CORPORATE LEVERAGE IN EMERGING MARKETS—A CONCERN?

SUMMARY

The corporate debt of nonfinancial firms across major emerging market economies quadrupled between 2004 and 2014. At the same time, the composition of that corporate debt has been shifting away from loans and toward bonds. Although greater leverage can be used for investment, thereby boosting growth, the upward trend in recent years naturally raises concerns because many financial crises in emerging markets have been preceded by rapid leverage growth.

This chapter examines the evolving influence of firm, country, and global factors on emerging market leverage, issuance, and spread patterns during the past decade. For this purpose, it uses large, rich databases. Although the chapter does not aim to provide a quantitative assessment of whether leverage in certain sectors or countries is excessive, the analysis of the drivers of leverage growth can help shed light on potential risks.

The three key results of the chapter are as follows: First, the relative contributions of firm- and country-specific characteristics in explaining leverage growth, issuance, and spreads in emerging markets seem to have diminished in recent years, with global drivers playing a larger role. Second, leverage has risen more in more cyclical sectors, and it has grown most in construction. Higher leverage has also been associated with, on average, rising foreign currency exposures. Third, despite weaker balance sheets, emerging market firms have managed to issue bonds at better terms (lower yields and longer maturities), with many issuers taking advantage of favorable financial conditions to refinance their debt.

The greater role of global factors during a period when they have been exceptionally favorable suggests that emerging markets must prepare for the implications of global financial tightening. The main policy recommendations are the following: First, monitoring vulnerable and systemically important firms, as well as banks and other sectors closely linked to them, is crucial. Second, such expanded monitoring requires that the collection of data on corporate sector finances, including foreign currency exposures, be improved. Third, macro- and microprudential policies could help limit a further buildup of foreign exchange balance sheet exposures and contain excessive increases in corporate leverage. Fourth, as advanced economies normalize monetary policy, emerging markets should prepare for an increase in corporate failures and, where needed, reform corporate insolvency regimes.

Introduction

Corporate debt in emerging market economies has risen significantly during the past decade. The corporate debt of nonfinancial firms across major emerging market economies increased from about $4 trillion in 2004 to well over $18 trillion in 2014 (Figure 3.1). The average emerging market corporate debt-to-GDP ratio has also grown by 26 percentage points in the same period, but with notable heterogeneity across countries. Likewise, comparable firm-level measures of leverage show an upward trend, with some readings still below historical peaks (Figure 3.2). Greater emerging market corporate leverage can confer important benefits, such as facilitating productive investment, and thereby faster growth. However, the upward trend in recent years naturally raises concerns because many emerging market financial crises have been preceded by rapid leverage growth.[1]
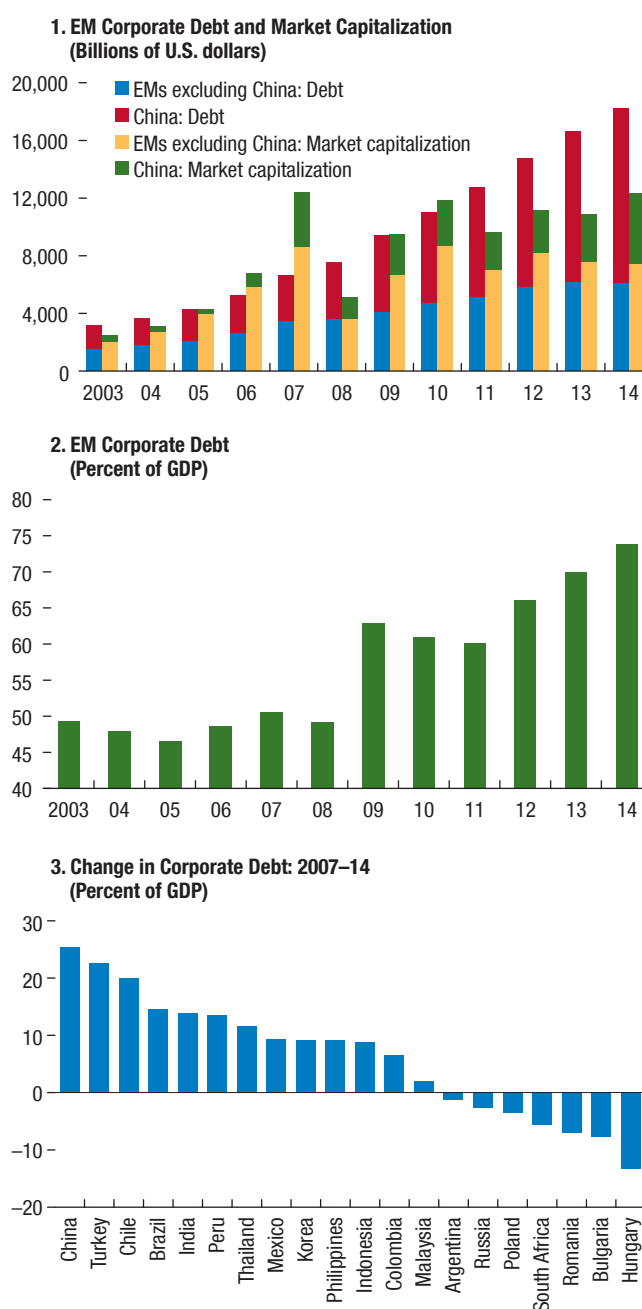
The composition of emerging market corporate debt has also changed. Although loans are still the largest component of that corporate debt, the share of bonds has been growing rapidly, from 9 percent of total debt in 2004 to 17 percent of total debt in 2014, with most of the increase materializing after 2008, including via offshore financial centers, as discussed in Shin (2013) and BIS (2014c) (Figure 3.3).[2]

The growth and changing nature of emerging market corporate debt has occurred amid an unprecedented monetary expansion in advanced economies and a shifting global financial landscape. Monetary policy has been exceptionally accommodative across major advanced economies. Firms in emerging markets have faced greater incentives and opportunities to increase leverage as a result of the ensuing unusually favorable global financial conditions. For example, the U.S. "shadow rate"—a useful indicator of the monetary policy stance when the federal funds rate is at the zero lower bound—dropped to about minus 5 percent in the first half of 2013 and is still negative

[1]As noted in Mendoza and Terrones (2008), the buildup of corporate leverage is often associated with boom-bust cycles. On the link between rapid growth in credit to the private sector and financial turbulence more generally, see Schularick and Taylor (2012) and Elekdag and Wu (2011); see also BIS (2014a).
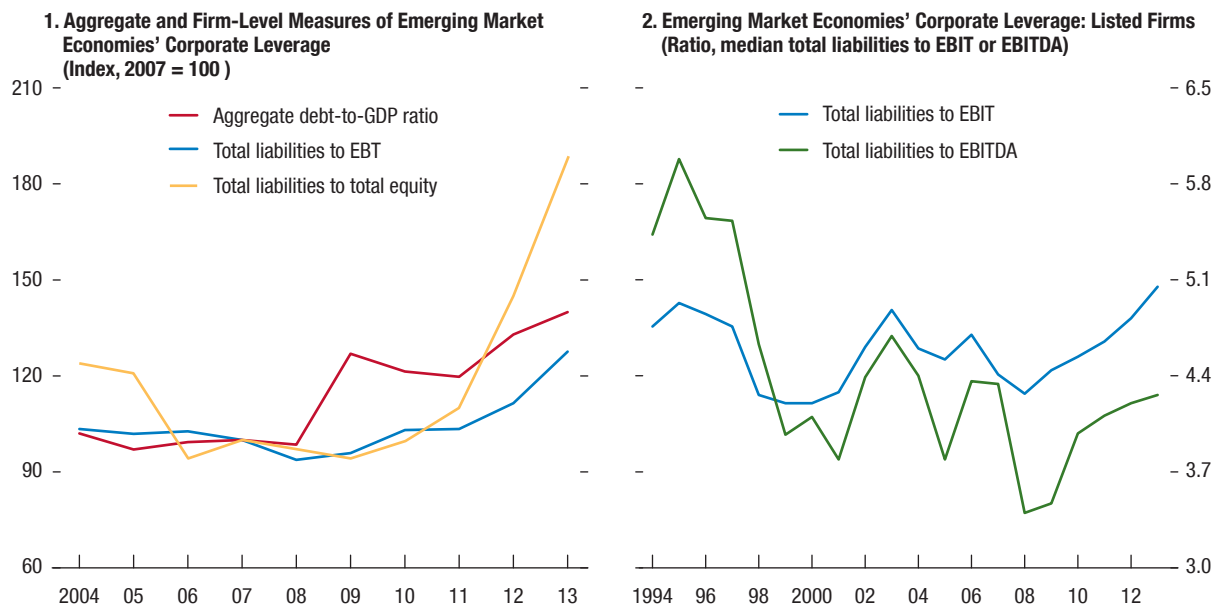
[2]The stock of outstanding bonds denominated in foreign currency has risen from $168 billion in 2003 to $855 billion in 2014, but their overall share has remained broadly stable (discussed below); see also Gelos (2003) and BIS (2014b).

Figure 3.1. Emerging Market Economies: Evolving Capital Structure

1. EM Corporate Debt and Market Capitalization
(Billions of U.S. dollars)

- EMs excluding China: Debt
- China: Debt
- EMs excluding China: Market capitalization
- China: Market capitalization

2. EM Corporate Debt
(Percent of GDP)

3. Change in Corporate Debt: 2007–14
(Percent of GDP)

Sources: Ayala, Nedeljkovic, and Saborowski 2015; Bank for International Settlements; Dealogic; IMF, International Financial Statistics database; national authorities; and IMF staff calculations.
Note: EM = emerging market economy; figure depicts major EMs. Debt includes bank credit and bond financing. Credit by nonbanks is excluded, possibly leading to a significant underestimation of corporate debt in countries with large nonbanking sectors such as China. At the same time, in China, the bulk of fiscal borrowing occurs off budget through local government financing vehicles and is recorded as private credit, although most of it is fiscal (see Arslanalp and others, forthcoming).

Figure 3.2. Emerging Market Economies: Selected Leverage Ratios

1. Aggregate and Firm-Level Measures of Emerging Market
Economies' Corporate Leverage
(Index, 2007 = 100)

- Aggregate debt-to-GDP ratio
- Total liabilities to EBT
- Total liabilities to total equity

2. Emerging Market Economies' Corporate Leverage: Listed Firms
(Ratio, median total liabilities to EBIT or EBITDA)

- Total liabilities to EBIT
- Total liabilities to EBITDA

Sources: Orbis; Thomson Reuters Worldscope; and IMF staff calculations.
Note: EBT = earnings before taxes; EBIT = earnings before interest and taxes; EBITDA = earnings before interest, taxes, depreciation, and amortization.

(Box 3.1). Another important recent development has been the decline in cross-border bank lending, largely driven by supply-side factors, specifically banks' efforts to strengthen their balance sheets and satisfy new supervisory and regulatory requirements (see Chapter 2 of the April 2015 *Global Financial Stability Report* [GFSR]).
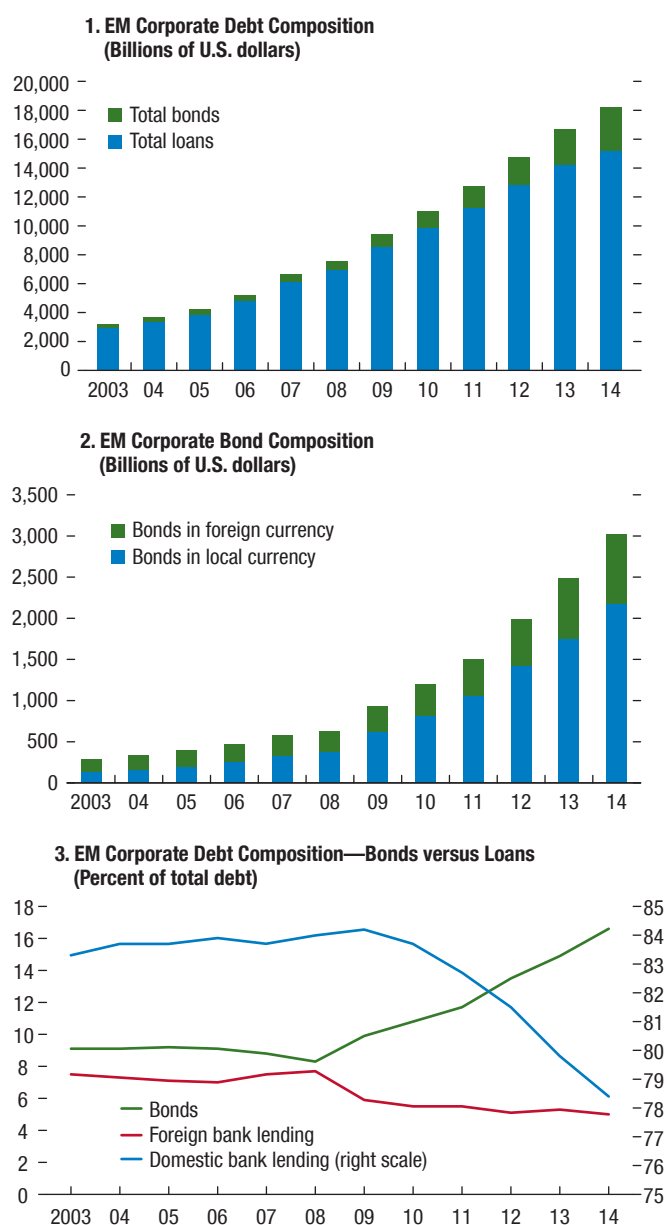
Accommodative global monetary conditions can encourage leverage growth in emerging markets through several channels. In line with Caruana (2012) and He and McCauley (2013), three transmission channels are worth highlighting (see also Bruno and Shin 2015). First, emerging market central banks set lower policy rates than they would otherwise in response to the prevailing low interest rates in advanced economies to alleviate currency appreciation pressures. Second, large-scale bond purchases in advanced economies reduce bond yields not only in their own bond markets, but also to varying degrees in emerging market bond markets through portfolio balancing effects. Likewise, accommodative monetary policies in advanced economies are typically accompanied by greater capital flows into emerging markets, seeking higher returns. Third, changes in policy rates

in advanced economies are promptly reflected in the debt-servicing burden on outstanding emerging market foreign currency-denominated debt with variable rates. Through these channels, expansionary global monetary conditions can facilitate greater corporate leverage through the relaxation of emerging market borrowing constraints owing to the widespread availability of lower-cost funding and appreciated collateral values.[3]

A key risk for the emerging market corporate sector is a reversal of postcrisis accommodative global financial conditions. Firms that are most leveraged stand to endure the sharpest rise in their debt-service costs once monetary policy rates in some key advanced economies begin to rise. Furthermore, interest rate risk can be aggravated by rollover and currency risks. Although bond finance tends to have longer maturities than bank finance, it exposes firms more to volatile financial market conditions (Shin 2014b). In addition, local currency depreciations

[3]Moreover, expectations of continued local currency appreciation are likely to have created incentives to incur foreign currency debt in certain regions and sectors.

Figure 3.3. Emerging Market Economies: Changing Composition of Corporate Debt

1. EM Corporate Debt Composition
(Billions of U.S. dollars)

- Total bonds
- Total loans

2. EM Corporate Bond Composition
(Billions of U.S. dollars)

- Bonds in foreign currency
- Bonds in local currency

3. EM Corporate Debt Composition—Bonds versus Loans
(Percent of total debt)

- Bonds
- Foreign bank lending
- Domestic bank lending (right scale)

Sources: Ayala, Nedeljkovic, and Saborowski 2015; Bank for International Settlements; Dealogic; IMF, International Financial Statistics database; national authorities; and IMF staff calculations.
Note: EM = emerging market economy; figure depicts major EMs.

associated with rising policy rates in the advanced economies would make it increasingly difficult for emerging market firms to service their foreign currency-denominated debts if they are not hedged adequately.

Corporate distress could be readily transmitted to the financial sector and contribute to adverse feedback loops. Greater corporate leverage can render firms less able to withstand negative shocks to income or asset values. This vulnerability has important implications for the financial system, in part because corporate debt constitutes a significant share of emerging market banks' assets (Figure 3.4). Therefore, shocks to the corporate sector could quickly spill over to the financial sector and generate a vicious cycle as banks curtail lending. Decreased loan supply would then lower aggregate demand and collateral values, further reducing access to finance and thereby economic activity, and in turn, increasing losses to the financial sector (Gertler and Kiyotaki 2010).

