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ABSTRACT

We analyze the sovereign bond issuance data of eight major emerging markets (EM) - Brazil, China, India, Indonesia, Mexico, Russia, Turkey and South Africa - in 1970-2018. Our analysis suggests EMs are more likely to issue local-currency sovereign bonds if their currencies appreciated before the global financial crisis of 2008 (GFC). Inflation-targeting monetary policy regime increases the likelihood of issuing local-currency debt before GFC but not after. EMs that offer higher yields are more likely to issue local-currency bond after GFC. EM bonds which are smaller in size, shorter in maturity, or lower in coupon rate are more likely to be issued in local currency. Future data will allow us to test and identify structural changes associated with the COVID-19 pandemic and its aftermath.

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1. Introduction

The financial opening of emerging markets (EM) in the 1990s provided them with greater access to the global financial system. While access to external finance delivered benefits, largely front-loaded, it led to large and growing external debt, mostly in hard currency. The wave of sudden stop crises that a dozen EMs suffered in the second half of the 1990s illustrated the sizable downside risk associated with large balance sheet exposures and over-borrowing syndrome related to non-pecuniary externalities. These crises are typically linked to the bailouts of systemic private sector players, which socialized their losses and exacerbated the public debt-overhang. More broadly, these developments brought to the fore the hard currency borrowing constraints that emerging markets face. More precisely, they find that their domestic currency cannot be used to borrow abroad or to borrow long term even domestically. This phenomenon is referred in Eichengreen, Hausmann, and Panizza (2007) as the 'Original Sin'.

However, a remarkable adjustment of EM took place in the late 1990s and 2000s. They adopted managed exchange rate flexibility, precautionary management of international reserves, and prudential policies. These adjustments helped cushion most EMs during the turbulent GFC of 2007-2009. In response to GFC, the US Federal Reserve drastically cut short-term policy interest rate and pursued unconventional monetary expansion such as quantitative easing (QE). QE policies included the Fed's purchase of longer-term bonds, aimed at flattening the yield curve. The euro zone sovereign debt crisis and the consequent spiraling sovereign spreads of Greece, Ireland,

Italy, Portugal and Spain (GIIPS) induced the ECB to adopt Draghi's version of unconventional monetary policies.[1]

These policies turned out to be a game-changer for the US, euro zone, and emerging markets. The sharp decline of interest rates drastically reduced the sovereign spreads of GIIPS. The negative policy interest rates of the EZ, including on most public debts of core EU countries, and the sharp drop in the yields on US bonds induced a global search for yields, reducing the sovereign spreads of most EMs to single digits. OECD institutional investors embarked on purchasing the local currency bonds of a growing number of EM. These developments mitigated the 'Original Sin', allowing a growing number of EM to borrow both in hard and domestic currencies.[2] The resulting expansion of EMs' external debt led to an unprecedented increase in their debt to GDP ratios, bringing to the fore concerns about growing debt overhang and fragility, including the possibility of fiscal dominance. This possibility arises when growing debt/GDP

[1] *Draghi's ECB tenure: Saving the euro, faltering on inflation*, FT 10/20/19 concisely summarized these policies. Draghi "expanded the ECB's policy toolbox to include generous subsidised lending to banks to help shore up their balance sheets, negative rates to lower borrowing costs and sovereign bond purchases to bring down the market interest rates faced by the bloc's most troubled economies." Consequently, "The ECB has subsequently accumulated €2.6tn of assets, including nearly a quarter of member states' outstanding bonds. Critics in northern Europe complained that these programmes were beyond the bank's mandate, while others warned that the negative side-effects outweighed the benefits." "In the eurozone, government bond yields measure investors' perception of risk — the more likely the markets think it is that a country will crash out of the bloc, the wider the spread between its yields and those of Germany, the single currency's largest economy. During Mr Draghi's tenure, peripheral countries' spreads shot up to historic highs as investors became fearful that they would be unable to finance their rising debt levels or stimulate their struggling economies. The bloc's banks are large holders of their home nations' debt, so the sovereign debt crisis soon evolved into a banking crisis, and that in turn hit lending to households and businesses. The subsequent retrenchment in eurozone bond spreads demonstrated that Mr Draghi's use of unconventional monetary policy had worked, economists say. 'It is widely agreed that [his] pledge to make the ECB the de facto lender of last resort to governments was the key to arresting the euro crisis,' said Christian Odendahl, chief economist at the Centre for European Reform."

