio in the outcome equation is negative (although not statistically significant), suggesting that participation in the international debt market is non-random, and that the unobservable political, institutional and economic characteristics of countries affecting the likelihood SBI also inversely influence bond spreads.

The baseline specification (columns 1–2) indicates that global factors matter for market access. When market volatility increases, so do primary spreads (Siklos, 2011; Csontó, 2014): a one standard deviation of the Vix index corresponds to a 49 basis points change in the spread. The effect of global interest rates is twofold: lower US rates are associated with a higher probability that countries issue sovereign bonds, but also with higher spreads, even though the effect is relatively small. The estimated coefficients indicate that 1 percentage point reduction in the US rate translates into a 17 basis-point increase in the primary spread. This result is consistent with that of Eichengreen and Mody (2000) and, as suggested when discussing the stylized facts (see above, Section 2.2), it is likely to be the result of frontier and Sub-Saharan African markets accessing international bond markets in a period of declining global interest rates, but placing bonds at spreads higher than the average spread on bonds placed by EMDEs (Fig. 3).¹⁹ Consistent with this

interpretation, the coefficient on the US rate in the spread equation is no more significant once we augment the model with the measure of government effectiveness, which should further capture the heterogeneity across early and late issuers.

Moving to domestic factors, results show that countries with higher per capita real GDP levels are more likely to issue sovereign bonds. The coefficient on real GDP growth indicates that low-growth countries are penalized when issuing bonds as they tend to do so at higher spreads (Gelos et al., 2011; Eichengreen and Mody, 2000). The coefficients on inflation are generally not statistically significant. Countries that had an IMF-supported lending arrangement in the previous three years are more likely to issue, supporting the catalytic role of IMF lending (Mody and Saravia, 2006), but they do so at a higher cost (126 basis points), even though the latter effect is washed out by the inclusion of the government effectiveness variable. Interestingly, this result on IMF-supported programs is consistent with the recent experience of Ghana, which agreed on an extended three-year credit facility in April 2015 and later issued a US\$1 billion sovereign bond in July, at a record-high coupon of 10.75%.

The external sector position and liquidity matter too. Countries with lower current account deficits face lower spreads than those with higher external deficits and lower reserves, while there is no evidence of a robust association between the current account and the probability of bond issuance. The latter, instead, is higher for countries with lower international reserves. The negative correlation between reserves and the probability of sovereign bond issuance is consistent with the findings of Gelos et al. (2011) and Olabisi and Stein (2015) and could suggest that a higher level of reserves insures sovereigns against exclusion from credit markets.

The fiscal position is a key determinant of market access. The coefficient on the public external debt-to-GDP ratio in the selection equation indicates that more indebted countries are less likely to issue sovereign bonds (Gelos et al., 2011) and when they do, they tend to pay higher prices (the coefficient is significant once we control for government effectiveness and even including time fixed effects): a 10% increase in the external debt-to-GDP ratio is associated with 10–12 basis-point increase in the primary spread (columns 5–7). The reinforcing effect of the debt-to-GDP ratio in the selection and outcome equations (columns 5–6) would suggest the presence of demand-side effects: high debt ratios would discourage demand from international investors and this shift would reduce the price of bonds, with a corresponding increase in primary spreads (Eichengreen and Mody, 2000). The negative coefficient on the government budget balance in the selection equation suggests that the demand for external borrowing is higher when fiscal deficit is larger, supporting the hypothesis that countries in the sample are capital scarce (Grigorian, 2003). By contrast, we do not find a significant correlation between the fiscal balance and primary spreads.

2008–2014 (results not reported) suggests that the supply-side effects may have dominated in the last period of global low interest rates.

¹⁸ Inclusion of population in the outcome equation (2) confirms that country size is not correlated with primary spreads.

¹⁹ This sort of sample selection effect is consistent with the early literature on emerging markets' bond spreads, when Fed tightening was associated with a narrowing, not widening, of bond spreads. One explanation is that initial market offerings during periods of Fed tightening, which were associated with turbulent market conditions, were only possible for the more creditworthy countries (Arora and Cerisola, 2001). Supply-side factors could be at play as well: with low yields, investors could look beyond the traditional markets and venture out in more risky frontiers markets, looking for higher spreads. The fact that the negative coefficient on US rates is not statistically significant when we exclude the period

Table 6
Regression results: baseline.

