CHAPTER 16

China's Offshore Corporate Dollar Bonds

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In recent years, emerging market economies have substantially increased their corporate bond issuance in the global capital markets. Their total overseas non-government securities outstanding (by nationality of issuer) grew from less than US$1 trillion in 2010 to close to US$2.5 trillion by the end of 2016, according to data from the Bank for International Settlements. The majority of offshore emerging market corporate bonds have been denominated in the US dollar regardless of the location of borrowers and lenders, and bonds issued by non-financial corporations have accounted for the bulk of total US dollar bonds for most of these issuers (McCauley, McGuire, and Sushko 2015).

The literature suggests that the primary driver of the rapid increase in emerging market offshore corporate bonds is related to corporate financial decisions that suggest carry trades (Bruno and Shin 2017; HUANG, Panizza, and Portes 2018). By issuing dollar debt and using the proceeds to acquire domestic financial assets, companies can benefit from an appreciation of the domestic currency against the US dollar. The increase in carry-trade activity was also in response to the surge in demand for high-yield fixed income assets by advanced economy investors after the global financial crisis, when yields in advanced economies were compressed as a result of unconventional monetary policies.

China is among the major contributors to this growing offshore corporate bond market. By 2016, Chinese nonfinancial corporations had issued about US$500 billion in offshore markets—about 20 percent of total emerging market economies' corporate bonds—from nearly zero in the mid-2000s. At the outset, this development reflected the liberalization of China's capital account in the past decade, including the easing of restrictions on corporations to tap into offshore financial markets (TANG and ZHU 2016). More specifically, the National Development and Reform Commission, the regulator for China's onshore enterprise bond market (see Chapter 1), implemented a policy in September 2015 to replace the previous case-by-case approval system for corporate offshore bond

issuance with a predeal filing system.[1] In 2016, the People's Bank of China also introduced a macroprudential assessment framework for cross-border financing to replace the previous ad hoc system of case-by-case approval and quota allocations. This new framework is designed to manage risks associated with capital flows by influencing the overall volume and composition of capital flows in a countercyclical manner through the use of prudential parameters, including one on excess leverage (IMF 2018b). It can be used to target single, multiple, or all financial or nonfinancial institutions in terms of overseas financing. "In 2017, the Ministry of Finance issued the first sovereign dollar bonds in over a decade, partly to serve as a benchmark for the nation's surging dollar corporate bonds."

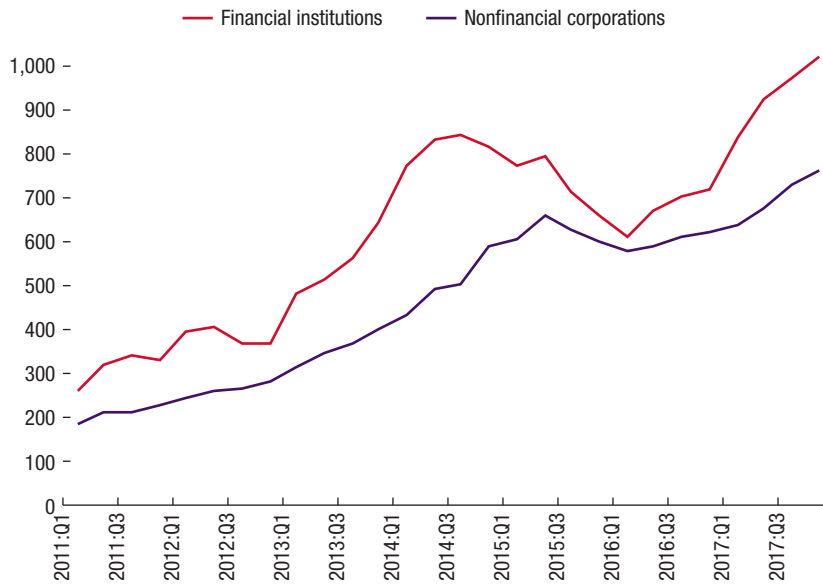
Given that capital account liberalization represents a regime change that relaxed restrictions on Chinese firms' access to overseas financing, the question that arises is whether the surge in China's offshore corporate bond issuance is associated with carry trades, similar to developments in other emerging market economies, or whether it is driven by policy changes that resulted in more liberalized capital accounts. In the latter case, it could make the traditional functions of offshore debt markets—namely, trade financing and precautionary borrowing for future financing needs—more accessible to Chinese nonfinancial corporations.

Understanding the drivers of corporate offshore bond issuance is also key to unraveling the significant shift of China's capital account balances in the past few years. Between 2013 and 2015, China's rolling annual capital account flows declined roughly US$900 billion. More than half of the swing, about US$500 billion, was caused by a reversal of residents' net acquisition of external liabilities—that is, debt repayments. Specifically, the fall in Chinese external liabilities primarily reflected the unwinding of previous loans from nonresidents and the repatriation of deposits of nonresidents. On an annual basis, the increased pace of foreign asset acquisition could explain about 70 percent of the deterioration in the capital account in 2014 but only roughly 15 percent in 2015—that is, a more rapid reduction of nonresident claims on China was the dominant driver of capital outflows in 2015 (IMF 2017).

In response to the capital outflow pressure, the Chinese government applied a wide range of measures, including intervention in the foreign exchange market and capital flow management measures. Together with the strengthening of the domestic growth momentum, these measures led to a substantial decline in capital outflows from about US$640 billion in 2015–16 to less than US$100 billion in 2017. Also, after a brief period of contraction in 2015, overseas bond market borrowing by Chinese firms recovered, with nonfinancial corporations

[1] National Development and Reform Commission Circular 2044: "Promoting the Reform of the Filing and Registration Regime for Issuance of Foreign Debt by Corporate Entities." Under this policy, issuers of offshore bonds and borrowers of offshore loans should meet the following basic requirements: a good credit track record, no record of default under previously issued bonds or other debt instruments, sound corporate governance and foreign debt risk control systems, sound credit quality, and strong debt repayment ability. The predeal filing system also applies to offshore bond offerings and borrowings by offshore subsidiaries and branches controlled by the onshore Chinese companies.

Figure 16.1. Offshore Bonds Outstanding, First Quarter 2011 to Third Quarter 2017
(Billions of US dollars)



Source: Bank for International Settlements.

accounting for almost half of the outstanding bonds as of the third quarter of 2017 (Figure 16.1).