[2] The share of local currency is estimated at 87.1 percent of total EM debt, amounting to $21.9 trillion, in 2017. Local currency debt outstanding has increased from 40 percent of GDP in the early 2010s to almost 60 percent of GDP recently (IMF, 2018).

constrains the conduct of monetary policy by forcing the central bank to pay growing attention to reducing the costs of servicing the public debt and external debt [see Blanchard (2004), and Ahmed et al. (2019) for empirical evidence in the context of inflation targeting regimes].[3]

Applying the public finance logic of the second-best, the mitigation of a constraint like the 'Original Sin' provides new borrowing opportunities and furthers the integration of EMs into global financial markets. However, it may also induce secondary effects with more ambiguous welfare effects.[4] Indeed, the resulting increase in external debt of Ems raises concerns that volatile sovereign spreads and interest rates are key determinants of EMs' fiscal vulnerability. Such fragility is evident in growing susceptibility to confidence crises when a seemingly moderate level of aggregate external debt/GDP ratio may push a country into an external debt crisis. Lower global risk tolerance, also known as a flight to quality, or deteriorating growth prospects of EMs sharply widen sovereign spreads and risk premia, inducing capital flight and exacerbating roll over difficulties. These events may put in motion self-fulfilling confidence crises of increasing spreads, leading to a sudden stop and capital flight crisis within just a few quarters. The end game frequently saddles the public sector with a large debt overhang associated with bailing out the financial system

[3] The distinction between fiscal and monetary dominance regimes is due to Sargent and Wallace (1981). If the government adjusts the primary deficit to limit debt accumulation, the central bank is not forced to inflate away the debt, allowing the central bank to focus on inflation targeting, in line with monetary dominance. However, long periods of large fiscal deficits and high public debt-to-GDP ratios raises the specter of fiscal dominance by tightening the links between fiscal policy, monetary policy and government debt management. When higher policy interest rates or depreciating currencies raise concerns about debt sustainability, monetary independence is compromised. Possible manifestations of these concerns include the 'fear of floating,' fiscal pressure against policy interest rate hikes, financial repression, and the like.

[4] See Aizenman (2004) for further discussion on the ambiguous impact of greater financial integration of EM. Recent analysis of the impact of local currency borrowing on the spreads of local and hard currency debts include Miyajima et al. (2015), Du and Schreger (2016), Engel and Park (2019). Park et. al. (2019), and Amstad et al. (2020).

and prime corporate borrowers, sometimes in the context of IMF stabilization packages [see Aizenman et al. (2019)].

The patterns of sovereign spreads and the interest rate costs of local-currency and hard-currency external borrowing for EM public and private sectors have shifted in recent decades. There are possible cross effects associated with deeper access of countries to hard currency and local currency external borrowing, creating conditions under which the cross effects are positive or negative, possibly exacerbating fragility over time. Specifically, while shifting from hard-currency borrowing to local-currency borrowing may reduce sovereign spreads on the former, it may increase the interest rate on the latter. These effects may be non-linear, and their sign may be reversed over time for a large enough debt overhang. Thereby, the growing access of EMs to more elastic external borrowing in hard and soft currencies imposes new debt management challenges, possibly increasing their fragility down the road and thus putting a premium on proper management of their financial and macro policies. The unconventional monetary policies adopted by the US Fed and ECB may be viewed as 21st century incarnations of financial repression, as succinctly pointed out in Reinhart (2012). While financial repression may postpone adjustment to the global leverage build-up, future instability associated with the exit from debt overhang is a tail risk, heightening EM financial fragility and perhaps even triggering future EM crises. See also the Appendix for a bird's-eye view of BRIC's financial fragility, and Diaz-Alejandro (1985) for the seminal paper on financial repression, financial fragility and crises trade-offs.

In this paper, we seek to understand the patterns of sovereign bond issuance by investigating the micro-level evidence grounded in bond issuances. One key issue is the choice of currency denomination. While some countries target domestic investors, others prioritize raising funds in the international market. Traditionally, EMs were not able to raise funds in their own

currency in the foreign market. However, in recent years, they are increasingly capable of doing so as the demand for EM asset increases. The choice of currency denomination is not only driven by issuers' preference but also the demand of international investors. When determining the currency denomination of sovereign bonds, EMs not only consider domestic factors but also international investors. Even if EMs prefer to issue a local-currency bond, if the market demand is weak, it would be difficult for them to raise sufficient funds. We take into account both supply- and demand-side factors to better understand the evolving patterns of currency-denomination in sovereign bond issuance.

Based on the sovereign bond issuance data of eight emerging markets in the Thomson Reuters Eikon database, we find that EM governments are more likely to issue local-currency bond when the local currency appreciates. Intuitively, rising currency increases the returns on local-currency denominated assets, which attracts more demand from international investors. The rising demand for local currency denominated assets enables the governments to issue more local currency denominated bonds. The result remains robust after we control for bond characteristics such as maturity and coupon types, country-specific economic fundamentals such as international reserves and the current account balance, and global factors such as global liquidity and risk appetite.

In addition, we find that EM which offer higher bond yields after the global financial crisis (GFC) are more likely to issue local-currency denominated bonds. This is due to the international investors' global search for yields after the Fed and ECB cut the interest rate to almost zero, resulting in negative yields in some advanced markets. Inflation targeting countries, which are more credible and less likely to inflate away their debt burden (Engle and Park, 2019), are found to be more likely to issue local-currency denominated bonds before but not after GFC. The

intensification of competition triggered by technology and the sharing economy is keeping global inflation in check. Even with unprecedented monetary expansion, inflation remains low in most economies in the post-GFC period. As such, inflation targeting may no longer make a significant difference.