Dep. Var.:	(1) SPREAD	(2) SBI	(3) SPREAD	(4) SBI	(5) SPREAD	(6) SBI	(7) SPREAD	(8) SBI
US rates	−17.565** (8.924)	−0.147*** (0.038)	−17.404* (8.884)	−0.118*** (0.040)	−2.473 (8.298)	−0.089** (0.045)		
Vix index	7.955*** (1.536)	−0.010 (0.008)	7.914*** (1.535)	−0.009 (0.008)	7.388*** (1.579)	−0.014 (0.009)		
Real per capita GDP	−113.383*** (23.018)	0.841*** (0.070)	−110.109*** (20.958)	0.676*** (0.074)	−48.613** (22.671)	0.573*** (0.096)	−47.163*** (17.907)	0.584*** (0.095)
GDP growth	−11.174*** (4.131)	−0.011 (0.017)	−10.769*** (4.130)	−0.015 (0.017)	−10.522** (4.307)	−0.031 (0.020)	−11.821*** (3.633)	−0.015 (0.021)
Inflation	0.036 (0.082)	−0.000 (0.001)	0.011 (0.083)	−0.000 (0.001)	−0.559 (0.350)	−0.003 (0.002)	−0.057 (0.382)	−0.004* (0.002)
PPG external debt (% GDP)	0.461 (0.449)	−0.003* (0.002)	0.502 (0.445)	−0.003* (0.002)	0.964** (0.462)	−0.004* (0.002)	1.160*** (0.434)	−0.004 (0.002)
Fiscal balance (% GDP)	5.001 (5.633)	−0.076*** (0.020)	2.656 (5.166)	−0.053*** (0.019)	−4.253 (5.060)	−0.046** (0.021)	−1.155 (4.693)	−0.048** (0.021)
Current account (% GDP)	−3.697* (2.126)	−0.002 (0.009)	−3.477* (2.096)	−0.002 (0.009)	−5.784** (2.302)	0.001 (0.010)	−6.665*** (2.367)	0.002 (0.010)
Reserves (in months of imports)	−5.255 (3.844)	−0.038*** (0.014)	−4.692 (3.799)	−0.027* (0.014)	−2.213 (3.593)	−0.035** (0.015)	−4.520 (3.193)	−0.035** (0.015)
IMF program in the previous 3 years	126.043*** (44.906)	0.542** (0.252)	124.696*** (44.348)	0.505* (0.258)	72.329 (51.836)	0.567** (0.267)	36.374 (48.706)	0.629** (0.271)
Europe and Central Asia	−36.891 (47.754)	0.814*** (0.296)	−21.089 (45.342)	0.536** (0.271)	−38.629 (43.128)	0.616** (0.295)	−56.529 (45.858)	0.626** (0.296)
Latin America and Caribbean	36.016 (43.668)	0.973*** (0.294)	53.351 (42.737)	0.672** (0.264)	38.235 (40.370)	0.722** (0.281)	21.551 (43.442)	0.743** (0.289)
Middle East and North Africa	−102.244** (40.984)	0.174 (0.309)	−96.834** (41.639)	0.008 (0.299)	−98.469** (39.934)	0.049 (0.304)	−106.796** (43.198)	0.017 (0.304)
Sub-Saharan Africa	85.966** (40.004)	0.474* (0.281)	90.923** (40.762)	0.341 (0.256)	99.491** (40.309)	0.382 (0.263)	97.696** (46.418)	0.346 (0.267)
Population		0.437*** (0.035)		0.355*** (0.037)		0.362*** (0.040)		0.359*** (0.040)
SBI in the previous 3 years			−56.122* (31.563)	0.783*** (0.113)	−50.091 (36.810)	0.720*** (0.116)	−55.434* (30.839)	0.741*** (0.116)
Government effectiveness					−132.850*** (30.270)	0.254** (0.119)	−144.313*** (27.910)	0.260** (0.120)
Observations	1851		1851		1716		1716	
Region FE	Yes		Yes		Yes		Yes	
Year FE	No		No		No		Yes	
Wald test (ρ)	0.259		0.169		0.467		0.170	
Test year FE	.		.		.		0.000	
Test region FE	0.000		0.000		0.000		0.000	