To shed light on the determinants of offshore bond issuance by Chinese nonfinancial corporations, this chapter constructs a firm-level data set for all publicly listed nonfinancial corporations headquartered in China. Firm-level evidence suggests that US dollar bond issuance (redemption) by these companies is highly correlated with global financial cycles (see Chapter 2 on China's bond and global financial markets) and economic policy uncertainty in China, a clear indication of carry trades. Moreover, the effect of offshore bond financing on corporate investment differs across sectors. For state-owned enterprises (SOEs), which typically have relatively easy access to domestic financing (bank and bond markets), funding raised in the offshore bond market seems to be channeled to other domestic entities, with SOEs acting as financial intermediaries. For real estate developers, offshore dollar debt issuance is found to be positively correlated with the firms' domestic investment.

DATA AND STYLIZED FACTS

Data Sources

The data set combines corporate bond data from Dealogic and corporate balance sheet information from Datastream for all publicly listed firms headquartered in China for 2005–16.[2] The Dealogic data set contains 25,123 observations of domestic and international bond issuance by 6,027 issuers headquartered in China, of which 2,254 bonds were issued in the US dollar by 476 corporations during the sample period. About one-quarter of them, or 557 bonds, were issued by 150 publicly listed nonfinancial corporations.[3]

The Datastream data set contains data on 2,827 publicly listed firms headquartered in mainland China. Out of these firms, 2,365 are listed in the Shanghai and the Shenzhen stock exchanges and 462 in the Hong Kong SAR stock exchange. The two data sets are manually combined by matching the bond issuers in Dealogic and the publicly listed firms in Datastream. About one-third of firms in the combined sample issued at least one bond in 2005–16 and 6 percent of the firms in the combined sample issued dollar-denominated bonds.

Stylized Facts

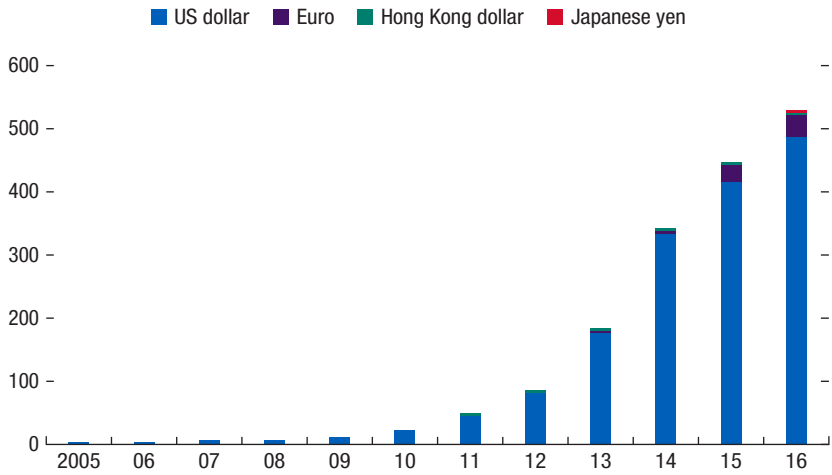
The combined data set shows that, like other emerging market economies, most of the offshore bonds issued by Chinese nonfinancial corporations were denominated in the US dollar. Less than 10 percent of the total outstanding Chinese offshore corporate bonds were issued in other currencies (Figure 16.2). The analysis that follows focuses on the US dollar–denominated bonds, all of which were issued in offshore markets.

Quarterly issuance of such bonds reached nearly US$100 billion in the second quarter of 2014 and declined noticeably following the market turmoil in 2015 before picking up again in late 2016. Redemption of the US dollar–denominated bonds, on the other hand, picked up substantially in 2015 as the renminbi weakened considerably against the US dollar, breaking the steady appreciation trend that started several years back. Given that the average maturity of the US dollar–denominated bonds issued in 2013–15 was around six years, a large fraction of the redemption in 2015–16 represented early repayment before maturity (Figure 16.3).

[2] Given that many Chinese corporations choose to issue foreign currency bonds through their Hong Kong SAR subsidiaries, the sample includes firms with headquarters in mainland China instead of Chinese firms by nationality.

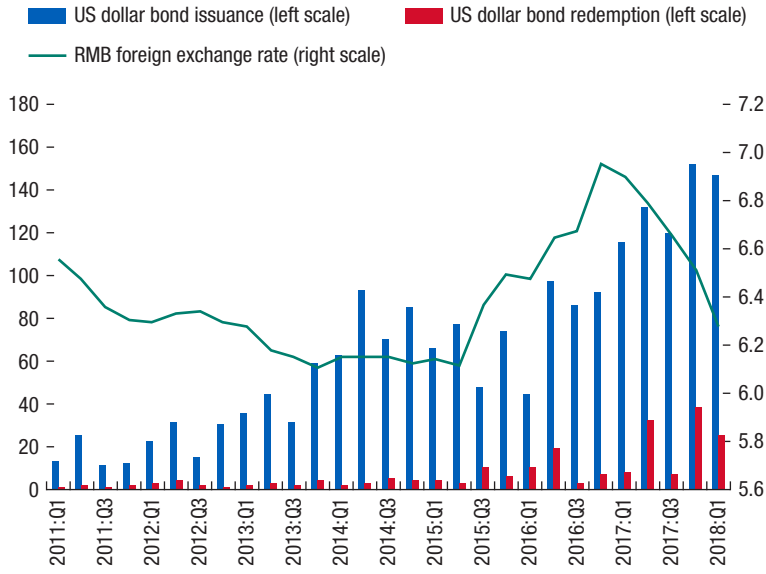
[3] This study first dropped from the Dealogic sample the 7,760 bonds issued by Chinese financial institutions and 634 bonds issued by the central government. It then dropped the 12,508 bonds issued by nonlisted firms. The remaining 4,671 bonds were issued by 1,370 issuers controlled by 871 listed firms, of which 557 bonds were issued by 238 firms (controlled by 150 parent firms) in US dollars. This constitutes the final sample of the US dollar bond issuers. The study then manually matched the US dollar bond sample with the listed firms for 2005–16.