2. Data and Methodology

We collect sovereign bond issuance data for eight EMs from the Thomson Reuters Eikon database for the period of 1970-2018. Our analysis focuses on Brazil, China, India, Indonesia, Mexico, Russia, Turkey and South Africa due to their relative importance in the EM bond markets and data availability.

We first present the summary statistics for local- and foreign-currency denominated bonds in Table 1. The average bond size - i.e. issue amount in USD per issuance - of foreign-currency denominated bond is larger than that of local-currency denominated bond, with the exception of China and India. Note that there are no records of foreign-currency denominated bond issuance in India in our dataset. The frequency of local-currency denominated bond issuance is higher than that of foreign-currency denominated bond issuance. If we exclude India from the sample, the ratio of local-currency bonds to the total size of bonds issued during the sample period is the highest for China (99.67%) and lowest for Russia (85%).The baseline framework for our probit regression is

$$P\left(D_{i,j,t} = 1\right) = \beta \;\; X_{j,t} + \gamma \mathrm{S}_{i,j,t} + C_j + T_t + \varepsilon_{i,j,t}, \qquad (1)$$

where $D_{i,j,t} = 1$ bond i in country j at period t is issued in local currency. The key country-specific variable is $X_{j,t}$, which captures variations in the attractiveness of local-currency denominated bonds in country j at period t. It takes the value of (i) $FX_{j,t}$, the currency appreciation of country j at period t relative to USD; (ii) $Yield_{j,t}$ 10-year sovereign bond yield difference between country j and US at period t; and (iii) $IT_{j,t}$, a dummy variable that equals 1 if country j is pursuing inflation targeting at period t. We control for a set of bond-specific variable $S_{i,j,t}$. It includes $\log(Size_{i,j,t})$, the logarithm of the issued amount of bond i in country j at period t, $\log(Maturity_{i,j,t})$, the logarithm of the maturity of bond i in country j at period t, and $\text{Zero}_{i,j,t}$, and a dummy that equals to one if the bond i in country j at period t is a zero-coupon bond. The variable C_j and Y_t are country and year fixed effects, respectively, and $\varepsilon_{i,j,t}$ is the error term clustered by country.

3. Empirical Results

We explore the likelihood of issuing local-currency denominated bond using bond-level data in this section. We hypothesize that EMs are increasingly capable of issuing local-currency denominated bond because of (i) risk-on exposures to EM as investors seek high yields since sovereigns bond in advanced markets are offering very low or negative yields; (ii) rising currency valuations that deliver additional returns to international investors; and (iii) inflation targeting that increases the credibility of EM's monetary policy and reduces the probability of currency debasement (Engle and Park, 2019).

3.1 Baseline Results

Table 2 summarizes the baseline probit regression results. Column 1 suggests that the appreciation of local currency, characterized by a positive $FX_{j,t}$, is associated with a higher probability of issuing bond in local currency. The yield spread between country j and US, $Yield_{j,t}$, does not seem to change the likelihood of local-currency denominated bond issuance. Inflation targeting appears to increase the probability of issuing local-currency denominated bond. The result is, however, not statistically significant. Controlling for inflation targeting does not affect the roles of currency valuation on the probability of issuing local-currency bond.[5] It is interesting that bonds which are smaller in size, shorter in maturity, or lower in coupon rate are more likely to issue in local currency.

3.2 Robustness Checks

We check whether the positive relation between currency appreciation and the likelihood of issuing local-currency bond is robust in this section. To address the issue of omitted variables, we further control for a number of domestic variables that could possibly affect the choice of bond denomination. A strong current account (CA) balance may increase a country's capacity to repay the debt and reduce the default risk. The result in Column 1 of Table 3 suggests that higher CA balance indeed enables the government to issue more local-currency bond. However, the positive relation between currency appreciation and the likelihood of issuing local-currency bond is not

[5] We experiment with CIP deviation but the results are not significant, possibly due to the lack of hedging tools to hedge typically long-term sovereign bonds.

driven by CA balance. The coefficient of FX remains positive and statistically significant after controlling for CA balance (see Column 1).

Column 2 of Table 3 accounts for the effect of domestic investment. Domestic investment is associated with local-currency denominated revenues. To mitigate currency mismatch, it is better to fund domestic investment with local currency bonds. The result suggests that more domestic investment is associated with higher likelihood of issuing local-currency bonds. Column 3 of Table 3 shows that countries with higher GDP per capita growth is more likely to issue foreign-currency bonds. A possible explanation is that rapid GDP per capita growth is usually accompanied with a greater need for capital for investment, foreign-currency bonds give an emerging market greater access to international capital. Higher international reserves enable a country to repay foreign-currency denominated debt and reduces the problem of currency mismatch, which may be especially risky during financial distress. Column 4 of Table 3 shows that countries with higher international reserve are more likely to issue foreign-currency denominated bond.

