



WP/15/72

IMF Working Paper

Assessing China's Corporate Sector Vulnerabilities

Mali Chivakul and W. Raphael Lam

IMF Working Paper

Asia and Pacific Department

Assessing China's Corporate Sector Vulnerabilities

Prepared by Mali Chivakul and W. Raphael Lam¹

Authorized for distribution by Steven Barnett

March 2015

This Working Paper should not be reported as representing the views of the IMF.

The views expressed in this Working Paper are those of the author(s) and do not necessarily represent those of the IMF or IMF policy. Working Papers describe research in progress by the author(s) and are published to elicit comments and to further debate.

Abstract

This paper documents and assesses the risk stemming from rising corporate indebtedness in China using a firm-level dataset of listed firms. It finds that while leverage on average is not high, there is a fat tail of highly leveraged firms accounting for a significant share of total corporate debt, mainly concentrated in the real estate and construction sector and state-owned enterprises in general. The real estate and construction firms tend to face lower borrowing costs and could withstand a modest increase of interest rate shocks despite their high leverage. The corporate sector is however vulnerable to a significant slowdown in the real estate and construction sector. Our sensitivity analysis suggests that the share of debt that would be in financial distress would rise to about a quarter of total listed firm debt in the event of a 20 percent decline in real estate and construction profits.

JEL Classification Numbers: E0, G3, L2, L3

Keywords: Corporate sector, leverage, China, state-owned enterprise (SOE), real estate, interest rate shock

Authors' E-Mail Addresses: mchivakul@imf.org; wlam@imf.org

¹ We thank Steven Barnett, Wei Carol Liao, and Wojciech Maliszewski for helpful comments and contributions. We also thank Daniel Law for his extensive help with the WIND dataset. We are grateful for comments from the seminar participants at the International Monetary Fund and the People's Bank of China.

Contents	Page
I. Introduction	3
II. Background	4
III. Data.....	5
IV. Leverage and Performance Indicators	7
V. Sensitivity Analysis.....	10
VI. Conclusion	13
References.....	27
 Figures	
1. China: Corporate Profit, Saving and Investment	15
2. China: Corporate Indebtedness	15
3. China: External Debt Development.....	16
4. China: Offshore Issuance.....	17
6. China: Financial Position of Listed Firms	18
7. China: Distribution of Corporate Indebtedness Among Listed Firms	19
8. Corporate Leverage.....	20
9. Financial Performance of Listed Firms.....	21
10. Sensitivity Analysis—Interest Rate and Profit Shocks.....	22
 Tables	
1. Number of Firms in the WIND Database, by Enterprise Nature and Industries	23
2. Leverage Regression.....	23
3. Effective Interest Cost Regression.....	24
4. Interest Coverage Ratios and Financial Distress Firms	24
5. Sensitivity Test Results of the Interest Rate Shock	25
6. Sensitivity of Interest Rate Shocks on Total Debt and Total Liabilities.....	25
7. Sensitivity Test Results of the Profit Shock	26
8. Sensitivity Test Results of the Combined Interest Rate and Profit Shocks	26

I. INTRODUCTION

China has increasingly relied on investment to drive growth in the post-Global Financial Crisis (GFC) period. To finance such rapid investment growth, Chinese firms as well as local government entities have borrowed from both banks and nonbanks. As a result, corporate debt has significantly risen, mirroring the rapidly increasing credit growth from the financial system.

Understanding corporate indebtedness in China is important as rising debt could pose risks to China's growth and financial stability. Firms' deleveraging process could weigh on growth while corporate defaults would have adverse effects on bank balance sheets, the availability of credit, and thus growth. The increase in China's corporate debt has attracted much attention. According to S&P (2014), for example, China has become the largest corporate debt borrower, surpassing the United States since 2013. S&P also indicated that the financial position of Chinese corporate borrowers has worsened since the global financial crisis, with lower cash flow but a higher leverage relative to other global peers.

This paper documents the dynamic of corporate indebtedness in China using firm-level dataset of listed firms. It assesses the overall level and distribution of debt and leverage over time, type of firm, and industry. It also assesses firms' financial indicators and gauges the extent to which leverage could present a source of risk in adverse scenarios. The key findings are:

- While, on average, Chinese private listed firms have scaled back their leverage ratio since the global financial crisis, SOEs' leverage at the tail end of the distribution has significantly increased. The rise in leverage has largely been driven by those in real estate and construction sector as well as in mining and utilities. Over time, an increasing share debt and liabilities is attributed to a few firms with high leverage ratios.
- In the aftermath of the global financial crisis, both private and state-owned real estate and construction firms seem to have enjoyed lower borrowing costs than firms in other sectors, controlling for firms' characteristics. Consequently, firms in the real estate and construction sector could withstand a modest increase of interest rate shocks despite their high leverage. They would be more sensitive, however, if an interest rate shock were also applied to other liabilities besides loans and bonds. Private firms in manufacturing are also vulnerable to interest rate increase given their thin profit margin. Central SOEs would experience the largest rise in debt at risk with an increase in interest rates.
- The Chinese corporate sector is vulnerable to a significant slowdown in the real estate and construction sector. Firms in the real estate and construction sector would face significant financial distress with their debt at risk rising sharply. Other sectors that are closely related to real estate activity such as manufacturing and transportation would also be strongly affected. Altogether, total debt at risk could rise to about a quarter of total debt of listed firms in the event of a 20 percent decline in real estate and construction profit.

The paper proceeds as follows. The background section gives an overview of China's corporate indebtedness at the aggregate level. The data section then describes the firm-level data used for the

analysis. The next section describes as well as empirically estimates the distribution of debt and leverage. The sensitivity analysis section then assesses the risks of corporate leverage, employing simple stress tests to quantify the effects of interest rate and profit shocks. The final section summarizes the main findings.

II. BACKGROUND

Overall credit financing of firms has increased substantially in China since 2008. Looking at the flow of fund data, Chinese firms traditionally finance most of their investment through retained earnings. Since the global financial crisis, corporate profits have declined as shown by flow-of-fund and industrial enterprise data, while there is an increasing trend for firms to borrow funds to keep up with increased investment (Figure 1). With high savings in the economy, firms mainly finance their investment domestically. However, some have also started to borrow abroad, taking advantage of low international interest rates. As a result, the corporate sector as a whole has become more leveraged.

Domestic Financing

Domestic financing to all nonfinancial sectors in China, measured by the stock of official total social financing (TSF), expanded rapidly following the global financial crisis (Figure 2). TSF rose by more than 50 percent of GDP between 2008 and 2013. In particular, financing to the corporate sector has come from both financial (“adjusted TSF”) and nonfinancial institutions. Excluding two components of TSF—equity financing (nondebt) and entrusted loans (netting out company-to-company loans)—domestic credit from the financial system still shows a rapid rise since 2008. Most of the increase was driven by an increase in bank loans and nonbank intermediation through trust loans and corporate bonds.

A large part of domestic credit goes towards firms. While sectoral data on TSF are not available, other data sources suggest that domestic credit to firms stood at about 150 percent of GDP at end-2013, over 30 percentage points higher than in 2009. Other components of domestic credit are household borrowing (about 23 percent of GDP) and borrowing by local government financing vehicles (LGFVs) (about 25 percent of GDP).²

External Financing

Despite rapid rise in recent years, China’s external debt remains relatively small compared to the size of the economy, international reserves and domestic credit (Figure 3). External debt reached US\$880 billion by end-2013 (about 10 percent of GDP, compared to TSF of about 200 percent of GDP), nearly a threefold increase from 2008 level.³ Nearly half of total external debt is related to trade credit of short-term nature. Most of the external debt is intermediated through onshore

² See IMF (2014) China Article IV Consultation Staff Report.

³ The analysis is based on several data sources, including the international investment position (IIP) published by SAFE, consolidated foreign claims of reporting banks on China published by BIS, and offshore bond issuance by Chinese entities available from Dealogic.

banks, masking the underlying exposures of corporate sector.⁴ According to the BIS data, about half of foreign banks' claims on China are on the domestic banking sector (US\$353 billion out of the total US\$698 billion in 2013). Direct exposures of foreign banks on Chinese nonbank private sector have been stable, suggesting onshore banks have served as intermediaries on corporate borrowing overseas through the provision of bank guarantees and letters of credit. Corporations take advantage of lower international interest rates, while the net result is an increase in cross-border exposures between banks.

In addition to external borrowing through banks, Chinese corporate have also taken advantage of low global interest rate through offshore bond issuance which has increased substantially since 2010 (Figure 4). Offshore issuance is generally done by an offshore entity, and, as a result, the borrowing is not captured by official external debt statistics. Half of the debt issued abroad has been for operations in China. Among large emerging markets, China has relied the most on offshore debt markets (US\$74 billion issued in 2013), with Brazil and Russia recording sizable increases in issuance too. The boost in offshore debt from Chinese issuers is mostly attributed to financial institutions, financing vehicles of the state-owned enterprise (for example in the oil and gas sector), as well as nonfinancial corporate sector. Banks often offer soft comfort letters to allow clients to issue debt offshore at lower cost. Since 2009, real estate developers have been the largest issuer of offshore bonds among nonfinancial firms.

International Comparison

On average, corporate credit in China has risen faster than elsewhere in the region (IMF REO April 2014) (Figure 5).⁵ Corporate credit in Asia has risen in the past few years. Bank credit growth has been strong, particularly in the regional financial centers of Hong Kong SAR and Singapore, which have been an increasing source of funding for firms across the region. In Hong Kong SAR, a large part of the credit increase is related to Chinese corporations. Corporate bond issuance has also picked up, particularly in the high yield segments. Moreover, corporate debt has become more concentrated at the highly-leveraged firms over the last five years in Asia. For instance, about one-third of corporate sector debt belongs to firms with high leverage (leverage ratio above three times equity). Those indebted firms tend to generally have lower profitability and interest coverage, and are less liquid.

III. DATA

This paper uses firm-level corporate data from the WIND dataset, which includes all Chinese

⁴ This observation stands out in particular for credit exposures of Hong Kong SAR's bank on the Mainland. More than three-quarters of Hong Kong SAR's foreign claims are on banks in China (including subsidiaries of Hong Kong SAR's banks in the Mainland), with rapid growth driven by rising trade credit extended to onshore exporters and banks. Since the launch of RMB cross-border settlement, Hong Kong SAR banks have provided cheap dollar funding to onshore entities in China, with those U.S. positions settled in RMB channeling as CNH deposits in Hong Kong SAR.

⁵ Corporate credit here only includes bank credit to corporate, a measure comparable to other countries in the region.

firms listed in Shanghai, Shenzhen, and Hong Kong SAR stock exchanges (over 2,500 firms) spanning from 2003 to 2013. WIND dataset contains financial statement information as well as firm information on the industry, ownership, and geographical incorporation.

Industry classification is based on the Chinese Securities Regulatory Commission (CSRC) system, with additional details from WIND. The CSRC classification contains 13 industries spanning from primary, secondary, and tertiary sectors. This paper considers only nonfinancial firms and therefore excludes firms classified to be in financial industry. Ownership classification is based on the control rights which include the followings: (i) SOEs controlled by the central government (“central SOEs”); (ii) SOEs controlled by the local government (“local SOEs”); (iii) cooperatives; (iv) group holding companies; (v) private entities; (vi) foreign-owned firms; and (vii) others. In the analysis, the latter four groups are consolidated to one.