Figure 16.2. Foreign Bond Composition, All Sectors, 2005–16
(Billions of US dollars)



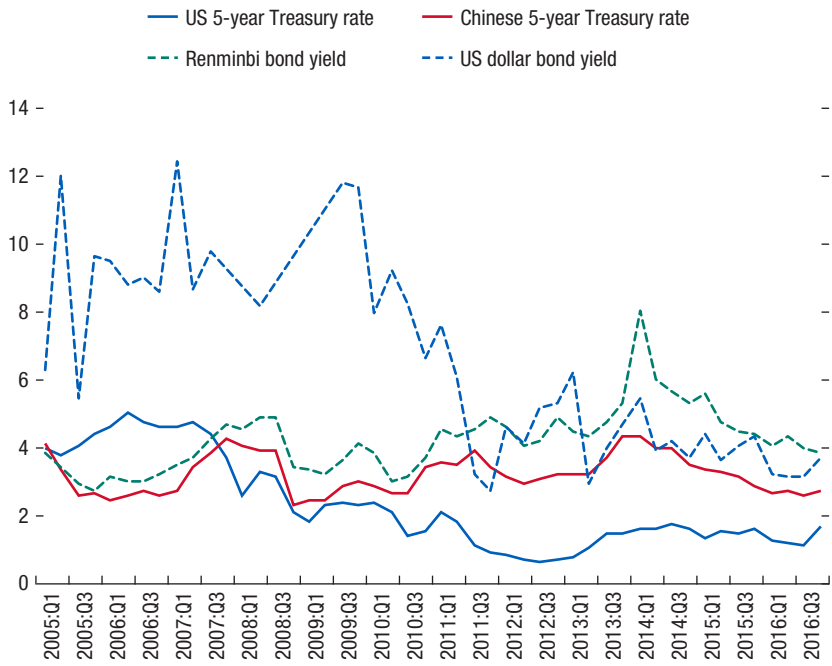
Sources: Bank for International Settlements; and Dealogic.

Figure 16.3. Quarterly Bond Issuance, Redemption, and Foreign Exchange Rate, First Quarter 2011 to First Quarter 2018
(Billions of US dollars, left scale; percent, right scale)



Sources: Bank for International Settlements; and Dealogic.
Note: RMB = renminbi.

Figure 16.4. Interest Rate Spreads between China and the United States, First Quarter 2005 to Third Quarter 2016
(Basis points)

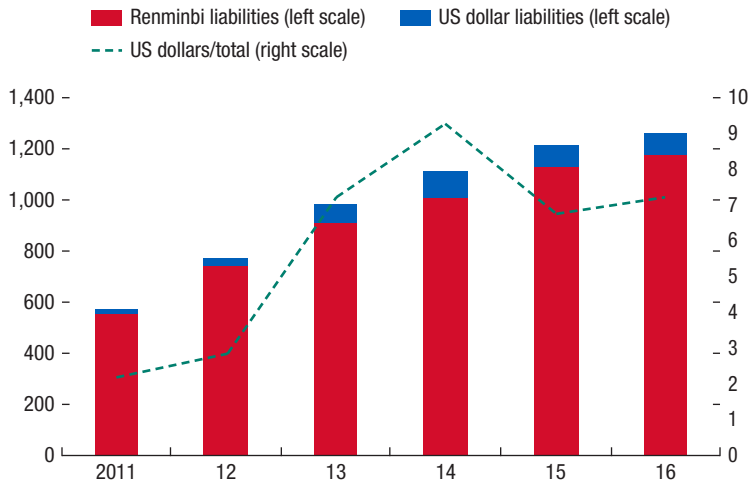


Source: Bank for International Settlements; and Dealogic.

The cyclical behavior of offshore bond issuance and redemption resembles the characteristics of carry trades. Before the global financial crisis, the average yield on the five-year US Treasury bill was almost twice that of the five-year Chinese government bond. However, by 2008, the spread had turned positive, with the yield on the five-year Chinese government bond exceeding that of the US five-year Treasury bill. The spread rose steadily to around 2 percent by 2015. Similarly, before 2008, the average yield on the dollar bond issued by Chinese corporations, at around 10 percent, was twice that of RMB-denominated Chinese corporate bonds. In 2013, the funding cost in China's onshore corporate bond market was almost 100 basis points higher than the cost in the offshore US dollar bond market (Figure 16.4).

As corporations increased their offshore financing to take advantage of the relatively low funding cost in the offshore markets, the share of dollar-denominated liabilities in total corporate liabilities rose rapidly and reached a peak of 9 percent in 2014 (Figure 16.5). The ratio declined in subsequent years, mostly because of rising domestic liabilities as the onshore corporate bond market experienced a bull run (Chapter 1).

Figure 16.5. Dollar Debt versus Renminbi Debt, 2011–16
(Millions of US dollars, left scale; percent, right scale)



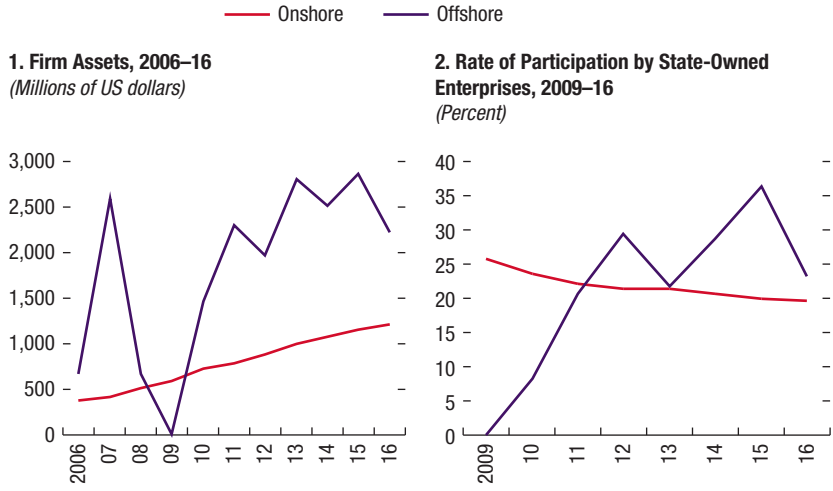
Sources: Bank for International Settlements; and Dealogic.

Issuers of US Dollar–Denominated Bonds

The sample here shows that large firms and SOEs account for the bulk of China's offshore US dollar–denominated bonds (Figure 16.6). Firms with access to the offshore bond markets are on average twice as large in terms of assets as the rest of the sample. SOEs also have a bigger presence in offshore bond markets than in onshore markets, suggesting that, on average, SOEs tend to have easier access to offshore markets than non-SOEs.