Notes: The table reports the estimated coefficients and the associated robust standard errors, of the maximum likelihood estimated of Eqs. (1) and (2). The model is estimated by two-step Heckman, using Stata 13 SE package with HECKMAN command. The dependent variable is: (1) a dummy equal to one if the country issues a sovereign bond at time t , and zero otherwise (SBI) in the selection equation and (2) the spread on sovereign bonds at issue (SPREAD) in the outcome equation. The 10-year US Treasury notes yield and the Vix are measured at time t , while all the other variables are averages between $t - 3$ and $t - 1$. A constant and year dummies are included, but coefficients are not shown. The bottom rows report the p -values of a t -test for the joint significance of year and region dummies, and the p -value of the Wald test for the independence of the two equations ($\rho = 0$).

* Significant at 10%.

** Significant at 5%.

*** Significant at 1%.

Regional dummies are often statistically significant suggesting that there are differences in the likelihood to issue sovereign bonds and in primary spreads which are not accounted for by observed heterogeneity. Interestingly, while there is no robust evidence that SSA countries has a higher probability of issuing a bond, the coefficient on the SSA dummy in the outcome equation is positive and relatively stable across specifications, indicating that the average SSA country pays up to 100 basis points more than the average Asian country (Asia is the reference category) and, in general, spreads in SSA are higher than in

all other countries, even after controlling for a large number of country characteristics. This effect is smaller than the one found by Olabisi and Stein (2015) who, however, control for a much smaller set of covariates.

In columns 3–4, the model is augmented to account for the fact that sovereign bond issuance is likely to be persistent. The analysis finds that after its first issuance, a country is more likely to issue again in the future, and when it does, spreads are lowered: the reduction in spreads for repeat issuers is about 56 basis points compared to countries that did not issue in the

Table 7
Regression results: robustness.