Previous work on China’s corporate sector has mainly been based on the much larger National Bureau of Statistics (NBS) database of industrial firms.⁶ While this dataset only represents the larger Chinese firms that have access to equity financing, there are some advantages to using this dataset. The WIND databases covers the most recent period up to 2013 as well as broader sectors including industrial and service sector firms.

The distribution of firms varies across industries (Figure 6). SOEs are concentrated in utilities, transportation, and real estate, while private firms are mostly in manufacturing and nonfinancial services, including information services and wholesale/retail trade. Firm distribution has not changed significantly over the sample periods.

Overall trend

Total assets of listed firms have been rising steadily, with a particularly fast rise in the real estate and construction sectors. Firms in manufacturing continue to account for about half of the total assets among listed firms, although average manufacturing firm’s total assets is smaller given the larger number of firms in the manufacturing sector. Total assets in real estate and construction sector account for more than one-third of total listed firms’ assets.

While the share of SOEs’ total assets has been declining, their share still accounts for about two-thirds of the sample’s total assets. The share is larger in this listed firm sample than the NBS data, because this dataset includes both industrial and services sector firm and larger SOEs (including in the service sector) are more likely to be listed in the stock exchange.

Despite the rapid increase of total assets among listed firms, their market capitalization has grown more moderately over the sample period. The market capitalization peaked in 2007 and following the large correction in 2008, the stock markets have recovered but remained 15 percent below the peak. As the share of SOEs in total market capitalization has declined steadily since 2007, private

⁶ The NBS database includes all industrial firms (firms in manufacturing, mining and utilities only) with annual sales greater than RMB 5 million. The firms in the NBS database account for about 90 percent of total industrial output. The latest year the data are available is 2009.

firms' capitalization has increased to account for more than 40 percent of the total capitalization.

Total liabilities of listed firms have risen significantly and become more concentrated in selected sectors and large firms (Figure 7). While the manufacturing sector has seen a decline in its share of total liabilities, most of the increase has been in the (i) mining and utilities, and (ii) real estate and construction sectors. Real estate and construction accounted for nearly one-quarter of total listed firms' liabilities in 2013, a rise of about 15 percentage points since 2003. Total liabilities are also concentrated in large firms, which include those in real estate and construction sector with the top 50 firms accounting for about half of total liabilities.

IV. LEVERAGE AND PERFORMANCE INDICATORS

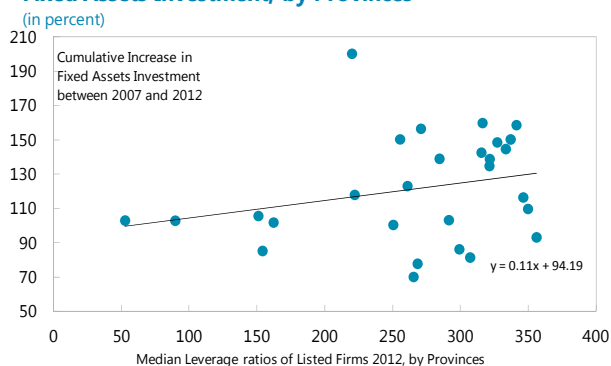
The concentration of liabilities as shown in the last section could increase corporate vulnerabilities if there is also a rise in leverage, a reduction of investment efficiency, or a decline in company's repayment ability. This section looks more closely at the developments of corporate leverage and other financial indicators.

Leverage

The ratio of total liabilities to common equity is used as the main measure of leverage.⁷ On average, private firms have steadily deleveraged over time while SOEs have increased their leverage (Figure 8). The median leverage ratio has stabilized since 2011, but the recent trend varies across sectors and type of firms.

- Private firms in the sample have steadily deleveraged since 2006. The median leverage for private companies has fallen from about 125 percent to 55 percent in 2013. The trend decline holds across leverage percentiles and most industries except for real estate and construction.
- In contrast, the median leverage ratio for SOEs has largely stayed flat at about 110 percent of their equities since 2006. Leverage has significantly increased at the tail end of the distribution at the 75th and 90th percentiles. The increase in leverage has largely been driven by the SOEs in real estate and construction sector (which on average have higher leverage), as well as local SOEs in mining and utilities. Interestingly, the rise of leverage of local SOEs appears to be correlated with the increase in fixed asset investment at the provincial level.

Median Leverage Ratio for Local SOEs and Cumulative Fixed Assets Investment, by Provinces



Sources: WIND database and Staff Estimates

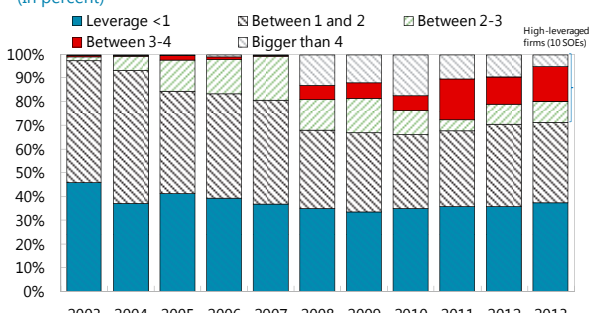
⁷ While using debt-to-equity ratio would make it more comparable to other studies, the debt data (defined as total loans and bonds) are not as comprehensive as the liability data in the listed firm dataset.

- The dynamic of median leverage among listed firms is broadly in line with the dynamic seen in the NBS sample (up to 2009 due to data limitation), suggesting that the listed-firm sample is representative of China’s corporate universe.

Highly leveraged firms account for an increasing share of total debt and liabilities in the corporate sector. Over time, an increasing share of listed firm’s debt and liabilities is attributed to firms with high-leverage ratios (defined to be firms with leverage ratio higher than three times of equity). Across industries, most of the buildup in leverage was in the real estate and construction sector and, to a lesser extent, mining and utilities. Across ownership types, SOEs—mainly local ones—account for a large share of increased borrowing.⁸ In the real estate and construction sector, only about 60 firms with high-leverage ratios account for more than two-thirds the sector’s liabilities in 2013, a rise of nearly three times over the decade. Similar concentration of liabilities is also seen in mining and utilities sectors in which SOEs generally play a greater role.

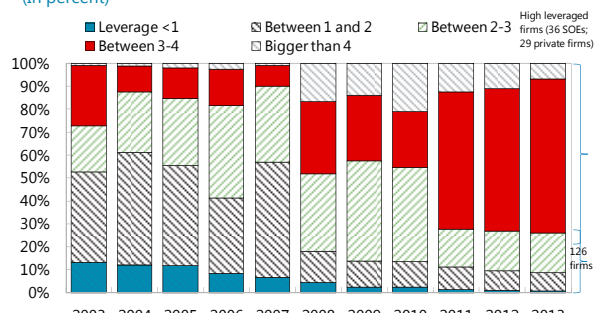
A ‘fat tail’ distribution of corporate liabilities among listed firms likely increases corporate vulnerabilities to shocks. Considering the increasing shift of corporate leverage in real estate and construction as suggested above, the high degree of concentration of liabilities in small number of highly-leveraged firms would likely increase corporate vulnerabilities to shocks.

Share of Total Corporate Liabilities in Mining and Utilities, by Leverage Ratios Group
(In percent)



Sources: WIND database; and IMF staff calculations.

Share of Total Corporate Liabilities in Real Estate and Construction, by Leverage Ratios Group
(In percent)



Sources: WIND database; and IMF staff calculations.

Using the total outstanding balance of bonds and loans (instead of total liabilities) when measuring the leverage ratio would yield similar results (text charts). From the data, the median total outstanding loans and bonds account for 40 percent of total liabilities for firms (or about 70 percent at the 90th percentile), with the rest related to trade credits, account payables, and other borrowing. The rise in leverage, using the narrower definition of bonds and loans, displays a similar trend but a more modest rise.

⁸ Real estate and construction firms have the high leverage on average is understandable given their assets are mostly land, buildings, and materials that could be used as collateral for leverage, but the pace of increase would point to a large buildup of leverage in recent years.

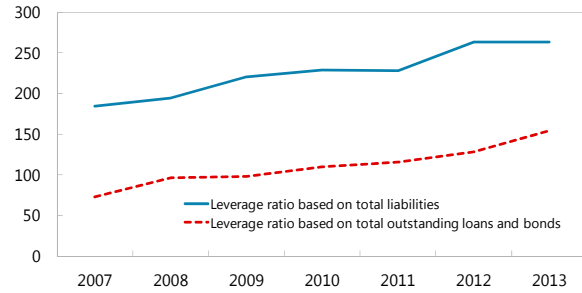
Loans and Bond Outstanding as Percent of Total Liabilities

	Median	90th Percentile
Central SOE	41.8	71.4
Local SOE	40.1	72.8
Private firms	40.3	70.3

Sources: WIND database; and IMF staff calculations.

Comparison of Leverage Ratio Measures for Real Estate and Construction Sector 1/

(In ratio as a percent of earnings before interest and tax)



Sources: WIND database; and IMF staff calculations.

1/ Earlier years before 2007 are subject to small sample size of firms on outstanding loans and bonds.

Financial performance

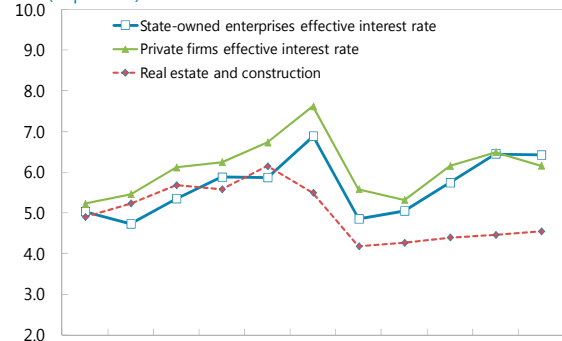
Profitability of listed firms, measured in terms of earnings before interest and tax (EBIT) to total assets, has declined from the periods prior to the global financial crisis, in line with the gradual slowdown in economic growth (Figure 9). There is, however, a significant difference across firms.

- Profitability of SOEs has been much less cyclical than that of private firms. SOEs' profitability only increased slightly up until 2007 and has been mostly stable at slightly less than 5 percent after the global financial crisis. Profitability of private firms, however, increased significantly from early 2000s to the peak in 2007 at over 10 percent, before falling to about 6 percent since 2009.
- Highly leveraged firms (leverage ratio higher than three times of equity) tend to be less profitable by about 1½–2 percentage points relative to other firms. Given their high debt, this implies worse performance after interest payments.

The decline of profitability is also reflected in a general decline of interest coverage ratios across firms, particularly for private firms. The interest coverage ratio has deteriorated from the peak since the onset of the GFC to about 4–6 times of their earnings before interest and tax. SOEs again tend to have lower interest coverage ratios. The effective interest rate⁹ has also been rising since its low in 2009. SOEs have consistently faced lower rates between 2004 and 2009. After 2009, the difference between the rates that SOEs and private firms face seems to disappear. In addition, since 2008, the real estate and construction sector has consistently paid lower interest rates than other firms.