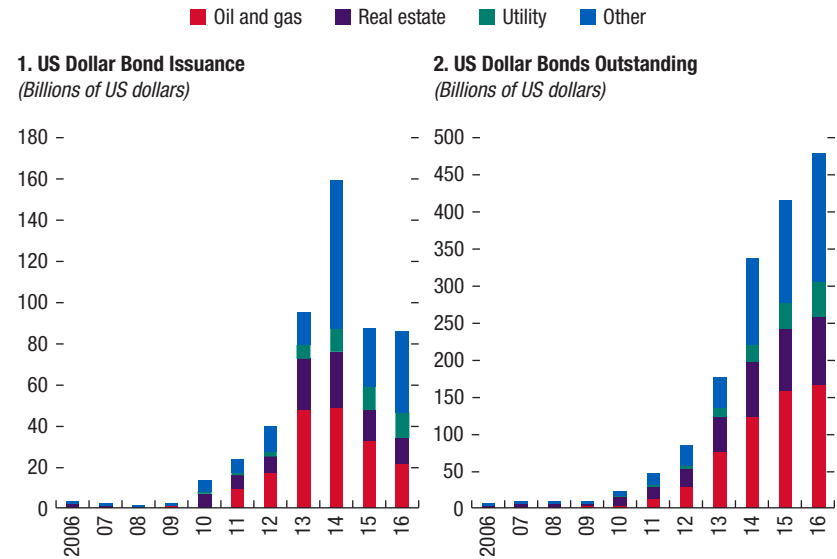
At the sectoral level, the sample indicates that oil and gas, real estate, and the utility sectors have the highest exposures to offshore bond markets (Figure 16.7). Altogether, these three sectors account for two-thirds of total dollar bonds issued by Chinese nonfinancial corporations. For the oil and gas sector, total dollar bonds outstanding grew from US$1.7 billion in 2006 to US$166 billion in 2016, accounting for 35 percent of the total dollar bonds outstanding. This substantial increase was driven by the sharp increase in China's demand for commodities. The real estate sector dominated offshore bond issuance before 2011, accounting for more than 60 percent of total dollar bonds issued by Chinese corporations. However, its share declined steadily to less than 20 percent by 2016, in part because of the government's window guidance on developers' offshore financing to contain overheating in the residential real estate market. It is noticeable in the utility sector that most firms are local government financing vehicles or city construction companies (*chengtou*) under increasing scrutiny domestically as the government tightens local government financing frameworks (see Chapters 5 and 12).

Figure 16.6. Firm Characteristics in Onshore and Offshore Markets, 2006–16



Source: Datastream.

Figure 16.7. Major Sectors in the Offshore Market, 2006–16



Source: Dealogic.

EMPIRICAL ANALYSIS

Determinants of Offshore Dollar Bond Issuance

This section uses a linear regression model to detect the determinants of US dollar–denominated bonds issued by Chinese nonfinancial corporations. Specifically, it regresses the dummy variable of US dollar bond issuance on a set of firm characteristics and policy variables.

$$USD\ Issuer_{i,t} = X_{i,t} + \alpha_i + \varepsilon_{i,t}. \quad (16.1)$$

The issuer dummy, $USD\ Issuer_{i,t}$, takes the value 1 if firm i issues US dollar bonds in year t. The firm characteristics, $X_{i,t}$, include external financial dependence (defined as investment minus net income scaled by investment), profit growth (revenue growth), Tobin's Q (market value divided by book value), leverage (total debt over equity), and profitability (proxied by return on assets).

In various specifications, the analysis replaces the time fixed effect α_i with the interest rate spread, the carry trade index, the Economic Policy Uncertainty Index, and the onshore RMB-denominated bond yield dispersion, respectively. The interest rate spread is calculated as the difference between the five-year Chinese government bond yield and the US five-year Treasury bill yield. The carry trade index is denoted as the interest rate spread scaled by implied foreign currency volatility, as in Bruno and Shin (2017). The Economic Policy Uncertainty Index developed by Baker, Bloom, and Davis (2016) is used as a proxy for movements in policy-related economic uncertainty for China. The RMB bond yield dispersion is the standard deviation of RMB-denominated bond yield, which captures the degree of risk differentiation.

Results are presented in the statistical tables in Annex 16.1. Annex Table 16.1.1 presents the main results. Column (1) shows that external financial dependence is negatively correlated with the likelihood of issuing US dollar bonds. As Shin and ZHAO (2013) suggest, firms normally use internal sources to finance operations and only seek outside funds after internal funds are exhausted. This pecking order theory implies that foreign bond markets should be the last resort for finance (Myers 1984). As suggested by the estimation here, at least for the firms covered in the sample, their decision to issue offshore US dollar–denominated funds was not due to the need for external financing. The results also suggest that firm profits and Tobin's Q are not correlated with the likelihood of issuing US dollar bonds, similar to the findings in Bruno and Shin (2017) for emerging market economies. US dollar bond issuance is found to be positively correlated with the firm-level leverage ratio and the return-on-assets rate.

Columns (2) and (3) show that China's offshore dollar bond issuance moves closely with the interest rate spread and the RMB-dollar bilateral exchange rate, an indication of carry trades. A higher interest rate spread and strengthening of the RMB against the dollar are associated with higher offshore bond issuance by China's nonfinancial corporations. Column (4) shows that the carry trade index,

calculated as the interest rate spread divided by exchange rate volatility, as in Bruno and Shin (2017), is also positively correlated with China's offshore dollar corporate bond issuance.

The analysis also finds a significant negative correlation between US dollar bond issuance and China's economic policy uncertainty (Annex Table 16.1.1, column (5)). As shown in Baker, Bloom, and Davis (2016), economic policy uncertainty can delay firms' financing decisions and hence negatively affect investment, employment, and output, possibly because of higher cost of corporate financing (Gilchrist, Sim, and Zakrajšek 2014), managerial risk aversion (Panousi and Papanikolaou 2012), and interactions between nominal rigidities and search frictions (Bundick and Basu 2015). In this regard, the results are consistent with the literature.

The last column of Annex Table 16.1.1 presents the effect of global funding conditions—proxied by the Chicago Board Options Exchange Volatility Index (VIX)—on dollar bond issuance by Chinese corporations. As suggested by the literature (see, for example, Fratzscher 2012), volatility in the global financial markets can have a large effect on capital flows from the advanced economies to emerging market economies. By augmenting the VIX in the regression, the analysis is able to show that firms are less likely to issue dollar bonds during periods of high volatility. As a robustness check, this analysis also estimated a logit model and obtained similar results.