This chapter highlights the financial stability implications of recent patterns in emerging market corporate finance by disentangling the role of domestic and external factors. The focus is on nonfinancial firms' corporate leverage, bond issuance, and spreads. Key external factors include measures of global economic and financial conditions. Domestic factors considered include bond-, firm-, and country-level characteristics. Although the chapter does not aim to provide a quantitative assessment of whether leverage in certain sectors or countries is excessive, the analysis of the key drivers of leverage growth can still help shed light on potential risks.[4]

If rising leverage and issuance have recently been predominantly influenced by external factors, then firms are rendered more vulnerable to a tightening of global financial conditions. Similarly, a decline in the role of firm- and country-level factors in recent years would be consistent with the view that markets may have been underestimating risks. In contrast, if firms issuing foreign currency debt have been reducing their net foreign exchange exposure through hedging or other means, simply focusing on the volume of foreign currency bond issuance would tend to overstate risks related to local depreciations.

[4]Scenario analysis to assess emerging market corporate vulnerabilities has been discussed in various IMF studies, including Chapter 1 of the April 2014 GFSR and in the latest IMF *Spillover Report* (IMF 2015a); see also Chow (forthcoming).

Figure 3.4. Domestic Banks: Ratio of Total Corporate Loans to Total Loans in 2014
(Percent)
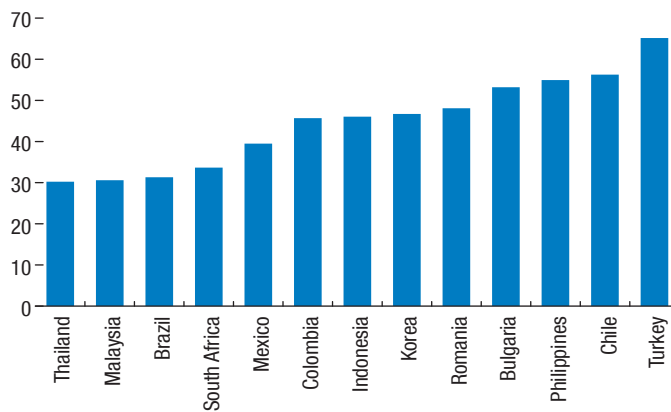
Sources: IMF, International Financial Statistics database; and IMF staff calculations.

This chapter addresses these issues by considering the following questions:

- How have corporate leverage and bond issuance in the emerging market nonfinancial sector changed over time and across regions, sectors, and firms? How have these funds been used? Has higher leverage or bond issuance been accompanied by an increase in net foreign exchange exposure?

- What is the relative role of domestic factors compared with that of external factors—such as accommodative global financial and monetary conditions—in the change in leverage, issuance, and corporate spread patterns? Is there evidence of a smaller role for firm- and country-level factors during the postcrisis period?

The chapter goes beyond existing studies by jointly analyzing firm, country, and global factors as determinants of emerging market corporate leverage, issuance, and spreads. Starting with Rajan and Zingales (1995), many papers have concluded that both firm- and country-specific factors influence corporate capital structure internationally.[5] However, these papers do not focus on the way in which global financial

and monetary conditions may have influenced firms' capital structure decisions. Relatedly, some studies have examined recent developments in bond issuance by emerging markets, mostly relying on aggregated issuance data.[6] The chapter builds upon the literature by examining how global factors affect firms' decisions to issue bonds while explicitly accounting for bond- and firm-specific characteristics using large, rich, and relatively underexploited databases.[7] Finally, the chapter also considers emerging market corporate spreads; a novel feature of that analysis is the use of relatively unexplored data on secondary market corporate spreads.

The main results of the chapter can be summarized as follows:

- *The relative roles of firm- and country-specific factors as drivers of leverage, issuance, and spreads in emerging markets have declined in recent years.* Global factors appear to have become relatively more important determinants in the postcrisis period. In some cases, evidence of a structural break appears in these relationships, with a reduced role for firm- and country-level factors in the postcrisis period.

- *Leverage has risen relatively more in vulnerable sectors and has tended to be accompanied by worsening firm-level characteristics.* For example, higher leverage has been associated with, on average, rising foreign exchange exposures. Moreover, leverage has grown most in the cyclical construction sector, but also in the oil and gas subsector. Funds have largely been used to invest, but there are indica-

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[5]Emerging market corporate capital structure, including leverage, has been studied in the context of Asia in IMF (2014a) and for central, eastern, and southeastern Europe in IMF (2015c). Kalemli-Ozcan, Sorensen, and Yesiltas (2012) present novel stylized facts using bank- and firm-level data, with a focus on advanced economies.

[6]For instance, Lo Duca, Nicoletti, and Vidal Martinez (2014) and Feyen and others (2015) focus on bond issuance data aggregated at the country and country-industry level, respectively. Likewise, Rodriguez Bastos, Kamil, and Sutton (2015) study issuance in five Latin American countries.

[7]This chapter is also related to a large literature on emerging market capital flows. Various studies find that unconventional monetary policy in advanced economies has had a significant impact on emerging market asset prices, yields, and corporate bond issuance (Chen and others 2014; Chen, Mancini-Griffoli, and Sahay 2014; Fratzscher, Lo Duca, and Straub 2013; Gilchrist, Yue, and Zakrajsek 2014; Lo Duca, Nicoletti, and Vidal Martinez 2014). IMF (2014b) identifies that global liquidity conditions drive cross-border bank lending and portfolio flows, but are affected by country-specific policies. Other studies find that the exit from unconventional monetary policy appears to have differentiated effects across emerging markets, depending on their initial conditions (Aizenman, Binici, and Hutchison 2014; Eichengreen and Gupta 2014; Sahay and others 2015); see also Nier, Saadi Sedik, and Mondino (2014).

Box 3.1. Shadow Rates

Shadow rates are indicators of the monetary policy stance and can be particularly useful once the policy rate has reached the zero lower bound (ZLB). A shadow rate is essentially equal to the policy interest rate when the policy rate is greater than zero, but it can take on negative values when the policy rate is at the ZLB. This property makes the shadow rate a useful gauge of the monetary policy stance in conventional and unconventional policy regimes in a consistent manner. Shadow rates are estimated using shadow rate term structure models, which take the ZLB into account, as originally proposed by Black (1995).[1]

Although shadow rate models are not easy to estimate because of the nonlinearity arising from the ZLB, the literature began to estimate shadow rates with Japan's data by applying nonlinear filtering techniques (Ichiue and Ueno 2006, 2007). Recently, the shadow rates of other countries also have been estimated by many researchers (for example, Wu and Xia, forthcoming) and discussed by policymakers (for example, Bullard 2012).[2]

Estimated shadow rates reasonably reflect monetary policy events in unconventional policy regimes. The U.S. shadow rate estimated by Krippner (2014) turned negative in November 2008, when the Federal Reserve started the Large Scale Asset Purchases program (Figure 3.1.1, panel 1). The shadow rate further declined as the Fed adopted additional unconventional policies. However, it bottomed out in May 2013, when the Fed raised the possibility of tapering its purchases of Treasury and agency bonds, and has continued to increase since then. The current level of the shadow rate is only slightly negative. The shadow rate estimates in the euro area, Japan, and the United Kingdom are consistent with their respective monetary policies (Figure 3.1.1, panel 2). These observations support the utility of shadow rates, although their limitations should be recognized. The global shadow rate, which is calculated as the first principal component, has been virtually flat in recent years, reflecting that the tighter stances in the United States and the United Kingdom have been offset by accommodative stances in Japan and the euro area.

This box was prepared by Hibiki Ichiue.
[1] In term structure models, interest rates of various maturities are represented as a function of a small set of common factors. This function is derived from a no-arbitrage condition.
[2] There are limited papers that estimate shadow rates without using term structure models. Kamada and Sugo (2006) and

Lombardi and Zhu (2014) summarize multiple financial indicators, such as monetary aggregates.

Figure 3.1.1. Shadow Rates
(Percent)
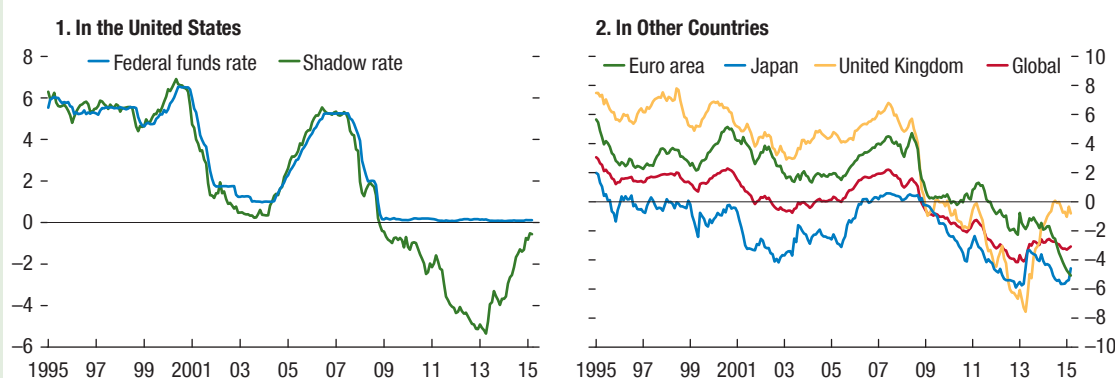
Sources: Reserve Bank of New Zealand; and IMF staff calculations.
Note: The global shadow rate is the first principal component of the shadow rates of the four central banks (Bank of England, Bank of Japan, European Central Bank, and U.S. Federal Reserve).

tions that the quality of investment has declined recently. These findings point to increased vulnerability to changes in global financial conditions and associated capital flow reversals—a point reinforced by the fact that during the 2013 "taper tantrum," more leveraged firms saw their corporate spreads rise more sharply.

- *Despite weaker balance sheets, emerging market firms have managed to issue bonds at better terms (lower yields, longer maturities) with many issuers taking advantage of favorable financial conditions to refinance their debt.* No conclusive evidence has been found that greater foreign currency-denominated debt has increased overall net foreign exchange exposures.

These results suggest that policy action is warranted to guard against the risks associated with the tightening of global financial conditions as monetary policy in advanced markets begins to normalize. The chapter makes the following five policy recommendations:

- Careful monitoring of vulnerable sectors of the economy and systemically important firms as well as their linkages to the financial sector is vital.
- The collection of financial data on the corporate sector, including foreign exchange exposures, needs improvement.
- Macroprudential policies can be deployed to limit excessive increases in corporate sector leverage intermediated by banks. Possible tools include higher capital requirements (for example, implemented via risk weights) for foreign exchange exposures and caps on the share of such exposures on banks' balance sheets.
- Microprudential measures should also be considered. For instance, regulators can conduct bank stress tests related to foreign currency risks, including derivatives positions.
- Emerging markets should be prepared for corporate distress and sporadic failures in the wake of monetary policy normalization in advanced economies, and where needed and feasible, should reform insolvency regimes.

The Evolving Nature of Emerging Market Corporate Leverage

This section documents the main patterns of corporate leverage across emerging market regions and sectors. A formal empirical analysis focuses on

the changing relationship between corporate leverage and key firm, country, and global factors.

The Evolution of Emerging Market Corporate Leverage

Two complementary data sets indicate noteworthy differences in the evolution of emerging market leverage across regions and sectors.[8]

- For publicly listed firms, leverage has risen in emerging Asia; in the emerging Europe, Middle East, and Africa (EMEA) region; in Latin America; and across key sectors (Figure 3.5).
- The striking leverage increase in the construction sector is most notable in China and in Latin America. This increase relates to concerns expressed in recent years about the connection between global financial conditions, capital flows, and real estate price developments in some emerging markets (Cesa-Bianchi, Céspedes, and Rebucci 2015).[9]
- Leverage has grown in mining, and even more so in the oil and gas subsector. These sectors are particularly sensitive to changes in global growth and commodity price fluctuations. In particular, oil price declines can cut into the profitability of energy firms and strain their debt-repayment capacity (see Chapter 1 of the April 2015 GFSR).
- The patterns shift somewhat in relation to small- and medium-sized enterprises (SMEs). For instance, SME leverage seems to have declined in emerging Asia and in the manufacturing sector during the past decade. One reason for such contrasts is the differences in country composition across the two data sets. A key similarity across both data sets is the increase in construction-sector leverage, particularly across EMEA and Latin America.

Both firm- and country-specific factors appear, on average, to have deteriorated across emerging markets in the postcrisis period. At the country level, lower real GDP growth and higher current account and fiscal deficits are examples of worsening postcrisis macroeconomic conditions (Table 3.1). The

[8]One data set, Thomson Reuters Worldscope, contains publicly listed firms, which tend to be larger and have received greater attention. The other, Orbis, predominantly includes unlisted small- and medium-sized enterprises and has been relatively underutilized.

[9]See also http://blog-imfdirect.imf.org/2014/06/11/era-of-benign-neglect-of-house-price-booms-is-over/.

Figure 3.5. Emerging Market Economies: Corporate Leverage by Selected Regions and Sectors
(Percent; ratio of total liabilities to total equity)
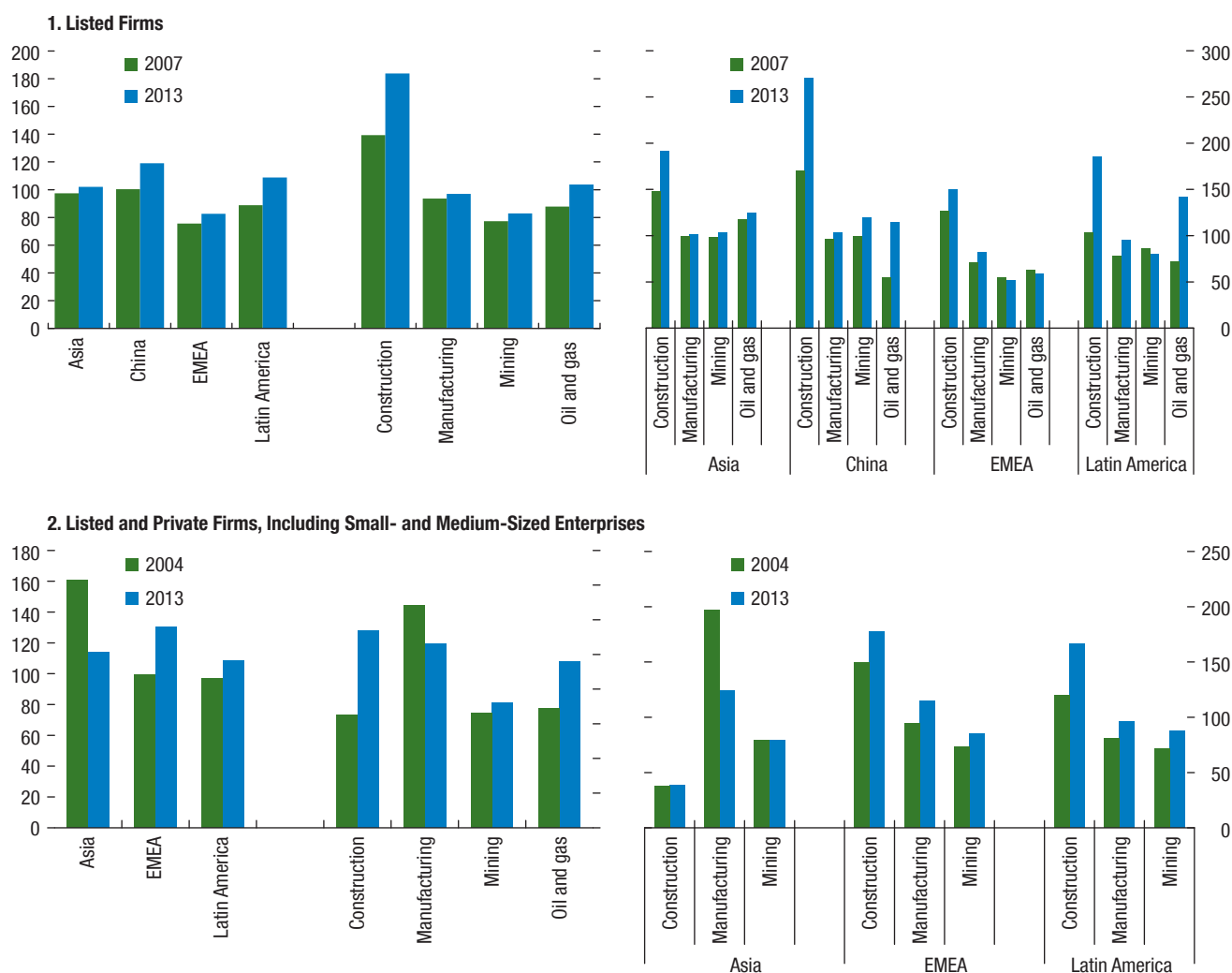
Sources: Orbis; Thomson Reuters Worldscope; and IMF staff calculations.
Note: Total liabilities refer to total (nonequity) liabilities. Mining includes oil and gas. Panel 1 begins in 2007 to account for the relative scarcity of Chinese firms in the beginning of the sample period; a balanced sample is used to highlight trends across larger firms. The relative scarcity of data, particularly in the first few years of the sample, is the main reason Chinese patterns are not shown individually in the bottom panels. The regional breakdown of the oil and gas subsector is also excluded for similar reasons. EMEA = Europe, Middle East, and Africa.