The results remain robust when we control for all the domestic factors mentioned above (see Column 5 of Table 3). Despite the fact that the relation between these domestic factors, which affect the choice of bond currency denomination, and currency valuation may affect our results, the positive relation between currency appreciation and the likelihood of local-currency bond issuance remain robust after controlling for these domestic factors. In the baseline regression, we control for year fixed effects which absorb any global factors that affect the emerging markets' choice of bond currency denomination.

It would be interesting to see how the global financial cycle and international financial market conditions affect EM's bond issuance behavior. Table 5 reports the estimation results that

replace year fixed effects with various global factors to check the robustness of our main findings and understand their role in the choice of bond currency denomination. Regardless of the specific global factor that we control for, the positive relation between currency appreciation and likelihood of local-currency bond issuance remains robust. We find that the global risk appetite indicator VIX, measured by the log return of the CBOE volatility index, has little influence on the choice of bond currency denomination. If global liquidity is abundant, as indicated by a lower value of Ted, the interest difference between 3-M LIBOR based on US dollars and 3-M US Treasury bill, EMs are more likely to issue local-currency bond. When the global liquidity is constrained and the market is in a risk-off mode, international investors prefer USD assets over EM currency asses, which reduces the demand of EM local-currency bonds and subsequently discourages EM from issuing local-currency bonds.

By the same logic, the shock of higher oil prices, measured by the log return in the crude oil price, would push global financial markets to a risk-off mode, which would trigger more demand for USD-denominated assets and less demand for local-currency EM bonds. There is no evidence that global policy uncertainty, measured by the log return of the global Economic Policy Uncertainty Index, affects the EMs' choice of bond currency denomination. Global factors add new information on the bond currency denomination, but they do not affect our main findings.

3.3 Heterogeneity analysis

Du and Tepper (2016) and Du, Tepper and Verdelhan (2018) show that the international debt market shows different patterns after the global financial crisis (GFC). In particular, covered interest rate parity (CIP) no longer holds after GFC. The deviation from CIP may change bond issuers' preferences for local vis-a-vis foreign currency denomination. To explore whether

sovereign bond issuance patterns changed after GFC, we extend Equation (1) to account for the interaction between the key independent variable and GFC, a dummy that equals 1 after 2007 and 0 otherwise.

Table 5 shows that the GFC indeed reshaped bond issuance patterns. The result in column 1 suggests that before GFC a government is more likely to issue local-currency denominated bond when domestic currency appreciates, the relation is reversed after GFC. The coefficient of the interaction between FX and GFC is negative and statistically significant and its magnitude exceed that of the coefficient of FX. Indeed, after GFC, domestic currency appreciation is associated with a lower probability of issuing local-currency bond. The result could potentially be driven by the expectation that the low interest rate environment of the US will persist for a long time, which increases the attractiveness of USD-denominated bond.

The association between $Yield_{j,t}$ and the likelihood of local-currency bond issuance varies before and after GFC, as shown in Column (2) of Table 5. The previous result of limited association between yield difference between local and US bond and the likelihood of local-currency bond issuance is driven by mixed effects. Before GFC, the government is less likely to issue local-currency bond when $Yield_{j,t}$ is positive - i.e. it is more costly to issue local-currency bonds. The results reflect rationally minimizing funding cost by raising funds in a less costly way. However, after GFC, the government is more likely to issue local-currency bonds when local yields are higher than US, which is consistent with the deviation from CIP in emerging markets documented by Du and Tepper (2016).

It is puzzling that EMs issue more local-currency denominated bonds even though they are more expensive. A possibility is the growing desire of EMs' to strengthen their resilience to

external shocks through risk-sharing and currency matching. The benefits from such strengthening may well exceed the additional funding costs that exceed USD-denominated bond. EMs were traditionally unable to raise funds in their own currency, which exposed them to substantial external shocks, especially when USD appreciates. As global investors searched for yield in the post-GFC low interest environment and EM inflation fell in recent years, the demand for EM-currency bonds rose, which allowed EMs to issue local-currency bond more easily. It seems that the demand of international investors for local-currency denominated EM bonds dominates the decision-making process on the choice of issuance currency after GFC. Our results suggest that the post-GFC low interest-environment provides an opportunity for EMs to issue bonds denominated in their own currency, especially bonds that offer higher yield relative to US bonds.

We find that inflation targeting increases the likelihood of issuing local-currency bond before but not after GFC (see Column (3) of Table 5). Again, such mixed results are driving the insignificant relation between inflation targeting and likelihood of local-currency bond issuance in Table 2. A country can increase its money supply significantly to inflate away the debt burden. EM inflation was thus a serious concern for international investors. Adopting inflation targeting restrains central banks from printing money to erode their debt, and thereby increases the credibility of their monetary policy. As such, inflation targeting mitigates the perceived risk of investing in EM-currency denominated bond and attracts more international investors. Inflation targeting therefore enables EMs to issue local-currency bond more easily.