US DOLLAR BOND ISSUANCE AND CORPORATE INVESTMENT

As shown in the previous section, Chinese nonfinancial corporations do not seem to issue US dollar–denominated bonds for external financing reasons. Rather, offshore bond issuance responded to the interest rate spread as well as to domestic policy uncertainty. This section explores whether offshore bond financing has a positive effect on corporate investment. The empirical analysis is specified as follows:

$$Investment_{i,t} = USD\ Issuer_i \times \beta + X_i\Gamma + \alpha_i + \tau_t + \varepsilon_{i,t}. \qquad (16.2)$$

Here, investment consists of two components—fixed asset investment and inventory investment. The analysis employs two proxies for the two types of investment on the left-hand side. Capital expenditure, $CapExp_{i,t}$, is a proxy for fixed asset investment, which is defined as the net increase of property, plant, and equipment (PPE) of firm i in year t over PPE in year $t-1$. Inventory investment, $Inventory\ Investment_{i,t}$, is defined as the net increase of inventory of firm i in year t divided by inventory in year $t-1$. On the right-hand side, a key explanatory variable is the dummy variable, which takes the value 1 if firm i issues offshore dollar-denominated bonds in year t and 0 if otherwise. The analysis also adds the same vector of firm characteristics as in equation (16.1), including firms' external financial dependence, profit growth, Tobin's Q, leverage, and profitability.

Annex Tables 16.1.2 and 16.1.3 present the regression results on capital expenditure and on inventory investment. Annex Table 16.1.2 shows a significantly negative correlation between US dollar bond issuance and capital expenditure. US dollar bond issuers on average spend 10 percentage points less on capital expenditure. At the same time, in line with the literature, firms with higher revenue growth, higher Tobin's Q, higher leverage, and a higher return on assets tend to invest more in fixed assets. The analysis also finds that if a firm is more dependent on external funding, it tends to be more cautious about investing because of refinancing risks. These results are robust when the analysis augments the lagged capital investment in year $t-1$ on the right-hand side and uses system generalized method of moments (GMM) to estimate the dynamic model.[4]

Annex Table 16.1.3 shows that US dollar bond issuers on average invest 8 percentage points less in inventories than non–dollar bond issuers. Again, firms with higher revenue growth, higher Tobin's Q, higher leverage, and a higher return on assets tend to invest more in inventories.[5] These results are consistent with the findings in the previous section showing that offshore bonds issued by Chinese corporations are not driven by the corporations' financing needs.

Extensive and Intensive Margins

Following HUANG, Panizza, and Portes (2018), the analysis in this chapter explores the extensive margin and the intensive margin of US dollar bond issuance on investment, that is, whether it is the offshore bond issuance itself or the amount of issuance that hinders corporate investment. To do this, both the dummy variable and US dollar bonds outstanding are incorporated in the model. Contrary to the results in HUANG, Panizza, and Portes (2018), the analysis here finds that it is the extensive margin rather than the intensive margin that matters for investment in fixed assets and inventories for Chinese nonfinancial corporations. For both capital expenditure (Annex Table 16.1.4) and inventory investment (Annex Table 16.1.5), it is found that the coefficient of the US dollar bond issuer dummy is significantly negative (except in the dynamic model), while the coefficient on US dollar bonds outstanding is negative (or positive) and insignificant.

The results further confirm that it is US dollar bond issuance (or firms' access to the offshore bond market), rather than the amount that is raised in the offshore market, that is associated with less corporate investment. This implies that once firms have access to the offshore bond market, they tend to conduct carry trades, regardless of the amounts of bond issuance. This is also in line with the pecking order that offshore bonds are usually the last resort of financing. When a firm with less investment demand resorts to the offshore markets it is unlikely to use the offshore funding for real investment.

[4] The system GMM result confirms a negative correlation between US dollar bond issuance and capital expenditure, though in a smaller magnitude of 6.3 percentage points.

[5] The system GMM yields a smaller but significant coefficient of negative 5.7 for US dollar bond issuers.

Sectoral Effect

This section zooms in on the sectoral effect on US dollar bond issuance and firms' investment sensitivity toward external financial dependence across different sectors. To specify the sensitivity of corporate investment by US dollar bond issuers to their external financial dependence, the analysis adds the interaction term of the issuer and external financial dependence on the right-hand side of the regression. Furthermore, it takes into account the difference of sensitivity across sectors by adding the third interaction term of the sector dummy, which equals 1 if the firm is an SOE or is in the real estate sector or oil and gas sector, and 0 otherwise. If firms in a certain sector tend to resort to the offshore bond market because they have stronger external financing demand, one would expect the coefficient of the triple interaction term to be positive. Otherwise, one would expect a negative or insignificant coefficient on the triple interaction term.

Annex Table 16.1.6 shows the sensitivity of investment to external financial dependence for US dollar bond issuers in each sector. For SOEs, the triple interaction term is significantly negative, implying that SOEs that issue US dollar bonds as an additional source of finance are even more cautious about investment when they have higher external financial demand. In other words, SOEs are more likely to issue US dollar bonds for carry trades. This is perhaps related to SOEs' easier access to domestic bank financing and their engagement in financial intermediation. For example, Allen and others (2018) show that a nonfinancial corporation that wants to maximize carry trade returns is more likely to lend to other firms, either directly or through entrusted loans, a popular shadow banking channel through which companies provided finance to one another with banks acting as intermediaries, and SOEs are more likely than private companies to engage in entrusted loans.

For the real estate sector, the triple interaction term is significantly positive for both fixed assets and inventories. According to accounting standards, newly built houses are recorded in the inventory item for real estate developers, whereas the equipment for construction is recorded as property, plant, and equipment. The two significantly positive signs imply that the real estate sector tends to use the offshore market to finance actual investment needs.

REDEMPTIONS OF US DOLLAR–DENOMINATED BONDS

The results of the correlation between US dollar bond issuance and corporate investment are largely in line with the literature on carry trades. This section examines the effect of US dollar bond redemption on corporate investment, an issue not extensively discussed in the literature. This analysis replaces the US dollar issuance dummy (or US dollar debt outstanding) with the redemption dummy (or redemption amount over total debt) to test the effect of redemption on investment. It also mixes the redemption dummy and the redemption amount

together to separate the extensive and the intensive margin. The results are presented in Annex Table 16.1.7.