International Country Risk Guide (ICRG) index summarizes these and other key macroeconomic fundamentals and corroborates the bleaker domestic conditions in 2010–13. Even though liquidity has edged up at the firm level since the crisis, profitability, solvency, and a measure of asset quality have deteriorated.

Firms that took on more leverage have, on average, also increased their foreign exchange exposures.

- Net foreign exchange exposures are indirectly estimated for listed firms using the sensitivity of their stock returns to changes in trade-weighted exchange rates (Box 3.2).[10]
- The estimated foreign exchange exposures highlight sectoral differences (Figure 3.6). Firms in nontradable sectors, such as construction, tend to have

[10]See also Acharya and others (2015).

Table 3.1. Worsening Emerging Market Firm-Level and Macroeconomic Fundamentals
(Percent, unless otherwise noted)

	Precrisis (2004–07)	Postcrisis (2010–13)
Firm-Level Fundamentals		
Profitability		
Return on Assets	3.6	3.3
Liquidity		
Quick Ratio	0.9	1.0
Solvency		
Interest Coverage Ratio	3.4	2.8
Asset Quality		
Tangible Asset Ratio	30.5	22.9
Macroeconomic Fundamentals		
Real GDP Growth	6.2	3.9
CPI Inflation	4.8	3.9
Short-Term Interest Rate	4.2	3.6
Current Account Balance[1]	0.6	−0.9
External Debt[1]	35.9	35.6
Fiscal Balance[1]	−0.9	−2.8
Public Debt[1]	38.1	39.2
ICRG (macroeconomic fundamentals summary) Index[2]	38.7	38.2

Source: IMF staff.
Note: Historical averages of median firm-level fundamentals reported for all countries in the sample. Interest coverage ratio is EBITDA (earnings before interest, taxes, depreciation, and amortization) to interest expenses; the quick ratio is cash, cash equivalents, short-term investments, and accounts receivables to current liabilities; the tangible asset ratio is the ratio of fixed assets (which include property, plant, and equipment) to total assets.
[1]Percent of GDP.
[2]The average of the International Country Risk Guide (ICRG) Economic and Financial Risk Ratings, which aim to provide an overall assessment of a country's economic situation and ability to finance its debt obligations, respectively. The ICRG index is fairly stable, indicating that small changes can be meaningful: the decline in the index between the two periods is about one-half standard deviation.

positive foreign exchange exposures, reflecting their need for imports. Firms in tradable sectors, such as mining, tend to have negative foreign exchange exposures, because exporting firms benefit from a depreciation of the local currency.[11] The evolution of foreign exchange exposures after the global financial crisis differs across regions. Outside of Asia, the fraction of firms with positive foreign exchange exposures increased across all sectors after the crisis.

• Interestingly, the construction sector, where leverage grew rapidly, is among the sectors perceived by stock markets in emerging market economies as having strongly increased their exposure to exchange rate fluctuations in recent years (Figure 3.7).

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[11]These results are consistent with the literature (for example, Bodnar and Gentry 1993; Griffin and Stulz 2001).
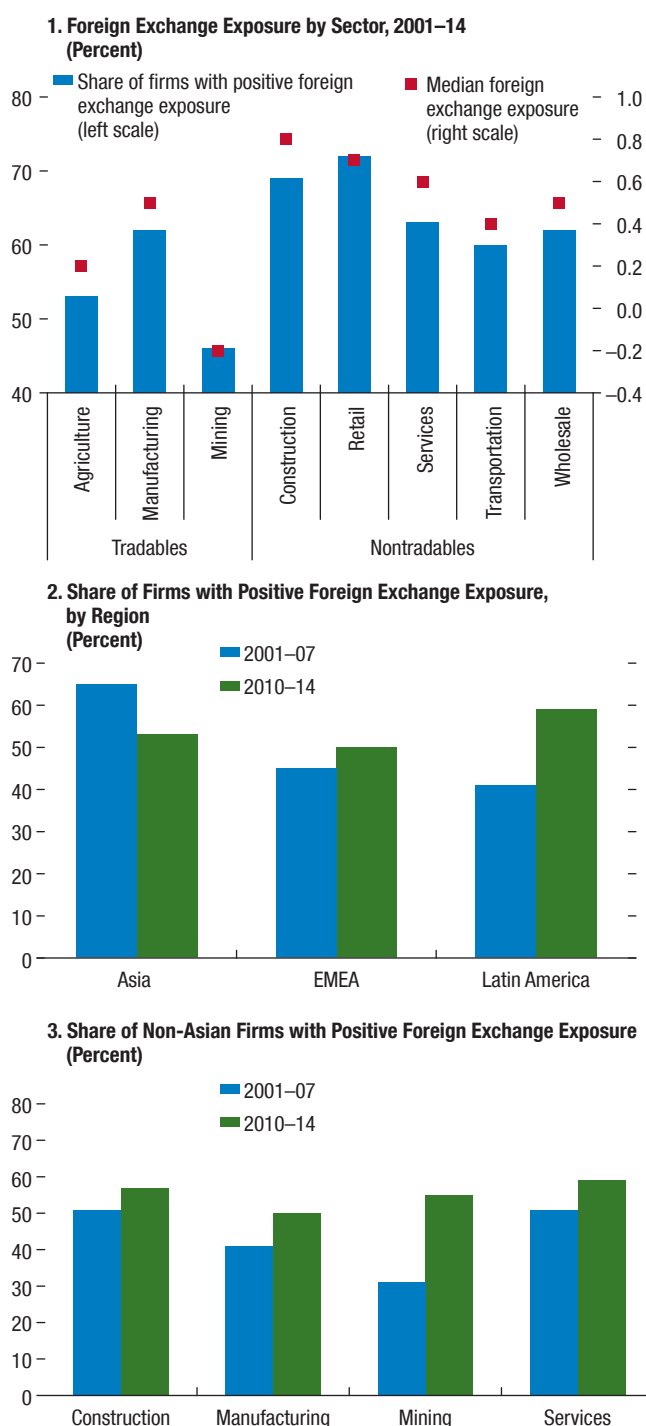
The data suggest a growing concentration of indebtedness in the weaker tail of the corporate sector. The share of liabilities held by listed firms is split according to a measure of their solvency, that is, the interest coverage ratio (ICR) (Figure 3.8). An ICR lower than 2 often means that a firm is in arrears on its interest payments. Note that the share of liabilities held by firms with ICRs lower than 2 has grown during the past decade, and is now greater than the 2008 level. The rise of corporate leverage amassed at the tail end of the distribution also raises concerns about China (Box 3.3).

Firm-Level Dynamics of Emerging Market Corporate Leverage

The empirical analysis focuses on the firm-level dynamics of emerging market corporate leverage. The corporate finance literature (focusing mostly on advanced economies) has converged to a set of variables that are considered reliable drivers of corporate leverage: firm size, collateral, profitability, and the market-to-book ratio. The literature's selection of these variables can be traced to various corporate finance theories on departures from the Modigliani-Miller irrelevance proposition, which holds that the specific proportions of debt and equity in a firm's capital structure are irrelevant to its market value (Box 3.4). Building on these studies, this chapter considers both domestic (firm-specific and macroeconomic) factors and global economic and financial conditions as potential determinants of corporate leverage. The focus is on the change in the leverage ratio.

The rise of global factors

The increase in emerging market corporate leverage appears to be closely associated with favorable global conditions. Econometric analysis confirms that firm- and country-specific characteristics are key determinants of emerging market corporate leverage growth: these terms have the expected signs and are statistically significant (Figure 3.9, panel 1). In particular, profitability, tangibility, and the measure of macroeconomic conditions are positively correlated with leverage growth. These positive relationships would imply that leverage should have declined given the deterioration in these determinants in the postcrisis period discussed above (Table 3.1). However, the fact that the opposite happened suggests that global

Figure 3.6. Foreign Exchange Exposures in Emerging Market Economies (Listed Firms)

1. Foreign Exchange Exposure by Sector, 2001–14
(Percent)

- Share of firms with positive foreign exchange exposure (left scale)
- Median foreign exchange exposure (right scale)

2. Share of Firms with Positive Foreign Exchange Exposure, by Region
(Percent)

- 2001–07
- 2010–14

3. Share of Non-Asian Firms with Positive Foreign Exchange Exposure
(Percent)

- 2001–07
- 2010–14

Sources: IMF, Information Notice System; Thomson Reuters Datastream; Thomson Reuters Worldscope; and IMF staff estimates.
Note: EMEA = Europe, Middle East, and Africa.

factors may be behind the rise in emerging market corporate leverage. Precisely identifying the role of individual global factors is difficult, however; therefore, the analysis initially captures global economic and financial conditions using time dummies—which can be thought of as unobservable global factors. The time dummies indeed suggest that global factors are becoming more important as drivers of emerging market corporate leverage growth in the postcrisis period.

When specific global factors are considered, the inverse of the U.S. shadow rate and, to a lesser extent, global oil prices seem to be particularly associated with leverage growth. This result emerges when including various global factors simultaneously in the regression.[12] Further econometric analysis points to a greater role for global factors, in particular the shadow rate, in the postcrisis rise of leverage. Their influence during the period was examined through two complementary regression models. The first explicitly accounts for possible structural breaks, and suggests that the U.S. shadow rate became a more significant postcrisis determinant of emerging market leverage growth.[13] The second model contrasts the precrisis (2004–07) and postcrisis (2010–13) periods, and finds a significant positive postcrisis correlation between the shadow rate and no significant role for country-specific factors.

The role of easier global financial conditions is corroborated through evidence on the relaxation of financing constraints. The relevance of relaxed financing constraints for leverage can be assessed by focusing on SMEs and weaker firms, which typically have more limited access to finance. Similarly, a closer look can be taken at sectors that are intrinsically more dependent on external finance (Rajan and Zingales

[12]In the baseline regression model, the inverse of the U.S. shadow rate and the change in global oil prices are the main global factors. The results hold if the U.S. shadow rate is replaced with the global shadow rate. The results are also robust to the inclusion of other global factors such as changes in the Chicago Board Options Exchange Volatility Index (VIX), global commodity prices, and global GDP, as well as other controls, and to GDP weighting (Annex 3.1). Although robustness of these alternative specifications is encouraging, longer time series would be needed to make more definitive statements on the precise relationship between emerging market leverage growth and specific global factors.

[13]The analysis of a longer sample (1994–2013) of listed firms reveals a positive and statistically significant correlation between the inverse shadow rate and emerging market leverage growth even after controlling for other global factors. Evidence based on this longer sample also confirms the presence of a postcrisis structural break.

Figure 3.7. Change in Foreign Exchange Exposures and Corporate Leverage, by Sector
(Percentage points)
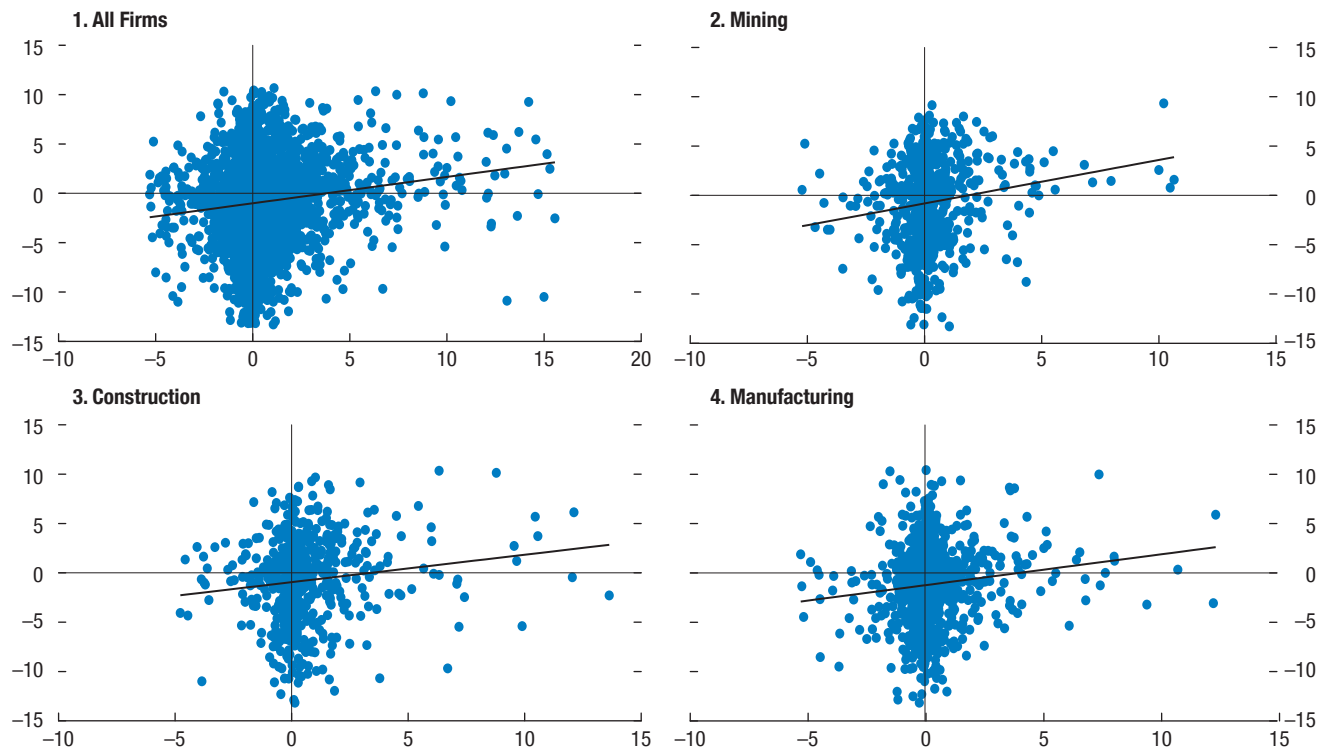
Source: IMF staff estimates.
Note: The vertical axes depict the changes (from 2001–07 to 2010–14) in estimated foreign exchange exposure and the horizontal axes depict the changes in the leverage ratio (total liabilities to market equity) for listed firms. The slopes are statistically significant at least at the 5 percent level. The results are robust to outliers and to other measures of leverage.

1998). Evidence indicates that leverage for all these types of firms is more responsive than for other firms to prevailing global monetary conditions. Moreover, in countries that have more open capital accounts and that received larger capital inflows, firms' leverage growth tends to be more responsive to global financial conditions.

### How have firms been using borrowed funds?

Estimates based on listed firms' balance sheets suggest that greater borrowing has been used more for net investment than for the accumulation of cash (Figure 3.10).[14] The results also suggest that in the postcri-

sis period, financing availability has become more important than profitability in driving investment. For example, during 2010–13, the relationship between investment and leverage strengthened, but it weakened for cash flows, and became statistically insignificant for a forward-looking measure of profitability (Tobin's Q). Possibly, the more favorable postcrisis global financial conditions relaxed financing constraints, allowing more debt-financed capital expenditure for less profitable projects.[15]

[14]Although these estimates are indicative, it is possible, for example, that net investment in any one year may have been financed with working capital or retained earnings (captured in the "other" term), including from earlier years. The close association between changes in leverage and investment are confirmed by firm-level investment equations. As expected, the level of leverage is negatively associated with investment (see also IMF 2015d).