Dep. Var.:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	SPREAD	SBI	SPREAD	SBI	SPREAD	SBI	SPREAD	SBI	SPREAD	SBI	SPREAD	SBI	SPREAD	SBI
Vix index	6.366** (1.647)	-0.014* (0.009)	6.749** (1.579)	-0.016* (0.008)										
Energy prices	-0.467 (0.347)	0.002 (0.002)												
Non-energy prices			-1.021* (0.541)	0.004 (0.003)										
Real per capita GDP	-41.069* (23.148)	0.580*** (0.095)	-38.419* (22.840)	0.577*** (0.094)	-52.484** (21.338)	0.594*** (0.095)	-43.228** (18.087)	0.578*** (0.094)	-27.399 (17.613)	0.627*** (0.103)	-48.317* (26.146)	0.507*** (0.117)	18.463 (19.306)	0.690*** (0.091)
GDP growth	-10.327** (4.336)	-0.035* (0.019)	-10.593** (4.272)	-0.034* (0.019)	-13.782*** (3.628)	-0.013 (0.020)	-11.623*** (3.531)	-0.016 (0.021)	-10.414*** (3.358)	-0.027 (0.022)	-11.773*** (4.028)	-0.016 (0.021)	-9.360** (2.579)	0.008 (0.015)
Inflation	-0.655** (0.320)	-0.003 (0.002)	-0.628** (0.312)	-0.003 (0.002)	-0.062 (0.418)	-0.003* (0.002)	-0.060 (0.378)	-0.004* (0.002)	-0.262 (0.344)	-0.003* (0.002)	-0.086 (0.388)	-0.004* (0.002)	3.315*** (1.082)	-0.018** (0.006)
PPG external debt (% GDP)	1.218** (0.478)	-0.004* (0.002)	1.261*** (0.470)	-0.004* (0.002)			1.215*** (0.415)	-0.004* (0.002)	1.430*** (0.469)	-0.005** (0.002)	1.100 (0.676)	-0.004* (0.003)	0.035 (0.416)	-0.002 (0.002)
Fiscal balance (% GDP)	-5.278 (4.858)	-0.048** (0.021)	-5.476 (4.800)	-0.049** (0.021)	1.832 (6.172)	-0.058** (0.025)	0.234 (5.036)	-0.053** (0.021)	-4.395 (4.273)	-0.041* (0.022)	-2.401 (5.465)	-0.043* (0.022)	-9.134** (4.121)	-0.042** (0.017)
Current account (% GDP)	-6.563** (2.316)	-0.000 (0.009)	-6.691** (2.296)	0.000 (0.009)	-6.193* (2.429)	0.002 (0.010)	-5.460* (2.298)	0.001 (0.009)	-9.041** (1.967)	-0.009 (0.011)	-8.433** (3.259)	0.002 (0.010)	-2.087 (1.842)	-0.004 (0.008)
Reserves (in months of imports)	-0.220 (3.359)	-0.032** (0.015)	0.273 (3.250)	-0.033** (0.015)	-7.125** (3.349)	-0.031** (0.015)	-4.563 (3.246)	-0.035** (0.016)	-7.700** (2.957)	-0.026* (0.016)	-2.656 (3.666)	-0.033** (0.016)	-9.128** (2.598)	-0.027* (0.014)
Government effectiveness	-149.285** (31.598)	0.236** (0.118)	-154.036*** (31.304)	0.237** (0.117)	-128.729** (26.101)	0.232** (0.117)	-150.644*** (27.588)	0.315** (0.124)	-167.195*** (24.962)	0.162 (0.127)	-160.325*** (35.143)	0.274** (0.122)	-115.155*** (30.775)	0.062 (0.112)
IMF program in the previous 3 years	52.235 (51.601)	0.532** (0.267)	50.858 (50.616)	0.526** (0.267)	42.695 (51.906)	0.623** (0.280)	35.630 (49.074)	0.638** (0.272)	48.166 (43.709)	0.553** (0.279)	26.917 (59.764)	0.598** (0.282)	176.918*** (60.396)	1.031*** (0.237)
SBI in the previous 3 years	-50.597 (33.506)	0.723*** (0.116)	-51.947 (32.776)	0.727*** (0.116)	-52.917 (42.911)	0.724*** (0.117)	-51.318 (32.866)	0.735*** (0.116)	-53.870** (26.637)	0.744*** (0.124)	-80.163 (44.797)	0.772*** (0.119)	82.014*** (27.637)	0.847*** (0.116)
Europe and Central Asia	-50.192 (43.092)	0.616* (0.294)	-55.382 (43.698)	0.623** (0.293)	1.584 (45.059)	0.457 (0.290)	-97.273** (46.280)	0.742** (0.295)	-12.072 (48.344)	0.510 (0.323)	-66.555 (53.559)	0.648** (0.318)		
Latin America and Caribbean	28.635 (40.161)	0.709** (0.278)	23.113 (40.683)	0.718*** (0.278)	48.181 (45.809)	0.682** (0.285)	-17.941 (44.561)	0.831*** (0.287)	118.395** (46.286)	0.584* (0.317)	6.234 (55.221)	0.748** (0.295)		
Middle East and North Africa	-105.163** (41.674)	0.039 (0.302)	-106.964** (42.480)	0.043 (0.302)	-117.245*** (39.843)	0.032 (0.300)	-145.911*** (40.853)	0.091 (0.301)	-44.088 (50.558)	-0.057 (0.327)	-117.354** (48.147)	0.020 (0.306)		
Sub-Saharan Africa	106.978*** (41.478)	0.398 (0.264)	107.741*** (41.663)	0.397 (0.264)	109.444** (45.452)	0.297 (0.262)	96.832** (42.129)	0.334 (0.273)	106.905** (48.957)	0.350 (0.291)	114.625* (67.098)	0.359 (0.272)		
Population		0.365*** (0.040)		0.364*** (0.040)		0.360*** (0.040)		0.362*** (0.040)		0.373*** (0.042)		0.333*** (0.045)		0.327*** (0.043)
Total public debt (% GDP)					1.193** (0.500)	-0.004 (0.003)								
Resource rich dummy							-96.122** (42.315)	0.316* (0.179)						
Capital account openness									-24.429*** (5.986)	0.064 (0.041)				
Aid (% GDP)											-3.023 (8.510)	-0.014 (0.019)		
Observations	1716		1716		1723		1716		1599		1668		1605	
Region FE	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Year FE	No		No		Yes		Yes		Yes		Yes		Yes	
Wald test (ρ)	0.421		0.409		0.514		0.286		0.184		0.236		0.001	
Test year FE	.		.		0.000		0.000		0.000		0.000		0.000	
Test region FE	0.000		0.000		0.000		0.000		0.000		0.000		0.000	