Our estimation results before GFC confirm that inflation targeting enables EMs to issue more local-currency bonds, which is consistent with Engle and Park (2019). However, we find that inflation-targeting countries no longer enjoy such a privilege after GFC, when inflation rate remained low despite massive quantitative easing in major advanced economies. When low

inflation becomes the norm, commitment to keep inflation low is no longer as valuable. There are two possible explanations for the negative relation between inflation targeting and the likelihood of issuing local-currency bond. First, inflation-targeting countries offer a lower yield compared to non-inflation targeting countries. Second, currency appreciates more in inflation-targeting countries than non-inflation-targeting countries after GFC. The result in column (4) shows that, after controlling for currency valuation and yield difference, the role of inflation targeting fades away. It suggests that either currency valuation or yield difference or both have absorbed the effects of inflation targeting.

Our results from the various specifications are consistent with the baseline regression results in that governments are more likely to issue local-currency bonds if the bond issue size is smaller, maturity is shorter, and coupon rate is lower.

4. Concluding Remarks

Advanced countries and emerging markets have increased substantially their public-sector borrowing as a share of GDP since the global financial crisis. This trend was driven by the secular decline of risk-free interest-rates, a process that was magnified by the unconventional monetary expansions of the US Fed and ECB. The GFC led to public sector bailouts of financial institutions, and the large-scale socialization of their private losses. Quantitative expansion (QE) and other monetary policies resulted in the secular decline of interest rates, and growing fiscal dominance. This may be a modern incarnation of financial repression, as articulated by Reinhart (2012).[6]

[6] "One of the main goals of financial repression is to keep nominal interest rates lower than would otherwise prevail. This effect, other things being equal, reduces governments' interest expenses for a given stock of debt and contributes

According to this view, the post-GFC monetary policies of the US and eurozone drastically reduced the cost of servicing sovereign debt, in ways that reflect political economy constraints. These effects propagated the unprecedented post-GFC EM leverage buildup, funded this time by both hard and domestic currency external borrowing.

The history of financial repression suggests that they may act as pain killer, delaying the adjustment required to address the debt build up, and providing the illusion of stability. With luck, a gradual exit strategy from the debt overhang will allow the US and eurozone to spread the adjustment over a decade or more, possibly by means of higher economic growth and inflation. Indeed, this was the post-WWII exit strategy of the US during 1945-1955, eventually reducing the public debt to GDP from about 110% to about 50% [Aizenman and Marion (2011)]. Yet exits from the debt overhang may induce also deflationary spells and lower growth rates [Lo and Rogoff (2012), Reinhart et al. (2012)]. Even a relatively fast exit from higher inflationary and leverage spells by OECD countries may destabilize EMs with less developed financial markets and relatively small tax bases.[7] The exposure of EM to this tail risk associated with the advanced economies' exit from debt overhangs remains a source of potential EM fragility and may even

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to deficit reduction. However, when financial repression produces negative real interest rates and reduces or liquidates existing debts, it is a transfer from creditors (savers) to borrowers and, in some cases, governments. This amounts to a tax that has interesting political-economy properties. Unlike income, consumption, or sales taxes, the repression tax rate is determined by factors such as financial regulations and inflation performance, which are opaque—if not invisible—to the highly politicized realm of fiscal policy. Given that deficit reduction usually involves highly unpopular spending cuts and/or tax increases, the stealthier financial-repression tax may be a more politically palatable alternative. Key factors underlying the high incidence of negative real interest rates after the crisis are aggressively expansive stance of monetary policy and heavy central bank intervention in many advanced and emerging economies. This raises the broad question of whether current interest rates are more likely to reflect market conditions or whether they are determined by the actions of large official players in financial markets. A large role for nonmarket forces in interest-rate determination is a central feature of financial repression." Reinhart (2012).

[7] To recall, Paul Volcker's disinflationary policies in the US during 1979-1983 triggered the EM lost decade. See Aizenman et al. (2019) for further analysis of EM fragility and fiscal space.

trigger future crises, possibly well before the actual OECD countries exit from the present debt overhang.

Our empirical analysis of sovereign bond issuance data from eight major emerging markets (EMs) in 1970-2018 lends further weight to such concerns. Our analysis is centered on delving into micro data to identify the key determinants of local-currency sovereign bond issuance. We find that EM bonds which are smaller in size, shorter in maturity, or lower in coupon rate are more likely to be issued in local currency. Our evidence indicates that there has been a structural change in the determinants of EMs' local-currency sovereign bond issuance since GFC. More specifically, we find that EMs are more likely to issue local-currency sovereign bonds if (1)domestic currencies appreciate, but only before GFC, (2) the monetary policy regime is inflation targeting, before but not after GFC, and (3) bonds offer a higher yield, but only after GFC. Taken together, these findings suggest that even EMs with less robust fundamentals are more able to issue local-currency sovereign bonds in the post-GFC period. In addition, the devastating COVID-19 health and economic crisis is likely to significantly increase the borrowing requirements of EMs. Therefore, the risk of financial turbulence in EMs which are becoming more closely integrated into the global financial system remains substantial. Future data will allow us to test and identify structural changes associated with the COVID-19 pandemic and its aftermath

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APPENDIX: Financial Fragility of BRICs, A Bird's-Eye View

To better understand our main results, we supplement our econometric analyses with a bird's-eye view of the financial vulnerability of Brazil, Russia, India, and China (BRIC) to external debts. These major EMs weathered the GFC shock better than the advanced economies. Yet it is unclear whether their economic recovery and financial access to international capital markets would continue and for how long. The following trends factors and co-movements in the patterns of sovereign costs may influence the performance of these countries.