Columns (1) and (4) present the effect of US dollar bond redemption on capital expenditure and inventory investment. The analysis finds a significantly negative correlation, with a magnitude even larger than that of US dollar bond issuance. This implies that when firms repay their US dollar debt, they tend to reduce investment. Columns (2) and (5) show that the larger the amount of redemption, the more cautious firms become in investing in fixed assets.

Columns (3) and (6) illustrate the results of the extensive and the intensive margin of US dollar bond redemption. Interestingly, the intensive margin, rather than the extensive margin, is a significant factor for US dollar bond redemption. In other words, the effect of redemption on investment mainly depends on the amount of US dollar bonds to be paid back. If a firm has a small amount of US dollar debt to pay, its binding power on the firm's investment decision is negligible. The asymmetric effect of offshore US dollar bond issuance and redemption on corporate investment implies that unwinding carry trade positions may add pressure on domestic investment, even though the accumulation of corporate offshore debt may not have translated into higher investment in the first place.

CONCLUSIONS

China's offshore corporate bond issuance has experienced a sharp increase since 2012 amid rising capital inflows to emerging market economies and China's own efforts to liberalize its capital account. To understand the determinants of offshore corporate bond issuance, the analysis presented in this chapter constructs a data set that combines corporate bond data and corporate balance sheet information for all publicly listed firms headquartered in China.

The firm-level analysis indicates that the surge in China's offshore corporate dollar bonds in 2012–15, and the subsequent contraction in 2015–16—and similar to the experience of other emerging market economies—resembled the characteristics of carry trades. The evidence suggests strong cyclicality in US dollar bond issuance and redemption by Chinese nonfinancial corporations, which also drove China's capital account balances in recent years. The analysis finds that US dollar bond issuance tends to rise when China's economic policy uncertainty is low, global financial market conditions are accommodative, and the renminbi is strengthening against the US dollar. The analysis also finds that offshore bond financing has different sectoral effects on corporate investment, possibly reflecting firms' different business models and their unequal access to domestic financing sources.

The analysis also finds that US dollar bond issuance is negatively correlated with firms' dependence on external finance. This is consistent with the pecking order theory that the offshore bond market is usually the last resort of financing for corporations. US dollar bond issuers tend to invest less in fixed assets and inventories. The extensive margin (that is, the offshore bond issuance itself)

rather than the intensive margin (that is, the amount of issuance) matters for corporations' decisions on fixed assets and inventory investment—another piece of evidence that firms tend to view access to the offshore bond market as a channel to conduct carry trade activities rather than a financing source to support investment.

On the other hand, the analysis finds that US dollar bond redemption tends to rise when global financial conditions tighten and economic policy uncertainty rises domestically, adding to pressure on the capital account and the exchange rate. When corporations face redemption pressures, it is the intensive margin (that is, the amount that needs to be repaid) that tends to have a more prominent effect on firms' investment decisions. According to the data set in this analysis, bond redemption will reach US$50 billion in the second quarter of 2018 and remain high until the second quarter of 2020, and refinancing may become a risk and negatively affect domestic investment.

By adding a triple interaction term of the US dollar issuers, external financial dependence, and the sector dummy, the analysis finds that the effect of offshore bond financing on investment is negative for SOEs and positive for the real estate sector. This perhaps reflects SOEs' easier access to domestic funding sources compared with the real sector, which has been subject to administrative and regulatory constraints on access to onshore (bank) financing.

The results indicate that the surge in China's offshore corporate dollar bonds demonstrates the characteristics of carry trade and does not seem to have contributed to corporate investment. To the extent that capital flows could carry risks for macroeconomic and financial stability—especially if they are large and volatile, as demonstrated by the large swings of China's capital account balance between 2013 and 2015—such risks need to be carefully managed.

Capital flow pressures should be primarily dealt with by macroeconomic policies, including an effectively floating exchange rate (IMF 2018a). Standard microprudential and macroprudential frameworks should continue to be strengthened to mitigate the procyclical buildup of systemic risk over the financial cycle. Meanwhile, the "macroprudential assessment framework for cross-border financing" that the Chinese government has developed since 2016 is more predictable and transparent compared with the previous capital flow management framework, and can be used to address risks arising from excessive cross-border financing and mismatches (including currency, maturity, and on/off balance sheet). Going forward, the liberalization of China's capital account should be gradual, carefully sequenced, and paced with supporting reforms that include an effective monetary policy framework, a sound financial system, reduced fiscal dominance, and more exchange rate flexibility (IMF 2018b).

ANNEX 16.1 STATISTICAL TABLES

Annex Table 16.1.1 reports the determinants of dollar bond issuance. The dependent variable is a dummy that equals 1 if a firm issues a dollar bond in year *t*, and 0 otherwise. The analysis controls for firms' revenue growth, Tobin's Q (market value divided by book value), leverage, and return on assets. It adds firm fixed effects and year fixed effects in the first column. In columns (2) through (7), it replaces the time fixed effect with the interest rate spread, the renminbi–dollar bilateral exchange rate, the carry trade index, the Economic Policy Uncertainty Index, the Chinese (CNY) bond yield dispersion, and the Chicago Board Options Exchange Volatility Index (VIX), respectively. The interest rate spread between China and the United States is calculated by the China 5-year government bond yield minus the US 5-year Treasury bond yield. The renminbi-dollar rate is the annual average onshore CNY rate. The carry trade index is the interest rate spread scaled by implied foreign exchange volatility, as in Bruno and Shin (2017). The Economic Policy Uncertainty Index is developed by Baker, Bloom, and Davis (2016) to serve as a proxy for movements in policy-related economic uncertainty in China. The CNY bond yield dispersion is the standard deviation of CNY-denominated bond yield. The VIX is the year average VIX.

ANNEX TABLE 16.1.1.