Notes: The table reports the estimated coefficients and the associated robust standard errors, of the maximum likelihood estimated of Eqs. (1) and (2). The model is estimated by two-step Heckman, using Stata 13 SE package with HECKMAN command. The dependent variable is: (1) a dummy equal to one if the country issues a sovereign bond at time t , and zero otherwise (SBI) in the selection equation and (2) the spread on sovereign bonds at issue (SPREAD) in the outcome equation. All control variables are averages between $t-3$ and $t-1$; in columns 13–14, instead, they are measured in $t-1$, with the exception of the dummies for past SBI and IMF programs in the previous three years. A constant and year dummies are included, but coefficients are not shown. The bottom rows report the p -values of a t -test for the joint significance of year and region dummies, and the p -value of the Wald test for the independence of the two equations ($\rho = 0$).

* Significant at 10%.

** Significant at 5%.

*** Significant at 1%.

previous three years. This result lends further support to the hypothesis of the presence of fixed costs in accessing international capital markets.²⁰

Results in columns 5–6 control for institutional strength, measured by the index of government effectiveness, which the

existing literature has identified as a key driver of market access (Thomas, 2009; Gelos et al., 2011), at the cost of reducing the sample size. Greater government effectiveness increases the likelihood of sovereign bond issuance and lowers its cost: a one standard deviation increase in the index of government effectiveness is associated with 80 basis points reduction in primary spreads. The inclusion of government effectiveness causes a sharp reduction of the coefficient on per capita real GDP associated with bond spreads and the coefficient on the US rate is

²⁰ This finding is consistent with that of Guscina et al. (2014) with first-time bond issuances trading at higher spreads, even after controlling for a standard set of macroeconomic and institutional variables.

Table 8
Issuances and primary bond spreads in Sub-Saharan Africa.

Dep. Var.:	(1) SPREAD	(2) SBI	(3) SPREAD	(4) SBI	(5) SPREAD	(6) SBI	(7) SPREAD	(8) SBI	(9) SPREAD	(10) SBI
Sub-Saharan Africa	103.185*** (35.574)	−0.030 (0.142)	194.137** (89.987)	0.673 (0.425)	207.992* (119.936)	0.604 (0.472)	−202.024 (304.980)	−1.730*** (0.516)	373.220 (336.749)	−2.510*** (0.599)
US rates	−4.544 (9.234)	−0.079* (0.045)	−3.310 (9.014)	−0.046 (0.050)	−4.783 (9.255)	−0.079* (0.045)				
Vix index	7.102*** (1.647)	−0.015* (0.008)	7.059*** (1.642)	−0.014* (0.009)	7.514*** (1.695)	−0.009 (0.009)	6.162*** (1.667)	−0.015* (0.009)	6.455*** (1.662)	−0.018** (0.009)
Energy prices							−0.432 (0.345)	−0.000 (0.002)		
Non-energy prices									−0.931* (0.557)	−0.000 (0.003)
Sub-Saharan Africa*US rates			−30.940 (26.950)	−0.209* (0.116)						
Sub-Saharan Africa*Vix index					−5.822 (6.232)	−0.033 (0.024)				
Sub-Saharan Africa*Energy prices							2.887 (2.673)	0.017*** (0.005)		
Sub-Saharan Africa*Non-energy prices									−2.598 (3.347)	0.028*** (0.007)
Repeaters capita GDP	−44.188 (34.925)	0.669*** (0.086)	−42.937 (35.878)	0.667*** (0.087)	−44.184 (35.933)	0.665*** (0.086)	−38.709 (34.590)	0.680*** (0.087)	−33.695 (38.064)	0.680*** (0.088)
GDP growth	−12.461*** (4.481)	−0.038* (0.020)	−12.953*** (4.613)	−0.040** (0.020)	−12.852*** (4.503)	−0.040** (0.020)	−12.676*** (4.654)	−0.043** (0.020)	−12.394*** (4.457)	−0.042** (0.021)
Inflation	−0.665 (0.450)	−0.002 (0.002)	−0.683 (0.459)	−0.003 (0.002)	−0.678 (0.456)	−0.002 (0.002)	−0.787* (0.430)	−0.003 (0.002)	−0.754* (0.412)	−0.003 (0.002)
PPG external debt (% GDP)	0.349 (0.476)	−0.004* (0.002)	0.378 (0.463)	−0.003 (0.002)	0.344 (0.477)	−0.004* (0.002)	0.643 (0.464)	−0.002 (0.002)	0.636 (0.482)	−0.002 (0.002)
Fiscal balance (% GDP)	−1.916 (6.147)	−0.027 (0.018)	−0.886 (6.448)	−0.025 (0.018)	−1.859 (6.238)	−0.027 (0.018)	−2.366 (6.164)	−0.029 (0.018)	−4.047 (6.558)	−0.030 (0.018)
Current account (% GDP)	−5.590** (2.437)	−0.005 (0.009)	−5.697** (2.511)	−0.003 (0.009)	−5.519** (2.486)	−0.003 (0.009)	−6.564*** (2.543)	−0.004 (0.009)	−6.198** (2.662)	−0.005 (0.010)
Reserves (in months of imports)	−0.891 (3.484)	−0.041*** (0.013)	−0.967 (3.499)	−0.041*** (0.014)	−0.863 (3.490)	−0.041*** (0.013)	1.117 (3.308)	−0.039*** (0.014)	1.819 (3.239)	−0.040*** (0.014)
IMF program in the previous 3 years	92.347 (62.958)	0.764*** (0.254)	92.664 (63.077)	0.742*** (0.255)	93.708 (64.610)	0.775*** (0.253)	72.219 (61.882)	0.696*** (0.255)	69.384 (63.127)	0.682*** (0.255)
SBI in the previous 3 years	−17.203 (57.564)	0.799*** (0.116)	−16.950 (58.290)	0.785*** (0.115)	−19.619 (60.036)	0.800*** (0.116)	−19.036 (54.202)	0.782*** (0.116)	−18.122 (61.138)	0.787*** (0.116)
Government effectiveness	−127.221*** (30.274)	0.223** (0.111)	−128.360*** (30.111)	0.226** (0.112)	−126.671*** (30.325)	0.229** (0.111)	−144.239*** (30.997)	0.208* (0.110)	−148.786*** (31.533)	0.207* (0.109)
Population		0.351*** (0.038)		0.349*** (0.038)		0.348*** (0.038)		0.351*** (0.038)		0.353*** (0.039)
Observations	1716		1716		1716		1716		1716	
Region FE	No		No		No		No		No	
Year FE	No		No		No		No		No	
Wald test (ρ)	0.932		0.942		0.932		0.947		0.991	