Effective Interest Cost 1/

(In percent)



Sources: WIND database; and IMF staff calculations.

1/ Including interest expenses on short-term and long-term loans, bonds, and debt.

⁹ The effective interest rate for a corporation refers to the annual interest payment as a ratio of its total debt.

Despite the rising interest cost and declining interest coverage ratios, the Z-value—a composite indicator of a firm’s liquidity, profitability, and solvency—seems to suggest that the balance sheets of private firms have improved, while those of SOEs have deteriorated slightly in recent years.

Empirical estimation

Panel regressions are estimated to explore the relationship between leverage and borrowing costs, and other firms’ characteristics.¹⁰ Controlling for firm age and size (measured by assets), the regressions seek to distinguish different groups of firms: by industry and by ownership. The main results are summarized below:

- Prior to the GFC, SOEs had lower leverage than private firms. However, since the GFC SOEs’ leverage has become much higher than that of private firms (Tables 2). Firms with higher leverage face higher borrowing cost.
- SOEs’ borrowing cost is about 20 bps lower than private firms prior to the GFC (Table 3). During the same period, firms from different industries appeared to face similar borrowing cost, controlling for size, age, ownership, and leverage.
- In the post GFC period, the real estate and construction sector stands out for having lower borrowing costs, even after controlling for other characteristics. The wedge between private and SOE firms, however, disappeared in this period. This suggests a privilege access to finance for both state-owned and private real estate and construction firms.

V. SENSITIVITY ANALYSIS

The high leverage in the fat tail of firms, together with shrinking profitability in recent years, could make firms vulnerable to shocks. For example, an interest rate increase could make it more difficult for some firms, particularly those with high leverage, to service their debt. At the same time, an economic slowdown could reduce firm profitability, amplifying the vulnerability to interest rate and profitability shocks.

Stress scenarios are analyzed to gauge firms’ vulnerability. Shocks include higher interest rates and a decline in profitability stemming from a slowdown in real estate.

Baseline

Highly leveraged firms in China tend to have lower profitability and lower interest coverage ratios, and to be less liquid (Table 4 and Figure 8). As stated in the previous section, there is a general decline of interest coverage ratios among listed firms between 2009 and 2013, particularly for private sector firms. Private firms in general have higher earnings available to cover their

¹⁰ Estimation uses random effects; since firms do not change their industry or ownership over time, a fixed effect regression would rule out capturing the effects of these variables. To control for outliers, only observations between the fifth and 95th percentiles of leverage and effective interest cost are used.

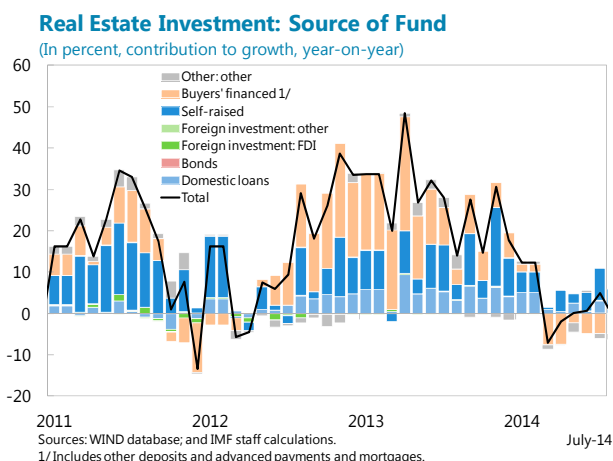
interest payments. Among SOEs, local SOEs generally have less earnings to cover their interest payments. Indeed, around 7 percent of local SOEs have an interest coverage ratio of less than one, a common definition of financial distress. Across sectors, the primary industries appear to have the lowest interest coverage ratios.

The share of “debt at risk,” defined as the amount of loans and bonds of firms in financial distress (interest rate coverage ratio below one) to total loans and bonds of listed firms is about 8 percent.¹¹ By ownership, the share is highest for local SOEs, while, by industry, debt at risk is concentrated in manufacturing. For primary industries, about one-third their debt are at risk but this only accounts for 0.1 percent of total debt of listed firms. While debt at risk in the real estate and construction sector is fairly low (0.7 percent of total debt), the concentration of corporate leverage in the sector which hold about 30 percent of total listed firm debt would imply that any shock to the sector could become systemic.

Sensitivity analysis

This section examines the sensitivity of the corporate sector to changes in interest rates and profits. Specifically, the impact of a real estate slowdown and interest rate shock (Table 5).

- Interest rate shock.** We examine mild scenario with a 100 bps increase in interest cost and a more severe scenario with a 200 bps increase. The analysis focuses on outstanding loans and bonds. A rise in interest rate could also raise the cost of financing in other liabilities, but the scenario abstracts from liabilities other than loans and bonds outstanding because information on the interest cost incurred on those liabilities are not known. For instance, a majority of real estate and construction sector liabilities are in the form of financing sources outside loans and bonds, which could also require interest payments not captured in the dataset (such as “self-raised” funding which likely includes informal borrowing). As a result, the analysis could understate the impact on the real estate and construction sector.



- Profit shock from a real estate slowdown.** The real estate sector accounts for 12–15 percent of the economy’s value added. The sector, including real estate-related activities (such as upstream materials and downstream household appliances), accounts for about one-third of total value added (Zhang, Han, and Chan, 2014). This suggests that a slowdown in real estate activity could affect the sector directly and have a wider adverse impact on the economy. The scenario considers a 10 percent decline in revenue (the moderate scenario) and a 20 percent

¹¹ To put this number into perspective, Spain’s share of debt at risk in the economy was 45 percent in 2010.

decline in revenue (the severe scenario) of the real estate and construction sector. The impact will vary across sector and firm depending on their exposures to real estate. The profit shock is applied to firms in each sector by adjusting for the sector's linkages to the real estate and construction sector. The adjustment is based on estimating the value-added linkages of each sector to real estate and construction. For instance, building materials industry has a very close linkage to real estate (with coefficient of 1.05) while healthcare services have essentially no linkage (with coefficient of 0.02).¹²

Results

- **Interest rate shock**

A moderate increase of interest rate by 100 bps would increase the debt at risk by about 2 percentage points, concentrated in the manufacturing and transportation industries. The share of debt at risk in total debt would increase by 1 percentage point for local SOEs to more than 5 percent.

A more severe shock of a 200 bps increase in interest rate delivers a larger-than-proportionate impact. Total debt at risk could rise by nearly 5½ percentage points to reach 14 percent of total corporate debt among listed firms. Central SOEs would experience the largest rise in debt at risk because of their low interest coverage and relatively higher leverage. Central SOEs' debt at risk would account for about half of total debt at risk in this scenario, compared to only about a third in the baseline.

As in the baseline, many private firms in manufacturing are sensitive to interest rate changes given their thin profit margin. Manufacturing and transportation account for the highest debt at risk from an interest rate shock. Out of the 14 percent debt at risk in the more severe scenario, these two sectors account for more than 10 percentage points. Real estate and construction, however, appear less sensitive to the interest rate shock. However, this result reflects that the shock is applied only to loans and bonds, which make up a small share of liabilities in this sector. If the same interest rate shock were applied to total liabilities, the debt at risk would have risen significantly to about one-third of the total liabilities or near 10 percent of the total debt at risk in the corporate sector (Table 6). The true effect likely lies between these two results.

- **Profit shock from a real estate slowdown**

A moderate decline of revenue (by 10 percent) in the real estate and construction sector appears manageable (Table 7). Given the linkages to real estate and construction, other sectors would face a varying degree of profitability shock. It would increase the debt at risk from 8 percent in the baseline to about 11 percent of total corporate debt. SOEs account for most of the increase

¹² The coefficients are estimated based on the 2010 input-output table across sectors based on (IMF, 2014 and Zhang, 2014).

in debt at risk while total debt at risk concentrates in the manufacturing sector, mainly because of their strong linkages to the real estate sector. The real estate and construction sector appears to be able to withstand a 10 percent decline in profits with the number of firms and the amount of debt at risk increasing only marginally. The adverse impact relative to the baseline in industries that are less connected to real estate (such as primary industry and information technology) is small.

A more severe slowdown (real estate profit declining by 20 percent) would have a significant impact on the corporate sector. Debt at risk would reach nearly one-quarter of total corporate debt, three times the size of debt at risk in the baseline. In particular, real estate and construction sector firms would face significant financial distress under the severe scenario, with their debt at risk rising sharply. The median interest coverage ratio in the sector would fall to only 2½ times of profits with 16 percent of firms in the sector (accounting for 11 percent of total corporate debt) in financial distress. In addition, about 60 percent of the increase in debt at risk would belong to the real estate and construction sector. Manufacturing and transportation continue to be most affected by the downturn in real estate. Local SOEs, largely overlapped with the real estate sector, would see their debt at risk more than triple. About 20 percent of SOEs would be in distress, facing an interest coverage ratio of below one.

- **Combined shocks.**

A combination of the interest rate and profit shocks suggest that the corporate sector is more sensitive to profit decline due to a real estate slowdown (Table 8). Adding the interest rate shock to the profit shock would further reduce the interest coverage (in particular at lower percentiles) but would not significantly raise debt at risk. This is because firms falling into financial distress under the profit shock scenario are often those that are also vulnerable to interest rate shocks. As a result, the marginal increase of debt at risk (both in number of firms and in amount) relative to the severe profit shock scenario is small. Under the severe combined shock scenario, a sizeable fraction of firms in each sector would fall into financial distress. Most of the firms in financial distress are SOEs (about 15–18 percent of SOEs), particularly for those local SOEs with higher leverage.

Some firms would also face negative earnings in face of a real estate slowdown (Figure 10). A more detailed breakdown of industries illustrates that those with strong linkage to real estate such as household appliances and construction materials are more sensitive to a profit shock from a real estate slowdown. For example, half of the firms in household appliance sector would face negative earnings, a much higher proportion than in the baseline. The average return on assets would decline by nearly 10 percentage points.