[15]As in Magud and Sosa (2015), the classic Fazzari, Hubbard, and Petersen (1988) model—which builds on the standard Q theory of investment—is augmented by a measure of leverage. In addition to leverage growth, the other main determinants of investment are Tobin's Q (to capture marginal profitability and growth opportunities), cash flow measures (a proxy for financing constraints), and the cost of capital. A positive and statistically significant cash flow coefficient suggests that firms face financial constraints because they would need to rely on internal funds to finance investment projects. Estimates using the full and precrisis (2004–07) samples reveal that all variables are statistically significant and have the expected signs.

Figure 3.8. Corporate Liabilities and Solvency
(Percent; solvency measured using the ICR)
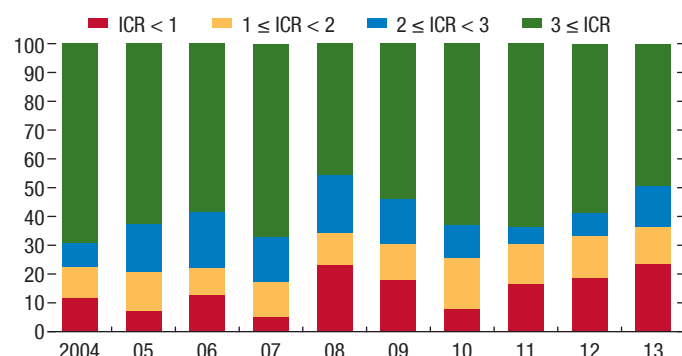
Sources: Thomson Reuters Worldscope; and IMF staff estimates.
Note: The figure shows the share of liabilities held by firms according to their interest coverage ratio (ICR). The ICR is a measure of firms' solvency, calculated as the ratio of earnings (before interest and taxes) to interest expenses.

Summary

Overall, the relative role of global factors as key drivers of emerging market corporate leverage dynamics has increased in recent years. The evidence shows some signs of elevated corporate exposure to a potential worsening in global financial conditions. The buildup in leverage in the construction sector and the related rise in net foreign exchange exposure as well as growing concentration of indebtedness in the weaker tail of the corporate sector provide particular reasons for concern. However, the growth in leverage appears to have fostered investment, although investment projects may have become less profitable more recently.

Emerging Market Corporate Bond Finance

The growth in emerging market corporate leverage has been accompanied by a change in its composition. In particular, the importance of bond finance has grown rapidly in recent years. Therefore, this section examines the role of firm, country, and global factors in explaining patterns of bond issuance to help determine whether the patterns are associated with rising vulnerabilities.

Emerging market corporate bond issuance has risen sharply since 2009, becoming an increasingly important source of corporate financing in those economies. Starting from a low base, the share of corporate finance accounted for by bonds has nearly doubled since the crisis, and totaled more than $900

## Figure 3.9. Key Determinants of Emerging Market Economies' Corporate Leverage

1. Determinants of Leverage Growth

Baseline Determinants	Expected Sign
Firm Level	
Sales	+/–
Profitability	+
Tangibility	+
Country Level	
Macroeconomic Conditions	+
Global	
Shadow Rate (inverse)	+
Oil Prices	+

2. The Changing Relationship between Leverage and Global Factors
(Percentage points)
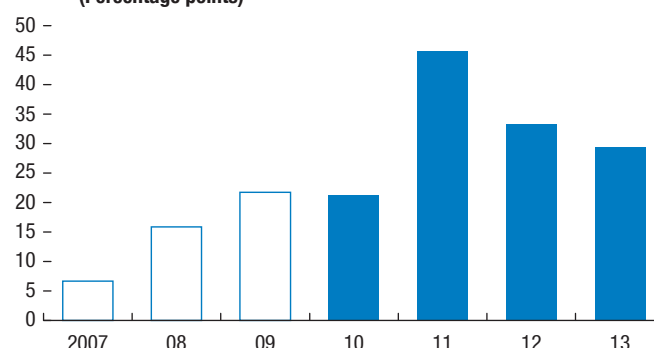
### 3. Specific Determinants of Leverage Growth
(Percentage points)
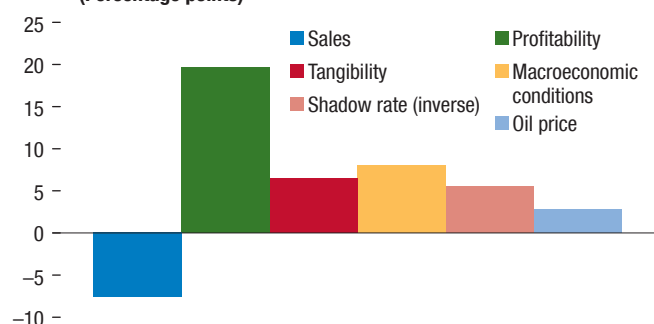
Sources: Orbis; and IMF staff calculations.
Note: Sample period: 2004–13. An empty bar (panel 2) denotes that the time dummy is not statistically significant at the 10 percent level. The standardized coefficients (panel 3) are statistically significant at the 1 percent level. Firm-level variables are lagged; sales and tangibility are changes. See Annex 3.1 for further details.

billion in 2014 (Figure 3.11, panel 1). Likewise, issuance via subsidiaries in offshore financial centers has increased significantly since the crisis, driven primarily by borrowers headquartered in Brazil and China

Figure 3.10. Leverage, Cash Holdings, and Corporate Investment
(Percent contributions to the change in debt as a share of total assets)
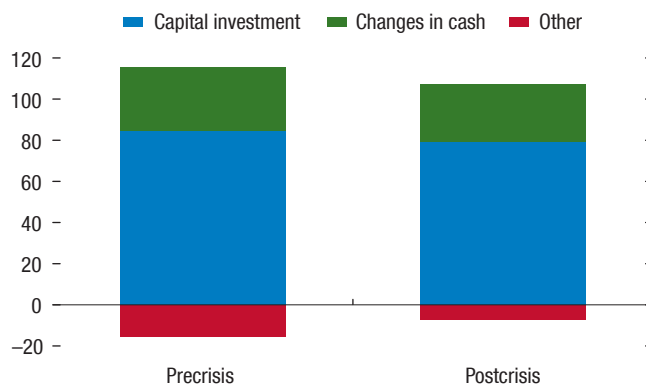
Sources: Thomson Reuters Worldscope; and IMF staff calculations.
Note: "Other" refers to other net assets and retained earnings. All variables were normalized by lagged total assets. Firms with an increase in leverage above the first quartile of the leverage distribution were included.

(McCauley, Upper, and Villar 2013; see also Shin 2013; Avdjiev, Chui, and Shin 2014).[16] Issuance is most notable in the oil and gas sector (with a sizable foreign exchange component) and in construction, especially since 2010.[17] Although China has been an important part of this development, the uptrend in issuance is broad based across emerging markets. In particular, emerging markets other than China have on average returned to the rapid pace of issuance observed before the global financial crisis. Within countries, however, the postcrisis growth in access has not been even. One-third of emerging markets have seen aggregate increases in the total amount issued alongside *declines* in the total number of issuers. To a significant extent, the growth in international bond issuance can be traced to the decline in cross-border lending, which in turn appears to be largely driven by a retrenchment on the part of banks (Chapter 2 of the April 2015 GFSR).

A shift to bond financing has benefits and drawbacks from both firm and macroeconomic perspectives. A key benefit of greater access to bond finance is that
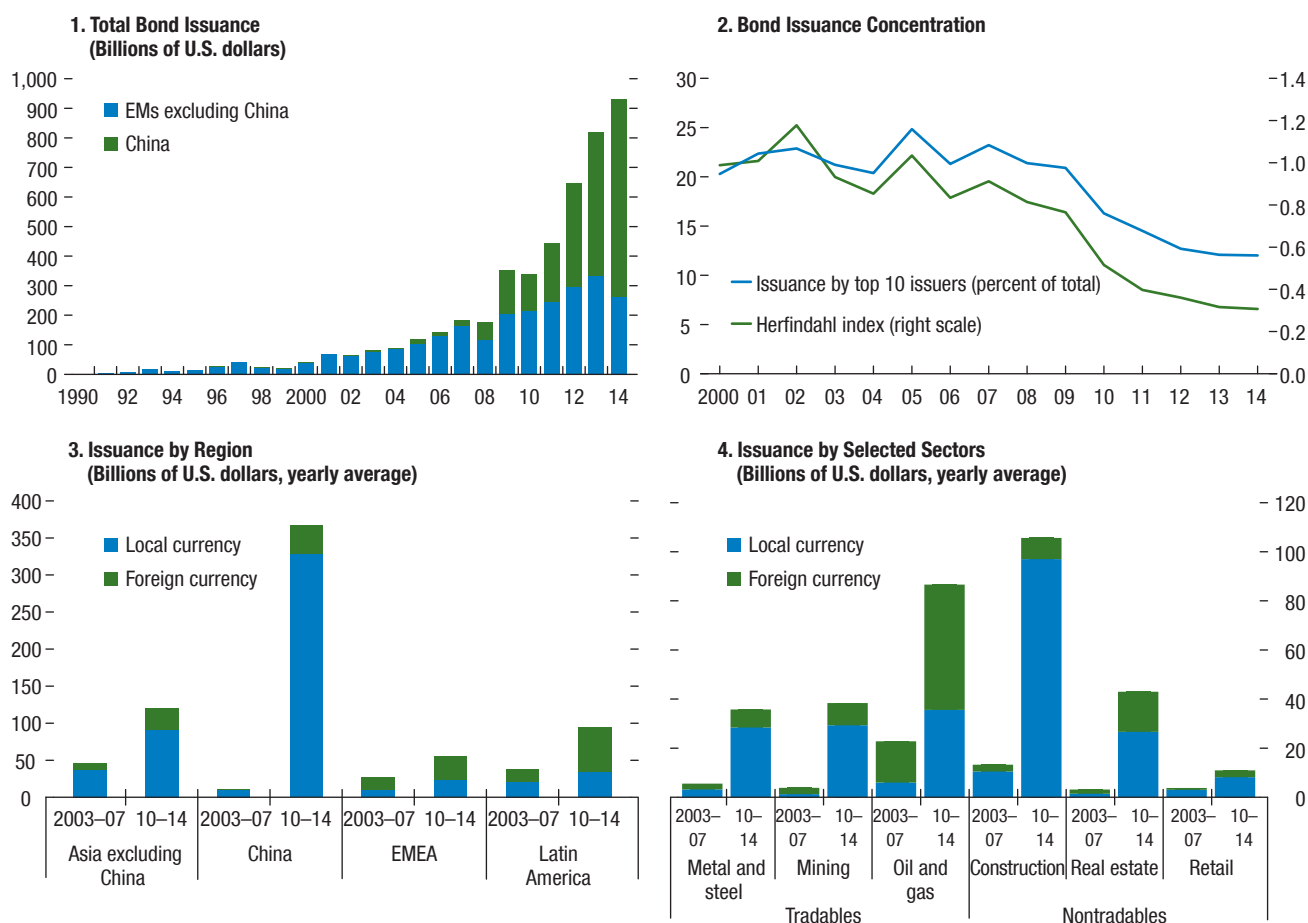
[16]The general trends discussed in this section, are, however, robust to the use of alternative notions of nationality, such as issuers' nationality of risk, country of incorporation, or ultimate parent nationality.

[17]Although currency mismatches are likely to be smaller in the oil and gas sector than in other sectors to the extent that export receipts are denominated in dollars, this sector is still vulnerable to oil price declines (see, for example, BIS 2015).

it can provide financing to the real economy even when banks are distressed, but it also exposes companies to more volatile funding conditions. Since bond financing is unsecured, it does not entail the macro-economic amplification mechanisms associated with collateral valuations (whereby an economic downturn depresses collateral values, thus constraining borrowing capacity and investment even more [Kiyotaki and Moore 1997]).[18] Compared with cross-border bank lending, the participation by international investors in local markets can also have advantages in dampening the impact of global financial conditions—for example, if foreign lenders want to withdraw, part of the balance of payments impact is cushioned by bond valuation effects. On the other hand, bond financing tends to be associated with weaker monitoring standards due to a larger pool of bond investors who may "choose" not to monitor the business activities of the bond issuers. This can create incentives for excessive risk-taking behavior by firms. Moreover, the growing intermediation through bond mutual funds can entail its own risks, as extensively discussed in Chapter 3 of the April 2015 GFSR.

The share of bond issuance denominated in euros has grown appreciably in recent years (Figure 3.12). Although foreign currency issuance continues to be dominated by U.S. dollar bonds, the rise in euro denominations likely reflects expectations of tighter U.S. monetary conditions and more accommodative monetary policy by the European Central Bank, and associated exchange rate expectations. For all emerging markets, the share of bonds issued in foreign currency has declined by more than 10 percentage points relative to the precrisis period. However, that reading is mainly driven by the sharp rise in bond issuance by China, which is predominantly in local currency. Although firms in some emerging markets, such as Colombia, Malaysia, the Philippines, Russia, and Thailand, have issued relatively more in local currency, firms in many other emerging markets have increased their bond financing in foreign currency. However, tentative evidence indicates that listed firms that have issued in foreign currency do not appear to have raised their foreign exchange exposures, possibly because of higher exports,

[18]In line with this, the effects of banking crises on the economy are found to be worse than in other types of crises (see Cardarelli, Elekdag, and Lall 2011; Giesecke and others 2014).

Figure 3.11. Bond Issuance by Regions and Sectors

1. Total Bond Issuance
(Billions of U.S. dollars)

2. Bond Issuance Concentration

3. Issuance by Region
(Billions of U.S. dollars, yearly average)

4. Issuance by Selected Sectors
(Billions of U.S. dollars, yearly average)

Sources: Dealogic; and IMF staff calculations.
Note: Nationality is based on a firm's country of risk. The general trends in these charts are robust to alternative notions of nationality, such as issuer's nationality of incorporation or ultimate parent nationality. A lower value of the Herfindahl index value indicates a lower degree of concentration. EMs = emerging market economies; EMEA = Europe, Middle East, and Africa.

increased hedging, or a substitution of foreign currency bank loans.[19]

The financial conditions of issuing firms appear to have broadly deteriorated in recent years. Since the crisis, bonds have been issued by more leveraged and less profitable firms on average (Figure 3.13). Indices of solvency (ICR) and liquidity (quick ratio) have also generally deteriorated among issuing firms.[20] Since 2010, firms have used bond issuance

less for investment and more to refinance debt, most likely to take advantage of the favorable financing conditions (see also Rodríguez Bastos, Kamil, and Sutton 2015).[21] Indeed, the share of issuers reporting refinancing as their intended use of proceeds has been rising.

Emerging market firms have managed to issue at better terms (Figure 3.14). Average maturity at issuance for domestic and external bonds has generally lengthened by more than one year relative to the precrisis average, mitigating rollover risk for

[19]The correlation between foreign currency bond issuance and the change in foreign exchange exposure is statistically insignificant in the postcrisis period; however, the sample of firms considered was relatively small.
[20]See Fuertes and Serena (2014) for a description of balance sheet trends in a broad range of emerging markets for firms tapping international bond markets.

[21]The fact that firms report lower use of proceeds for investment purposes is not inconsistent with the information presented earlier that more leverage had been associated with higher investment (for example, firms may have used proceeds to pay off bank debt while increasing their overall leverage and investment).