Notes: The table reports the estimated coefficients and the associated robust standard errors, of the maximum likelihood estimated of Eqs. (1) and (2). The model is estimated by two-step Heckman, using Stata 13 SE package with HECKMAN command. The dependent variable is: (1) a dummy equal to one if the country issues a sovereign bond at time t , and zero otherwise (SBI) in the selection equation and (2) the spread on sovereign bonds at issue (SPREAD) in the outcome equation. The 10-year US Treasury notes yield, the Vix, and the energy and non-energy price indexes are measured at time t , while all the other variables are averages between $t - 3$ and $t - 1$. A constant, is included, but not shown. The bottom row reports the p -value of the Wald test for the independence of the two equations ($\rho = 0$).

* Significant at 10%.

** Significant at 5%.

*** Significant at 1%.

less precisely estimated, while we still find evidence that spreads increase in periods of market volatility.

Finally, in columns 7–8, we model global shocks with time fixed effects rather than with the inclusion of the yield on the 10-year US Treasury note and the Vix index. The results on the domestic factors are broadly unaffected (the negative correlation between inflation and the probability of bond issuance becomes significant) and time fixed effects are jointly significant, lending further support to the hypothesis that common global factors matter for market access by EMDEs.

3.3. Robustness

The robustness analysis focuses mainly on the potential role of additional external and domestic factors in affecting market access. First, given that strong correlation between capital inflows to developing countries and commodity prices, we consider the role of energy and non-energy prices in driving market access by developing countries. In columns 1–2 and 3–4 of Table 7 we replace the US rate with, respectively, the index of energy prices and the one of non-energy prices published

by the World Bank (2015). Results on the domestic factors are broadly in line with what shown in Table 6 (columns 5–6) and the Vix turns out to be significant also in the selection equation, indicating that periods of higher market volatility are associated with a lower probability of issuance and with higher primary bond spreads. Commodity prices, instead, are not associated with issuances, but only with bond spreads, which are lower when non-energy prices are higher.