VI. CONCLUSION

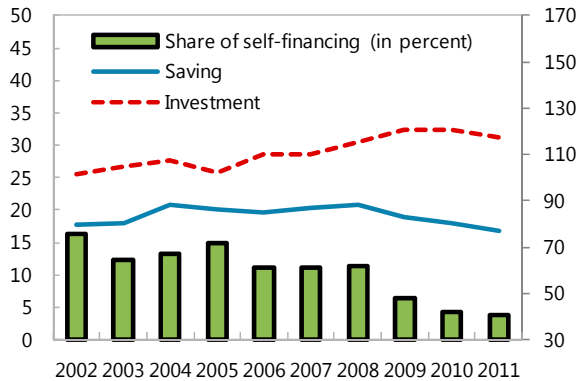
The Chinese corporate sector has increased its borrowing since the GFC, keeping up investment as profits fell. Most of the borrowing was done domestically through the banking system as well as nonbank financial intermediaries, although some larger firms have also tapped external sources. As a result, corporate debt has increased by over 30 percent of GDP

from 2009 to around 150 percent of GDP at end-2013. To assess the risk of the increase in the debt level, it is important to understand at the distribution of debt, leverage and ability to pay across firms. This paper uses a data set of listed firms from 2003 to 2013 to assess the risk and vulnerability of the Chinese corporate sector. The main findings are:

- On average, Chinese firms' leverage is not high. In fact, private listed firms have reduced their leverage ratio since the GFC. However, SOEs' leverage at the tail end of the distribution has significantly increased. The rise in leverage has largely been driven by those in the real estate and construction sector as well as in mining and utilities. Over time, an increasing share of listed firm's debt and liabilities is attributed to a few firms with high leverage ratios, illustrating a pocket of vulnerability.
- There is evidence that in the aftermath of the GFC, both private and state-owned real estate and construction firms face lower borrowing cost than firms in other sectors, controlling for firms' characteristics. Consequently, firms in the real estate and construction sector are able to withstand a modest interest rate shock despite their high leverage. They would be more sensitive however if interest rate shock is also applied to liabilities other than just loans and bonds. Private firms in manufacturing are also vulnerable to interest rate increase given their thin profit margin. Central SOEs would experience the largest rise in debt at risk (debt under financial distress, defined by interest coverage ratio below one) with an increase in interest rate.
- The Chinese corporate sector is sensitive to a significant slowdown in the real estate and construction sector. Firms in the real estate and construction sector would face significant financial distress with their debt at risk rising sharply. Other sectors that are closely related to real estate activity such as manufacturing and transportation would also be strongly affected. Altogether, total debt at risk could rise to about a quarter of total debt of listed firms in the event of a 20 percent decline in real estate and construction profit.

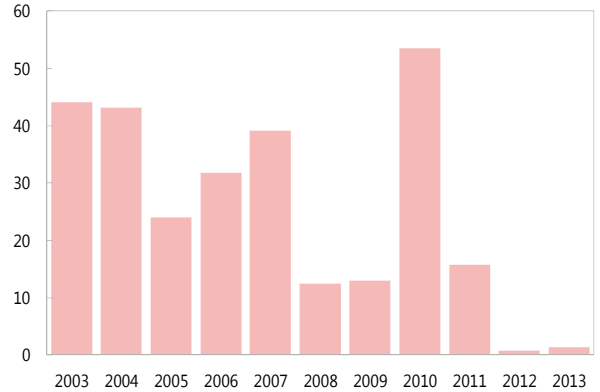
Figure 1. China: Corporate Profit, Saving and Investment

China: Corporate saving and investment
(in percent of GDP)



Sources: CEIC China and staff calculations.

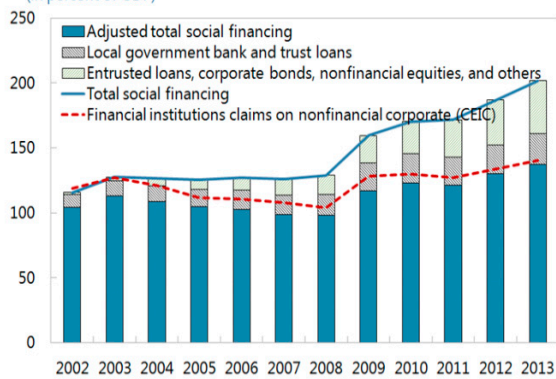
Industrial Profit Growth
(In percent)



Sources: CEIC and IMF staff calculations.

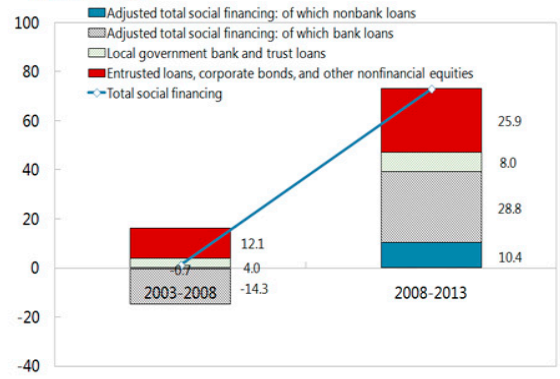
Figure 2. China: Corporate Indebtedness

Adjusted Total Social Financing, by Components
(in percent of GDP)



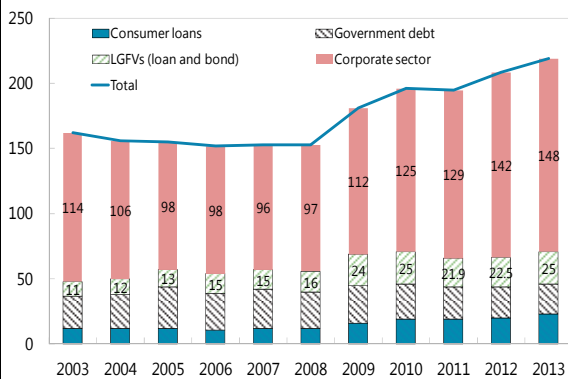
Sources: CEIC, Staff estimates

Overall Credit Growth, by Components
(in percent of GDP)



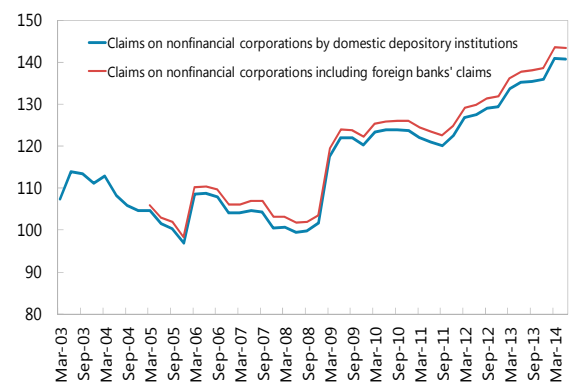
Sources: CEIC and staff estimates.

Total Domestic Credit in China, by Sector
(in percent of GDP based on total social financing indicators)



Sources: WIND database, PBoC, GS, and staff estimates

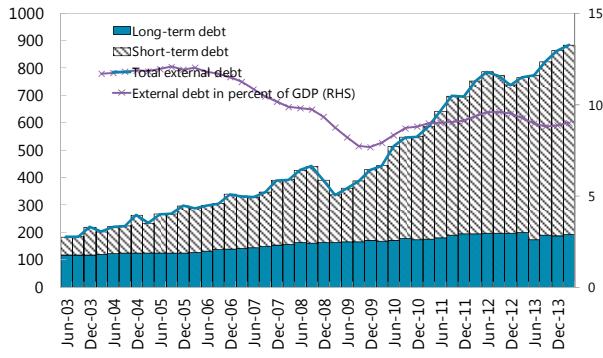
Total Nonfinancial Corporate Debt
(In percent of GDP)



Source: Haver.

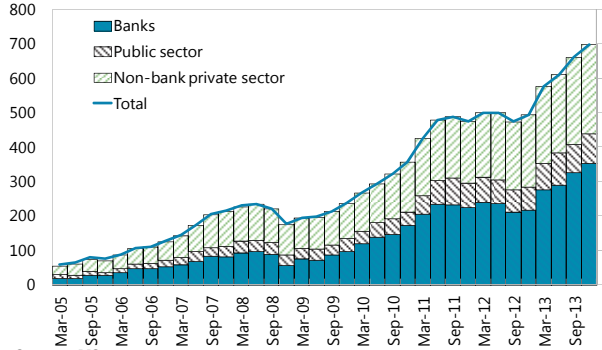
Figure 3. China: External Debt Development

China: External Debt Composition
(in billions of USD)



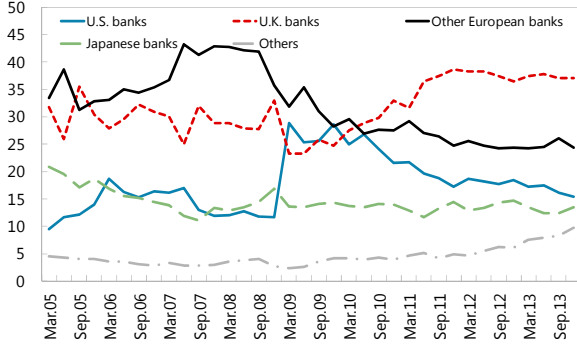
Sources: CEIC

Consolidated Foreign Claims on China by Sectors
(in USD billions)



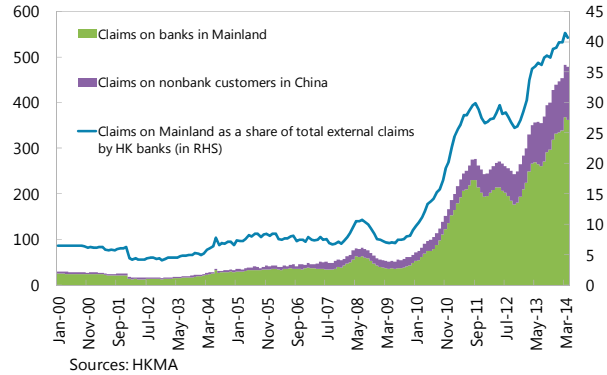
Sources: BIS

Consolidated Claims of Foreign Banks on China across Countries (in percent)



Sources: BIS

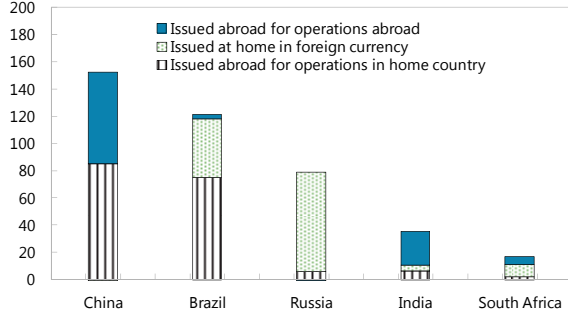
Hong Kong SAR Banks' Claims on Mainland
(in USD billions and in percent of total foreign claims of HK banks)



Sources: HKMA

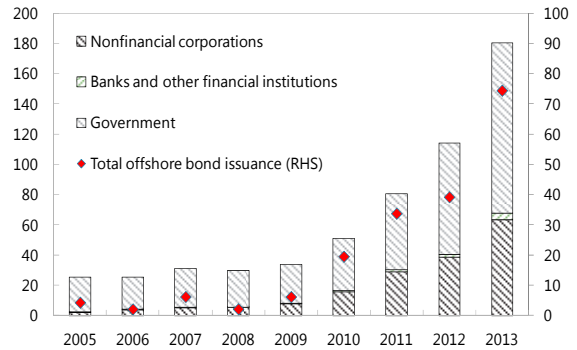
Figure 4. China: Offshore Issuance

Breakdown of int. bond issuance since 2010Q1 1/
billions of USD



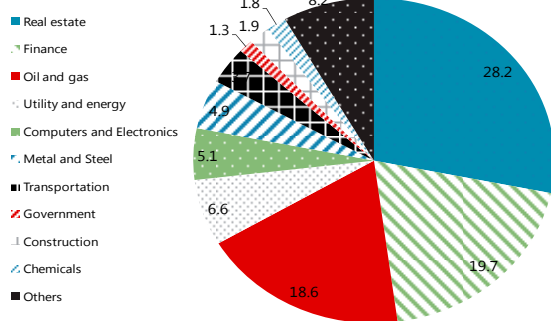
Sources: Dealogic and staff calculations
1/ Sum of the 3 categories. Net matured bonds. Not accounted for call options and amortization schedules.