Credit default swaps: We look at sovereign credit default swap (CDS) prices in basis points based on 5-year contracts (end-of-day data from Markit). CDS prices showed co-movements of sovereign borrowing costs among the BRIC economies, especially between Brazil and Russia. Sovereign CDS prices of China are lower and less volatile than the CDS prices of Brazil, Russia, and India throughout the sample period.

Government bond yields: The yields on benchmark 10-year government bonds of BRIC countries - i.e. local currency debts- reveal notable fluctuations in the yields of Brazil and Russia. China's yields were mostly below 4 percent while the yields of Russia above 8 percent and Brazil exceeded 10 percent during the sample period. Unlike CDS prices, there was no discernible co-movement among the government bond yields of the BRIC countries. For instance, the sharp rise of Russia's government yields in 2009 and 2014 did not associate with any significant increase in the government yields of Brazil, India and China. Similarly, a large increase in Brazil's government yield in 2016 was not associated with any notable change in the yields of the other BRIC countries.

Policy rates: We use the following as the policy rate targets of the BRIC countries: Brazil - Selic target rate, Russia - minimum rate on the 7-day repo, India - repo rate (EP), and China - major loan rate on capital construction 1 year and below. There is a convergence of policy rates toward 4 to 6 percent among the BRIC countries. Brazil's policy rates closed the upward gap of 10 percent with other BRIC countries in the early 2000s and became comparable to the rates of Russia and India.

External debts: We use the proportion of outstanding external short-term debts of BRIC countries held by non-residents, based on BIS data. The external debt of Brazil, Russia, and India grew steadily, while China's external short-term debts increased significantly during the 2010s. For the past two decades, more than 90 percent of BRIC external debts were in foreign currencies. The interest payments on external debt as a percentage of GNI (weighted average of local and foreign currency debts; World Bank IDS) suggested that the interest payments trended downward for India and China. the interest payments of Brazil and Russia peaked in the early 2000s but declined significantly since.

Real exchange rates: The patterns of the real CPI broad effective exchange rate (indexing 2010 = 100, series from JP Morgan) suggest that Brazil and Russia, the two commodity exporters in the BRIC, were exposed to terms of trade fluctuation and deterioration.

Global industrial cycles: The ratio of copper prices to gold prices, based on the S&P GSCI total return series, is widely viewed as a barometer of global industrial activity. The ratio does not point to a sustained global industrial recovery since GFC.

Global interest rates: The movements of the benchmark 10-year government bond price indices of the US, UK, Germany and Japan indicate that the pace of decline in global interest rates has slowed down. The deceleration is especially evident in US interest rates during the past five years.

Table 1. Summary statistics

This table reports the average bond size in million USD and the number of bond issuances, denominated in local and foreign currency respectively, for eight emerging markets for the sample period of 1970-2018. Local/Total reports the total amount (number) of bond issued in local currency relative to the total amount (number) of all bond.

		Average bond size (Million $)			Number of Bond		
Country	Country ISO	Local currency	Foreign currency	Local / Total	Local currency	Foreign currency	Local / Total
Brazil	BRA	570.08	1981.94	0.94	6302	110	0.98
China	CHN	4270.22	548.24	1.00	1129	29	0.97
Indonesia	IDN	621.67	1579.02	0.65	365	76	0.83
India	IND	1132.28	NA	1.00	2388	0	1.00
Mexico	MEX	1408.93	1534.74	0.90	1764	180	0.91
Russia	RUS	881.67	4380.77	0.54	215	37	0.85
Turkey	TUR	529.35	941.66	0.70	796	193	0.80
South Africa	ZAF	392.74	694.84	0.95	1645	46	0.97
	Total	1033.06	1499.20	0.94	14604	671	0.96

Table 2: Baseline probit regression results

This table reports the estimation results from the following probit regression, equation (1),

$P(D_{i,j,t} = 1) = \beta \ X_{j,t} + \gamma S_{i,j,t} + C_j + T_t + \varepsilon_{i,j,t}$ where $D_{i,j,t} = 1$ bond i in country j at period t is issued in local-currency. The key country-specific variable is $X_{j,t}$, which takes the value of (i) $FX_{j,t}$, the currency appreciation of country j at period t relative to USD; (ii) $Yield_{j,t}$ 10-year sovereign bond yield difference between country j and US at period t; and (iii) $IT_{j,t}$, a dummy variable that equals 1 if country j is pursuing inflation targeting at period t. The vector of bond-level control variable $S_{i,j,t}$ covers (i) $\log(Size_{i,j,t})$, the logarithm of the issued amount of bond i in country j at period t; (ii) $\log(Maturity_{i,j,t})$, the logarithm of the maturity of bond i in country j at period t; and (iii) $Zero_{i,j,t}$, a dummy that equals to one if the bond i in country j at period t is a zero-coupon bond. The variable C_j and Y_t are country and year fixed effects respectively. Standard errors reported in the parenthesis are clustered by country. ***, ** and * denote significance level at 1%, 5% and 10%.