Figure 3.12. Bond Issuance: Currency Composition

1. Foreign Currency Share of Bond Issuance
(Percent)

2. Share of Euro-Denominated Bond Issuance
(Percent)
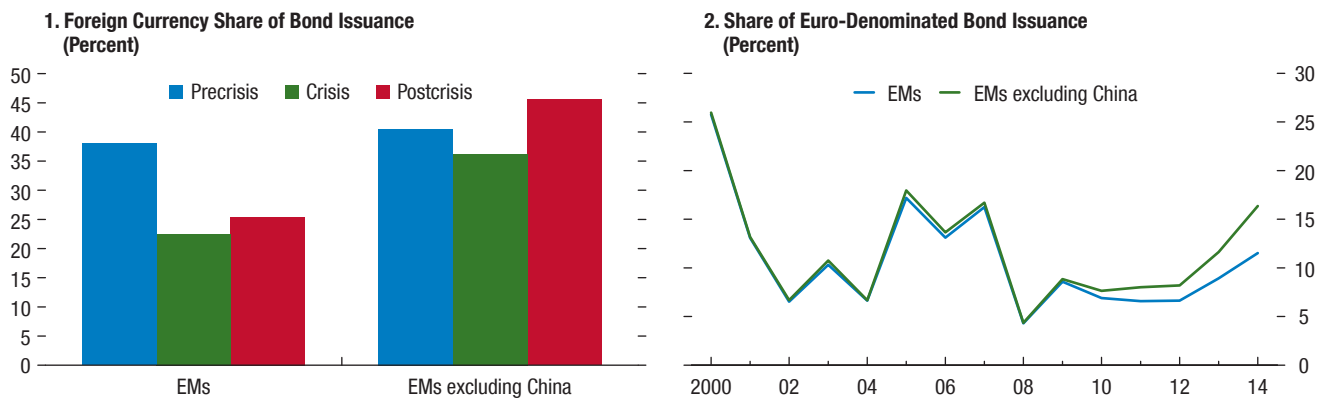
Sources: Dealogic; and IMF staff calculations.
Note: EMs = emerging market economies. Precrisis: 2003–07, crisis: 2008–09, postcrisis: 2010–14. Nationality is based on a firm's country of risk. The general trends in these charts are robust to alternative notions of nationality, such as issuer's nationality of incorporation or ultimate parent nationality. The share of euro-denominated bond issuance (panel 2) is computed relative to the total amount of dollar and euro issuance.

borrowers at the expense of increased duration risk for investors. Yields to maturity have also fallen. The fact that firms have been able to issue at better terms against a background of worsening balance sheets suggests that global factors may have played an important role in facilitating firms' access to finance.

Changes in firms' access to bond markets

The role of firm-level factors in explaining issuance since the crisis has decreased (Figure 3.15). In line with the literature, the analysis indicates that larger, more-leveraged, and seasoned-issuer firms have a greater tendency to issue bonds.[22] Although higher real GDP growth is related to a higher probability of issuance, macroeconomic variables are generally not reliable predictors of firm-level bond issuance.[23] Although

the inverse of the U.S. shadow rate is generally not statistically significant over the entire sample, in the postcrisis period it is a key determinant of the change in the postcrisis probability of issuance.[24] In line with this result, using country-level data focusing on the composition of emerging market corporate leverage, Ayala, Nedeljkovic, and Saborowski (2015) conclude that global factors have taken center stage in explaining changes since the crisis (Box 3.5).[25]

Changes in bond maturity

The crisis seems to have brought about a structural change in the relationship between bond maturity and its determinants. Regression analysis shows that bond- and firm-level characteristics, as well as global factors, are important determinants of bond matu-
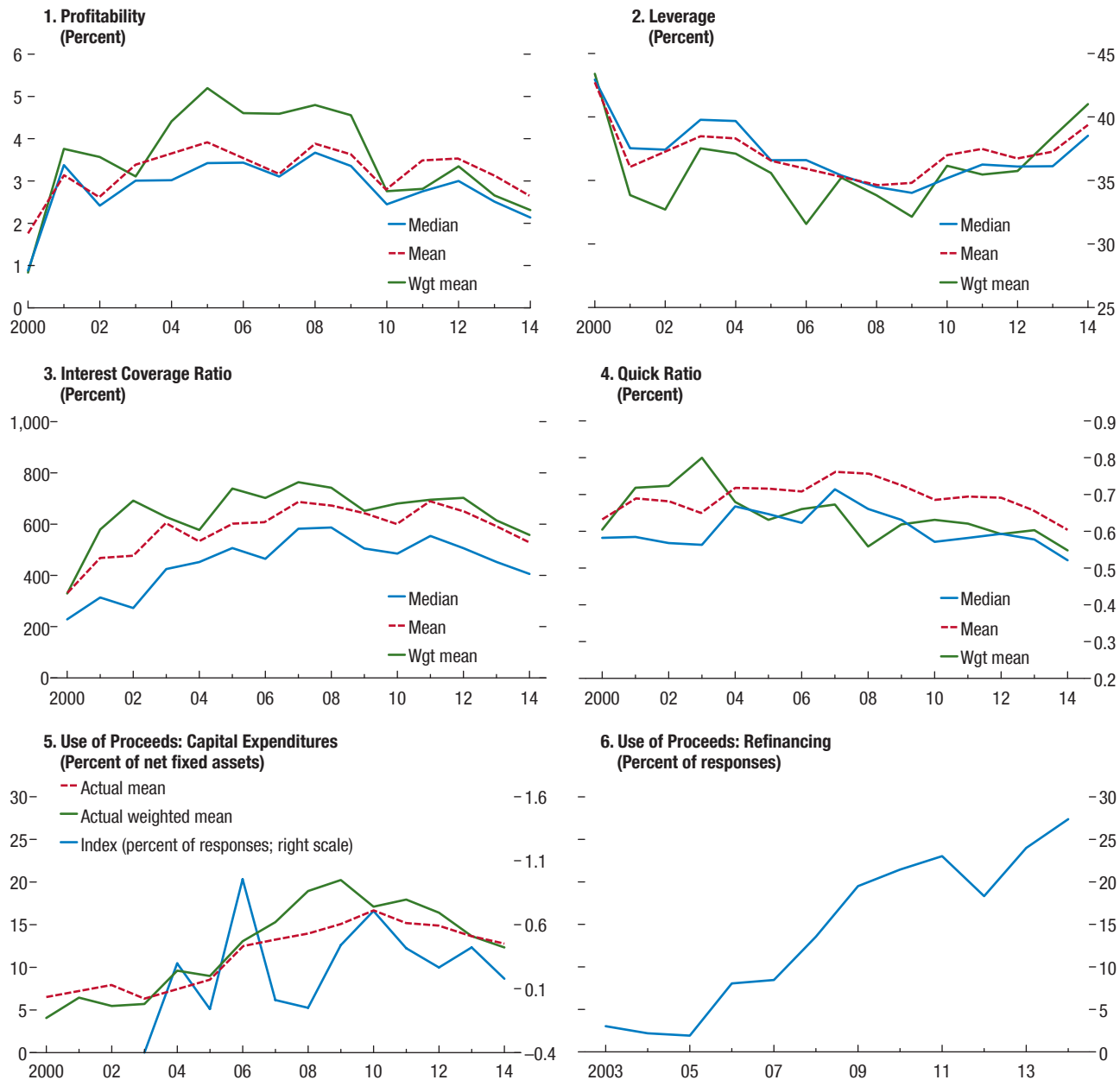
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[22]Using firm-level data, a pooled probit model was used to estimate the probability of bond issuance controlling for firm characteristics as well as macroeconomic and global factors (see Annex 3.2). These results are consistent with the notion that issuing a bond entails significant fixed costs (Borensztein and others 2008). To the extent that it serves as a proxy for healthier financial conditions, profitability might be expected to have a positive influence on the decision to issue bonds. However, profitable firms may use internal funds instead of external financing. The findings in the empirical literature are mixed (Borensztein and others 2008; Didier, Levine, and Schmukler 2014).

[23]Using aggregate data and spanning a broader set of emerging markets, Feyen and others (2015) find that issuance is greater in countries with higher per capita GDP, growth, or current account deficits. Lo Duca, Nicoletti, and Vidal Martinez (2014) show that

domestic financial variables such as the domestic interest rate, equity returns, and equity volatility are not statistically significant when global factors are included. Policies to promote bond market development may have also played a role in greater issuance, for example, the Asian Bond Market Initiative, an initiative of 12 central banks in the Asia-Pacific region administered by the Bank for International Settlements.
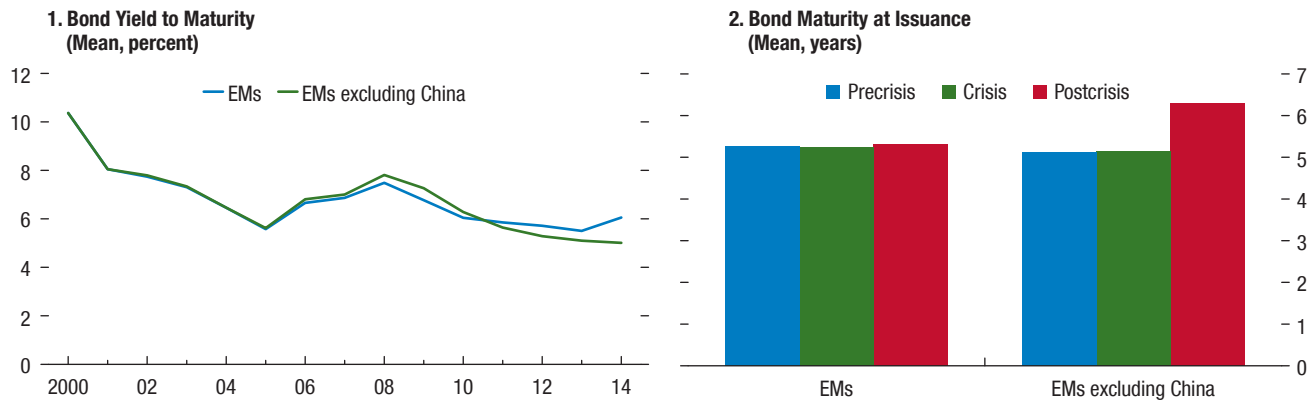
[24]The VIX (used to capture global investor sentiment) is negatively related to the probability of crisis over the full sample period. However, the relationship is no longer statistically significant in the postcrisis period. More generally, similar results are obtained when estimating the probability of first-time bond issuance.

[25]Also in line with these results, Lo Duca, Nicoletti, and Vidal Martinez (2014) and Feyen and others (2015) find, using aggregate issuance data, that global monetary conditions have had a significant positive effect on emerging market corporate issuance during the postcrisis period.

Figure 3.13. Deteriorating Firm-Specific Fundamentals for Bond-Issuing Firms

1. Profitability
(Percent)

2. Leverage
(Percent)

3. Interest Coverage Ratio
(Percent)

4. Quick Ratio
(Percent)

5. Use of Proceeds: Capital Expenditures
(Percent of net fixed assets)

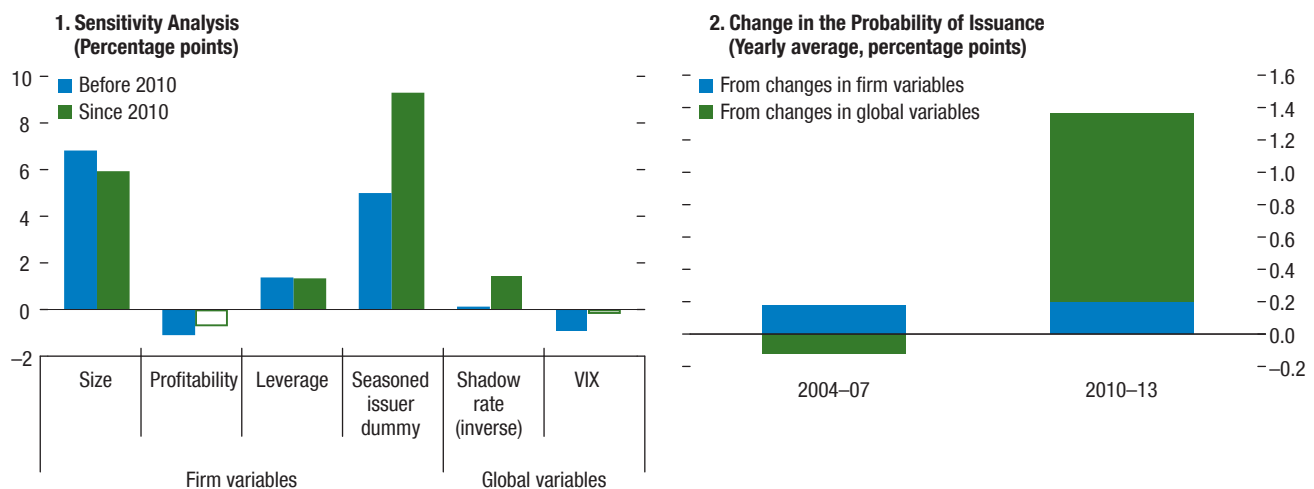**6. Use of Proceeds: Refinancing**
(Percent of responses)

Sources: Bloomberg, L.P.; Dealogic; and IMF staff calculations.
Note: Profitability is the return on assets. Leverage is total debt to total assets. Interest coverage ratio is EBITDA (earnings before interest, taxes, depreciation, and amortization) to interest expenses. Liquidity is measured by the quick ratio (cash, cash equivalents, short-term investments, and receivables to current liabilities). All variables correspond to the year prior to issuance. Nationality is based on the country of risk. Listed and nonlisted firms are included (although coverage is limited for the latter). Panel 5 shows the actual capital expenditures in percent of net fixed assets on the year of issuance. Index constructed based on intended use of proceeds as reported to Dealogic, as percentage of total responses per year. The index in panel 6 includes the categories "Refinancing," "Debt repayment," and "Restructuring." Wgt mean = mean weighted by deal value.

Figure 3.14. Bond Issuance: Yields and Maturity

1. Bond Yield to Maturity
(Mean, percent)

EMs ── EMs excluding China

2. Bond Maturity at Issuance
(Mean, years)

Precrisis   Crisis   Postcrisis

Sources: Dealogic; and IMF staff calculations.
Note: Precrisis: 2003–07, crisis: 2008–09, postcrisis: 2010–14. Nationality is based on a firm's country of risk. These general trends are robust to alternative notions of nationality, such as issuer's nationality of incorporation or ultimate parent nationality. EMs = emerging market economies.

Figure 3.15. Factors Influencing the Probability of Bond Issuance

1. Sensitivity Analysis
(Percentage points)

Before 2010
Since 2010

Size | Profitability | Leverage | Seasoned issuer dummy | Shadow rate (inverse) | VIX

Firm variables   Global variables

2. Change in the Probability of Issuance
(Yearly average, percentage points)

From changes in firm variables
From changes in global variables

2004–07   2010–13

Sources: Bloomberg, L.P.; Thomson Reuters Worldscope; and IMF staff calculations.
Note: The shaded bars denote statistical significance at least at the 5 percent level. The probability of issuance is estimated using a pooled probit model with a time trend and country and sector dummies. Standard errors are clustered at the country level. Nationality is based on firms' country of risk. The attribution analysis shown in panel 2 is computed using the coefficients of the pre- and postcrisis estimates and is not standard because of the nonlinear nature of the probit model. The analysis decomposes the average yearly change in probability of issuance into that explained by changes in firm or global variables. For each annual change, all variables are kept at their initial mean, except firm- and global-level variables, which are assigned their initial and end-period means to obtain their contributions. The pre- and postcrisis contributions are obtained by averaging yearly contributions for 2004–07 and 2010–13, respectively. The calculation is done for nonseasoned issuers and for the median country and sector fixed effects. A seasoned issuer is a firm that has issued before. See Annex 3.2. VIX = Chicago Board Options Exchange Volatility Index.