Offshore Bond Outstanding by Sectors and Issuance by Chinese Entities (in USD billions)



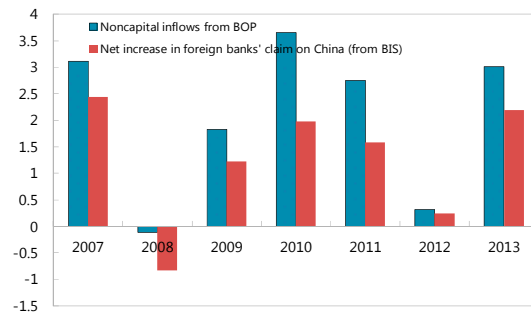
Sources: Dealogic.

China Offshore Bond Outstanding, by Industry
(in percent as of end-June 2014)



Sources: Dealogic.

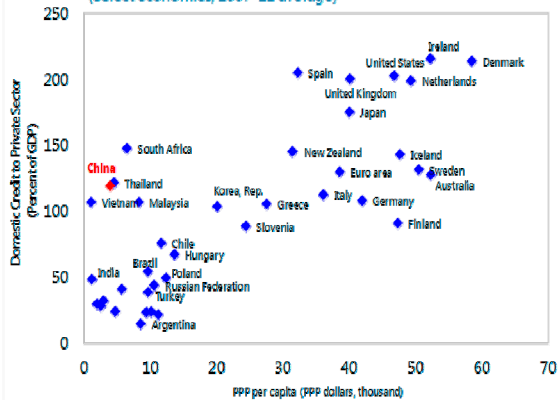
Non-FDI Capital Inflows and External Borrowing
(in percent of GDP)



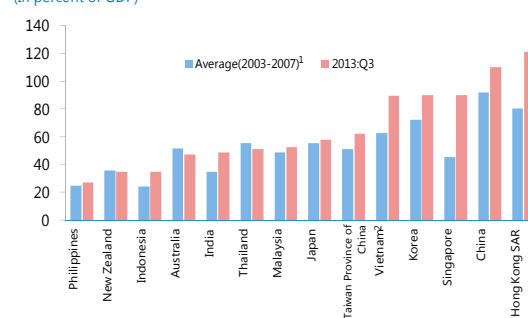
Sources: CEIC and BIS.

Figure 5. International Comparison on Corporate Credit

Domestic Credit to Private Sector and PPP per Capita
(Select economies, 2007-11 average)



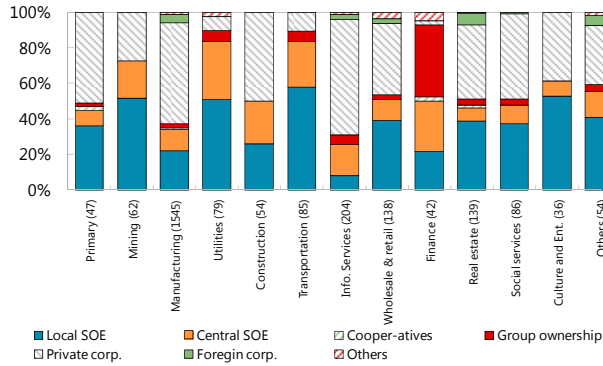
Nonfinancial Corporate Credit-to-GDP Ratio
(In percent of GDP)



Sources: CEIC Data Co.ltd; HAVER Analytics;and IMF staff calculations.
1/Except for Singapore, which is average for 2004/07, and for China, which is average for 2007 only.
2/For Vietnam graph shows private sector credit-to-GDP ratio.

Figure 6. China: Financial Position of Listed Firms

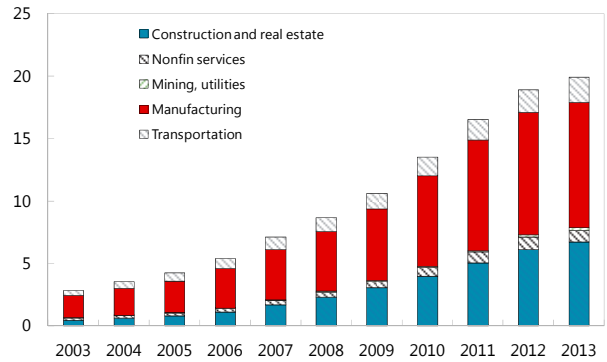
Distribution of Listed Firms, by Control Entities and Industrie
(In percent of total number of firms, end-2012)



Sources: WIND, and IMF staff estimates.

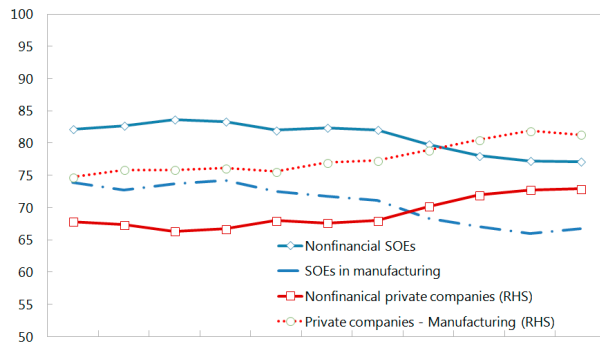
1/ Numbers in parentheses indicate the total number of listed companies in each industry.

Total Firm Assets of Listed Companies, by Industries
(in trillions of RMB)



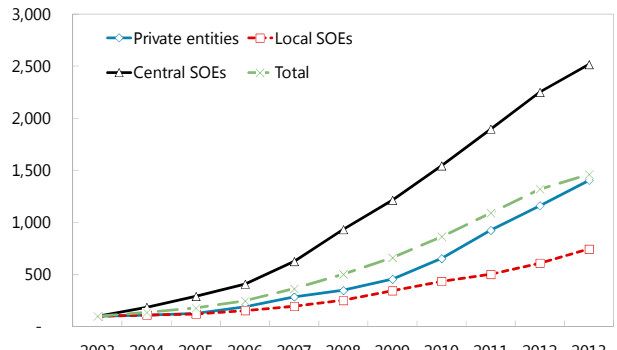
Sources: WIND database and staff estimates

Share of Total Firm Assets, by Enterprise Type
(in percent)



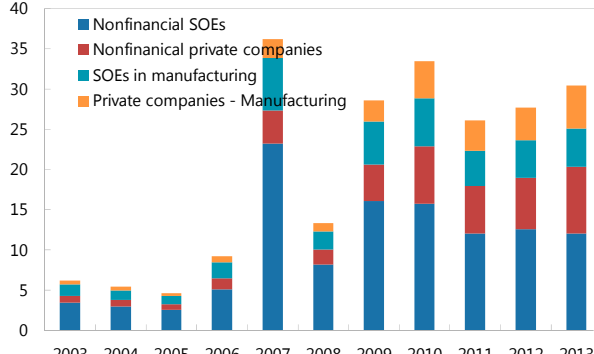
Sources: WIND and staff estimates.

Growth in Total Firm Assets: Construction and Real Estate
(scaled to 2003=100 for each enterprise type)



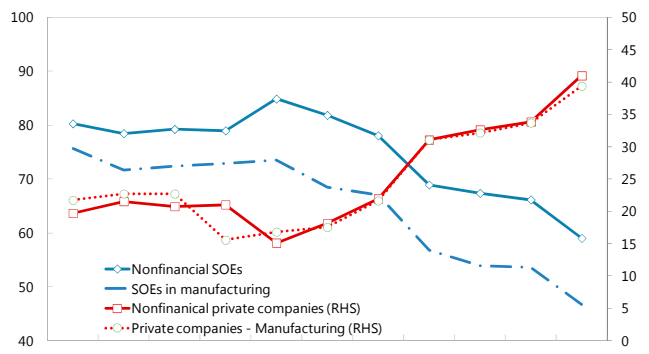
Sources: staff estimates and WIND database.

Total Market Capitalization of Listed Firms
(in trillions of RMB)



Sources: WIND and staff estimates.

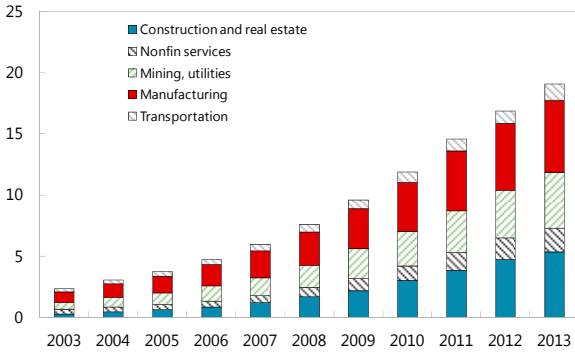
Share of Total Firm Market Capitalization, by Enterprise Types
(in percent)



Sources: WIND and staff estimates.

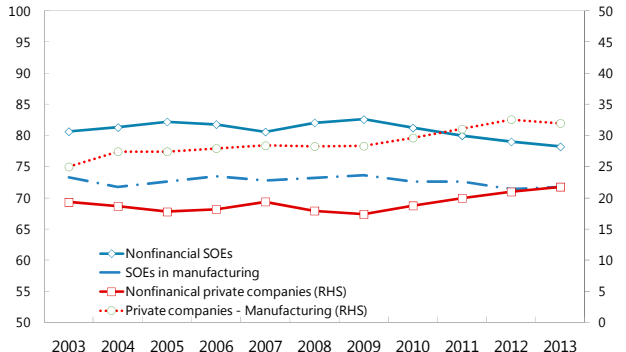
Figure 7. China: Distribution of Corporate Indebtedness Among Listed Firms

Total Liabilities of Listed Companies, by Industries
(in trillions of RMB)



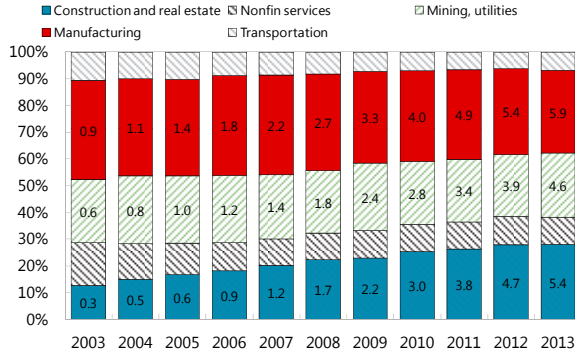
Sources: WIND database and staff estimates

Share of Total Firms' Liabilities, by Enterprise Types
(in percent)



Sources: WIND and staff estimates.

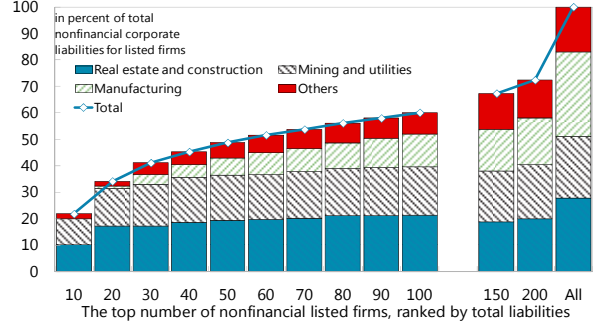
Total Liabilities of Listed Companies, by Industries
(in percent of total)



Sources: WIND database and staff estimates

1/ Numbers indicate the total liabilities in RMB trillions.