Determinants of Offshore US Dollar Bond Issuance

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
External financial dependence	−0.033***	−0.032***	−0.032***	−0.032***	−0.039***	−0.040***	−0.032***
	(−3.128)	(−3.104)	(−3.030)	(−3.053)	(−6.042)	(−6.158)	(−7.096)
Revenue growth	−0.000	−0.001	−0.002	−0.002	−0.001	0.001	−0.001
	(−0.195)	(−0.552)	(−0.861)	(−0.929)	(−0.326)	(0.280)	(−0.748)
Tobin's Q	−0.139	−0.064	0.002	−0.005	0.286	0.078	0.066
	(−0.887)	(−0.668)	(0.019)	(−0.057)	(1.424)	(0.342)	(0.489)
Leverage	0.007***	0.007***	0.007***	0.007***	0.004*	0.004*	0.007***
	(2.913)	(3.009)	(3.113)	(3.038)	(1.851)	(1.775)	(5.474)
Return on assets	0.010***	0.009***	0.008**	0.010***	0.016*	0.018**	0.012**
	(2.903)	(2.676)	(2.129)	(2.891)	(1.886)	(2.107)	(2.539)
Interest spread		0.162***					
		(6.226)					
Foreign exchange rate			−0.770***				
			(−5.578)				
Carry Trade Index				0.011***			
				(5.721)			
Economic Policy Uncertainty Index					−0.002***		
					(−2.663)		
CNY bond yield dispersion						−0.455	
						(−1.114)	
Chicago Board Options Exchange Volatility Index							−0.054***
							(−5.871)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	No	No	No	No	No	No
No. of observations	22,545	22,545	22,545	22,545	14,583	14,583	22,545
R^2	0.008	0.008	0.006	0.007	0.004	0.004	0.006

Source: Authors' calculations.
Note: Robust *t*-statistics appear in parentheses. Tobin's Q represents market value divided by book value. CNY = Chinese yuan.
***$p < .01$; **$p < .05$; *$p < .1$.

ANNEX TABLE 16.1.2

Offshore Dollar Bond Issuance and Capital Expenditure								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	**Dependent Variable: Capital Expenditure**							
US$ issuer	–10.11***	–8.41**	–8.79**	–8.72**	–8.96**	–9.52***	–9.81***	–6.33**
	(–2.84)	(–2.48)	(–2.51)	(–2.49)	(–2.57)	(–2.77)	(–2.85)	(–2.13)
Revenue growth			0.27***	0.27***	0.26***	0.24***	0.24***	0.23***
			(21.10)	(20.85)	(20.83)	(18.63)	(18.58)	(23.99)
Tobin's Q				1.62*	1.86**	1.57*	1.55*	–0.09
				(1.93)	(2.20)	(1.94)	(1.92)	(–0.18)
Leverage					0.01*	0.03***	0.03***	0.02***
					(1.94)	(3.56)	(3.59)	(5.20)
Return on assets						0.28***	0.28***	0.18***
						(10.07)	(10.08)	(8.46)
External financial dependence							–0.04*	–0.06***
							(–1.82)	(–2.59)
Lag capital expenditures								0.18***
								(20.28)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of observations	22,566	22,566	22,543	22,543	22,543	22,543	22,543	19,494
R^2	0.00	0.04	0.09	0.09	0.09	0.10	0.10	System GMM

Source: Authors' calculations.
Note: Robust *t*-statistics appear in parentheses. Tobin's Q represents market value divided by book value. GMM = generalized method of moments.
***$p < .01$; **$p < .05$; *$p < .1$.

ANNEX TABLE 16.1.3

Offshore US Dollar Bond Issuance and Inventory Investment

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	**Dependent Variable: Inventory Investment**							
US$ issuer	−11.07***	−6.74**	−7.32***	−7.23***	−7.65***	−8.19***	−8.33***	−5.70*
	(−3.64)	(−2.53)	(−2.89)	(−2.87)	(−3.03)	(−3.27)	(−3.32)	(−1.68)
Revenue growth			0.37***	0.37***	0.37***	0.34***	0.34***	0.30***
			(26.32)	(26.11)	(25.96)	(23.96)	(23.93)	(27.14)
Tobin's Q				1.86**	2.28***	2.06**	2.05**	−0.33
				(2.25)	(2.73)	(2.52)	(2.51)	(−0.55)
Leverage					0.02***	0.04***	0.04***	0.04***
					(3.24)	(4.75)	(4.76)	(7.53)
Return on assets						0.26***	0.26***	0.27***
						(8.28)	(8.29)	(10.61)
External financial dependence							−0.02	−0.03
							(−0.80)	(−1.17)
Lag capital expenditures								−0.02**
								(−2.02)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of observations	22,188	22,188	22,177	22,177	22,177	22,177	22,177	19,135
R^2	0.00	0.07	0.14	0.14	0.14	0.15	0.15	System GMM

Source: Authors' calculations.

Note: Robust *t*-statistics appear in parentheses. Tobin's Q represents market value divided by book value. GMM = generalized method of moments.

***$p < .01$; **$p < .05$; *$p < .1$.

ANNEX TABLE 16.1.4

Extensive and Intensive Margin of Offshore US Dollar Bond Issuer and Capital Expenditure

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables				**Dependent Variable: Capital Expenditure**				
US$ issuer	–9.76**	–7.62*	–7.40*	–7.25*	–7.60*	–8.13**	–8.46**	–4.46
	(–2.31)	(–1.86)	(–1.76)	(–1.73)	(–1.82)	(–1.98)	(–2.05)	(–1.39)
US$ outstanding	–0.01	–0.02	–0.03	–0.03	–0.03	–0.03	–0.03	–0.02
	(–0.22)	(–0.53)	(–0.85)	(–0.90)	(–0.84)	(–0.89)	(–0.86)	(–0.46)
Revenue growth			0.27***	0.27***	0.26***	0.24***	0.24***	0.22***
			(21.09)	(20.85)	(20.83)	(18.62)	(18.57)	(14.39)
Tobin's Q				1.63*	1.87**	1.58*	1.56*	0.59
				(1.94)	(2.21)	(1.95)	(1.93)	(0.85)
Leverage					0.01*	0.03***	0.03***	0.02***
					(1.93)	(3.54)	(3.58)	(4.40)
Return on assets						0.28***	0.28***	0.19***
						(10.06)	(10.08)	(6.80)
External financial dependence							–0.04*	–0.06***
							(–1.81)	(–2.58)
Lag capital expenditures								0.15***
								(11.01)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of observations	22,566	22,566	22,543	22,543	22,543	22,543	22,543	19,494
R^2	0.00	0.04	0.09	0.09	0.09	0.10	0.10	

Source: Authors' calculations.

Note: Robust *t*-statistics appear in parentheses. Tobin's Q represents market value divided by book value.