Figure 3.16. Factors Influencing Bond Maturity

1. Bond Maturity at Issuance

Variable	Expected Sign	Estimates	
Issuance in Local Currency	−	−	**
Investment Grade	+	+	**
Firm Size	+	+	***
Profitability	+	−	
Leverage	−	−	**
Inverse Shadow Rate[1]	+	+	**
VIX	−	−	***
Currency Depreciation	−	−	**
Size of Government Debt	+	+	**

2. Changes in Maturity at Issuance, 2009–13
(Years)
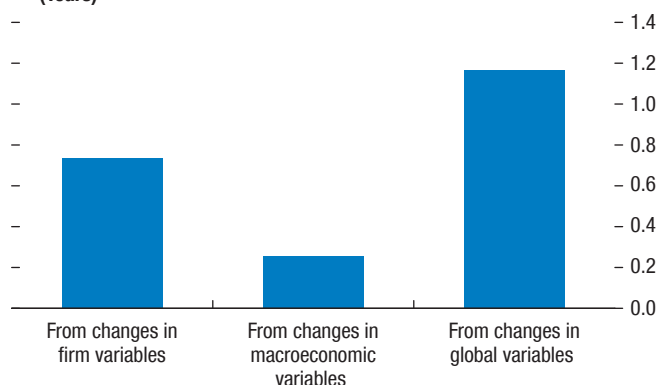
Sources: Bloomberg L.P.; and IMF staff calculations.
Note: The baseline specification estimates bond maturity at issuance as a function of bond, firm, macro, and global factors, with country and sector fixed effects and a time trend. Firm factors include a measure of size (total assets), profitability (return on assets), and leverage (debt-to-assets), all at the year prior to issuance. Bond factors include dummies for bond currency denomination; investment grade; and put, call, and sink options. Global factors are the VIX and the inverse shadow rate (three-month average prior to issuance) interacted with a postcrisis dummy. Macro factors include the government debt and exchange rate depreciation relative to the U.S. dollar. Standard errors are clustered at the country level. Nationality is based on country of risk; Chinese firms are excluded. VIX = Chicago Board Options Exchange Volatility Index. See Annex 3.2. ** and *** denote statistical significance at the 5 and 1 percent levels, respectively.
[1]Refers to the coefficient in the postcrisis period.

rity.[26] In particular, larger and less leveraged firms, firms in countries with smaller government debt-to-GDP ratios and with depreciating exchange rates, and companies facing lower investor uncertainty (measured by the Chicago Board Options Exchange Volatility Index [VIX]) tend to issue at longer maturities.[27] Favorable global financial conditions have been a key determinant of the lengthening of maturity in the postcrisis period. Indeed, in recent years, accommodative U.S. monetary policy explains more of the recent lengthening in maturities than do firm characteristics (Figure 3.16).[28] Moreover, U.S. shadow rate fluctuations have a greater impact on maturity for external issuances and for non-investment-grade issuances.

[26]Fuertes and Serena (2014) and Shin (2014a) document a lengthening in maturities for external bond issuances by nonfinancial corporations and nonbank financial corporations in a broad range of emerging markets.

[27]The finding that maturities tend to be longer in countries with larger government debt is in line with the idea that a large, liquid government bond market can have a positive effect on the development of corporate debt markets.

[28]Feyen and others (2015) show that global factors have an impact on maturity structure of emerging market financial and nonfinancial corporate bond issuance. The specification in this section is similar to theirs, but it focuses only on nonfinancial firms and controls for firm-level characteristics, as is standard in the literature (Annex 3.2).

Summary

Global factors seem to have become relatively more important determinants of bond issuance and maturity in the postcrisis period. Emerging market corporate bond issuance has grown on a broad basis since 2009. The decline in the share of foreign currency issuance in emerging markets reflects activity in China, where firms have issued mostly in local currency. Despite weaker domestic fundamentals, emerging market firms have managed to issue bonds with lower yields and longer maturities.

Emerging Market Corporate Spreads

This section examines changes in the balance between domestic and global factors in the behavior of emerging market corporate spreads. Extending the approach of the preceding sections, it uses a price-based analysis in which spreads are linked to firm-level, country-level, and global characteristics. A novel feature of this analysis is the use of data on secondary market spreads.[29]

[29]The literature on emerging market corporate spreads mainly uses issuance-level launch yield data. The approach gives rise to endogeneity issues (Eichengreen and Mody 1998) because during poor market conditions, when secondary spreads rise, primary

Figure 3.17. Emerging Market Economies: Secondary Market Corporate Spreads
(Percent)
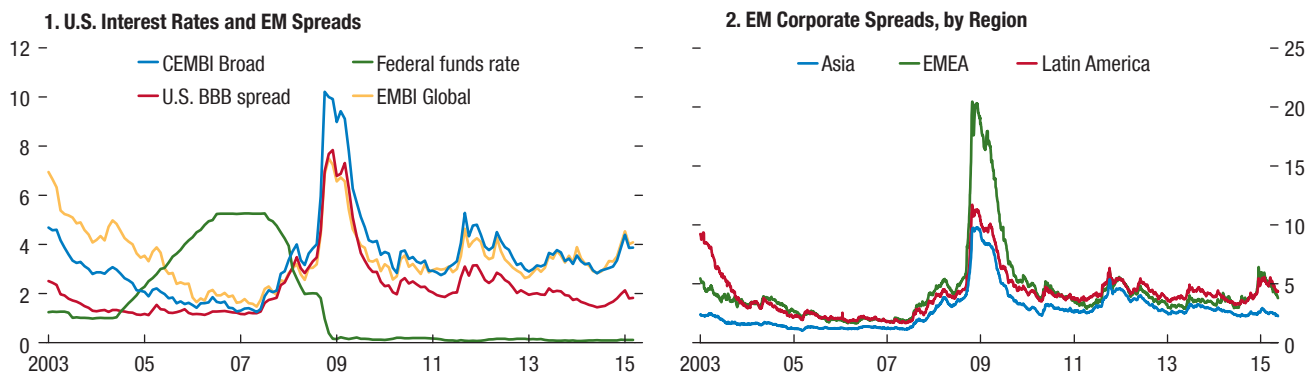
Sources: Bloomberg, L.P.; Federal Reserve Bank of St. Louis FRED Economic Data; and J.P. Morgan Chase.
Note: CEMBI = Corporate Emerging Markets Bond Index; EM = emerging market economies; EMBI = Emerging Markets Bond Index; EMEA = Europe, Middle East, and Africa.

In recent years, emerging market corporate spreads have been hovering above the average of the precrisis period (Figure 3.17). The secondary-market corporate (Corporate Emerging Markets Bond Index [CEMBI]) spreads move in unison with their sovereign counterpart (the Emerging Market Bond Index spread) and the U.S. BBB corporate spread (a gauge of global credit conditions), but inversely with the U.S. policy rate (the federal funds rate).[30] More recently, U.S. corporate and CEMBI spreads have been diverging, mainly because of relatively better U.S. economic conditions; corporate spreads also differ across some regions.

How has the relationship between spreads and fundamentals changed over time?

Regression analysis confirms that CEMBI spreads are closely linked to country-specific and global factors. Cross-country panel regressions reveal a strong statistical relationship between CEMBI spreads, leverage, and macroeconomic factors (Figure 3.18).

---

spreads do not rise proportionately (and can indeed sometimes fall), a reflection of the tendency for only the most creditworthy borrowers to remain in the market. Although Eichengreen and Mody (1998) and other studies attempt to correct for the bias, the model can be unstable if not properly specified. Only a few studies use secondary market data, and then only with a limited scope; for instance, Dittmar and Yuan (2008) and Zinna (2014) focus on the relationship between sovereign and corporate spreads.

[30]The secondary-market spreads are from J.P. Morgan's CEMBI. The CEMBI tracks U.S. dollar-denominated debt instruments issued by emerging market firms; the spread is calculated against the U.S. Treasury yield.

The behavior of emerging market corporate spreads is also closely linked to the U.S. corporate spread. Although not reported, similar results are found using individual-issuance-level data covering more than 1,000 issuances for 20 emerging markets from 1990 to 2015.

The empirical analysis suggests that the relationship between corporate spreads and their determinants has also changed, with domestic factors becoming less influential in the postcrisis period. For instance, the significantly positive precrisis correlation between spreads and leverage broke down since 2010. Furthermore, the negative correlation between spreads and country-level factors has also declined in the postcrisis period. This breakdown suggests firms would be relatively more susceptible to a worsening in global financial conditions—a case in point is the 2013 "taper tantrum" episode, in which spreads for more leveraged firms rose sharply (Box 3.6).

Policy Implications

Emerging markets should prepare for the eventual reversal of postcrisis accommodative global financial conditions because those conditions have become more influential determinants of emerging market corporate finance. Weaker firms and cyclical sectors, such as construction, are likely to be especially susceptible to such global changes. Once market access declines, elevated debt-servicing costs (resulting from the combination of higher interest rates and depreciating currencies) and

Figure 3.18. Emerging Market Economies: Effects of Domestic and Global Factors on Corporate Spreads
(Percentage points)
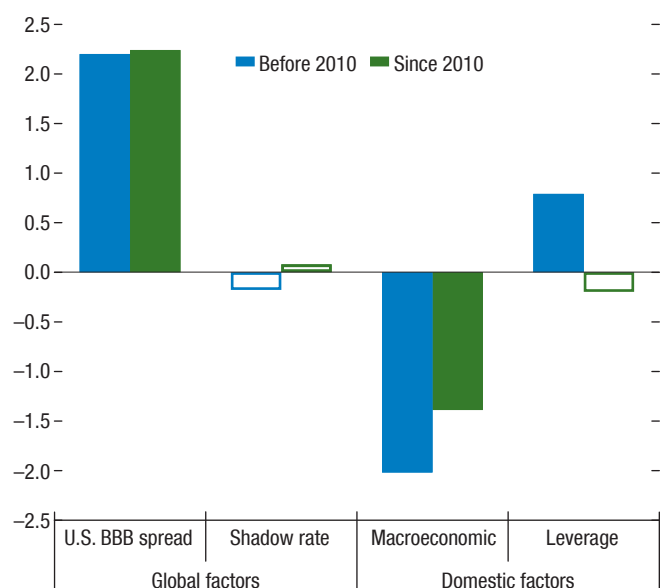
Source: IMF staff calculations.
Note: The figure is based on country-level panel regressions (see Annex 3.3 for details). The dependent variable is the CEMBI spreads for 20 emerging markets over December 2001–December 2014. Explanatory variables include global factors (U.S. BBB spread and the U.S. shadow rate) as well as domestic factors (macroeconomic conditions [based on the International Country Risk Guide index] and leverage [median across firms]). The bars show the effects of a one standard deviation increase in each variable on the CEMBI spread before 2010 and in the postcrisis period (2010–14). These effects are calculated by multiplying the estimated coefficient of regression by the standard deviation of the corresponding independent variable over all country-month observations. Nonshaded bars are statistically insignificant at the 5 percent level. CEMBI = Corporate Emerging Markets Bond Index.

rollover problems may hit some firms especially hard. Therefore, it is important to closely monitor sectors and systemically important firms most exposed to risks and the sectors and large firms closely connected to them, including across the financial system, and to pre- pare for contingencies. Emerging markets should also be prepared for the eventuality of corporate failures; where needed, insolvency regimes should be reformed to enable rapid resolution of both failed and salvage- able firms. This section further discusses (1) measures that could be taken relatively quickly and that would help contain the further buildup of vulnerabilities or their impact, although they would not eliminate these vulnerabilities in the short term; (2) medium-term recommendations; and (3) actions to be taken in the event of large capital outflows.

Measures that could be taken now

Macroprudential measures could be used to limit risks from a further buildup of foreign exchange exposures and leverage in emerging markets with latent vulner- abilities. Potential instruments include higher bank capital requirements for corporate exposures, as well as risk weights and caps on the share of foreign currency exposures on banks' balance sheets. Active provisioning and increasing equity capital can also bolster financial system resilience. Where relevant, loan-to-value and debt-service-coverage ratios can be introduced to address risks related to commercial real estate.[31] However, risks associated with market-based funding may prove difficult to manage. This may require an even greater emphasis on macroprudential measures to enhance the resilience of banks and other important nonbank classes of intermediaries (IMF 2014d). For example, securities regulators should adopt a macroprudential orientation in their supervision of asset managers and the funds they manage that have significant corporate bond exposures (see Chapter 3 of the April 2015 GFSR).

Microprudential and other tools can play a comple- mentary role. Regulators can conduct bank stress tests related to foreign currency risks, including derivatives positions. Hedging foreign exchange exposures could also be more actively encouraged. Nevertheless, the hedges used by some corporations to limit their expo- sure risks may be compromised when most needed, so they should be assessed conservatively by regulators.[32]

Financial turbulence in emerging markets could also have important implications for advanced economies. Some evidence indicates that if shocks from advanced economies generate financial volatility in emerging markets, significant "spillbacks" of that volatility to the advanced economies could ensue in periods of financial stress.[33] Such risks are particularly relevant for banks, mutual funds, and other investors in advanced economies that have increased their emerging market

[31]However, it should be recognized that corporate borrowers can substitute borrowing from unregulated financial institutions or in capital markets for domestic bank credit, especially in emerging markets in which capital markets are well developed and globally integrated.
[32]As noted in Chui, Fender, and Sushko (2014), although derivatives with "knock-in, knock-out" features can insure against modest foreign exchange movements, they leave the firm exposed to large losses if the domestic currency were to depreciate sharply.
[33]Spillbacks are often underestimated because they tend to flow through channels that are inadequately tracked owing to their complexity—for instance, in the financial sector. See *2014 Spillover Report* (IMF 2014a).

Box 3.2. Corporate Foreign Exchange Rate Exposures

Foreign exchange exposures are indirectly measured using stock returns. Following a seminal paper by Adler and Dumas (1984), the foreign exchange exposure of firm i is estimated as the value of β_i in the following augmented capital asset pricing model (CAPM):

$$R_{it} = \alpha_i + \gamma_i R_t^M + \beta_i R_t^{FX} + \varepsilon_{it}$$

in which R_{it} is firm i's stock return, R_t^M is the market return, and R_t^{FX} is the percentage change

in the trade-weighted nominal exchange rate (an increase indicates an appreciation). A positive foreign exchange exposure means that the firm's return falls when its local currency depreciates. The value of β_i can be interpreted as firm i's foreign exchange exposure net of financial and operational ("natural") hedging, after accounting for market conditions (Bartram and Bodnar 2005). The foreign exchange exposures are estimated for about 5,000 listed nonfinancial firms in 31 emerging market economies over 2001–14.

This box was prepared by Machiko Narita.

Box 3.3. Corporate Leverage in China

Corporate leverage is high in China. China has relied on investment to drive growth in recent years. The rapid increase in investment has been financed by credit, leading to a sharp increase in corporate debt. Total social financing, a measure of overall credit to the economy in China, has risen dramatically (32 percentage points of GDP) since the global financial crisis.[1] The credit-to-GDP ratio remains high and exceeds the level implied by economic factors and cross-country comparisons.[2]

External corporate debt has also risen, albeit from a low level relative to GDP, international reserves, and domestic credit. Onshore banks have served as intermediaries for corporate borrowing overseas through the provision of bank guarantees and letters of credit. Chinese firms have also taken advantage of low global interest rates through offshore bond issuance, which has increased substantially since 2010. Half of the debt issued abroad has been for operations in China. Since 2009, real estate developers have been the largest issuers of offshore bonds among nonfinancial firms.

The increase in corporate leverage is largely concentrated at the tail end of the distribution of firms' liabilities, as well as in state-owned enterprises (SOEs) and the real

This box was prepared by Raphael Lam.
[1]The Bank for International Settlements "credit gap" measure, defined as the gap between the credit-to-GDP ratio relative to its trend, is used to assess whether credit is greater than the levels implied by fundamentals (see Arslanalp and others, forthcoming).
[2]Offshore issuance is generally conducted by an offshore entity, and, as a result, the borrowing is not captured by official external debt statistics.

Figure 3.3.1. China: Leverage Ratios
(Percent)
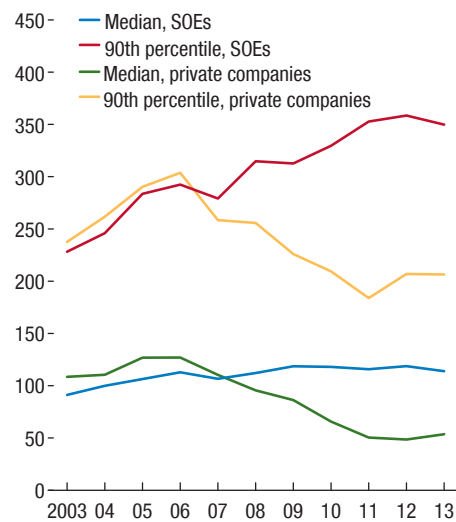
Sources: Wind Info Inc. database; and IMF staff estimates.
Note: SOE = state-owned enterprise.

estate sector (Chivakul and Lam 2015). Total liabilities of listed firms have risen dramatically and become more concentrated. Although the median leverage ratio—measured by the ratio of total liabilities to total equity—has largely stayed flat since 2006, leverage has significantly increased at the tail end (the 90th percentile) of the distribution of firms (see Figure 3.3.1). In addition, highly leveraged firms account for a growing share of total debt and liabilities in the corporate sector.