Concentration Index for Corporate Debt, by Industries^{1/}
(in percent)

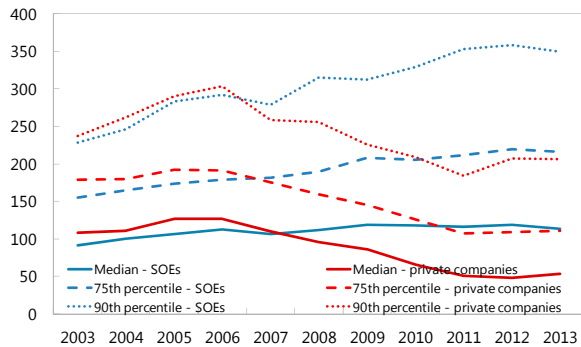


Sources: WIND database and staff estimates.

1/ The top 10 nonfinancial listed firms account for over 20 percent of total corporate liabilities among nonfinancial listed firms, mostly from real estate and construction, and mining and utilities.

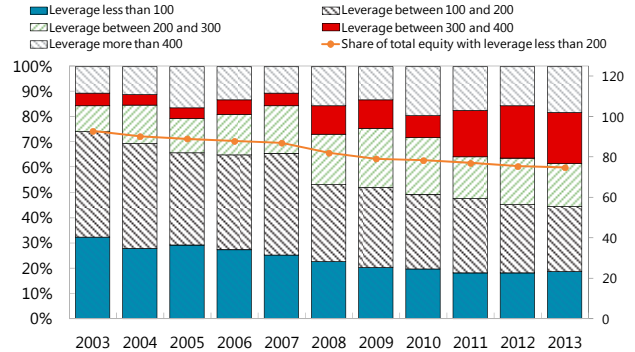
Figure 8. Corporate Leverage

Leverage Ratios (In percent)



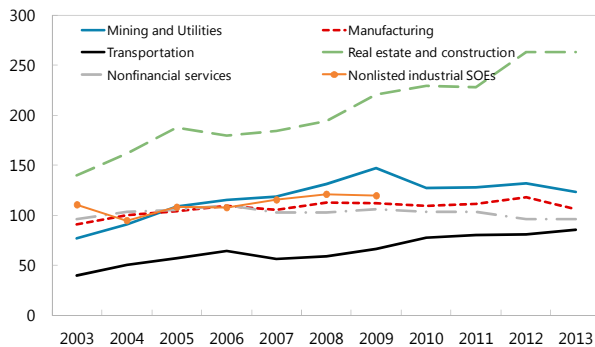
Sources: WIND database; and IMF staff estimates.

Share of Total Corporate Liabilities, by Leverage Ratios (In percent)



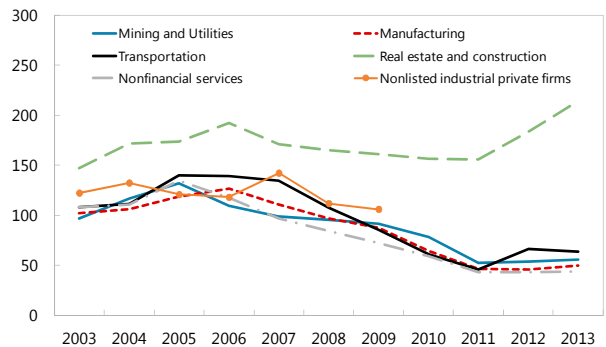
Sources: WIND database; and IMF staff estimates.

Leverage Ratios Across Industries (Median leverage ratios for SOEs; in percent)



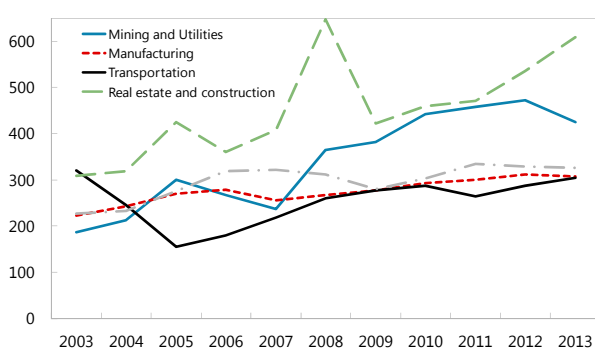
Sources: WIND database; and IMF staff estimates.

Leverage Ratios Across Industries (Median leverage ratios for private companies; in percent)



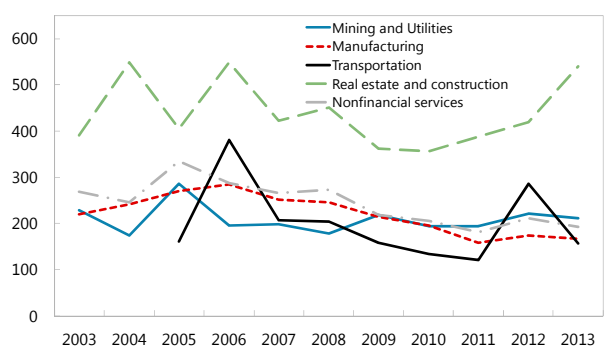
Sources: WIND database; and IMF staff estimates.

Leverage Ratios Across Industries (Leverage ratios at 90th percentile for SOEs; in percent)



Sources: WIND database; and IMF staff estimates.

Leverage Ratios Across Industries (Leverage ratios at 90th percentile for private companies; in percent)

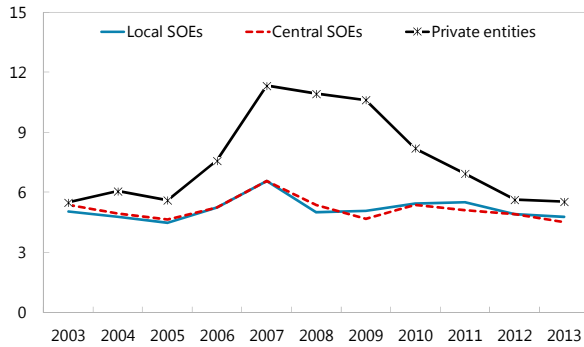


Sources: WIND database; and IMF staff estimates.

Figure 9. Financial Performance of Listed Firms

Profitability of Listed Firms

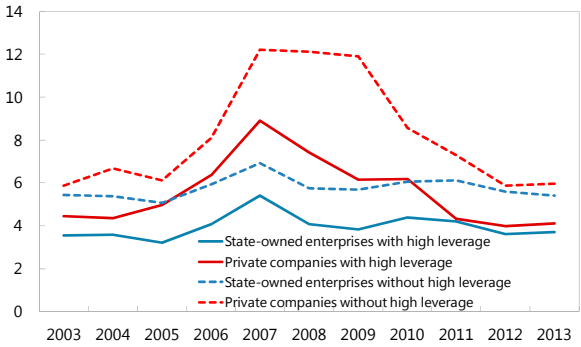
(Earnings before interest and tax as a percent of total assets)



Sources: WIND database; and IMF staff estimates

Profitability of Listed Firms, by Leverage Levels

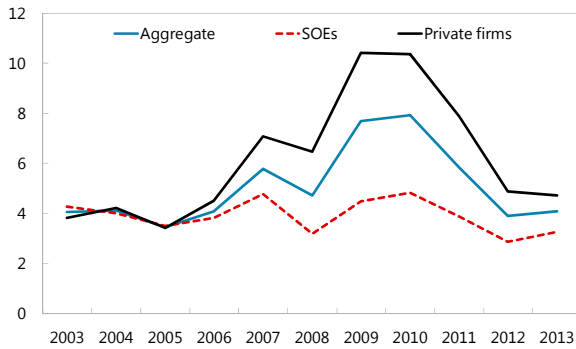
(In percent)



Sources: WIND database; and IMF staff estimates.

Interest Coverage Ratio

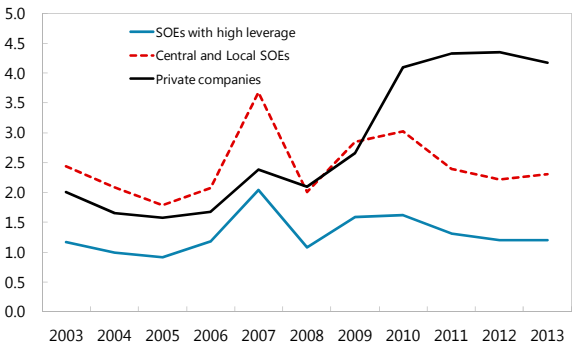
(In number of times of earnings before interest and tax (EBIT))



Sources: WIND database; and IMF staff estimates.

Median Z-scores by Enterprise Types

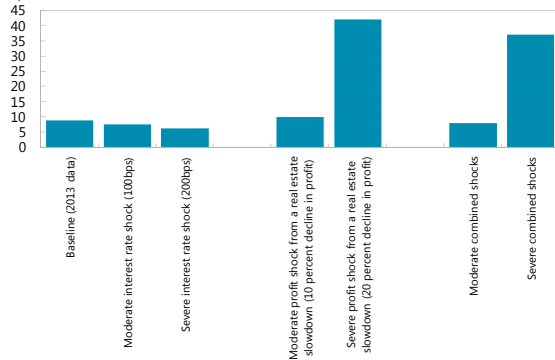
(Index)



Sources: WIND database; and IMF staff estimates.

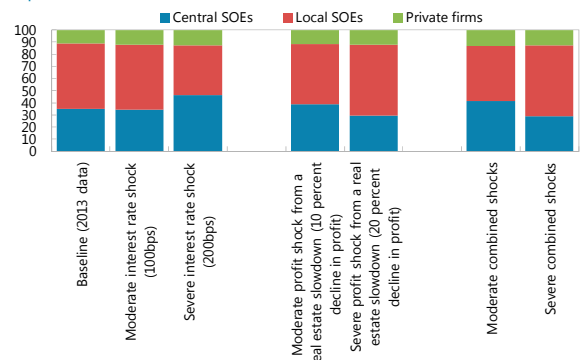
Figure 10. Sensitivity Analysis—Interest Rate and Profit Shocks

Sensitivity Analysis on Real Estate and Construction Sector (In percent of total debt at risk in each scenario)



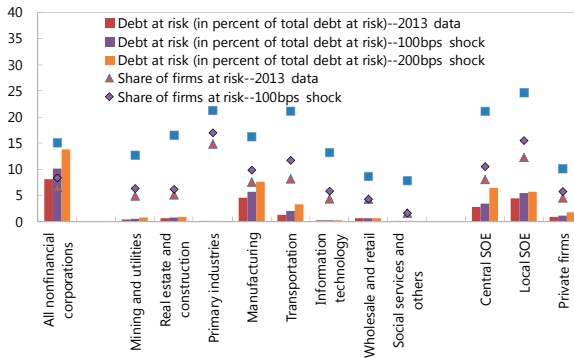
Sources: WIND database; and IMF staff estimates.