***$p < .01$; **$p < .05$; *$p < .1$.

ANNEX TABLE 16.1.5

Extensive and Intensive Margin of Offshore Dollar Bond Issuer and Inventory Investment

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	**Dependent Variable: Inventory Investment**							
US$ issuer	−16.06***	−10.53***	−10.35***	−10.16***	−10.78***	−11.29***	−11.46***	−5.12
	(−4.69)	(−3.45)	(−3.26)	(−3.20)	(−3.43)	(−3.65)	(−3.70)	(−1.41)
US$ outstanding	0.10**	0.08**	0.06	0.06	0.06	0.06	0.06	0.02
	(2.57)	(1.98)	(1.42)	(1.37)	(1.48)	(1.46)	(1.47)	(0.29)
Revenue growth			0.37***	0.37***	0.37***	0.34***	0.34***	0.28***
			(26.32)	(26.11)	(25.96)	(23.96)	(23.93)	(16.61)
Tobin's Q				1.84**	2.26***	2.04**	2.03**	1.75**
				(2.22)	(2.71)	(2.50)	(2.49)	(2.20)
Leverage					0.02***	0.04***	0.04***	0.04***
					(3.27)	(4.79)	(4.80)	(6.77)
Return on assets						0.26***	0.26***	0.25***
						(8.27)	(8.29)	(7.45)
External financial dependence							−0.02	−0.02
							(−0.82)	(−0.93)
Lag capital expenditures								0.02
								(1.60)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of observations	2,790	22,566	22,543	22,543	22,543	22,543	22,543	19,494
R^2	0.00	0.04	0.09	0.09	0.09	0.10	0.10	

Source: Authors' calculations.
Note: Robust *t*-statistics appear in parentheses. Tobin's Q = market value divided by book value.
***$p < .01$; **$p < .05$; *$p < .1$.

ANNEX TABLE 16.1.6

Sensitivity of Investment to External Financial Dependence: Sectoral Impact

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent Variable: Capital Expenditure			Dependent Variable: Inventory Investment		
Variables	State-Owned Enterprise	Real Economy	Oil	State-Owned Enterprise	Real Economy	Oil
US$	–9.196	–7.355 ***	–10.837 ***	–5.735	–9.607 ***	–7.102 ***
	(–1.434)	(–2.881)	(–2.971)	(–1.315)	(–3.435)	(–2.815)
US$ × External Financial Dependence	0.163	0.039	0.138	–0.018	–0.179	–0.044
	(1.558)	(0.635)	(1.564)	(–0.060)	(–1.225)	(–0.222)
US$ × Sector	9.293	–4.243	–3.792	0.394	3.218	–13.104
	(0.980)	(–0.498)	(–0.263)	(0.051)	(0.620)	(–1.421)
External Financial Dependence × Sector	–0.047	–0.267***	0.240	–0.148***	0.112	–0.053
	(–0.945)	(–5.546)	(1.183)	(–3.104)	(1.103)	(–0.917)
US$ × External Financial Dependence × Sector	–0.481***	0.291**	1.404	–0.274	0.896**	–0.193
	(–3.778)	(2.211)	(0.979)	(–0.753)	(2.059)	(–0.763)
Revenue growth	0.239***	0.239***	0.239***	0.320***	0.340***	0.340***
	(14.512)	(18.574)	(18.575)	(16.392)	(23.774)	(23.773)
Tobin's Q	–0.203	1.504*	1.575*	0.857	1.743**	1.695**
	(–0.190)	(1.857)	(1.947)	(0.835)	(2.144)	(2.082)
Leverage	0.022**	0.026***	0.026***	0.033***	0.035***	0.035***
	(2.065)	(3.572)	(3.588)	(3.291)	(4.713)	(4.704)
Return on assets	0.286***	0.280***	0.278***	0.261***	0.258***	0.258***
	(7.916)	(10.133)	(10.083)	(6.261)	(8.021)	(8.026)
External financial dependence	0.017	0.020	–0.050**	–0.138***	–0.222***	–0.216***
	(0.486)	(1.010)	(–2.560)	(–4.197)	(–12.656)	(–12.035)
Constant	19.523***	15.188***	15.096***	14.353***	13.244***	13.311***
	(10.660)	(11.665)	(11.596)	(7.107)	(9.249)	(9.296)
No. of observations	12,987	22,543	22,543	12,698	22,177	22,177
R^2	0.113	0.102	0.101	0.152	0.157	0.157

Source: Authors' calculations.
Note: Robust *t*-statistics appear in parentheses. Tobin's Q represents market value divided by book value.
***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

ANNEX TABLE 16.1.7

Dollar Bond Redemptions and Corporate Investment

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	**Dependent Variable: Capital Expenditure**			**Dependent Variable: Inventory Investment**		
US dollar redemption dummy	−12.47***		−0.02	−8.77		9.29
	(−3.21)		(−0.00)	(−1.19)		(0.92)
US dollar redemption/total debt		−2.36***	−2.36*		−1.84	−3.42
		(−3.61)	(−1.83)		(−1.38)	(−1.57)
Revenue growth	0.24***	0.24***	0.24***	0.35***	0.35***	0.35***
	(17.99)	(17.99)	(17.99)	(23.89)	(23.89)	(23.89)
Tobin's Q	1.46*	1.46*	1.46*	2.09**	2.09**	2.09**
	(1.75)	(1.74)	(1.74)	(2.36)	(2.36)	(2.36)
Leverage	0.02***	0.02***	0.02***	0.03***	0.03***	0.03***
	(2.89)	(2.88)	(2.88)	(4.55)	(4.55)	(4.54)
Return on assets	0.31***	0.31***	0.31***	0.28***	0.28***	0.28***
	(10.60)	(10.61)	(10.60)	(8.23)	(8.23)	(8.23)
External financial dependence	−0.03	−0.03	−0.03	−0.01	−0.01	−0.01
	(−1.49)	(−1.49)	(−1.49)	(−0.62)	(−0.61)	(−0.62)
Firm fixed effects	Y	Y	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y	Y	Y
No. of observations	20,896	20,896	20,896	20,688	20,688	20,688
R^2	0.11	0.11	0.11	0.16	0.16	0.16

Source: Authors' calculations.
Note: Robust *t*-statistics appear in parentheses. Tobin's Q represents market value divided by book value.
***$p < .01$; **$p < .05$; *$p < .1$.

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