	Dependent variable: $P(D_{i,j,t} = 1)$			
	(1)	(2)	(3)	(4)
FX	4.236***			4.287***
	(1.464)			(1.462)
Yield		-0.018		
		(0.027)		
IT			0.077	0.113
			(0.110)	(0.111)
log(Size)	-0.253***	-0.182***	-0.245***	-0.253***
	(0.016)	(0.020)	(0.015)	(0.016)
log(Maturity)	-0.384***	-0.324***	-0.380***	-0.386***
	(0.038)	(0.052)	(0.038)	(0.038)
Zero	1.055***	1.909***	1.101***	1.061***
	(0.112)	(0.296)	(0.112)	(0.111)
Constant	8.574***	7.703***	13.672	8.567***
	(0.518)	(1.045)	(10,696.730)	(0.518)
Observations	15,072	12,297	15,271	15,072
Log Likelihood	-1,191.020	-637.551	-1,274.029	-1,190.495
Country fixed effects?	Yes	Yes	Yes	Yes
Year fixed effects?	Yes	Yes	Yes	Yes

Table 3: Controlling for additional domestic factors

This table reports the estimation results from the probit regression, $P(D_{i,j,t} = 1) = \beta \ FX_{j,t} + \gamma S_{i,j,t} + \tau DF_{j,t} + C_j + T_t + \varepsilon_{i,j,t}$, where $D_{i,j,t} = 1$ bond i in country j at period t is issued in local-currency. $FX_{j,t}$ is the currency appreciation of country j at period t relative to USD. The domestic factor DF_t includes (i) CA Balance, the current account balance normalized by GDP; (ii) Investment, the domestic investment normalized by GDP; (iii) Growth, the GDP per capita growth rate; and (iv) Reserve, the international reserve normalized by GDP. The vector of bond-level control variable $S_{i,j,t}$ covers (i) $\log(Size_{i,j,t})$, the logarithm of the issued amount of bond i in country j at period t; (ii) $\log(Maturity_{i,j,t})$, the logarithm of the maturity of bond i in country j at period t; and (iii) $\text{Zero}_{i,j,t}$, a dummy that equals to one if the bond i in country j at period t is a zero-coupon bond. The variable C_j and Y_t are country and year fixed effects respectively. Standard errors reported in the parenthesis are clustered by country. ***, ** and * denote significance level at 1%, 5% and 10%.

	Dependent variable: $P(D_{i,j,t} = 1)$				
	(1)	(2)	(3)	(4)	(5)
FX	5.048**	4.166*	5.125***	4.687**	9.507***
	(2.317)	(2.289)	(1.516)	(2.370)	(1.813)
log(Size)	-0.214***	-0.219***	-0.261***	-0.237***	-0.194***
	(0.018)	(0.018)	(0.017)	(0.019)	(0.016)
log(Maturity)	-0.348***	-0.375***	-0.365***	-0.379***	-0.206***
	(0.039)	(0.041)	(0.039)	(0.041)	(0.036)
Zero	0.976***	1.008***	1.091***	0.991***	1.298***
	(0.115)	(0.117)	(0.115)	(0.116)	(0.117)
CA Balance	0.036**				0.025**
	(0.016)				(0.011)
Investment		0.007***			0.018***
		(0.002)			(0.001)
Growth			-0.026**		-0.054***
			(0.012)		(0.010)
Reserve				-0.542*	-0.369**
				(0.322)	(0.165)
Constant	7.868***	7.872***	8.590***	8.933***	5.754***
	(0.830)	(0.981)	(0.530)	(0.984)	(0.406)
Observations	14,517	13,319	14,563	13,918	12,403
Log Likelihood	-1,093.170	-1,026.425	-1,129.459	-993.694	-1,087.018
Country fixed effects?	Yes	Yes	Yes	Yes	Yes
Year fixed effects?	Yes	Yes	Yes	Yes	Yes