Sensitivity Analysis by Type of Ownership (In percent of total debt at risk in each scenario)



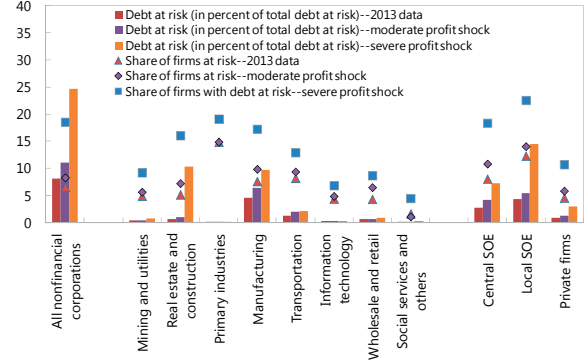
Sources: WIND database and staff estimates.

Sensitivity Analysis—Interest Rate Shocks (In percent)



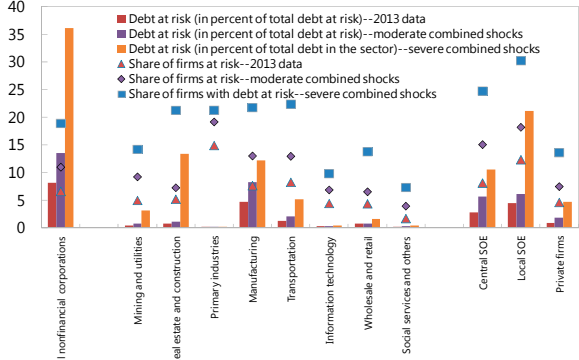
Sources: WIND database and staff estimates.

Sensitivity Analysis—Profit Shock from a Real Estate Slowdown (In percent)



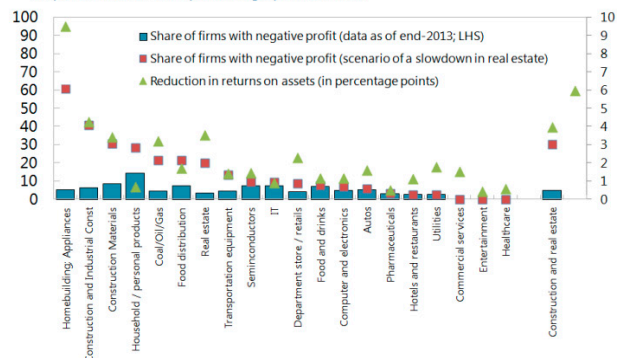
Sources: WIND database; and IMF staff estimates.

Sensitivity Analysis—Combined Interest Rate and Profit Shocks (In percent)



Sources: WIND database; and IMF staff estimates.

Impact across Sectors from a Slowdown in Real Estate (in percent (LHS) or in percentage points (RHS))



Sources: WIND and staff estimates.

Table 1. Number of Firms in the WIND Database, by Enterprise Nature and Industries

	Local SOE	Central SOE	Cooperatives	Group ownership	Private corp.	Foregin corp.	Others	Total
Primary (47)	17	4	1	1	24			47
Mining (62)	32	13			17			62
Manufacturing (1545)	342	181	12	40	879	68	23	1545
Utilities (79)	40	26		5	6		2	79
Construction (54)	14	13			27			54
Transportation (85)	49	22		5	9			85
Info. Services (204)	16	36		11	133	5	3	204
Wholesale & retail (138)	54	16		4	55	4	5	138
Finance (42)	9	12	1	17	1		2	42
Real estate (139)	54	10	2	5	58	9	1	139
Social services (86)	32	9		3	41	1		86
Culture and Ent. (36)	19	3			14			36
Others (54)	22	8		2	18	3	1	54
Total	700	353	16	93	1282	90	37	2571

Sources: WIND database and staff estimates.

Table 2. Leverage Regression 1/

	All		2003-08		2009-13	
Size	4.256	***	13.208	***	6.862	***
Age	-1.334	***	-0.435	**	-0.986	***
Ownership						
SOEs	16.748	***	-19.697	***	28.111	***
Others	9.550	**	-10.659	**	10.750	***
Industry						
Mining	2.574		4.847		-3.543	
Manufacturing	11.863	**	13.181	*	8.193	
Utilities	28.499	***	17.315	*	35.327	***
Construction	69.506	***	70.039	***	63.991	***
Transportation	-15.085	*	-28.367	***	-4.506	*
IT	-9.829		-1.178		-12.749	
Wholesale/Retail	44.530	***	33.813	***	44.286	***
Real estate	57.901	***	35.286	***	59.065	***
Health and social work	-1.592		-3.430		-3.298	
Culture, sport and entertainment	-0.325		12.602		-13.510	
Group holding	31.226	***	19.744	*	25.382	**
Constant	63.083	***	23.703	*	32.310	***
R2	0.0674		0.0739		0.118	
Obs	17104		8494		8610	

Sources: WIND database; and IMF staff calculations.

1/ ***, **, * indicate a p-value lower than 1 percent, 5 percent, and 10 percent respectively.

Table 3. Effective Interest Cost Regression 1/

	All		2003-08		2009-13	
Size	-0.263	***	-0.230	***	-0.130	***
Age	0.019	***	0.066	***	0.010	*
Leverage (t-1)	0.006	***	0.006	***	0.005	***
Ownership						
SOEs	0.047		-0.191	**	0.059	
Others	-0.047		-0.255	*	0.023	
Industry						
Mining	0.007		0.302		-0.231	
Manufacturing	0.320	*	0.362		0.303	
Utilities	0.146		-0.091		0.429	
Construction	-0.512	*	-0.346		-0.632	**
Transportation	-0.125		-0.077		-0.329	
IT	0.068		0.360		-0.084	
Wholesale/Retail	0.183		0.158		0.107	
Real estate	-0.374		-0.458		-0.604	*
Health and social work	0.292		0.280		0.276	
Culture, sport and entertainment	-0.018		0.015		-0.023	
Group holding	0.114		-0.215		0.047	
Constant	6.661	***	6.175	***	5.794	***
R2	0.0367		0.029		0.0489	
Obs	10591		5612		4979	

Sources: WIND database; and IMF staff calculations.

1/ ***, **, * indicate a p-value lower than 1 percent, 5 percent, and 10 percent respectively.

Table 4. Interest Coverage Ratios and Financial Distress Firms

	Interest coverage ratio 1/				Share of financially distressed firms in each group 2/	Share of debt at risk in each group	Share of total debt at risk	percentage of firms in each group (data)			
	2009		2013					2013	2013	number of firms	share of debt
	Lowest decile	Median	Lowest decile	Median							
All nonfinancial corporations	1.27	7.69	0.94	4.10	9.2	8.1	8.1	100.0	100.0		
<i>By industry:</i>											
Mining and utilities	1.30	4.63	1.19	3.51	6.5	1.8	0.4	5.6	23.5		
real estate and construction	1.25	5.27	1.41	3.83	7.1	2.4	0.7	7.6	29.3		
Primary industries	0.65	5.91	-0.86	2.50	23.3	35.6	0.1	1.9	0.3		
Manufacturing	1.20	8.27	0.74	3.88	10.7	15.3	4.6	61.1	30.1		
Transportation	1.24	6.22	0.92	3.26	10.4	18.4	1.2	3.4	6.7		
Information technology	1.98	22.72	1.10	6.33	6.7	6.8	0.3	8.1	3.8		
Wholesale and retail	1.53	6.63	1.41	4.77	6.3	19.7	0.7	5.5	3.4		
Social services and others	1.13	6.39	1.69	7.04	2.3	2.9	0.1	7.0	2.8		
<i>By ownership:</i>											
Central SOE	0.95	4.43	0.85	3.35	10.4	10.7	2.8	27.3	26.2		
Local SOE	1.14	4.72	0.41	3.19	14.7	8.5	4.4	13.5	51.8		
Private firms	1.81	10.42	1.17	4.74	7.0	4.1	0.9	59.2	22.1		

Sources: WIND database; and IMF staff calculations.

1/ Earnings before interest and taxes divided by financing cost on interest payments.

2/ Financially distressed firms is characterized if the interest coverage ratio is less than one.

Table 5. Sensitivity Test Results of the Interest Rate Shock

	Interest rate coverage ratio 1/		Debt at risk 2/			Interest rate coverage ratio		Debt at risk			Interest rate coverage ratio		Debt at risk		
	2013 data					100 bps shock					200 bps shock				
	Lowest decile	Median	Share of firms in the sector	Share in each group	in percent of total	Lowest decile	Median	Share of firms in the sector	Share in each group	in percent of total	Lowest decile	Median	Share of firms in the sector	Share in each group	in percent of total
All nonfinancial corporations	0.9	4.1	6.6	8.1	8.1	0.8	3.6	8.4	10.2	10.2	0.7	3.1	15.1	13.8	13.8
<i>By industry:</i>															
Mining and utilities	1.2	3.5	5.0	1.8	0.4	1.2	3.5	6.4	2.2	0.5	0.9	2.6	12.8	3.3	0.8
real estate and construction	1.4	3.8	5.2	2.4	0.7	1.4	3.8	6.2	2.6	0.8	1.0	3.0	16.6	2.9	0.9
Primary industries	-0.9	2.5	14.9	35.6	0.1	-0.9	2.5	17.0	36.5	0.1	-0.6	1.6	21.3	38.3	0.1
Manufacturing	0.7	3.9	7.6	15.3	4.6	0.7	3.9	9.9	18.9	5.7	0.5	3.0	16.2	25.4	7.7
Transportation	0.9	3.3	8.2	18.4	1.2	0.9	3.3	11.8	31.0	2.1	0.7	2.4	21.2	49.2	3.3
Information technology	1.1	6.3	4.4	6.8	0.3	1.1	6.3	5.9	7.0	0.3	0.6	4.6	13.2	7.0	0.3
Wholesale and retail	1.4	4.8	4.3	19.7	0.7	1.4	4.8	4.3	19.7	0.7	1.2	3.5	8.7	20.0	0.7
Social services and others	1.7	7.0	1.7	2.9	0.1	1.7	7.0	1.7	2.9	0.1	1.2	5.1	7.9	6.4	0.2
<i>By ownership:</i>															
Central SOE	0.8	3.3	8.1	10.7	2.8	0.7	2.8	10.6	13.3	3.5	0.7	2.5	21.1	24.5	6.4
Local SOE	0.4	3.2	12.3	8.5	4.4	0.1	2.6	15.5	10.6	5.5	0.1	2.3	24.6	11.0	5.7
Private firms	1.2	4.7	4.6	4.1	0.9	0.3	4.2	5.8	5.5	1.2	0.9	3.7	10.1	7.9	1.7

Sources: WIND database; and IMF staff calculations.

1/ Earnings before interest and taxes divided by financing cost on interest payments.

2/ Financially distressed firms is characterized if the interest coverage ratio is less than one.