Box 3.3. *(continued)*

Across industries, most of the buildup in leverage was in the real estate and construction sector and, to a lesser extent, in mining and utilities. Across ownership types, SOEs—mainly local ones—account for a large share of increased borrowing. For instance, in the real estate and construction sector, only about 60 firms with high leverage ratios account for more than two-thirds of the sector's liabilities, a rise of nearly three times over the decade. This elevated concentration of debt in the most leveraged tail of the leverage distribution raises corporate vulnerabilities to shocks.

The high level of credit could weigh on China's growth and financial stability. The efficiency of the investment financed by credit has been falling, with a commensurate drop in corporate sector profitability. This situation makes servicing debt obligations more difficult. In particular, the interest coverage ratio has fallen in SOEs, which have contributed to the bulk of the rise in credit. At the same time, deleveraging by firms could weigh on growth, while mounting corporate defaults would have adverse effects on bank balance sheets and credit availability, and thereby further weaken growth.

The Chinese corporate sector is vulnerable to a slowdown in the real estate and construction sector. Sensitivity analysis finds that although on average

firms can withstand a moderate 1 percent interest rate increase, SOEs appear to be relatively exposed to an interest rate shock because of their low interest coverage and relatively higher leverage. Taking into account the value-added linkages of each sector to real estate and construction, a severe slowdown in the real estate sector (a 20 percent profit decline) would have a significant impact on the corporate sector, including a drop in the median interest coverage ratio to only 2½ times profits, with nearly 20 percent of firms in the real estate sector (accounting for 11 percent of total corporate debt) in financial distress.

In the future, some debt write-offs would help improve credit flow and investment efficiency and reduce risks in China. Write-offs—combined with the restructuring of viable companies and steps to facilitate greater tolerance of defaults, exit, and bankruptcy of nonviable firms—could reduce the burden on banks and allow them to reallocate credit to more efficient sectors. Banks can embark on rigorous quality assessments of their loan portfolios, setting the stage for addressing nonperforming loans and the potential need for bank recapitalization. Continuing reforms to promote capital market development would help provide an alternative financing channel for healthy firms.

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exposures, warranting preparation for possible illiquidity in certain asset markets.

Medium-term measures

In the medium term, preventive policies could help avert the buildup of excessive risks. For example, consideration should be given to changes in the tax code that remove fiscal incentives in favor of debt or that encourage foreign currency debt.[34] Measures to reduce liquidity risks could be gradually phased in for domestic open-end mutual funds holding debt and offering daily redemptions (see Chapter 2 of this report and Chapter 3 of the April 2015 GFSR). In addition, governments can promote specific forms of financial deepening, such as development of a local investor base (both banks and nonbanks) to help dampen

global financial shocks. The move toward more flexible exchange rates may enable emerging markets to adjust more readily to shocks, could facilitate an independent monetary response to financial imbalances, and may discourage banks and corporations from building up large foreign exchange exposures in the first place.

Significant data gaps need to be addressed to enhance the effectiveness of surveillance. Data gaps prevent a full assessment of the financial stability risks posed by corporate balance sheets from being made. For instance, firm-level data on foreign currency exposures and the degree to which they are hedged are generally unavailable. Offshore bond issuance introduces another complication because the true external exposure of firms with cross-border activities may not be fully captured by using only residence-based statistics. Renewed global efforts by authorities to collect and provide better information on foreign currency corporate indebtedness and offsetting factors (such as hedges) are desirable (see IMF 2015b). Investing in

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[34]Other policies that may encourage rapid leverage growth, such as implicit or explicit government guarantees, should also be reconsidered.

Box 3.4. Firm Capital Structure, the Business Cycle, and Monetary Policy

*This box summarizes the theoretical and empirical litera-
ture on capital structure.*

The capital structure of a firm is defined as the mixture
of debt and equity the firm uses to finance its opera-
tions. The term is often used in conjunction with vari-
ous measures of borrowing such as the debt-to-equity
ratio (one measure of the leverage ratio). In a seminal
paper, Modigliani and Miller (1958) put forth the capi-
tal structure irrelevance proposition: the market value of
the firm is independent of its capital structure.

Departures from the Modigliani-Miller proposition

Subsequent research has shown that the Modigliani-
Miller proposition fails under a variety of circumstanc-
es.[1] This finding has led to three broad alternative
theories of firms' decisions on their capital structure:
The first is the trade-off theory in which firms issue debt
until the benefits (tax incentives) and costs (bankruptcy)
of debt are balanced. The second is the pecking order
theory (Myers and Majluf 1984), which governs the
order of financing sources and not the amount of debt
a firm issues—firms prefer to finance themselves first by
using internal funds, then by issuing debt, and last by
issuing equity. The third is the market timing theory,
in which managers are more likely to tap markets with
the most favorable conditions (for example, during asset
price rallies).

The role of business cycles

Another strand of the literature examines the aggregate
determinants of corporate capital structure. Empirical
papers provide differing evidence regarding the cyclical-
ity of leverage.[2] For example, in Covas and Den Haan

(2011), firm-level leverage is procyclical. Fernández and
Gulan (2015) find that leverage is countercyclical for
emerging markets. With regard to theory, Hackbarth,
Miao, and Morellec (2006) argue that leverage is coun-
tercyclical; Kiyotaki and Moore (1997) argue that it is
procyclical, and Bhamra, Kuehu, and Strebulaev (2010)
argue that these opposing views are reconcilable.

The role of monetary conditions

Monetary policy can be transmitted to the nonfinancial
corporate sector through several channels, and thereby
influence firms' capital structure. The traditional interest
rate channel stimulates aggregate demand by lowering
interest rates and thereby encouraging firms to borrow.
Barry and others (2008) find that firm leverage increases
when interest rates are low. Based on a survey of chief
financial officers, Graham and Harvey (2001) report
that the level of interest rates is one of the most impor-
tant factors influencing the decision to issue debt.

In addition to the interest rate channel, many
papers have investigated the credit channel (Bernanke
2007). The credit channel focuses on the change in
the availability of credit and has two dimensions: (1)
the balance sheet channel, which focuses on bank loan
demand; and (2) the bank lending channel, which is
more about the supply of bank loans (Kashyap, Stein,
and Wilcox 1993). Bernanke, Gertler, and Gilchrist
(1996) develop a model of the balance sheet chan-
nel, in which lower monetary policy rates raise equity
prices and a firm's net worth, and thereby lower the
cost of external (debt) financing. This generates a vir-
tuous cycle (or financial accelerator) as firms use debt
to finance investment, which boosts aggregate demand
and raises equity prices again, allowing for even greater
debt-financed investment.

This box was prepared by Ayumu Ken Kikkawa.

[1]Such as taxes, transaction and bankruptcy costs, agency con-
flicts, adverse selection, and time-varying market opportunities,
among others (Frank and Goyal 2003; de Mooij 2012).

[2]Many papers have looked at how other aspects of business
cycles affect capital structures. Beaudry, Caglayan, and Schian-

tarelli (2001) and Baum and others (2006) find that at times of
high macroeconomic volatility, firms' investment and financing
decisions become more alike as uncertainty constrains managers'
ability to make decisions based on firm-specific information.

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reporting systems to help more effectively monitor the
corporate sector—including foreign currency expo-
sures—is therefore warranted.

Measures to address disruptive outflows

In the event of rapid capital outflows, macroeco-
nomic and financial sector policies can be deployed.
Worsening global financial conditions can induce

investors to reassess emerging market risks; therefore,
the likelihood of sudden outflows is considerably
higher in the presence of latent corporate sector
vulnerabilities. In fact, mounting emerging market
leverage has typically been associated with a subse-
quent reversal of capital flows (for instance, Men-
doza and Terrones 2008; Elekdag and Wu 2011). In
such a scenario, nontradable sectors are likely to be

Box 3.5. The Shift from Bank to Bond Financing of Emerging Market Corporate Debt

The role of bond market finance has grown notably as a share of corporate debt in emerging market economies since the global financial crisis. Although the development of equity markets picked up pace in the 1990s, private bond market development was initially limited to a subset of industries in a few emerging market economies. The recent boom allowed a wider set of borrowers to diversify their funding sources while also contributing to growing leverage and foreign exchange exposure. Ayala, Nedeljkovic, and Saborowski (2015) propose a measure of corporate debt at the country level that can be decomposed into local and foreign currency and into bank loans and bonds, and document that the share of bonds in total debt has, on average, grown since the crisis.
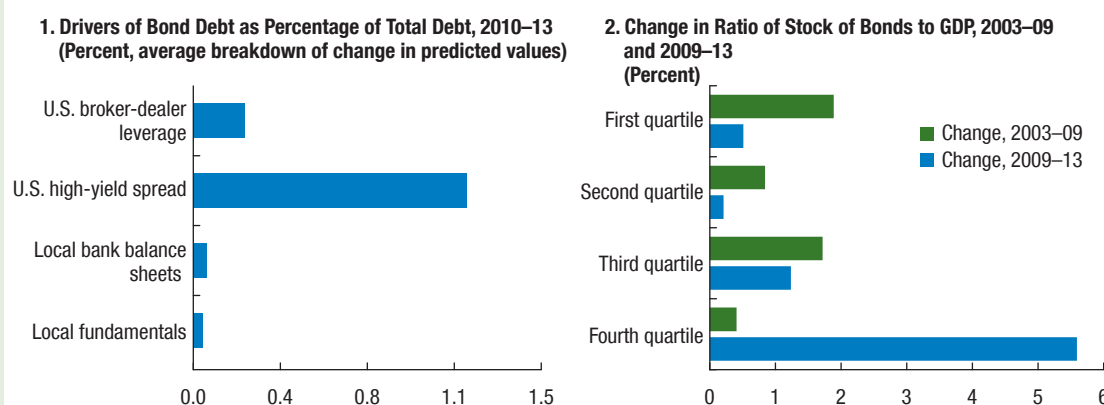
It is important to understand whether the factors that drove the boom in bond finance relative to bank loans were structural or cyclical. Ayala, Nedeljkovic, and Saborowski (2015) examine whether emerging markets that experienced the largest booms relative to bank lending were those with strong fundamentals or whether cyclical factors drove flows into the largest and most liquid markets.

This box was prepared by Christian Saborowski.

The empirical findings confirm that domestic factors do not explain much of the variation in growing bond shares during the postcrisis period. Macroeconomic and institutional variables are shown to be important determinants of bond market development throughout the sample period, but their relative role declined substantially during the postcrisis period as global factors took center stage. The search for yield in global financial markets (proxied by the U.S. high-yield spread) explains the bulk of the boom in bond finance relative to bank loans (Figure 3.5.1, panel 1).

The search for yield accounts for most of the increase in bond shares, with differences across emerging markets explained by market size rather than domestic factors. Dividing emerging markets according to the degree of bond market access in 2009 shows that the largest bond markets (fourth quartile) grew the most since the crisis (Figure 3.5.1, panel 2). Quartile regressions confirm that the impact of the U.S. high-yield spread on bond market shares was substantially larger for emerging markets with initially larger bond markets. This finding suggests that the bond market boom was mostly driven by favorable liquidity conditions, with investor interest in specific emerging markets dependent on market size and the associated ease of entry and exit.

Figure 3.5.1. Changes in the Stock of Bonds by Initial Quartile

1. Drivers of Bond Debt as Percentage of Total Debt, 2010–13
(Percent, average breakdown of change in predicted values)

2. Change in Ratio of Stock of Bonds to GDP, 2003–09 and 2009–13
(Percent)

Source: Ayala, Nedeljkovic, and Saborowski 2015.
Note: Quartiles in panel 2 defined by stock in 2009.

Box 3.6. Taper Tantrum: Did Firm-Level Factors Matter?

This box investigates the impact of the "taper tantrum" on corporate spreads across emerging market economies. On May 22, 2013, during testimony to Congress, the chairman of the U.S. Federal Reserve raised the possibility of tapering its purchases of Treasury and agency bonds. Following this "tapering talk," there were sharp corrections in emerging market economies' asset prices and a reversal of capital flows (Sahay and others 2015).

An event study is used to investigate how emerging market corporate spreads reacted to the tapering shock. Firm-level factors (leverage, size, profitability, and growth prospects) are used to explain the change in corporate credit default swap (CDS) spreads three, six, and eight days after May 21. The analysis covers 309 firms from 21 emerging markets.

Borrowing costs increased disproportionately for more leveraged and smaller firms following the tapering shock. Moreover, these effects tended to become stronger over time as investors digested fundamentals and differentiated across emerging market firms accordingly (Figure 3.6.1). For example, after eight days, a one standard deviation increase in the leverage ratio (corresponding to 16 percentage points) is associated with a 7 basis point increase (corresponding to an annualized rate of 3.3 percent) in the CDS spread. These effects are substantial, given that the firms experienced an increase in spreads of 18 basis points on average. In other words, a one standard deviation increase in the leverage ratio of a firm pushes up its borrowing cost by 40 percent relative to its average peer. In sum, the results suggest that when

This box was prepared by Ayumu Ken Kikkawa.

Figure 3.6.1. Effects of the Shock on Credit Default Swap Spreads
(Basis points; for one standard deviation increase)
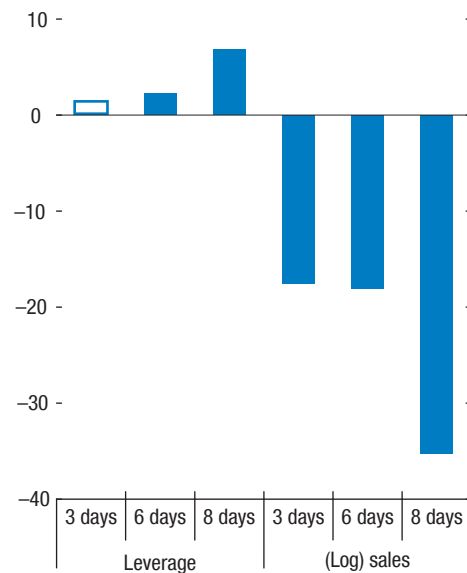
Sources: Bloomberg, L.P.; and IMF staff estimates.
Note: The shaded bars denote statistical significance at least at the 10 percent level. The explanatory variables are leverage ratio (total debt to total assets), log sales, income-to-sales ratio, and Tobin's Q. Country and sector fixed effects are included.

search-for-yield effects reverse, firms with weaker fundamentals may disproportionately suffer from greater exposure to credit risk.

hit disproportionately. To dampen adverse macroeconomic consequences, the policy response could include, if warranted, exchange rate depreciation and the use of monetary policy and reserves. The public provision of emergency foreign exchange hedging facilities could also be considered. The combination of policies would be based on macroeconomic conditions, taking into consideration financial stability risks such as foreign exchange exposures. Fiscal policy may need to be adjusted depending on macroeconomic circumstances and available policy space. If the financial system comes under stress, liquidity provision may be required.

Conclusion

This chapter considers the evolving influence of firm-level, country-level, and global factors in driving leverage patterns, bond issuance, and corporate spreads. Three key results emerge from the investigation:

- The relative contributions of firm- and country-specific characteristics in explaining leverage growth, issuance, and spreads seem to have diminished in recent years. In contrast, global financial factors appear to have become relatively more important determinants in the postcrisis period.
- Leverage has risen more in sectors that are more vulnerable to cyclical and financial conditions, and it

has grown most in construction. Higher leverage has also been associated with, on average, rising foreign currency exposures.

- Despite weaker balance sheets, emerging market firms have managed to issue at better terms (lower yields, longer maturities); on the positive side, many issuers have taken advantage of favorable financial conditions to refinance their debt.