Then, we consider a set of additional domestic factors that could affect market access. We take the last specification of Table 5 (columns 7–8), including the dummy variable for past bond issuances, government effectiveness and year fixed effects, as reference. We test the robustness of our findings by including a set of alternative domestic macroeconomic control variables. We start by controlling for the level of total public debt, rather than measuring exclusively public and publicly guaranteed external debt, and we find that the two debt indicators have similar effects, as higher public debt ratios are associated with higher bond spreads (Table 7, columns 5–6). The inclusion of a dummy variable for resource-rich economies does not alter the baseline results and shows that natural resource rich countries are more likely to issue sovereign bonds and pay lower prices than other countries (columns 7–8). Further, the Chinn and Ito (2006) *de jure* measure of financial openness shows that countries with more open capital accounts can issue at a significant lower spread than less financially open sovereigns. We also augment the model by adding the ratio of aid inflows to GDP, in order to control for the possibility that countries with easier access to grants and concessional loans could have a smaller demand for non-concessional financing (columns 11–12); our results indicate that market access for countries depending more on foreign aid does not differ significantly from other countries.

Finally, in columns 13 and 14 all domestic variables are measured at time $t - 1$ (rather than averaged over the three-year period before the issuance). Results are quite similar to the baseline, even though there are few notable exceptions: (1) higher international reserves and stronger fiscal balances are significantly associated with lower primary spreads, and (2) a higher inflation is associated with a lower probability to issue and to higher primary spreads.

3.4. Is market access in Africa different?

Given the new wave of external borrowing by a number of African countries over the last decade, and given that bonds issued by SSA countries are, on average, larger relative to the size of the domestic economy and are issued at a premium compared to the ones issued by other developing countries (see Tables 4 and 6), it is interesting to investigate whether the correlation between global conditions and bond issuances in SSA is different than in other regions. Siklos (2011) provides some evidence that bond markets in the region are decoupled from those in other parts of the world, in line with a lower level of international financial integration of African economies. Alternatively, one could argue that global factors are relatively more important for international lenders when investing in SSA sovereign

bonds than in more advanced financial markets. To discriminate between these two hypotheses, in Table 8 we replicate our main analysis including a dummy for SSA countries rather than the set of regional dummies and then we interact the SSA dummy with the different global factors that have been shown to affect market access.

Results confirm that, once several macroeconomic characteristics are taken into consideration, countries in SSA are equally likely to issue sovereign bonds than other countries, but they issue at a premium of more than 100 basis points. Moreover, while market volatility affects all countries in the same way, US interest rates and commodity prices have a much stronger association with issuances in SSA than elsewhere. In particular, low interest rates and high commodity (both energy and non-energy) prices are associated with a higher likelihood of issuance by SSA countries, while this is not the case for other regions. Thus, the general correlation between global liquidity and bond issuances seems to be driven by African issuers. This result is consistent with SSA issuances having been clustered in recent years, when US rates have been at a record-low level and commodity prices boomed (Fig. 2), but, at the same time, it indicates the presence of some vulnerabilities related to a decline in commodity price and monetary policy normalization in the US.

4. Conclusions

Our analysis, drawing on the experience of emerging markets and developing economies that have gained market access, provides some messages for LIDCs and African countries that are accessing international markets in recent years. Countries with higher public debts and weak governance are less likely to issue sovereign bonds than their peers. Moreover, countries with sound external positions, as reflected in the current account balance, strong economic growth, and low public debts can issue sovereign bonds at a lower premium than other countries. Global conditions also matters for bond issuances, as they are more likely in periods of global liquidity and high commodity prices, while primary spreads are lower in periods of low market volatility. Finally, we also observe that SSA countries are more exposed than countries in other regions to global conditions and they pay a premium of about 100 basis points when issuing sovereign bonds.

These findings, though not to be interpreted in a causal way, would suggest that frontier markets and first-time sovereign bond issuers should fulfill certain preconditions—building a record of good economic performance, ensuring a sound fiscal and external positions—in order to successfully attract foreign investors (Das et al., 2008; Guscina et al., 2014).

Given the ongoing trend in sovereign bond issuances by LIDCs, especially in Sub-Saharan Africa, further analysis will be needed to better understand the real effects of SBIs on the scaling up of public investment, growth and debt sustainability, in order to have a more informed framework to assess the potential benefits and risks of alternative sources of external financing for frontier markets.

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