Table 6. Sensitivity of Interest Rate Shocks on Total Debt and Total Liabilities

	Interest rate		Debt at risk			Interest rate		Debt at risk		
	200 bps shock on loans and bonds					200bps shock on total liabilities				
	Lowest decile	Median	Share of firms in the sector	Share in each group	in percent of total	Lowest decile	Median	Share of firms in the sector	Share in each group	in percent of total
All nonfinancial corporations	0.7	3.1	15.1	13.8	13.8	0.6	2.4	15.2	29.8	29.8
<i>By industry:</i>										
Mining and utilities	0.9	2.6	12.8	3.3	0.8	0.8	2.1	12.8	11.8	2.8
real estate and construction	1.0	3.0	16.6	2.9	0.9	0.7	1.7	16.6	33.4	9.8
Primary industries	-0.6	1.6	21.3	38.3	0.1	-0.5	1.5	21.3	39.3	0.1
Manufacturing	0.5	3.0	16.2	25.4	7.7	0.5	2.5	16.4	33.6	10.1
Transportation	0.7	2.4	21.2	49.2	3.3	0.5	2.1	22.4	76.4	5.1
Information technology	0.6	4.6	13.2	7.0	0.3	0.2	4.0	13.2	9.9	0.4
Wholesale and retail	1.2	3.5	8.7	20.0	0.7	0.8	2.4	8.7	32.6	1.1
Social services and others	1.2	5.1	7.9	6.4	0.2	0.9	3.8	8.4	11.2	0.3
<i>By ownership:</i>										
Central SOE	0.7	2.5	21.1	24.5	6.4	0.5	1.9	21.3	35.0	9.2
Local SOE	0.1	2.3	24.6	11.0	5.7	0.1	1.9	25.2	33.8	17.5
Private firms	0.9	3.7	10.1	7.9	1.7	0.8	3.0	10.2	14.3	3.1

Sources: WIND database; and IMF staff calculations.

1/ Earnings before interest and taxes divided by financing cost on interest payments.

2/ Financially distressed firms is characterized if the interest coverage ratio is less than one.

Table 7. Sensitivity Test Results of the Profit Shock

	Interest rate coverage ratio 1/					Debt at risk 2/					Interest rate coverage ratio					Debt at risk				
	2013 data					10 percent decline in profit					20 percent decline in profit									
	Lowest decile	Median	Share of firms in the sector	Share in each group	in percent of total	Lowest decile	Median	Share of firms in the sector	Share in each group	in percent of total	Lowest decile	Median	Share of firms in the sector	Share in each group	in percent of total					
All nonfinancial corporations	0.9	4.1	6.6	8.1	8.1	0.8	3.6	8.3	11.0	11.0	-0.1	3.0	18.6	24.6	24.6					
<i>By industry:</i>																				
Mining and utilities	1.2	3.5	5.0	1.8	0.4	1.1	3.2	5.7	1.8	0.4	0.8	2.9	9.2	3.4	0.8					
real estate and construction	1.4	3.8	5.2	2.4	0.7	0.9	3.2	7.3	3.7	1.1	0.3	2.4	16.1	35.3	10.3					
Primary industries	-0.9	2.5	14.9	35.6	0.1	-0.9	2.5	14.9	35.6	0.1	-0.9	2.1	19.1	38.3	0.1					
Manufacturing	0.7	3.9	7.6	15.3	4.6	0.6	3.4	9.9	21.2	6.4	-0.6	2.7	17.3	32.1	9.7					
Transportation	0.9	3.3	8.2	18.4	1.2	0.9	3.3	9.4	29.2	2.0	0.4	2.9	12.9	32.1	2.2					
Information technology	1.1	6.3	4.4	6.8	0.3	0.7	6.1	4.9	6.9	0.3	-0.1	5.8	6.9	8.3	0.3					
Wholesale and retail	1.4	4.8	4.3	19.7	0.7	1.0	4.6	6.5	21.1	0.7	0.2	4.1	8.7	25.4	0.9					
Social services and others	1.7	7.0	1.7	2.9	0.1	1.6	6.5	1.1	2.7	0.1	1.2	5.8	4.5	11.9	0.3					
<i>By ownership:</i>																				
Central SOE	0.8	3.3	8.1	10.7	2.8	0.7	3.0	10.9	16.4	4.3	-0.1	2.5	18.4	27.6	7.2					
Local SOE	0.4	3.2	12.3	8.5	4.4	-0.2	2.9	14.1	10.5	5.5	-1.0	2.1	22.6	27.9	14.5					
Private firms	1.2	4.7	4.6	4.1	0.9	1.0	4.3	5.9	5.9	1.3	0.2	3.7	10.7	13.4	2.9					

Sources: WIND database; and IMF staff calculations.

1/ Earnings before interest and taxes divided by financing cost on interest payments.

2/ Financially distressed firms is characterized if the interest coverage ratio is less than one.

Table 8. Sensitivity Test Results of the Combined Interest Rate and Profit Shocks

	Interest rate coverage ratio 1/					Debt at risk 2/					Interest rate coverage ratio					Debt at risk					Interest rate coverage ratio					Debt at risk									
	2013 data					100 bps shock					200 bps shock					10 percent decline in profit					20 percent decline in profit					Combined shock: 10 percent decline in profit and 100bps rise in interest rate					Combined shock: 20 percent decline in profit and 200bps rise in interest rate				
	Lowest decile	Median	Share of firms in the sector	Share in each group	in percent of total	Lowest decile	Median	Share of firms in the sector	Share in each group	in percent of total	Lowest decile	Median	Share of firms in the sector	Share in each group	in percent of total	Lowest decile	Median	Share of firms in the sector	Share in each group	in percent of total	Lowest decile	Median	Share of firms in the sector	Share in each group	in percent of total	Lowest decile	Median	Share of firms in the sector	Share in each group	in percent of total	Lowest decile	Median	Share of firms in the sector	Share in each group	in percent of total
All nonfinancial corporations	0.9	4.1	6.6	8.1	8.1	0.8	3.6	8.4	10.2	10.2	0.7	3.1	15.1	13.8	13.8	0.8	3.6	8.3	11.0	11.0	-0.1	3.0	18.6	24.6	24.6	0.6	3.2	11.0	13.5	13.5	-0.1	2.3	18.9	36.1	36.1
<i>By industry:</i>																																			
Mining and utilities	1.2	3.5	5.0	1.8	0.4	1.2	3.5	6.4	2.2	0.5	0.9	2.6	12.8	3.3	0.8	1.1	3.2	5.7	1.8	0.4	0.8	2.9	9.2	3.4	0.8	1.0	2.8	9.2	3.3	0.8	0.6	2.0	14.2	13.3	3.1
real estate and construction	1.4	3.8	5.2	2.4	0.7	1.4	3.8	6.2	2.6	0.8	1.0	3.0	16.6	2.9	0.9	0.9	3.2	7.3	3.7	1.1	0.3	2.4	16.1	35.3	10.3	0.8	2.9	7.3	3.7	1.1	0.3	1.6	21.2	45.3	13.3
Primary industries	-0.9	2.5	14.9	35.6	0.1	-0.9	2.5	17.0	36.5	0.1	-0.6	1.6	21.3	38.3	0.1	-0.9	2.5	14.9	35.6	0.1	-0.9	2.1	19.1	38.3	0.1	-0.7	1.9	19.1	38.3	0.1	-0.7	1.5	21.3	39.3	0.1
Manufacturing	0.7	3.9	7.6	15.3	4.6	0.7	3.9	9.9	18.9	5.7	0.5	3.0	16.2	25.4	7.7	0.6	3.4	9.9	21.2	6.4	-0.6	2.7	17.3	32.1	9.7	0.5	3.0	13.0	27.2	8.2	-0.5	2.1	21.7	40.4	12.2
Transportation	0.9	3.3	8.2	18.4	1.2	0.9	3.3	11.8	31.0	2.1	0.7	2.4	21.2	49.2	3.3	0.9	3.3	9.4	29.2	2.0	0.4	2.9	12.9	32.1	2.2	0.8	2.6	12.9	31.0	2.1	0.3	1.9	22.4	75.7	5.1
Information technology	1.1	6.3	4.4	6.8	0.3	1.1	6.3	5.9	7.0	0.3	0.6	4.6	13.2	7.0	0.3	0.7	6.1	4.9	6.9	0.3	0.5	5.5	6.9	7.5	0.3	0.5	5.5	6.9	7.5	0.3	-0.4	4.6	9.8	9.2	0.3
Wholesale and retail	1.4	4.8	4.3	19.7	0.7	1.4	4.8	4.3	19.7	0.7	1.2	3.5	8.7	20.0	0.7	1.0	4.6	6.5	21.1	0.7	0.2	4.1	8.7	25.4	0.9	0.9	3.9	6.5	21.1	0.7	0.2	2.8	13.8	45.1	1.5
Social services and others	1.7	7.0	1.7	2.9	0.1	1.7	7.0	1.7	2.9	0.1	1.2	5.1	7.9	6.4	0.2	1.6	6.5	1.1	2.7	0.1	1.2	5.8	4.5	11.9	0.3	1.3	5.5	3.9	7.8	0.2	0.8	4.2	7.3	14.8	0.4
<i>By ownership:</i>																																			
Central SOE	0.8	3.3	8.1	10.7	2.8	0.7	2.8	10.6	13.3	3.5	0.7	2.5	21.1	24.5	6.4	0.7	3.0	10.9	16.4	4.3	-0.1	2.5	18.4	27.6	7.2	0.6	2.6	15.1	21.4	5.6	0.0	1.8	24.7	39.9	10.4
Local SOE	0.4	3.2	12.3	8.5	4.4	0.1	2.6	15.5	10.6	5.5	0.1	2.3	24.6	11.0	5.7	-0.2	2.9	14.1	10.5	5.5	-1.0	2.1	22.6	27.9	14.5	-0.3	2.4	18.2	11.8	6.1	-0.9	1.5	30.2	40.7	21.1
Private firms	1.2	4.7	4.6	4.1	0.9	0.3	4.2	5.8	5.5	1.2	0.9	3.7	10.1	7.9	1.7	1.0	4.3	5.9	5.9	1.3	0.2	3.7	10.7	13.4	2.9	0.8	3.8	7.5	8.0	1.8	0.1	2.7	13.6	20.9	4.6

Sources: WIND database; and IMF staff calculations.

1/ Earnings before interest and taxes divided by financing cost on interest payments.

2/ Financially distressed firms is characterized if the interest coverage ratio is less than one.

REFERENCES

International Monetary Fund, 2014, “People’s Republic of China—2014 Article IV Consultation—Staff Report,” IMF Staff Country Report No. 14/235 (Washington).

—————, 2014, *Regional Economic Outlook: Asia and Pacific* (Washington).

Standard and Poor’s, 2014, “Credit Shift: As Global Corporate Borrowers Seek \$60 Trillion, Asia-Pacific Debt Will Overtake U.S. and Europe Combined,” Ratings Direct (New York: McGraw-Hill, June).

Zhang, W., G. Han, and S. Chan, 2014, “How Strong Are the Linkages between Real Estate and Other Sectors in China?” HKIMR Working Paper No.11/2014. Available via the Internet: <http://ssrn.com/abstract=2441108> or <http://dx.doi.org/10.2139/ssrn.2441108>