The expanded role of global financial factors during a period when they have been extraordinarily accommodative means that emerging markets must prepare for the adverse domestic stability implications of global financial tightening:

- Monitoring vulnerable and systemically important firms as well as banks and other parts of the economy closely linked to them is crucial.
- Such expanded monitoring requires that collection of data on corporate sector finances, including foreign currency exposures, be improved.
- Macroprudential policies can be deployed to limit excessive increases in corporate sector leverage. Possible tools include higher bank capital requirements (for instance, implemented via risk weights) for corporate foreign currency exposures and caps on the share of such exposures on banks' balance sheets. Managing risks associated with market-based funding may be challenging, however, potentially requiring an even greater emphasis on macroprudential measures to enhance the resilience of the financial system.
- Microprudential measures should also be considered. Regulators can conduct bank stress tests related to foreign currency risks.
- Finally, as advanced economies normalize monetary policy, emerging markets should prepare for an increase in corporate failures and, where needed, should reform corporate insolvency regimes.

Annex 3.1. Emerging Market Corporate Leverage: Data and Empirics

This annex discusses the data and the empirical methodology used to analyze the main determinants of emerging market corporate leverage. Data sources and definitions are summarized in Table 3.1.1.[35]

The author of this annex is Adrian Alter.

[35]Emerging market economies included in the analysis comprise Argentina, Bahrain, Brazil, Bulgaria, Chile, China, Colombia, Croatia, Egypt, Hungary, India, Indonesia, Jordan, Kazakhstan, Korea, Kuwait, Lebanon, Lithuania, Malaysia, Mauritius, Mexico, Morocco, Nigeria,

Measures of leverage

Leverage, or financial leverage, is the degree to which a company uses debt. Leverage is usually presented as a ratio, such as debt to capital. The broadest definitions of leverage consider total nonequity liabilities. An advantage of using total liabilities is that it implicitly recognizes that some firms can use trade credit as a means of financing, rather than purely for transactions (Rajan and Zingales 1995). Another benefit of using total liabilities is its availability. In contrast, debt may not be reported in larger data sets that include nonlisted firms.

Data

Although firm-level databases contain an abundance of information, they do have limitations, particularly in the context of emerging market corporate leverage. For example, data can vary greatly over the time period covered. Accounting standards and reporting requirements vary widely across countries, so it is important to use databases with harmonized definitions. Worldscope (Thomson Reuters) and Orbis (Bureau van Dijk) are two examples of such cross-country harmonized databases that provide annual firm-level balance sheet and income statement information. Worldscope contains publicly listed firms; the main advantage of the Orbis database is its wide coverage of both listed and nonlisted firms—including SMEs—which enrich the cross-sectional information in the data set. To avoid double counting, unconsolidated accounts are considered.[36] Firm-level data are merged with country-specific indicators of macroeconomic conditions and global factors. The firm-country-global data set used comprises more than 1 million active nonfinancial firms (with assets of more than $1 million) and 4.3 million firm-year observations for 24 emerging market economies during 2004–13.

Methodology

Panel regressions link firm-level leverage growth with key firm- and country-specific as well as global determinants. For firm i, in sector s, country c, at time t,

Oman, Pakistan, Peru, Philippines, Poland, Qatar, Romania, Russia, Saudi Arabia, Serbia, South Africa, Sri Lanka, Thailand, Turkey, Ukraine, United Arab Emirates, and Venezuela.

[36]Orbis has the advantage of being more comprehensive, with millions of firms represented in the database, but more granular balance sheet data can be incomplete. For example, debt is not reported for many emerging market firms in Orbis. More detailed information on financial statements is even harder to come by.

Annex Table 3.1.1. Definition of Variables

Variable	Description	Source
Firm-Level Variables		
Leverage Metrics		
Ratio of Liabilities to Book Equity	Total liabilities divided by book equity	Orbis, Worldscope
Ratio of Liabilities to Book Assets	Total liabilities divided by book assets	Bloomberg, L.P., Orbis, Worldscope
Ratio of Liabilities to Market Equity	Total liabilities divided by market capitalization	Worldscope
Ratio of Liabilities to Market Assets	Total liabilities divided by the sum of total liabilities and market capitalization	Worldscope
Ratio of Debt to Book Assets	Total debt divided by book assets	Orbis, Worldscope
Ratio of Debt to Market Assets	Total debt divided by the sum of total liabilities and market capitalization	Worldscope
Ratio of Debt to EBIT	Total debt divided by earnings before interest and taxes	Orbis, Worldscope
Ratio of Debt to EBITDA	Total debt divided by earnings before interest, taxes, depreciation, and amortization	Orbis, Worldscope
Fundamental Variables		
Sales	Total sales (Worldscope code WC01001)	Orbis, Worldscope
Tobin's Q	Sum of market value of equity and book value of debt divided by book value of assets	Worldscope
Return on Assets	Net income divided by total assets	Bloomberg, L.P., Orbis, Worldscope
Return on Equity	Net income divided by shareholders' equity	Orbis, Worldscope
Interest Coverage Ratio	Earnings before EBITDA or earnings before EBIT divided by interest expense	Orbis, Worldscope
Tangibility	Tangible fixed assets (or net PPE in Worldscope) divided by total assets	Orbis, Worldscope
Tradable and Nontradable Sectors	Tradable sectors: agriculture, mining, and manufacturing; nontradable sectors: construction, transportation, communications, utilities, wholesale/retail trade, services	
Seasoned Issuer Dummy	Dummy equal to 1 if firm has issued a bond before a given year	Bloomberg, L.P., Dealogic
Firm Size Definitions		
Size	Total assets in logs	Bloomberg, L.P., Orbis, Worldscope
Very Large[1]	Operating revenue ≥ $130 million; total assets ≥ $260 million; employees ≥ 1,000	
Large[1]	Operating revenue ≥ $13 million; total assets ≥ $26 million; employees ≥ 150	
Medium[1]	Operating revenue ≥ $1.3 million; total assets ≥ $2.6 million; employees ≥ 15	
Small	Not included in any of the categories listed above	
Bond-Level Variables		
Local Currency	Dummy equal to 1 if bond is denominated in country of risk's local currency	Bloomberg, L.P., Dealogic
External	Dummy equal to 1 if market type is not domestic	Dealogic
Investment Grade	Dummy equal to 1 if rating is equal to or higher than BBB	Bloomberg, L.P.
Call/Put/Sink	Dummy equal to 1 if maturity type includes call/put/sink option	Bloomberg, L.P.
Country-Level Variables		
ICRG Economic and Financial Risk Rating	The average of ICRG Economic and Financial Risk Ratings, following Bekeart and others (2014)	PRS Group
Corporate Spread	J.P. Morgan CEMBI Broad	Bloomberg, L.P.
Ratio of Government Debt to GDP	General government debt-to-GDP ratio	WEO
Exchange Rate	EM currency per U.S. dollar	WEO
Financial Openness Index	The Chinn-Ito index (KAOPEN) is an index measuring a country's degree of capital account openness.	http://web.pdx.edu/~ito/Chinn-Ito_website.htm
Financial Development Index	Index that summarizes information regarding financial institutions (banks and non-banks), and financial markets across three dimensions: depth, access, and efficiency	Sahay and others (2015)
Financial Integration	Total portfolio investment liabilities from an emerging market economy toward a subset of advanced economies (euro area, Japan, United Kingdom, and United States) scaled by nominal GDP	CPIS
Exchange Rate Regime	De facto exchange rate regime classification, in which a higher value indicates greater exchange rate flexibility	Ilzetzki, Reinhart, and Rogoff (2008)
Global-Level Variables		
VIX	Chicago Board Options Exchange Market Volatility Index	Datastream
U.S. BBB Spread	Bank of America Merrill Lynch U.S. Corporate BBB Option-Adjusted Spread©	FRED®
U.S. Shadow Rate	Estimated from a term-structure model (see Krippner 2014)	RBNZ
U.S. Real Shadow Rate	The U.S. shadow rate minus the approximately one-year-ahead U.S. inflation forecast (Blue Chip Economic Indicators)	RBNZ, Haver Analytics
U.S. GDP Growth	Annual average growth rate	WEO
Global Shadow Rate	Principal component of the shadow rates of the euro area, Japan, and United States	RBNZ and authors' calculations
Commodity Price Index	Commodity price index	WEO
Global Real GDP Growth	Global real GDP growth	WEO

Source: IMF staff.

Note: CEMBI = Corporate Emerging Markets Bond Index; CPIS = Coordinated Portfolio Investment Survey; EBIT = earnings before interest and taxes; EBITDA = earnings before interest, taxes, depreciation, and amortization; EM = emerging market economy; EMBI = Emerging Markets Bond Index; FRED = Federal Reserve Economic Data; ICRG = International Country Risk Guide; PPE = property, plant, and equipment; RBNZ = Reserve Bank of New Zealand; WEO = *World Economic Outlook.*

[1]At least one of the criteria is met.

a general specification of the regression model can be written as follows:

$$\Delta Leverage_{isc,t} = \beta_1 FIRM_{isc,t-1} + \beta_2 MACRO_{c,t}$$
$$+ \beta_3 GLOBAL_t$$
$$+ \theta \ INTERACTION_{isc,t}$$
$$+ OTHER,$$

in which the dependent variable, $\Delta Leverage$, is the change in the ratio of total liabilities to book equity. The term *FIRM* includes measures of size (sales), profitability (return on assets), and asset tangibility (to reflect collateral availability and asset quality). *MACRO* refers to, among others, the ICRG Economic and Financial Risk Rating, which captures country-level macroeconomic factors.[37] The *GLOBAL* factors include the oil price index, the U.S. shadow rate, a proxy for monetary policy conditions in advanced economies, the change in the VIX (a proxy for investors' sentiment and global risk aversion), and global GDP growth. Various interactions between the shadow rate and firm-, sector-, or country-specific characteristics are captured with the term *INTERACTION*. The panel regressions include firm fixed effects (*OTHER*), and standard errors are clustered at the country level.

Main Results

Estimation results suggest a statistically significant relationship between the inverse of the U.S. shadow rate and emerging market corporate leverage growth: a 1 percent decrease in the shadow rate is associated with about 2 percentage point faster leverage growth.

The results remain broadly consistent when other leverage ratios (such as net total liabilities to book equity, total liabilities to total assets, or total debt to total assets) are considered. Subsample analysis is also conducted, and the impact of the shadow rate on leverage is larger (and still statistically significant) during 2010–13. For another robustness check, the models are estimated with standard errors clustered at the country and sector levels, and the results remain broadly unaltered.

[37]Other macro controls include the financial development index (Sahay and others 2015), which captures the financial sector's depth, access, and efficiency; the financial openness index (Chinn and Ito 2006), which measures the degree of capital account openness; and financial integration, which is proxied by total portfolio liabilities to advanced economies, net capital flows, and the exchange rate regime.

Annex 3.2. Bond Issuance Analysis

This annex describes the data and the firm-level regression models used to examine the determinants of the probability of emerging market corporate bond issuance and bond maturity at issuance.

Data

Data on emerging market nonfinancial corporate bond issuance were obtained from Dealogic and Bloomberg, L.P. (see Table 3.1.1). In Dealogic, nonfinancial firms are identified if their general industry classification flag differs from government or finance. In Bloomberg, L.P., nonfinancial firms are identified as corporations excluding financials. Coverage differs across the two data sources, but country aggregates and general trends are similar. Issuers' nationality was determined based on country of risk, which depends on (in order of importance) management location, country of primary listing, country of revenue, and reporting currency of the issuer.

Each data set was used according to its comparative strength. For instance, Dealogic data were used to span a broader set of countries (40 emerging markets) and a longer period (starting in 1980), and to compare different notions of firm nationality (country of incorporation, country of risk, and parent nationality of operation). Bloomberg, L.P., allowed firm's balance sheet information for the year before issuance to be obtained, but, because of data downloading limitations, such information was obtained for only 20 major emerging markets, starting in 1990.

For the analysis of the probability of bond issuance, balance sheet data on issuers and nonissuers are required. For this purpose, two matching exercises were conducted. First, with the help of Bureau van Dijk representatives, issuers in the Dealogic database were matched to the corresponding firm-level balance sheet data in the Orbis database using information on the issuer company name, industry sector, and country of incorporation. The final sample was restricted to listed firms. Second, issuers in the Bloomberg, L.P., database were matched to Thomson Reuters Worldscope. The two merged data sets are complementary given that their coverage differs substantially.

Probability of bond issuance

The probability of issuance at the firm level is modeled as a function of firm and macroeconomic characteristics,

The author of this annex is Nicolas Arregui.

global factors, and bank lending conditions. A probit model is estimated with standard errors clustered at the country level, with country and sector dummies, as well as a time trend. The baseline model is estimated using the Bloomberg, L.P.–Thomson Reuters Worldscope matched database described above. The full sample begins in 1995. The postcrisis estimation starts in 2010, but the findings are robust to starting in 2009. For an additional robustness check, the exercise is repeated using the Dealogic-Orbis matched database, also described above. The model takes the following form:

$$\text{Prob}(\textit{Issuance}_{it} = 1) = F(\alpha + \beta_1 \, \textit{firm}_{it-1} \\ + \beta_2 \textit{macro}_{it-1} + \beta_3 \textit{bank}_{it-1} \\ + \beta_4 \, \textit{global}_{it} + \varepsilon_{it}),$$

in which *Issuance*, a dummy variable, is 1 if firm *i* issued at least once in a given year *t*.

A wide range of macroeconomic (*macro*) and bank lending (*bank*) variables are considered, including rule of law index; exchange rate regime; real GDP growth; per capita GDP; ICRG political, financial, and economic indexes; inflation; inflation volatility; current account and fiscal balances; external, public, and corporate debt; exchange rate changes; and domestic and cross-border bank claims to the private sector. However, these variables are generally not statistically significant.

Firm (*firm*) characteristics are generally robust across time and databases considered.

Global (*global*) factors included are the inverse shadow rate and the VIX. A higher VIX reading is related to a lower probability of issuance over the entire sample.

Bond Maturity at Issuance

The analysis of bond maturity at issuance excludes Chinese firms, and includes bonds issued both domestically and externally. Issuances are related to bond- and firm-level, macroeconomic, bank lending, and global variables. The model is estimated using ordinary least squares with standard errors clustered at the country level, and it includes country and sector dummies, as well as a time trend. The model takes the following form:

$$\textit{Maturity}_i = \alpha + \beta_0 \textit{bond}_i + \beta_1 \textit{firm}_i + \beta_2 \textit{macro}_i \\ + \beta_3 \textit{bank}_i + \beta_4 \textit{global}_i + \varepsilon_i,$$

in which *Maturity* is each bond's maturity at issuance measured in years. Bond characteristics (*bond*)

include dummies for local currency denomination; investment grade; and put, call, and sink options. Firm-level variables (*firm*) include size, profitability, leverage, and a dummy for firms that have issued in the past. All bond and firm characteristics (except for profitability) are significant with the expected sign. As above, a wide range of macroeconomic and bank-level variables are considered but are generally not statistically significant.

Global controls include the inverse shadow rate and the VIX. Bonds tend to be issued with shorter maturity in times of financial uncertainty (measured by the VIX). The inverse shadow rate is not significant over the entire sample, but becomes strongly statistically significant in the postcrisis period (defined as starting either in 2009 or 2010). The addition of interaction terms shows that the effect of the inverse shadow rate on maturity was stronger for bonds issued in foreign currency and for non-investment-grade bonds.

Annex 3.3. Regression Analysis of Determinants of Emerging Market Corporate Spreads

This annex describes the data and the country-level regression model used to examine determinants of emerging market corporate spreads.

The regression model takes the following form:

$$\textit{spread}_{it} = \alpha_i + \beta_1 \, \textit{global}_t + \beta_2 \, \textit{domestic}_{it} \\ + \beta_3 \, \textit{post}_t + \beta_4 \, \textit{post}_t \times \textit{global}_t \\ + \beta_5 \, \textit{post}_t \times \textit{domestic}_{it} + \varepsilon_{it},$$

in which *spread* denotes the corporate spread of emerging market country *i* in month *t*. This analysis uses secondary market spread data, which are not susceptible to endogeneity of issuance decisions. The term *global* is a vector of a U.S. corporate spread and real shadow rate. The term *domestic* is a vector of a macroeconomic fundamentals index (the ICRG risk rating), and a leverage indicator (debt-to-book assets, the median of firms within each country). These variables are demeaned. The term *post* is a postcrisis dummy that takes the value of one from January 2010 onward. End-of-month market variables are used for 20 emerging markets; the previous year's leverage is used.

The results are generally robust to using a global real shadow rate or the U.S. one-year real Treasury rate instead of the U.S. real shadow rate.

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