Table 4: Controlling for global factors

This table reports the estimation results from the following probit regression

$$P(D_{i,j,t} = 1) = \beta \ \ FX_{j,t} + \gamma S_{i,j,t} + C_j + GF_t + \varepsilon_{i,j,t}, \quad (1)$$

where $D_{i,j,t} = 1$ bond i in country j at period t is issued in local-currency. $FX_{j,t}$ is the currency appreciation of country j at period t relative to USD. The global factor GF_t includes (i) VIX, the log return of the CBOE volatility index; (ii) Ted Spread, the interest difference between 3-M LIBOR based on US dollars and 3-M US Treasury bill; (iii) Oil Price Shock, the log return in the crude oil price; and (iv) Policy Uncertainty, the log return of the global Economic Policy Uncertainty Index. The vector of bond-level control variable $S_{i,j,t}$ covers (i) $\log(Size_{i,j,t})$, the logarithm of the issued amount of bond i in country j at period t; (ii) $\log(Maturity_{i,j,t})$, the logarithm of the maturity of bond i in country j at period t; and (iii) $\text{Zero}_{i,j,t}$, a dummy that equals to one if the bond i in country j at period t is a zero-coupon bond. The variable C_j and Y_t are country and year fixed effects respectively. Standard errors reported in the parenthesis are clustered by country. ***, ** and * denote significance level at 1%, 5% and 10%.

	Dependent variable: $P(D_{i,j,t} = 1)$				
	(1)	(2)	(3)	(4)	(5)
FX	9.814***	9.696***	10.343***	4.641**	4.725**
	(1.002)	(1.001)	(1.016)	(1.834)	(1.941)
log(Size)	-0.165***	-0.165***	-0.168***	-0.157***	-0.160***
	(0.011)	(0.011)	(0.012)	(0.014)	(0.014)
log(Maturity)	-0.294***	-0.302***	-0.301***	-0.279***	-0.296***
	(0.033)	(0.033)	(0.033)	(0.037)	(0.038)
Zero	1.062***	1.048***	1.054***	1.201***	1.170***
	(0.106)	(0.106)	(0.105)	(0.130)	(0.129)
VIX	-0.243				1.340
	(0.833)				(1.325)
Ted Spread		-0.163*			-0.280**
		(0.095)			(0.117)
Oil Price Shock			-2.596***		-1.110
			(0.897)		(1.049)
Policy Uncertainty				0.550	-0.051
				(0.930)	(1.209)
Constant	7.198***	7.338***	7.335***	6.934***	7.257***

	(0.355)	(0.364)	(0.361)	(0.419)	(0.439)
Observations	15,072	15,072	15,072	14,162	14,162
Log Likelihood	-1,353.824	-1,352.496	-1,349.734	-1,080.347	-1,076.830
Country fixed effects?	Yes	Yes	Yes	Yes	Yes
Year fixed effects?	No	No	No	No	No

Table 5: Heterogeneity before and after Global Financial Crisis (GFC)
This table reports the estimation results from the following probit regression

$$P(D_{i,j,t}=1)=\beta\ \ X_{j,t}+\vartheta\ \ X_{j,t}*GFC_t+\gamma S_{i,j,t}+C_j+T_t+\varepsilon_{i,j,t},\quad (1)$$

where $D_{i,j,t}=1$ bond i in country j at period t is issued in local-currency. GFC_t is a dummy variable tha equals to 1 after 2007 and 0 otherwise. The country-specific variable is $X_{j,t}$, which takes the value of (i $FX_{j,t}$, the currency appreciation of country j at period t relative to USD; (ii) $Yield_{j,t}$ 10-year sovereig bond yield difference between country j and US at period t; and (iii) $IT_{j,t}$, a dummy variable that equals if country j is pursuing inflation targeting at period t. The vector of bond-level control variable $S_{i,j,t}$ cover (i) $\log(Size_{i,j,t})$, the logarithm of the issued amount of bond i in country j at period t ; (ii $\log(Maturity_{i,j,t})$, the logarithm of the maturity of bond i in country j at period t; and (iii) $\text{Zero}_{i,j,t}$, dummy that equals to one if the bond i in country j at period t is a zero-coupon bond. The variable C_j an Y_t are country and year fixed effects respectively. Standard errors reported in the parenthesis are clustere by country. ***, ** and * denote significance level at 1%, 5% and 10%.

	(1)	(2)	(3)
FX	5.251***		
	(1.477)		
Yield		-0.093***	
		(0.034)	
IT			0.304**
			(0.125)
FX*GFC	-28.594***		
	(6.511)		
Yield*GFC		0.162***	
		(0.050)	
IT*GFC			-0.720***
			(0.194)
GFC	0.738**	-1.451	-4.031

	(0.332)	(0.907)	(10,696.720)
log(Size)	-0.255***	-0.181***	-0.242***
	(0.016)	(0.020)	(0.015)
log(Maturity)	-0.395***	-0.323***	-0.380***
	(0.038)	(0.052)	(0.038)
Zero	1.074***	1.954***	1.103***
	(0.113)	(0.300)	(0.111)
Constant	8.729***	8.273***	13.579
	(0.522)	(1.051)	(10,696.720)
Observations	15,072	12,297	15,271
Log Likelihood	-1,181.284	-631.928	-1,266.973
Country fixed effects?	Yes	Yes	Yes
Year fixed effects?	Yes	Yes	Yes